

VTrans Structures 2014 Legislative Update

Presented By:

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Pam Thurber, Structures Mgt. and Insp. Manager

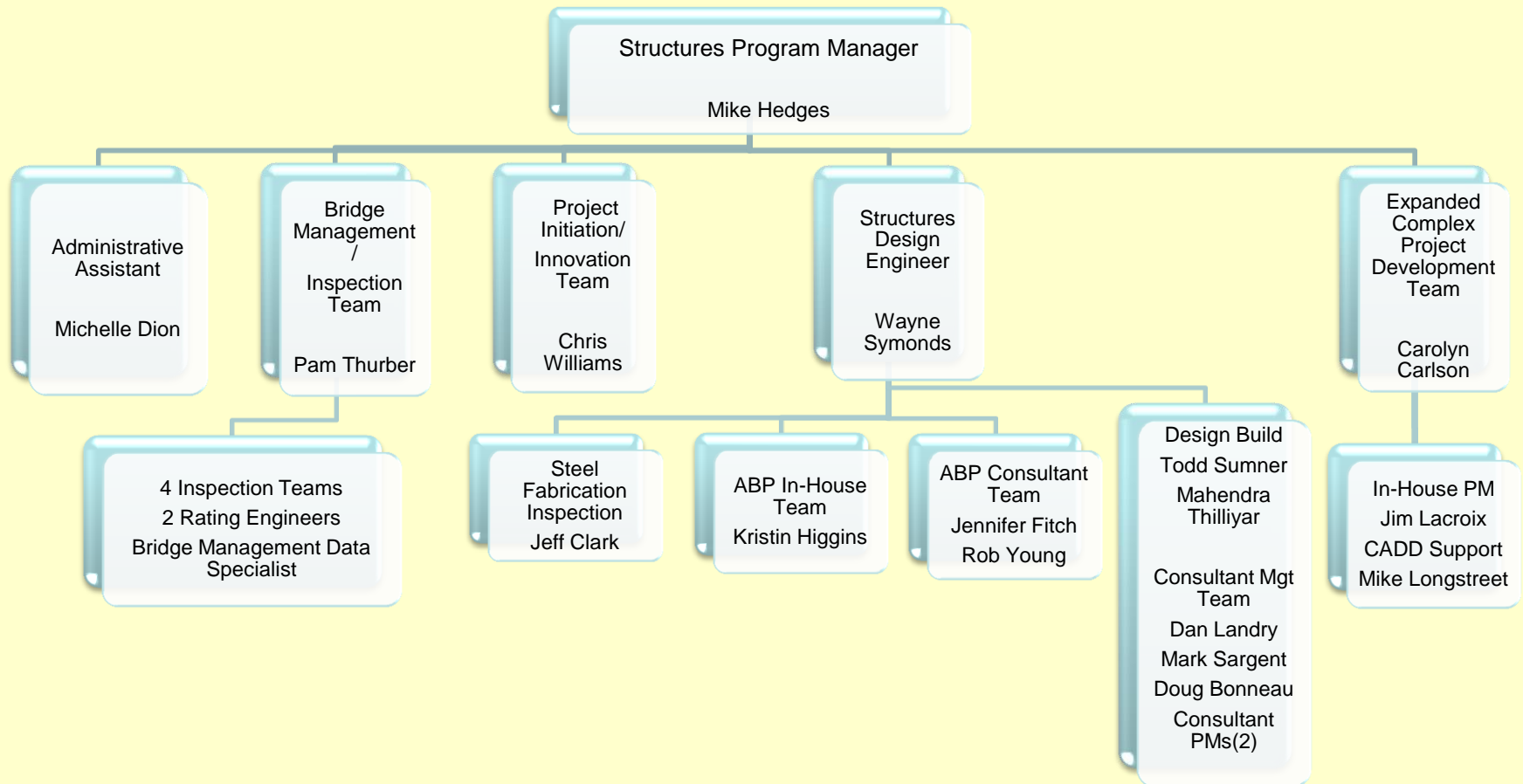
Structures 2014 Legislative Update

- Outline
 - Section Overview
 - Inspection and Conditions
 - Irene Recovery Update
 - Accelerated Bridge Program
 - Design-Build, CMGC
 - Legacy Project Advancement
 - Performance Goals
 - Questions and Answers

Section Overview

- Structures Section
 - Responsible for 3 Bridge Programs
 - Interstate Bridge
 - State Highway Bridge
 - Town Highway Bridge
 - Located at National Life, Davis Fourth Floor
 - 50 Staff including Engineers and Technicians
 - General Phone Number: (802) 828-2621

Structures Organization



Structures 2014 Legislative Update

Inspection and Conditions

Bridge Management & Inspection Staff

- Program Manager
- Inspection Teams
 - Perform visual assessments by qualified and trained inspectors each having a minimum of 5 years of experience
 - 24 months for longs
 - 60 months for shorts
- Bridge Mgmt Technician
- Load Rating Engineers



Bridge Count & Deficiencies

Structure Type	Interstate Highway	State Highway	Town Highway	Other Highway	Total
Long Structures (span length greater than 20 feet)	313	776	1,622	5	2,716
Short Structures (span length greater than 6 and less than or equal to 20 feet)	211	1,050	***	***	1,261
Totals	524	1,826	1,622	5	3,977
Structurally Deficient (long structures only)	8	64	154	0	226
Functionally Obsolete (long structures only)	96	100	357	3	556

*** VTrans does not inspect or maintain an inventory of these structures

Bridge Inspection Terms

- Bridges are considered **structurally deficient** if significant load carrying elements are found to be in poor condition due to deterioration or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to point of causing intolerable traffic interruptions.
 - The fact that a bridge is classified under the federal definition as “structurally deficient” does not imply that it is unsafe.
 - A structurally deficient bridge, when left open to traffic, typically requires significant maintenance and repair to remain in service and eventual rehabilitation or replacement to address deficiencies. To remain in service, structurally deficient bridges are often posted with weight limits to restrict the gross weight of vehicles using the bridges to less than the maximum weight typically allowed by statute.

Bridge Inspection Terms

- A **functionally obsolete** bridge is one that was built to standards that are not used today. These bridges are not automatically rated as structurally deficient, nor are they inherently unsafe. Functionally obsolete bridges are those that do not have adequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand, or those that may be occasionally flooded.
 - A functionally obsolete bridge is similar to an older house. A house built in 1950 might be perfectly acceptable to live in, but it does not meet all of today's building codes. Yet, when it comes time to consider upgrading that house or making improvements, the owner must look at ways to bring the structure up to current standards.

Classifying Work Candidate Types

Condition Code	Description	Common Feasible Actions
9	Excellent Condition	Preventive Maintenance
8	Very Good Condition	
7	Good Condition	
6	Satisfactory Condition	Preventive Maintenance or Rehabilitation
5	Fair Condition	
4	Poor Condition	
3	Serious Condition	Rehabilitation or Replacement
2	Critical Condition	
1	Imminent Failure Condition	
0	Failed Condition	

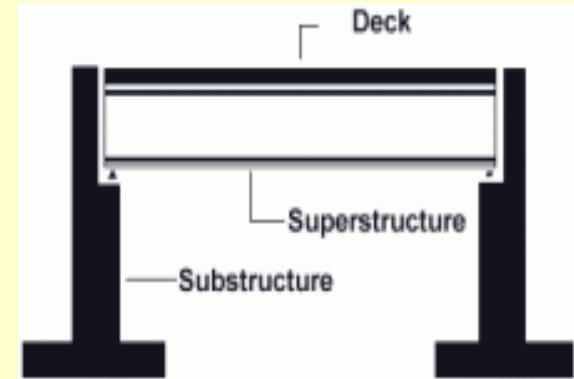
Performance Measures and Goals

- **Interstate Bridge**
 - Number of structurally deficient bridges not to exceed 6% (18 bridges or less)
- **State Highway Bridge**
 - Number of structurally deficient bridges not to exceed 10% (77 bridges or less)
- **Town Highway Bridge**
 - Number of structurally deficient bridges not to exceed 12% (194 bridges or less)
- **Interstate / State Highway Short Structures**
 - Number of structures in poor or worse condition less than 10% (126 culverts)

*New federal measure is % deck area of structurally deficient bridges on the National Highway System (NHS) not to exceed 10%

