



Programmatic Implementation of ABC: Module 3

Innovative Contracting and ABC





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Presentation Outline

- Construction Manager/General Contractor (CM/GC) and ABC

- CM/GC Project Highlights
 - Hartford Bridge Replacement Project
 - Middlebury Tunnel Project
 - Colchester Accelerated Deck Replacement Project

- Lessons Learned

- Questions

Implementing ABC Thru CM/GC

- CM/GC is an innovative contracting method used to deliver complex projects
- CM/GC brings the contractor, designer and owner together during project development
- Vermont used CM/GC to deliver one ABC project and has two more under development
- Vermont uses a qualifications based selection process to procure the CM/GC team
 - Technical proposals scored
 - Short listed firms interviewed
 - Emphasis on Approach to Project
 - Costs to construct are not provided

Benefits of using CM/GC with ABC projects

- CM/GC team partners with design team during project development
 - Construction Manager
 - Superintendent
 - Traffic Management specialist
 - ABC specialist
 - Estimator/Project Scheduler



- Constructability input and plan reviews provide value Engineering up front
- Opportunity for innovation through contractor input
- Aggressive construction schedules are developed and refined throughout the design process

Benefits of using CM/GC with ABC projects

- Construction risks mitigated through partnering and refining design details
- Construction cost estimates developed and refined throughout design phase. As risks are mitigated, costs are reduced
- CM/GC involved in project planning builds project if the price is agreed upon.
- Independent Construction Estimator (ICE) used to validated contractors prices

Public Outreach with CM/GC

- ABC projects require intensive public outreach
- Contractor participation at public meetings
- Contractor adds credibility to construction approach
- Continued public outreach into construction

IT'S MOVING DAY! I-91 Hartford BRIDGES PROJECT

The weekend of Aug 28-31, the Vermont Agency of Transportation (VTrans) will install a new I-91 Northbound replacement bridge at Exit 11, over US Route 5 in White River Junction.



Can the PUBLIC watch the BRIDGE slide?

Yes on **Saturday, August 29**, but...that weekend traffic on Route 5 will be very heavy because the northbound I-91 will experience a closure from 6 p.m. Friday, August 28 – 6 a.m. Monday, August 31. Traffic will be re-routed at Exit 11 from the Northbound Off Ramp, across Route 5 back onto the Northbound On Ramp. For safety reasons it will be important to limit pedestrians in construction area so VTrans requests people to **meet** at its **DISTRICT OFFICE** located near the construction site, **221 Beswick Drive, White River Junction**. From there the public will be shuttled by van to a viewing area just north of the bridge **FROM 2 p.m. to 7 p.m.**

How will the slide happen? Hydraulic jacks will move the bridge 18 inches at a time, with 10-15 minute intervals between each slide. The total distance the bridge will move will be about 50 feet.



Can't visit the site to see the slide on August 29? That's OK. VTrans will have a live video feed on the project website all weekend and you can check out progress. Also, a time-lapse video will be made for future viewing online at

www.i91wrj.vtransprojects.vermont.gov

Questions? Contact Jill Barrett, Call (802) 272-1248 or Write jbarrett@fhiplan.com



***Slide date is subject to change.



Jeremy Mackinnon, project manager at PCL, explains the construction of the new Interstate 91 bridges over Route 5 in White River Junction during a news conference at the site last week. The "slide-in" of the bridge is scheduled for this weekend. *Valley News*

I-91 Bridge Plans Sliding Into I

By MAISON CASSIDY
Valley News Staff Writer

WHITE RIVER JUNCTION — The Vermont Agency of Transportation is urging drivers and pedestrians to avoid the area around Interstate 91's Exit 11 interchange in White River Junction this weekend as construction crews plan to shut down the interstate's northbound lanes to replace the bridge over Route 5.



ly closed, effects vehicular traffic be delayed up to sites at a time, one to one late most routes include Vt...
"We believe we're getting much better value for the taxpayer, but more importantly, less inconvenience long term for our customers," VTrans Secretary Sue Minter said at a recent news conference in White River Junction.
Crews from Florida-based PCL Construction plan to knock down the old northbound bridge this weekend and slide into place one of two new bridge...

Project 1: 2015 – Hartford IM 091-2(79) Lateral Slide



Slide In Bridge Construction

- Vermont's first SIBC and CM/GC project

Project Details

- Two bridges replaced on I-91 in Hartford, Vermont
- Site constraints were steering designers towards ABC
- Slide-in bridge construction preferred method of construction
- Two weekend closures permitted – 1 for each bridge
- Desired high public/stakeholder satisfaction

Concerns with Slide-in Bridge Construction

- Lack of Design experience with Slide-in bridge construction
 - What needs to be engineered up front
- Lack of local contractor experience with Slide-in bridge construction
 - Vermont is a small state and has limited resources
 - Concern with risk of “Low Bid”
- Utilized Construction Manager/General Contractor (CM/GC)
 - Worked with FHWA and hosted CM/GC workshop in Vermont
 - Took advantage of MAP-21 funding for innovation in both delivery and construction
- Procured CM/GC with heavy lift experience

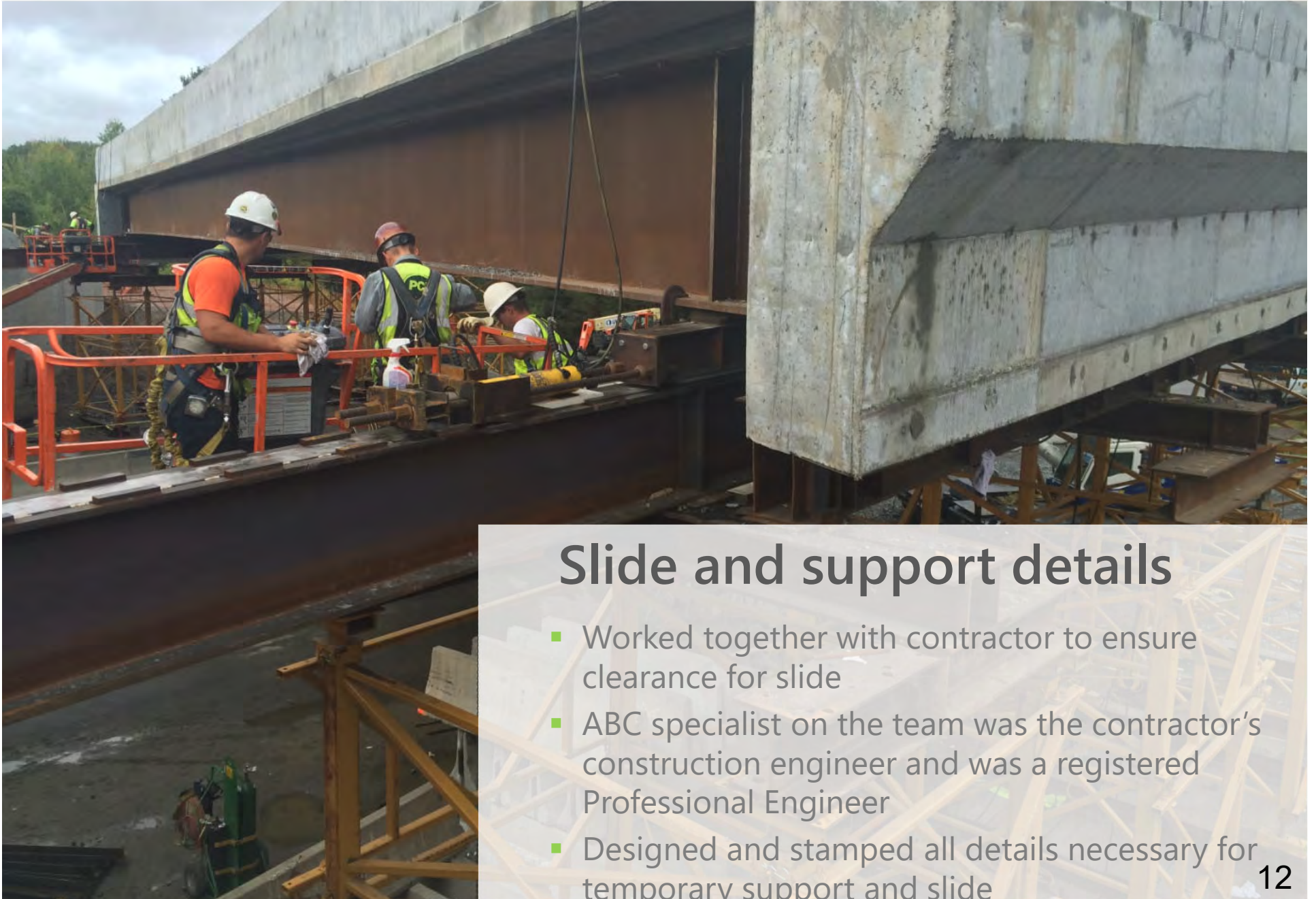
Project 1: 2015 – Hartford IM 091-2(79) Project Plans



Foundation

- Conceptual foundation plan - MSE walls with a shallow foundation
- Contractor recommended minipiles due to space constraints for wall reinforcing strips
- Building project as we conceptually planned would have resulted in much more SOE