Bridge Inspection – Condition Ratings

- Deck
 - Roadway portion of a bridge which carries traffic, including shoulders
- Superstructure
 - Supports the deck and connects substructure elements to another
- Substructure
 - Supports the superstructure and distributes all load to foundation
- Culvert
 - Structure used for drainage under a highway or railroad



Structure Inspection & Appraisal Report

- Condition Ratings
 - Deck
 - Superstructure
 - Substructure
 - Culvert
- Appraisal Ratings
 - Structure Evaluation
 - Deck Geometry
 - Waterway Adequacy
- Summary and Needs

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET	
Vermont Agency of Transportation – Structures Section – Bridge Management and Inspection Unit	
Inspection Report for HARDWICK	bridge no.: 00028 District: 7
Located on: C3030 ave LAMOILLE RIVER	approximately 0.05 MI JCT TH 30 + VT16 Owner: 03 TOWN-OWNED
CONDITION	STRUCTURE TYPE and MATERIALS
Deck Rating: 6 SATISFACTORY	Bridge Type: RLD BM W TIMBER DK
Superstructure Rating: 6 SATISFACTORY	Number of Approach Spans: 0000 Number of Main Spans: 001
Substructure Rating: 6 SATISFACTORY	Kind of Material and/or Design: 3 STEEL
Channel Rating: 5 FAIR	Deck Structure Type: 8 TIMBER
Culvert Rating: N NOT APPLICABLE	Type of Wearing Surface: 7 WOOD OR TIMBER
Federal Str. Number: 100305002803051	Type of Membrane: 0 NONE
Federal Sufficiency Rating: 031.7	Deck Protection: 0 NONE
Deficiency Status of Structure: SD	
AGE and SERVICE	APPRAISAL *AS COMPARED TO FEDERAL STANDARDS
Year Built: 1950 Year Reconstructed: 0000	Bridge Ratings: 0 DOES NOT MEET CURRENT STANDARD
Service On: 1 HIGHWAY	Transitions: 0 DOES NOT MEET CURRENT STANDARD
Service Under: 3 WATERWAY	Approach Guardrail: 0 DOES NOT MEET CURRENT STANDARD
Lanes on the Structure: 01	Approach Guardrail Ends: 0 DOES NOT MEET CURRENT STANDARD
Lanes Under the Structure: 00	Structural Evaluation: 2 INTOLERABLE, REPLACEMENT NEEDED
Bypass, Detour Length (miles): 99	Deck Geometry: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA
ADT: 000010 % Truck ADT: 02	Underclearances Vertical and Horizontal: N NOT APPLICABLE
Year of ADT: 2007	Waterway Adequacy: 6 OCCASIONAL OVERTOPPING OF ROADWAY WITH INSIGNIFICANT TRAFFIC DELAYS
GEOMETRIC DATA	Approach Roadway Alignment: 6 EQUAL TO MINIMUM CRITERIA
Length of Maximum Span (ft): 0054	Scour Critical Bridges: 2 SCOUR CRITICAL - IMMEDIATE ACTION REQUIRED
Structure Length (ft): 000056	
Lt Curb/Sidewalk Width (ft): 0	DESIGN VEHICLE, RATING, and POSTING
Rt Curb/Sidewalk Width (ft): 0	Load Rating Method (Inv): 2 ALLOWABLE STRESS (AS)
Bridge Rwy Width Curb-to-Curb (ft): 13.5	Posting Status: B OPEN, POSTING RECOMMENDED
Deck Width Out-to-Out (ft): 14.6	Bridge Posting: 4 POSTING REQUIRED
Appr. Roadway Width (ft): 016	Load Posting: 01 NO LOAD POSTING SIGNS EXIST NEAR BRIDGE
Skew: 00	Posted Vehicle: POSTING NOT REQUIRED
Bridge Median: 0 NO MEDIAN	Posted Weight (tons):
Min Vertical Clr Over (ft): 99 FT 99 IN	Design Load: 0 OTHER OR UNKNOWN
Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD	
Min Vertical Underclr (ft): 00 FT 00 IN	INSPECTION and CROSS REFERENCE X-Ref. Route:
	Insp. Date: 09/20/13 Insp. Freq. (months) 24 X-Ref. BrNum:
INSPECTION SUMMARY and NEEDS	
09/20/13 Guardrail system is poor and needs to be repaired as numerous bridge post are sheared off. Sheathing along abutment 1 has failed & is laying flat in streambed. Due to failure concrete kneewall is undermined. Due to deck configuration the structure should be posted for 3 tons or full width runners need to be installed. Previous letter sent in 02/2010 and no action taken yet. MJX SP	
07/18/11 Structure is in need of repairs due to scouring along abut 1. The driven sheathing has pulled away from concrete and scouring is present beneath the concrete kneewall that was poured some time ago. The bridge rail and approach rail is non-functional and needs to be upgraded as it is a traffic safety concern. Refer to town letter dated 3/29/10 for bridge posting for 3 tons & rail needing replacement. MJX & NV	
10/28/2009 The overall condition of this bridge is satisfactory except for dysfunctional bridge and approach guardrails all around. PLB	

Structures 2014 Legislative Update

Irene Recovery Update

ER Project Summary



- **Hancock ER STP 0174(17) VT 125, BR24**
 - Road Closed for one weekend
 - Opened Nov. 20, 2011
 - Construction Cost \$200,000

ER Project Summary



- **Warren ER STP 013-4(36) VT 100, BR165**
 - Project completed July 2012
 - Construction Cost \$950,000

ER Project Summary



- **Woodford ER BHF 010-1(44) VT9, BR11**
 - Project Completed June 2013
 - Construction Cost \$2,100,000

ER Project Summary



- **Hubbardton ER STP 0161(26) VT30, BR96**
 - 14 day road closure
 - Project completed November 2012
 - Construction cost \$780,000

ER Project Summary



- **Hubbardton ER STP 0161(27) VT30, BR98**
 - 3 day road closure
 - Project completed November 2012
 - Construction cost \$453,000

ER Project Summary



- **Hancock ER BRF 0174(26) VT125, BR23**
 - Project completed August 2013
 - Construction cost \$1,247,000

ER Project Summary



- **Bennington ER BHF 010-1(45) VT9, BR9**
 - Pier Foundation replacement
 - Project completed December, 2013
 - Construction Cost \$1,300,000

ER Project Summary



- **Jamaica ER BHF 015-1(25) VT30, BR40**
 - Scour remediation
 - Project Completed October, 2013
 - Construction Cost \$540,000

ER Project Summary



- **Jamaica ER BRF 013-1(16) VT100, BR78**
 - Structure replacement
 - Project Completed October, 2013
 - Construction Cost \$2,371,000

ER Project Summary



- **Brighton ER STP 034-3(25) VT105, BR84**
 - Structure Replacement
 - Completed August, 2013
 - Construction Cost \$906,000

ER Project Summary



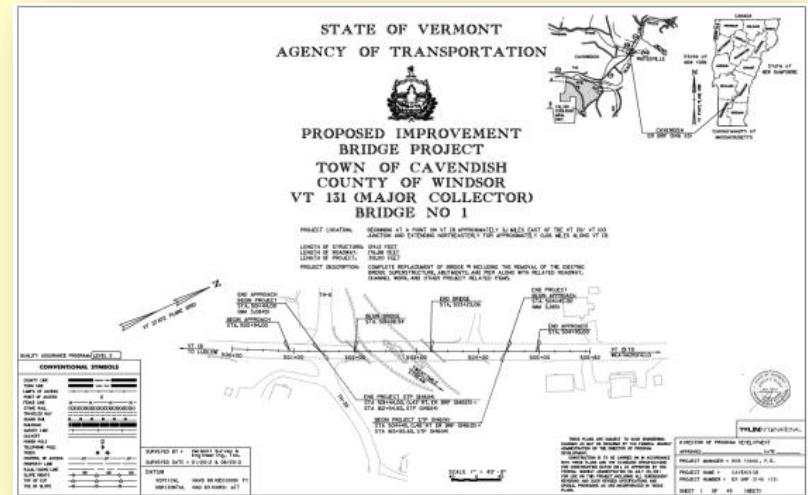
- **Jamaica ER BRF 015-1(23) VT30, BR30**
 - Structure Replacement
 - Project Completed December, 2013
 - Construction cost \$2,800,000