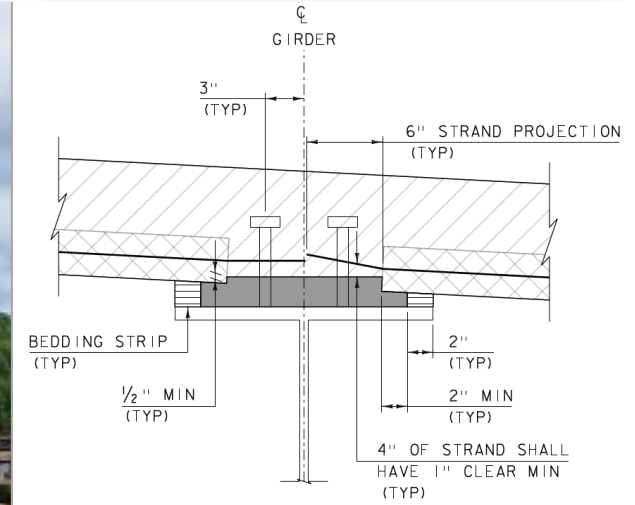
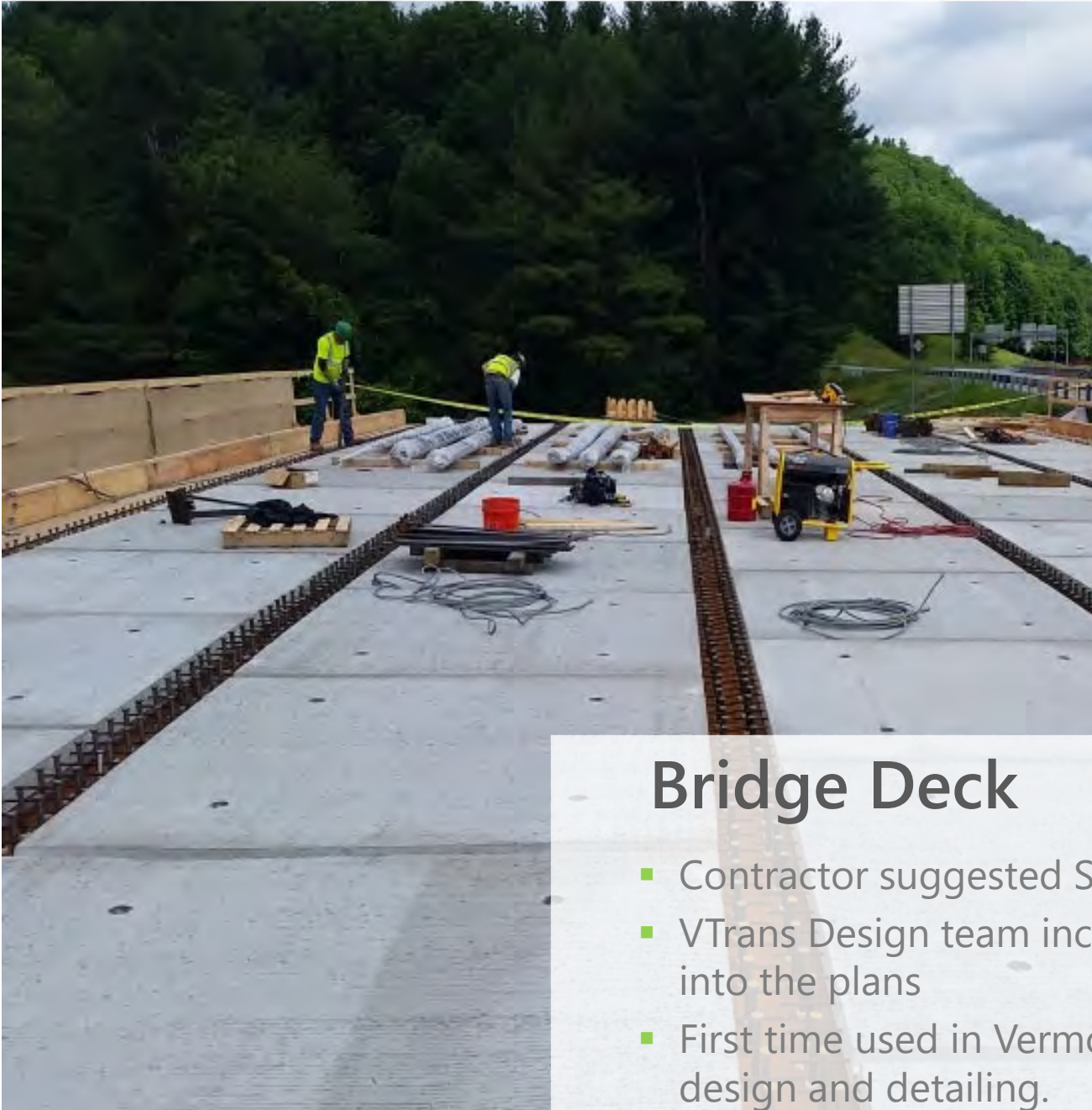
Project 1: 2015 – Hartford IM 091-2(79) Project Plans



Slide and support details

- Worked together with contractor to ensure clearance for slide
- ABC specialist on the team was the contractor's construction engineer and was a registered Professional Engineer
- Designed and stamped all details necessary for temporary support and slide

Project 1: 2015 – Hartford IM 091-2(79) Project Plans



Bridge Deck

- Contractor suggested SIP precast deck panels
- VTrans Design team incorporated precast SIP forms into the plans
- First time used in Vermont resulted in more time for design and detailing.