ER Project Summary



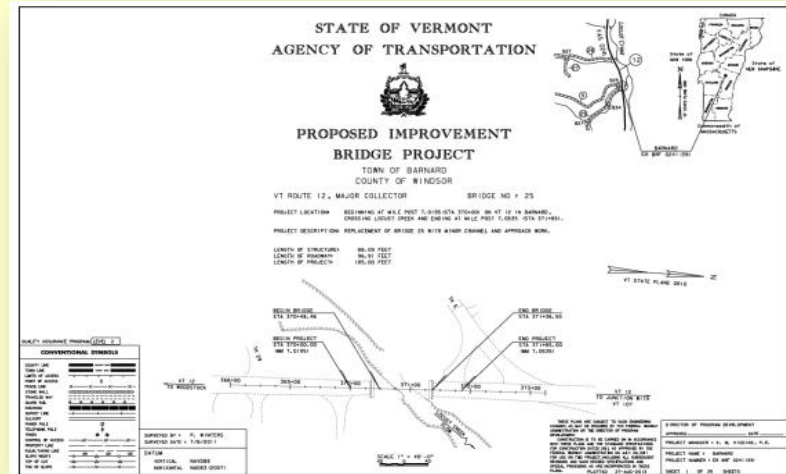
- **Plymouth ER BRS 0149(5) VT100A, BR8**
 - Structure Replacement
 - Project completed October, 2013
 - Construction Cost \$950,000

ER Project Summary



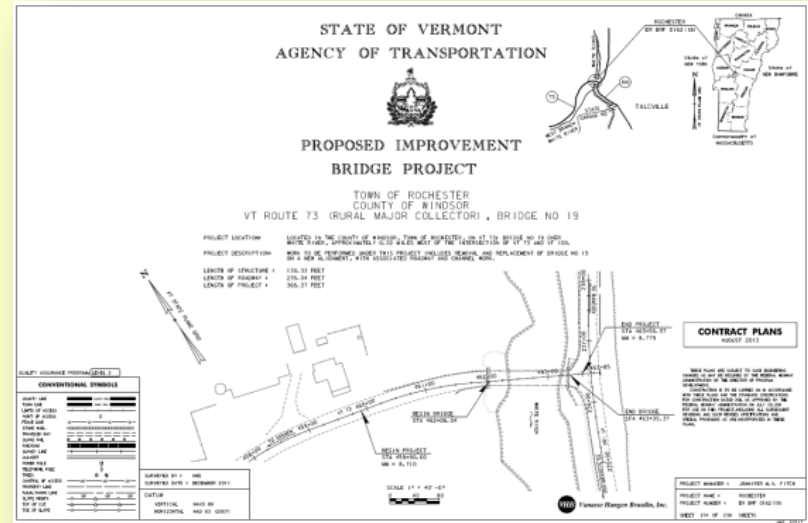
- **Cavendish ER BRF 0146(13) VT131, BR1**
 - Structure Replacement
 - Construction 2014
 - Construction Cost \$1,770,000

ER Project Summary



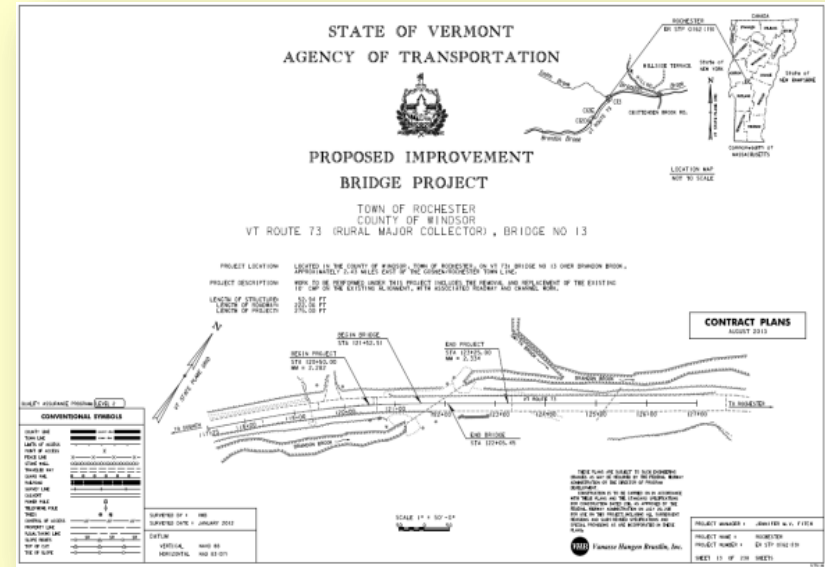
- **Barnard ER BRF 0241(39) VT12, BR25**
 - Structure Replacement
 - Construction in 2014
 - Construction Cost \$1,180,000

ER Project Summary



- **Rochester ER BRF 0162(18) VT73, BR19**
 - Structure replacement
 - Construction 2014
 - Construction cost \$3,000,000

ER Project Summary



- **Rochester ER BRF 0162(19) VT73, BR13**
 - Structure replacement
 - Construction 2014
 - Construction cost \$2,400,000

Structures 2014 Legislative Update

Accelerated Bridge Program

VTrans Accelerated Bridge Program

- Accelerated Bridge Program (**ABP**)
 - Began Jan. 2012
 - Jump started by Tropical Storm Irene Recovery Projects
- VTrans Structures Section Initiative
 - Need to Expedite Bridge Project Delivery
 - Systematic Approach for expediting projects
 - Standardize use of Accelerated Bridge Construction

Accelerated Bridge Program Goals

- Expedite the delivery of bridge reconstruction and bridge rehabilitation projects to support the Performance Measures and Goals for bridge conditions.
 - Minimize project development and construction Cost
 - Expedite Project Delivery
 - Utilize Accelerated Bridge Construction Technologies
 - Standardize Project Plans
 - Utilize Alternative Contracting Methods

Accelerated Bridge Program Goals

- Accelerated Bridge Program will lead the deployment of Innovation at VTrans
 - Maximize use of all available technology
 - Maximize use of flexibility in rules and process for project delivery
 - Create a culture that values new ideas
 - Document successful innovations
 - Be an early adopter of ABC research
 - Be an early adopter of research leading to new techniques for Expedited Project Delivery

Accelerated Bridge Program Goals

- Accelerated Bridge Program will be transparent to Stakeholders and Customers
 - Develop website with real time information on Performance of Accelerated Bridge Program
 - Implement best practices on Public Outreach during project Development and Construction
 - Developing and maintain validated and credible CPM project schedules
 - Partner with internal stakeholders and other Governmental stakeholders
 - Partner with Contractors and Fabricators on ABC

Accelerated Bridge Construction

- Accelerated Bridge Construction – ABC
 - Been used in Vermont for 10 years
 - Successful but not systematic approach
- ABC = Innovative Bridge Design and Construction
 - Faster Construction in the Field
 - Better Construction schedules
 - New Construction techniques
 - New materials
 - Prefabricated Elements and Systems (PBES)
 - Standard designs
 - *Projects that are Designed for ABC*

Why Do ABC?

- The answer to this question is somewhat different for rural states like Vermont.
- Narrow existing bridges and roads make phased construction limited option
- Permitting and project development time for temporary bridges adds years to delivery.
- Environmentally friendly
- Emphasis on safety in the work zone
- Community Disruption due to multi-year projects.
- Typically not Driven by high road user costs nor large traffic delays associated with construction

ABC in Vermont

- ABC is not controversial with the public – who wouldn't want Contractors to work fast?
- ABC is not causing huge cost premiums for our projects
- ABC is a concern to Contractors
- ABC is causing some re-tooling of roles and responsibilities within VTrans – Construction oversight and materials
- All manageable and not driving the need for a policy in Vermont.