Hartford Project Special Provisions

- Temporary Support and Horizontal Slide
 - Developed as performance specification
 - Placed all responsibility on contractor
 - Nothing specifically shown in plans
 - Developed specification with contractor input
- High Early Strength Concrete
 - Performance based specification - 4000 psi before loading
- Contractor fabricated precast elements
 - Allowed contractor to self perform the precast the approach slabs
 - Cast adjacent to structure and did not need to be shipped
- Contingency item - Pavement Jet Dryer
 - Mitigated during discussion over paving costs
 - Many hidden costs in items to protect contractor against unexpected conditions such as rain or cold weather



Project 2: Middlebury Bridge and Rail Project



Middlebury
Bridge & Rail Project

Defining Purpose and Need



Purpose and Need



Middlebury Tunnel

- Replace bridges on Main Street and Merchants Row
- Reconstruct rail through the project area (lowered 6')
- Address existing drainage concerns within the rail line corridor

Rail Reconstruction and Drainage Improvement



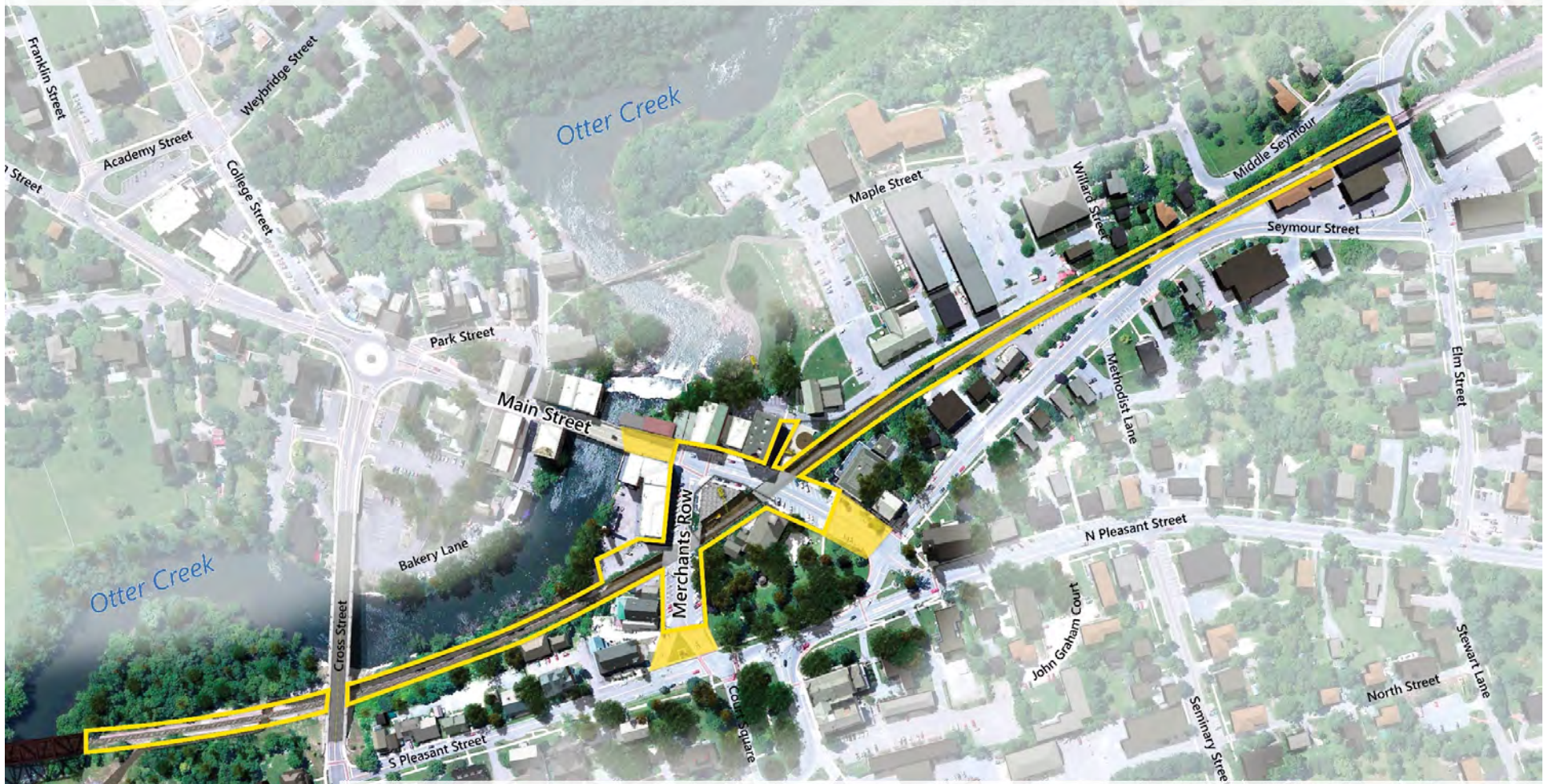
Middlebury Tunnel

- Address poor rail alignment through the project
- Provide drainage of the rail corridor
- Increase vertical clearance from approx. 18' to 21'
- Improve safety and reliability for rail operation