Short Term Road Closures

- **ABC and Short term Road Closures**
 - Support 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 for ABP**
 - No temp bridge saves \$\$\$
 - No temp bridge = shorter project design/permitting time
 - No temp bridge = shorter construction time
 - *“Build Three – Get One for Free.”*

Short Term Road Closure

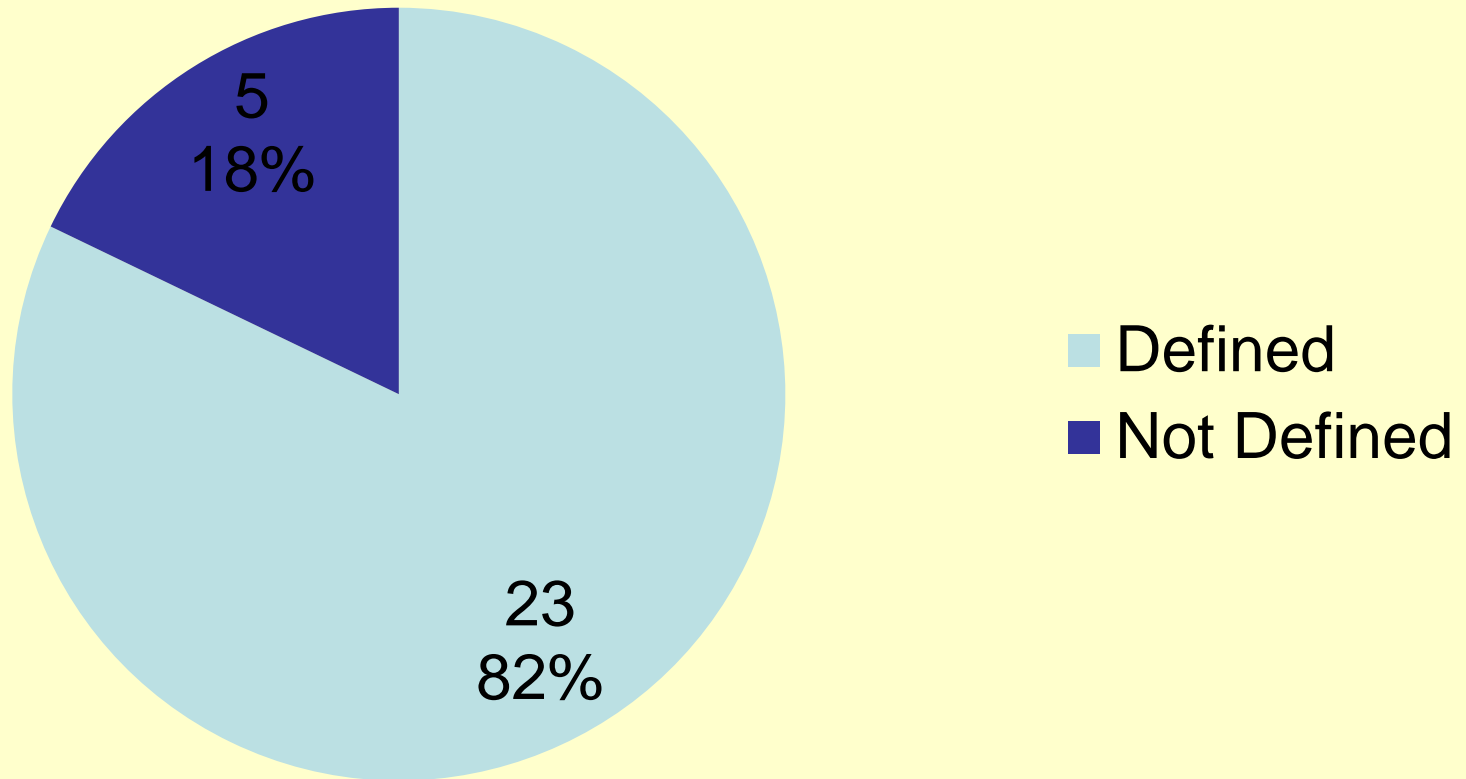
- Not right for all locations but they are for many in Vermont
- Short term road closures are controversial
- Can be political
- By-passed businesses
- Increased traffic on detour routes
- Bisected communities
- Long detours
- And the Question of Equity around decision to close the road in my town.

Act 153 of 2012

- Local share reduced by 50% when road is closed for construction.
- Town provides written acceptance of construction closure
- 19 of 35 current TH projects scope includes road closure during construction (54%)
- 16 of 35 will have local share reduced under Act 153 provisions
- 2 preservation agreements so there is no local share
- 1 elected a temporary pedestrian bridge
- Some current projects still in definition phase (possibly 4 more)