Community Project Goals

- Protect the safety of the community: people, property, environment
- Minimize the project impact on the vitality of the downtown community: businesses, residents, institutions
- Maintain traffic flow and pedestrian access to the greatest extent possible
- Develop and maintain a credible schedule
- Engage with the local community and facilitate clear communication with all stakeholders

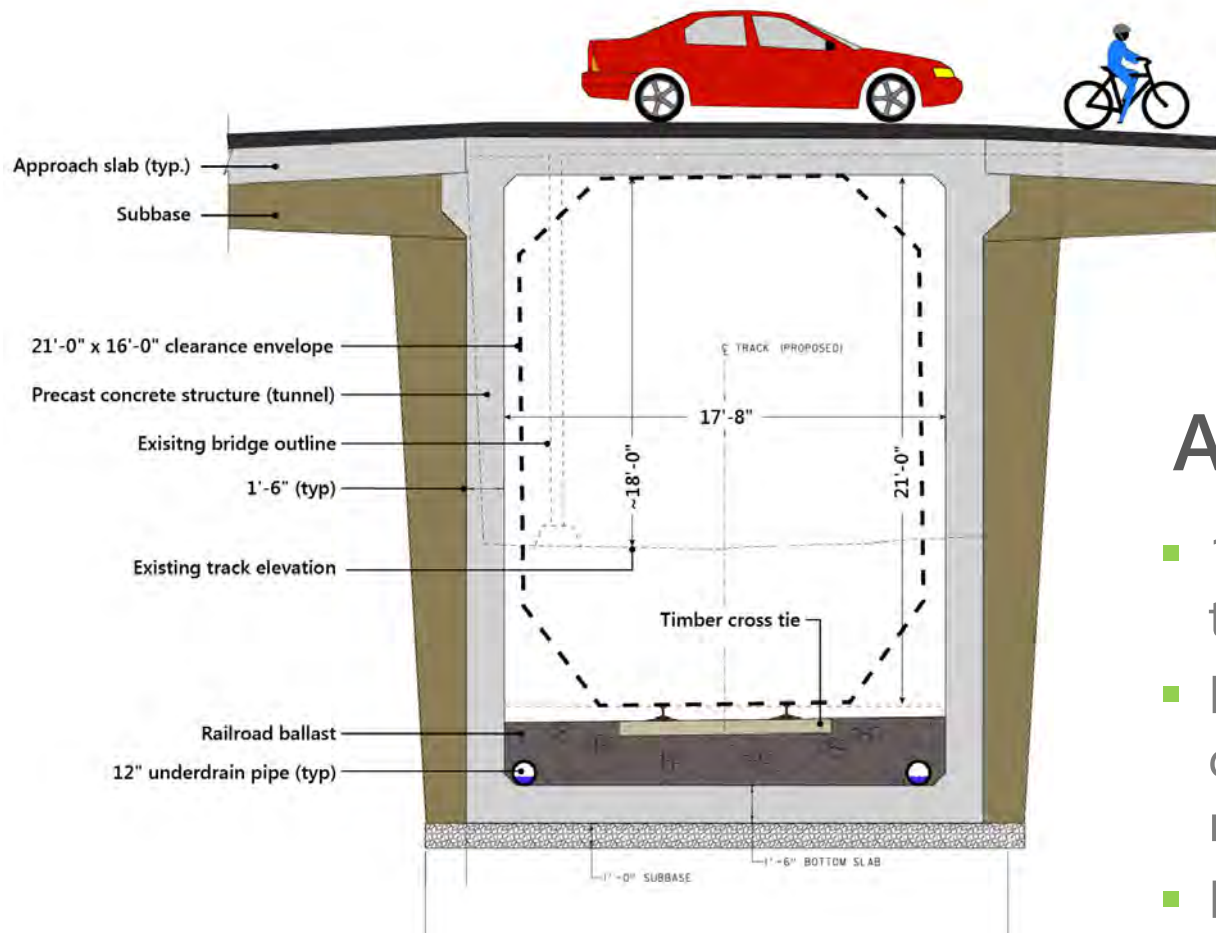
Middlebury Bridge and Rail Project



Middlebury Tunnel

- Requires 3,000 linear feet of support of excavation
- Tunnel structure is 360 feet long
- Added public space to Village Green areas

Middlebury Tunnel



ABC with CM/GC

- 10 week road closure and train detour
- New bridge uses precast concrete pieces to rapidly replace the bridges
- Project designed to be built quickly
- CM/GC Kubricky Construction Corporation teaming with VHB and VTrans

Project Challenges – Middlebury Contractor

- Support of excavation
 - Lowering the track to accommodate 21' rail clearance requires extensive excavation well below the existing walls of the rail corridor
- Existing rail corridor infrastructure is unstable in many locations along the length of the project
- Some buildings along the rail corridor are founded on top of existing walls.
- Staging area is limited due to downtown location of project
- 330 precast pieces need to fit together perfectly. No room for error in connection locations