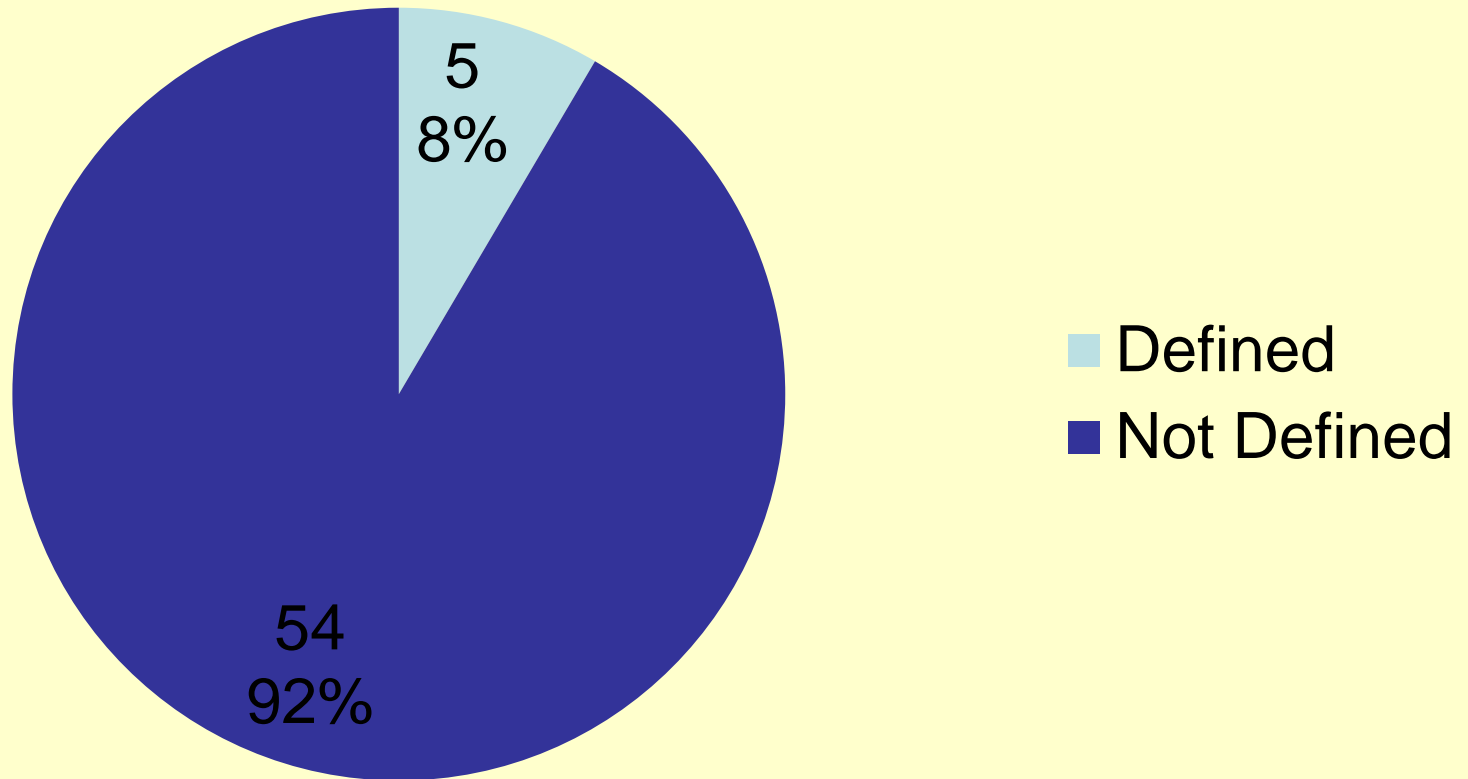
ABP Performance Measures

Projects Funded in CY 2012 Project Definition Milestone



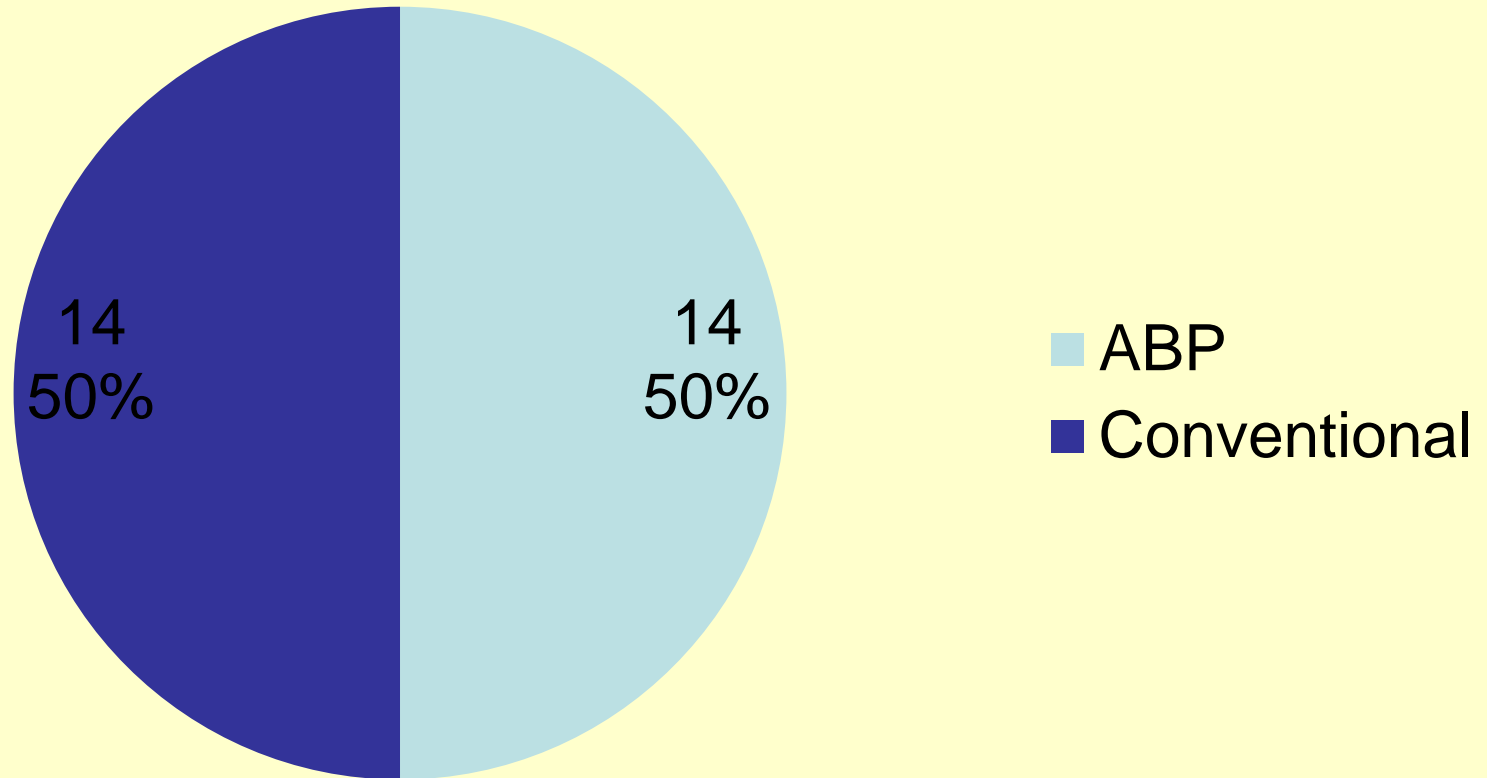
ABP Performance Measures

Projects Funded in CY 2013 Project Definition Milestone



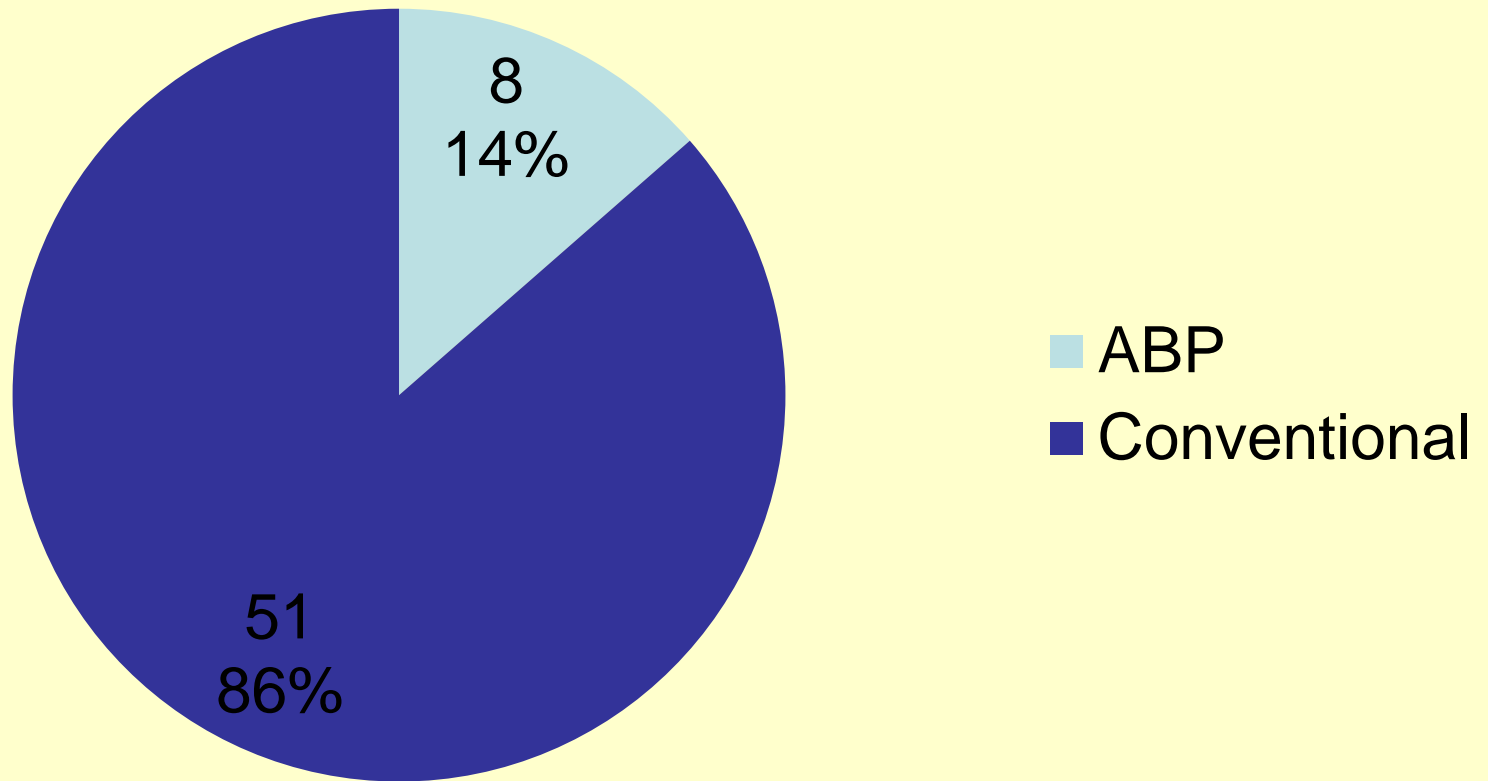
ABP Performance Measures

Projects funded in CY 2012



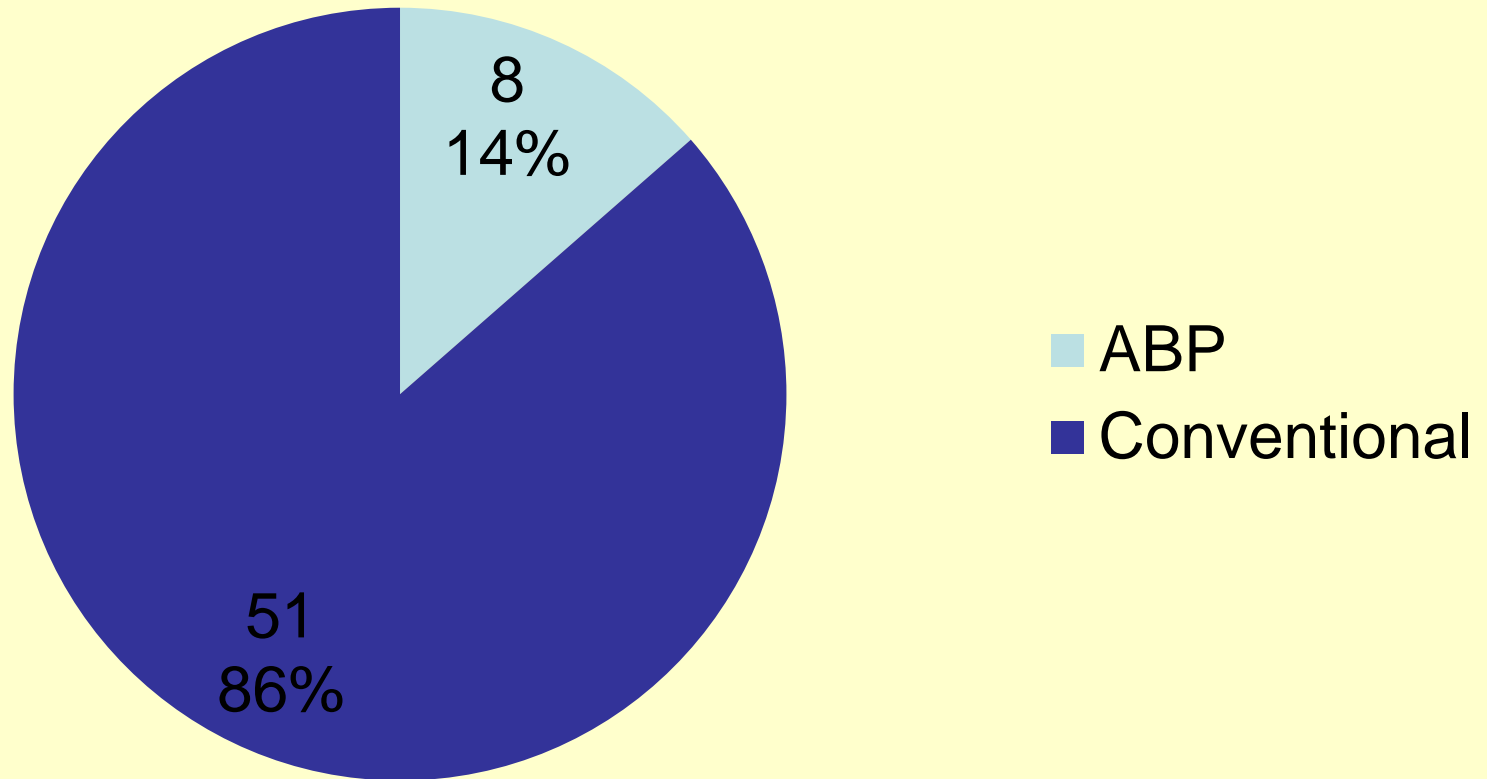
ABP Performance Measures

Projects funded in CY 2013



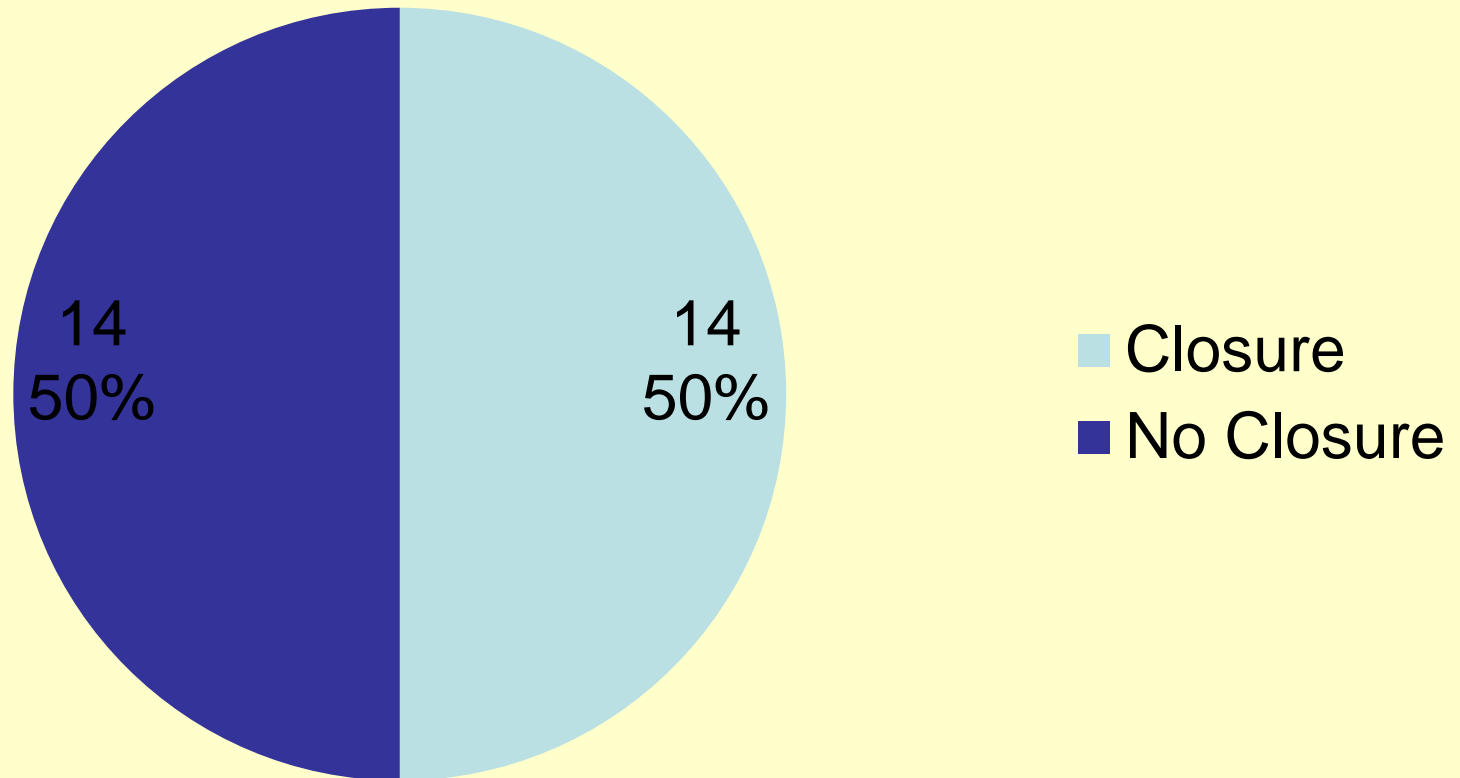
ABP Performance Measures

Percent ABP for Projects funded in 2013



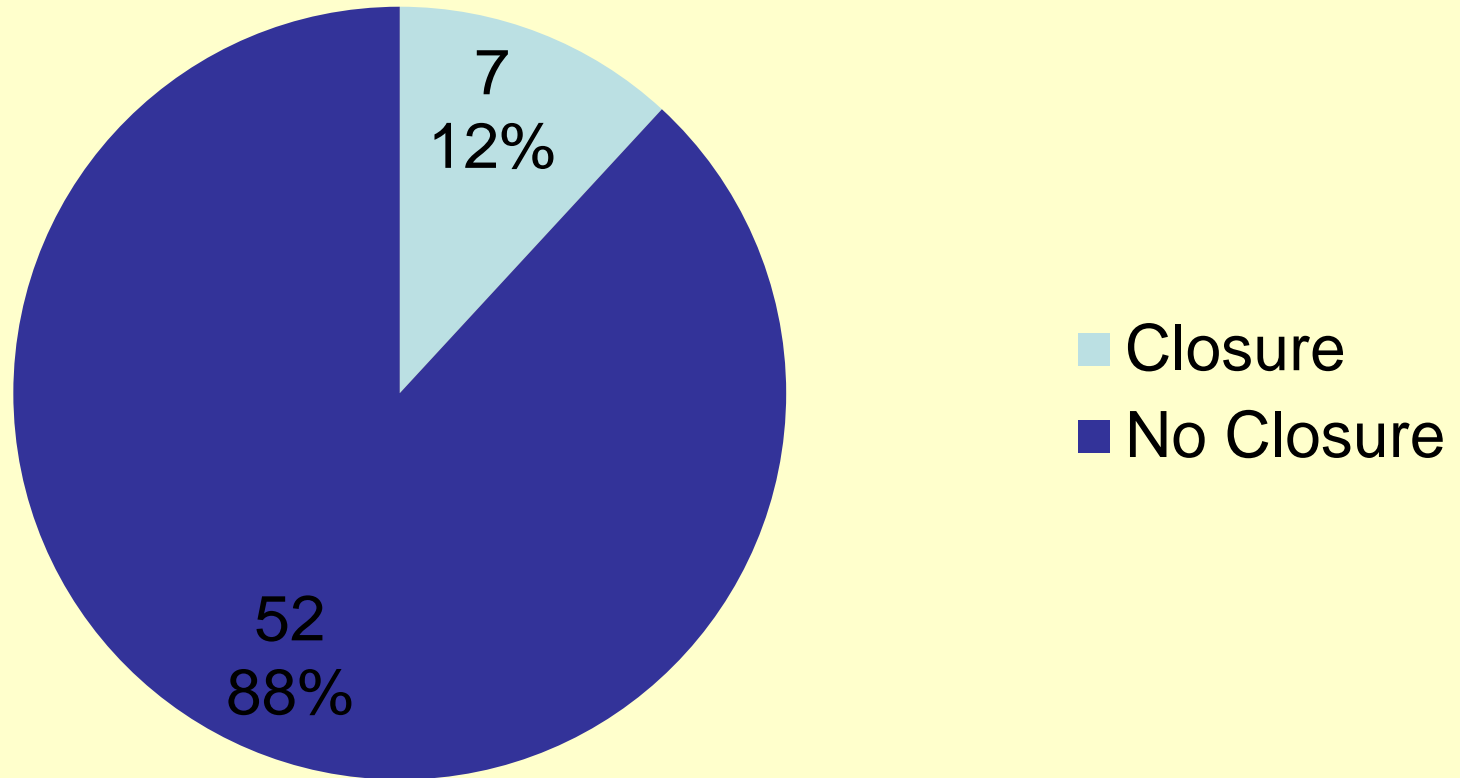
ABP Performance Measures

Projects funded in CY 2012



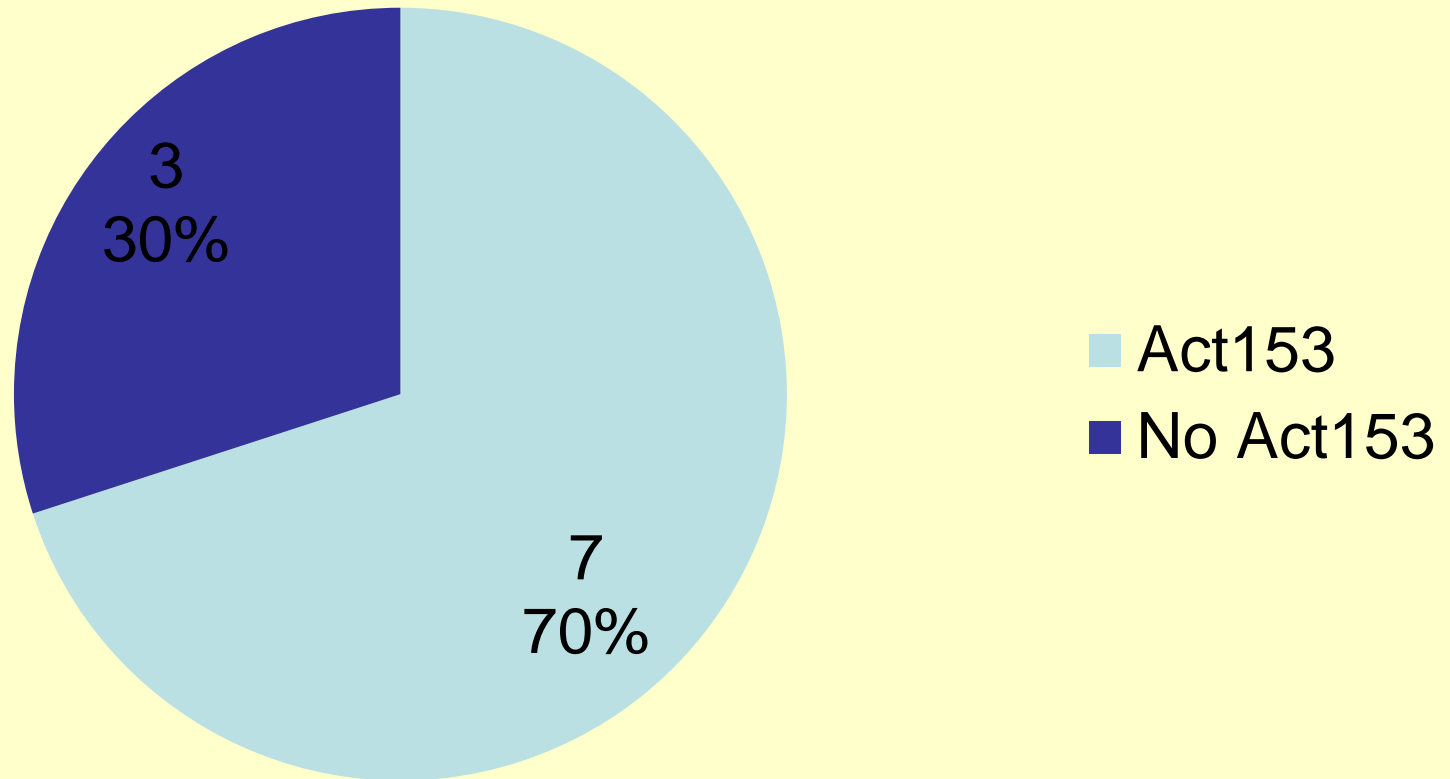
ABP Performance Measures

Projects funded in CY 2013



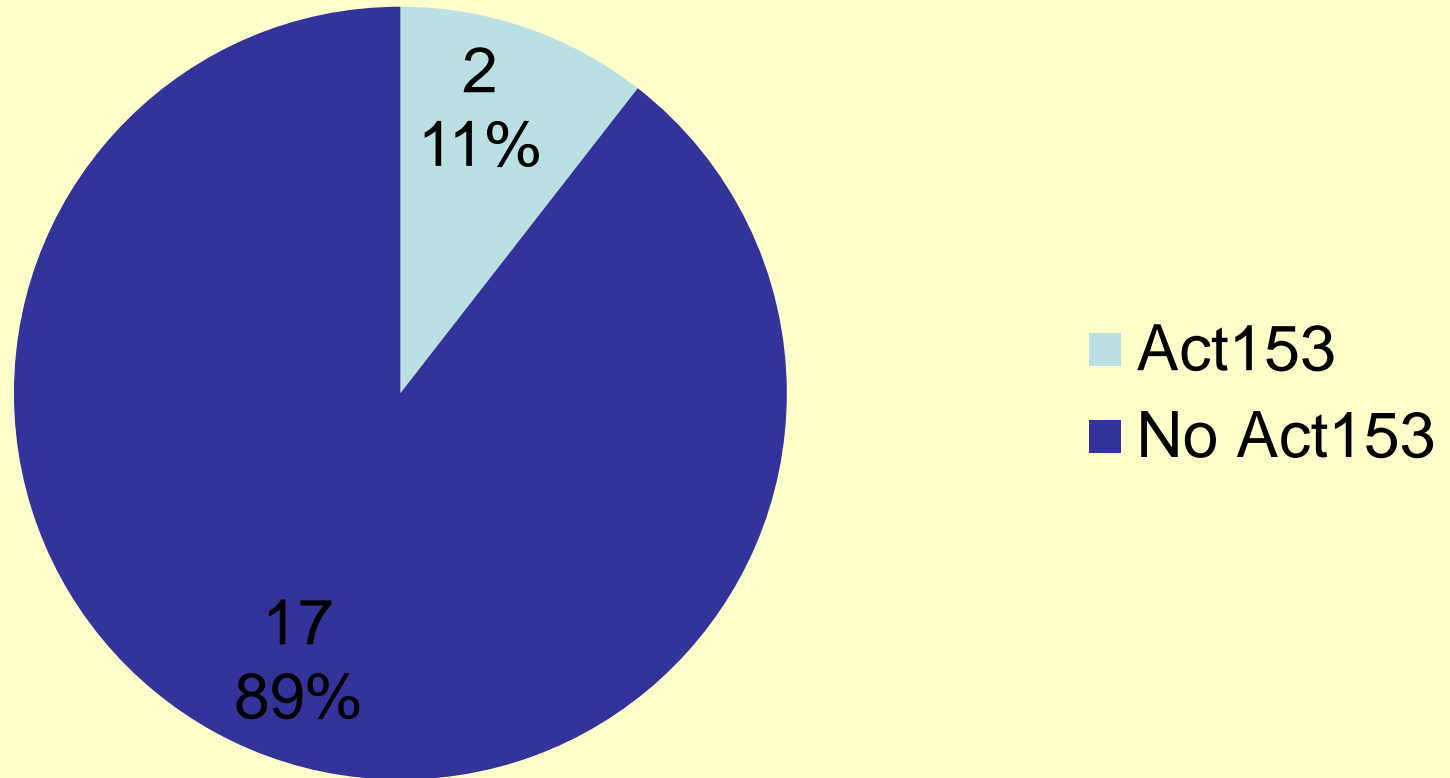
ABP Performance Measures

Town Highway Projects funded in CY 2012



ABP Performance Measures

Town Highway Projects funded in CY 2013



Structures 2014 Legislative Update

Design Build Program

Design Build Program

- Initiated in 2008 to:
 - Expedite project delivery
 - Construct projects more efficiently
 - Allocate potential stimulus funding
- DB legislation passed in 2009
- DB limitations imposed for 2010 and 2011
 - Number of projects (4 per year)
 - Cost estimate restrictions
- Two Part Procurement Method Developed