Middlebury Corridor Pictures



Benefits of Partnering – Middlebury Contractor

- All Stake Holders (Owner, Contractor, Town, Etc.) have clear understanding of what is important and work towards achieving overall project success.
 - What success looks like to the Town
 - What success looks like to VTrans
 - What success looks like to Kubricky Construction
- Open & Direct Communication amongst stake holders
- Organizational Lines are Blurred – Everyone is accountable and helps each other – Work as a team
- Conflicts resolved quickly – minimizes change orders & claims
- Project Risks identified and Mitigated during design process

Risk Register – Middlebury Contractor

- Pro-Active Risk Identification and Explanation
 - Design to reduce risk
 - Contingency Items developed to keep project cost down

No.	Status	Date Initiated	Risk Item Description	Type of Risk	Probability	Cost Estimate	Estimated Impact	Mitigation Options	Contingency Amount
1	Open	9/25/2018	Building Settlement	Cost	25%	\$ 500,000.00		Building Monitoring	\$ 125,000.00
1a	Open	9/25/2018	Building Settlement	Schedule			30	Building Monitoring	\$ -
2	Open	9/25/2018	TBM Stuck/Recovery Pit	Cost	10%	\$ 600,000.00			\$ 60,000.00
2a	Open	9/25/2018	TBM Stuck/Recovery Pit	Schedule			60		\$ -
3	Open	7/11/2017	Rock Ex Delays	Cost	10%	\$ 50,000.00			\$ 5,000.00
3a	Open	7/11/2017	Rock Ex Delays	Schedule			15		\$ -
4	Open	7/11/2017	RR Track Settlement	Cost	10%	\$ 50,000.00			\$ 5,000.00
4a	Open	7/11/2017	RR Track Settlement	Schedule			30		\$ -
5	Open	7/11/2017	RR Support Delays	Cost	25%	\$ 25,000.00			\$ 6,250.00
5a	Open	7/11/2017	RR Support Delays	Schedule			5		\$ -
6	Open	7/11/2017	Material Escalation	Cost	50%	\$ 25,000.00		Steel Esc Clause	\$ 12,500.00
8	Closed	7/11/2017	Added Cutter Head TBM	Cost	50%	\$ 44,000.00		Contingency Item	\$ 22,000.00
9	Closed	7/11/2017	Obstruction and Drilling Down Time	Cost	75%	\$ 60,000.00		Contingency Item	\$ 45,000.00
9a	Open	7/11/2017	Obstruction and Drilling Down Time	Schedule			5		\$ -
10	Open	7/11/2017	Instrumentation - No Spec	Cost	0%	\$ 250,000.00		Developed Spec	\$ -
11	Open	7/11/2017	Availability of TBM Equip and Lead Time	Schedule			90		\$ -
7	Open	7/11/2017	Liquidated Damages (\$2,700/DY)	Cost	20%	\$ 634,500.00	235		\$ 126,900.00
									\$ -
						\$ 2,238,500.00	235		\$ 407,650.00

Middlebury Contingency Items

CONTINGENCY ITEMS

DESCRIPTION. The Contingency Items provide a contract contingency allowance for the timely payment of authorized extra work that was completed to fulfill the intent of the contract documents.

ELIGIBLE WORK. Only work that is included in the scope of the Contract, included as a Contingency Item below, and for which there is a quantity and price included in the Contract is covered by the Contingency Items.

All other work that is outside of the Contingency Items, outside of the Contract, and for which there are no quantity and price included in the Contract shall be considered Extra Work in accordance with Section 104.03 of the Standard Specifications.

The following items are eligible for payment under Contingency Items:

- (1) Tunnel Boring Machine Cutter Head Disk
- (2) Rock Anchor
- (3) Soil Nail Wall
- (4) Rock Netting

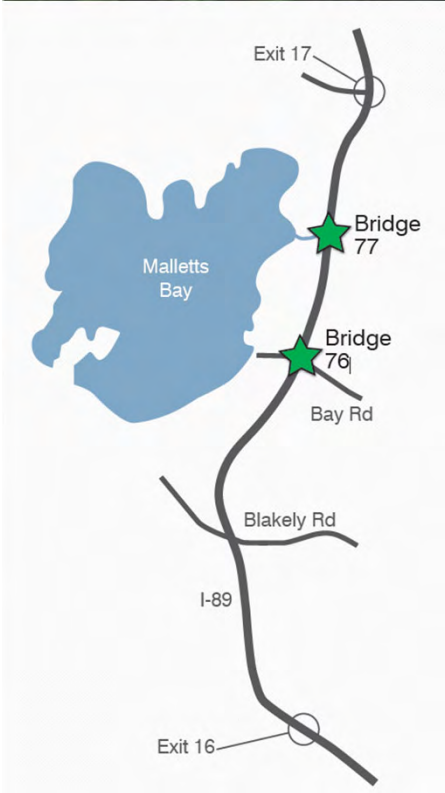
Middlebury Contingency Items

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Contingency Item) (Tunnel Boring Machine Cutter Head Disk)	Each
900.640 Special Provision (Contingency Item) (Rock Anchor)	Linear Foot
900.645 Special Provision (Contingency Item) (Soil Nail Wall)	Lump Sum
900.670 Special Provision (Contingency Item) (Rock Netting)	Square Foot
900.630 Special Provision (Minipile Obstruction Drilling)	Hour