Design Build Projects

- 2 DB projects completed in 2013
 - \$17.5 million in construction costs
- 3 DB projects under construction
 - \$115.0 million in construction costs
- 1 DB project under procurement
 - \$11.0 million construction estimate
- 2 DB projects in early development
 - \$8.0 million preliminary construction estimate

Brattleboro IM 091-1(50)



- The first VTrans DB Project
- Replacement of four bridges on I91 - Bridges 5 N&S and Bridges 6 N&S
- Completed in June 2013

Richmond STP RS 02884(11)



- DB was the procurement choice due to the complexity of widening the historic truss and the poor condition of the existing bridge
- DB allowed VTrans to shorten design time by a year and capture innovative ideas for widening the bridge
- Completed September 2013

Windsor IM 091-1(64)



- DB allowed for accelerated project delivery and earlier obligation of federal funds
- Replacement of two 652 foot long bridges (BR 33N&S) on I91 over Mill Brook and VT 44
- Currently under construction
- Southbound bridge is completed, Northbound will be completed by January 2015

Milton IM 089-3(66)



- DB allowed for accelerated project delivery and earlier obligation of federal funds
- Replacement of two 480 foot long bridges (BR 81N&S) on I89 over the Lamoille River
- Currently under Construction
- Expected completion date of June 2016

January 9, 2014

Brattleboro IM 091-1(65)



- DB significantly shortened the project delivery process to meet aggressive funding schedule
- VTrans was able to obligate federal funds for construction 8 months after the project was initiated
- First VTrans DB project to incorporate aesthetic evaluation criteria in the “Best Value” contract award
- Replacement of 4 bridges on I91 over West River and VT 30. Involves BR 9N&S (1016 feet long each) and BR 8N&S (137 feet long each)

Brattleboro IM 091-1(65)



Rendering of Future Bridge 9

- Currently under construction
- Expected completed date June 2016

Future of Design Build

- By June 2016 VTrans will have constructed over a mile of bridges using the Design Build process
- Interstate Bridge Replacement Projects work well with Design Build
 - Already using Design Consultants for replacing bridges on the Interstate System
 - Additional Right of Way not typically required for Interstate projects
- Current goal: to advertise 2 or 3 Design Build projects a year

Structures 2014 Legislative Update

Construction Manager/General Contractor

CMGC

Hartford IM 091-2(79) BR 43N & 43S Over VT Route 5

- Located on Interstate 91 in Hartford, Vermont
- MM 70 just north of Exit 11
- Less than 0.5 mile north of I-89/I-91 interchange
- Over VT Rte 5 – High Traffic



CMGC Defined

- CMGC = Construction Manager General Contractor
- Modified Design Build Process
- Two Phase Contract with General Contractor
 - Phase one “Construction Management” consulting contract to help with design
 - Phase two – A “General Contracting” contract to build the project

Benefits of CMGC

- **Innovation** – Contractor input into the design process
- **Cost Management** – Contractors provide real-time cost information
- **Design Savings** – Reduced design effort
- **Design Control** – VTrans retains control of the design, with contractor input
- **Construction Risk** – Mitigated during project development
- **Cost Certainty** – Higher final cost certainty earlier in the project
- **Time Savings** – Able to deliver early work package similar to DB

CMGC

Sample Lateral Slide – Single Span Bridge plus Approach Slabs



CMGC

Detour, Demolish Existing Bridge, Place Precast Approach Slab Supports



CMGC

Slide New Bridge



January 9, 2014

CMGC

Slide in New Bridge, Raise Approaches, Reopen



CMGC

Construct Walls, Complete Approach Widening



CMGC

Project Summary:

- Accelerated Bridge Construction - Lateral Slide Technology to install bridges.
- 2 short duration I-91 closures to remove existing bridges and slide in the new structures (1 closure for each structure).
- VT Route 5 to remain open. Possible night time only short closures or rolling road blocks for critical construction operations.
- Removal of existing structures will be difficult and will require innovation. Lane shifts and partial removal anticipated.
- Professional to work with VTrans engineering team to develop project plans and Maintenance of Traffic plans.

Structures 2014 Legislative Update

Legacy Project Advancement

Legacy Project Advancement

- Bethel VT 107 Truss Bridge
- Warren VT 100 Truss Bridge
- Cambridge VT 108 Truss Bridge
- Bristol VT 116 “Stop Light Bridge”
- Royalton VT 14 Dual Bridges
- Middlebury VT 125 Historic Arch



Legacy Project Advancement

- All Projects Mike worked on in the 80s
 - Evolving scope, ran into permitting issues & ROW
- All advanced to construction recently by Structures
 - Scopes scaled back to reduce impacts
 - Makes a good argument for the PIIT

Structures 2014 Legislative Update

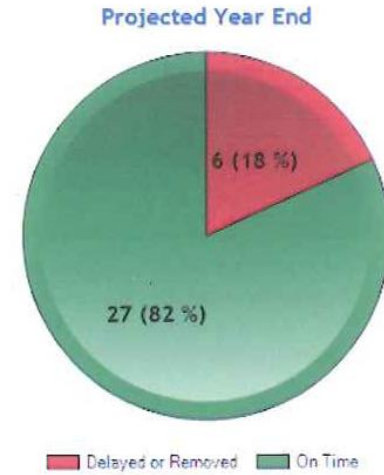
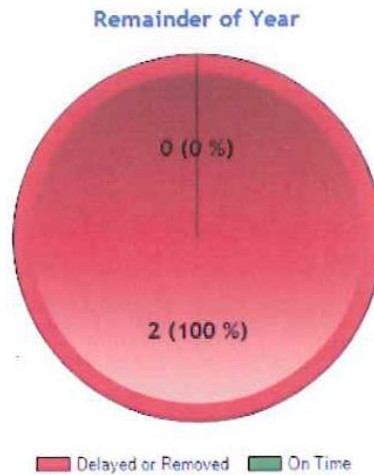
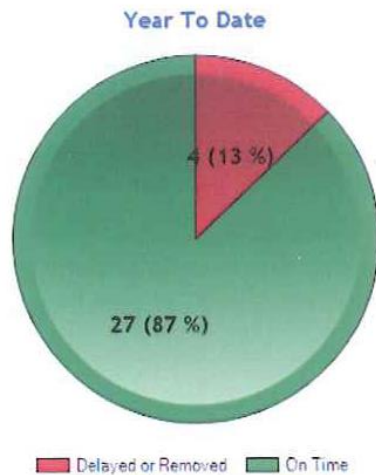
Performance Measures

Sectional Performance Measures

- National Bridge Inspection Program – 23 Metrics
- Define Projects in less than 12 months
- Design ABP Projects in less than 24 months (Goal>80%)
- Design conventional projects in less than 60 months (Goal>80%)

2013 Project Delivery Statistics

Goal: 80% no later than 30 days



Advertisement for All Structures (VTrans/Operations)

Program	Year To Date			Remainder of Year			Projected Year End		
	On-Time	Delayed or Removed	% On-Time	On-Time	Delayed or Removed	% On-Time	On-Time	Delayed or Removed	% On-Time
BIKE & PEDESTRIAN FACILITIES	0	1	0	0	0	0	0	1	0
INTERSTATE BRIDGES	1	1	50	0	0	0	1	1	50
STATE HIGHWAY BRIDGES	19	1	95	0	1	0	19	2	90
TOWN HIGHWAY BRIDGES	7	1	88	0	1	0	7	2	78
All Structures:	27	4	87 %	0	2	0 %	27	6	82 %

Structures 2014 Legislative Update

Questions?

For More Information

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Our websites:

<http://vtransengineering.vermont.gov/sections/structures>

<http://acceleratedbridge.vermont.gov/>