Benefits of Partnering – Construction Inspector

- Collaboration:
 - Increased constructability through contractor and inspector involvement in design process and details
 - Multiple on site reviews for constructability and logistics, resulting in all parties having a clear understanding of what is required.
 - Relationships formed between the contractor, VTrans construction personnel and members of the community
 - Third Party perspective - ongoing collaboration in constructability between Contractor and VTrans' inspector
 - Over 40 years experience as contractor
 - Reviews plans and submittals thoroughly
 - Inspector has no financial interest in project and can offer best decisions for project and public
 - Trust between CM/GC and inspector brings value to project

Project 3: Colchester Deck Replacement using ABC and CM/GC



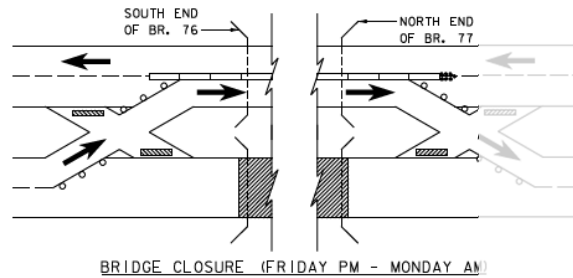
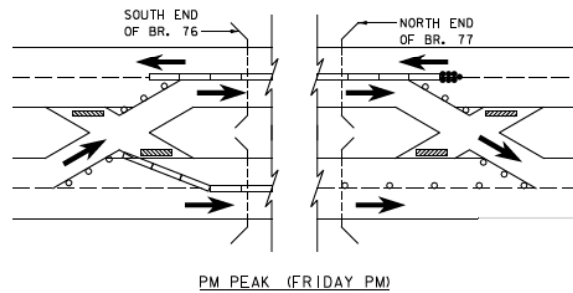
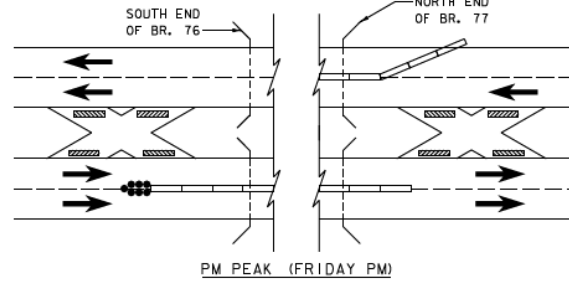
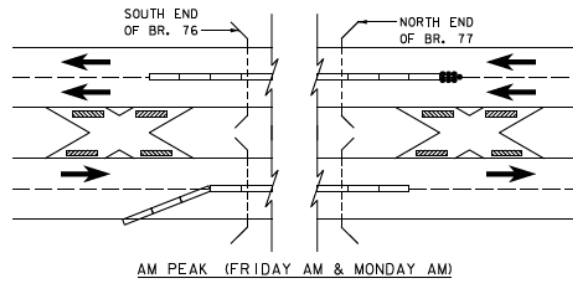
Precast Deck Panels

- 4 Bridge Decks on Interstate 89 between exit 16 & 17

Colchester Complex Traffic Control

TRAFFIC PHASING NOTES

1. THE ADJACENT TABLE INDICATES THE I-89 NORTHBOUND AND SOUTHBOUND HOURLY TRAFFIC VOLUMES DIVIDED INTO MONDAY-THURSDAY, FRIDAY, AND SATURDAY-SUNDAY TRAFFIC. THE PERIODS OF REDUCTION TO ONE LANE OF TRAVEL IN THE APPLICABLE DIRECTION IS ALSO INDICATED.
2. TRAFFIC PHASING CROSS SECTIONS ARE SHOWN ON THE FOLLOWING SHEETS. BELOW ARE GENERAL NORTHBOUND AND SOUTHBOUND TRAFFIC PHASING DIAGRAMS DEPICTING THE METHOD FOR MAINTAINING TWO TRAVEL LANES IN THE DIRECTION INDICATED, PRIOR TO AND FOLLOWING THE WEEKEND BRIDGE CLOSURE. TRAFFIC PHASING DURING THE BRIDGE CLOSURE IS ALSO SHOWN BELOW.



NORTHBOUND TRAFFIC PHASING DIAGRAMS
NOT TO SCALE

Interstate 89

- High Traffic Volumes on I-89 through the project area require 2-lanes of traffic in each direction during peak flows
- Current AADT: 15,900 vehicles per day
- Lower traffic volumes during weekend allow for 1-lane in each direction – complete access to bridge 30

2018 Estimated Average Volumes -
Based on Growth Rate of 0.5% per year

MAY NORTHBOUND				JUNE NORTHBOUND			
Begin Hour	Mon-Thu	Fri	Sat-Sun	Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00 AM	107	124	163	12:00 AM	117	144	196
1:00 AM	60	68	75	1:00 AM	66	67	89
2:00 AM	42	46	61	2:00 AM	48	59	69
3:00 AM	44	46	48	3:00 AM	44	51	46
4:00 AM	58	49	43	4:00 AM	58	57	45
5:00 AM	167	158	77	5:00 AM	149	156	79
6:00 AM	457	431	139	6:00 AM	436	386	139
7:00 AM	706	680	253	7:00 AM	712	649	288
8:00 AM	602	591	338	8:00 AM	623	591	366
9:00 AM	566	592	464	9:00 AM	595	623	486
10:00 AM	615	675	633	10:00 AM	657	708	662
11:00 AM	688	784	787	11:00 AM	736	867	861
12:00 PM	782	939	957	12:00 PM	829	1015	1009
1:00 PM	876	1072	1027	1:00 PM	944	1196	1100
2:00 PM	1177	1373	1100	2:00 PM	1204	1487	1122
3:00 PM	1701	1833	1144	3:00 PM	1718	1885	1181
4:00 PM	2318	2290	1166	4:00 PM	2385	2345	1147
5:00 PM	2287	2153	1041	5:00 PM	2340	2220	1047
6:00 PM	1268	1367	866	6:00 PM	1292	1361	875
7:00 PM	853	970	720	7:00 PM	880	996	728
8:00 PM	642	778	586	8:00 PM	701	857	601
9:00 PM	481	677	474	9:00 PM	536	749	532
10:00 PM	281	478	324	10:00 PM	327	507	354
11:00 PM	211	301	232	11:00 PM	246	378	249

MAY SOUTHBOUND				JUNE SOUTHBOUND			
Begin Hour	Mon-Thu	Fri	Sat-Sun	Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00 AM	51	60	68	12:00 AM	58	64	88
1:00 AM	32	44	39	1:00 AM	41	50	42
2:00 AM	44	43	38	2:00 AM	45	48	36
3:00 AM	97	108	62	3:00 AM	98	109	67
4:00 AM	254	227	91	4:00 AM	264	245	96
5:00 AM	684	689	184	5:00 AM	721	710	207
6:00 AM	1641	1687	416	6:00 AM	1731	1638	421
7:00 AM	2652	2613	548	7:00 AM	2640	2490	518
8:00 AM	1822	1750	700	8:00 AM	1822	1833	727
9:00 AM	1103	1256	951	9:00 AM	1179	1290	967
10:00 AM	912	1078	1102	10:00 AM	1008	1213	1150
11:00 AM	850	1043	1200	11:00 AM	951	1164	1207
12:00 PM	854	1031	1112	12:00 PM	943	1143	1191
1:00 PM	821	1023	1033	1:00 PM	893	1076	1104
2:00 PM	873	1039	963	2:00 PM	923	1089	1046
3:00 PM	896	1117	903	3:00 PM	936	1150	1018
4:00 PM	945	1160	836	4:00 PM	977	1120	937
5:00 PM	790	790	790	5:00 PM	790	790	790
6:00 PM	640	640	640	6:00 PM	640	640	640
7:00 PM	386	473	473	7:00 PM	401	584	494
8:00 PM	287	40	343	8:00 PM	322	436	396
9:00 PM	257	257	257	9:00 PM	257	366	325
10:00 PM	190	190	190	10:00 PM	190	245	219
11:00 PM	78	128	110	11:00 PM	89	140	114

▨ = PERIOD OF REDUCTION TO ONE (1) TRAVEL LANE IN DIRECTION OF TRAVEL INDICATED. IN ALL OTHER PERIODS TWO (2) TRAVEL LANES ARE PROVIDED IN THE DIRECTION OF TRAVEL INDICATED.

PROJECT NAME: COLCHESTER
PROJECT NUMBER: JM 089-3(69)
FILE NAME: z95a2010notes.dgn
DATE: 2/17/2017
DRAWN BY: J. BARNES
CHECKED BY: S.E. BURBANK
TRAFFIC PHASING NOTES SHEET 15 OF 10

Colchester Construction Details

Innovations:

- Deck System
 - Accelbridge – New to Vermont initiated by contractor
 - Uses jacking instead of post tensioning after installation
 - Consultation with the Engineer who developed system during design

- Accelerated Demolition
 - Partial removal during lane shifts
 - Demolition plan vetted during design with construction personnel.

- Complex traffic control
 - Traffic Engineer is active member of the CM/GC team

Closing Thoughts – Key to Success

- CM/GC is a great tool for trying new innovations
- Determine project goals and seek appropriate personnel for CM/GC team
- Input from construction staff
 - Gordy Eastman adds great value to team and is respected for his construction experience
- Communicate expectations externally and internally
- Assemble strong team of subcontractors
- Project Team committed to credible schedules

For More Information

- Hartford Project SharePoint Site

<https://outside.vermont.gov/agency/vtrans/external/Projects/Structures/12A132>

- Middlebury Project Website

<http://vtrans.vermont.gov/projects/middlebury>

- Colchester Project SharePoint Site

<https://outside.vermont.gov/agency/vtrans/external/Projects/Structures/95A208>



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Questions

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