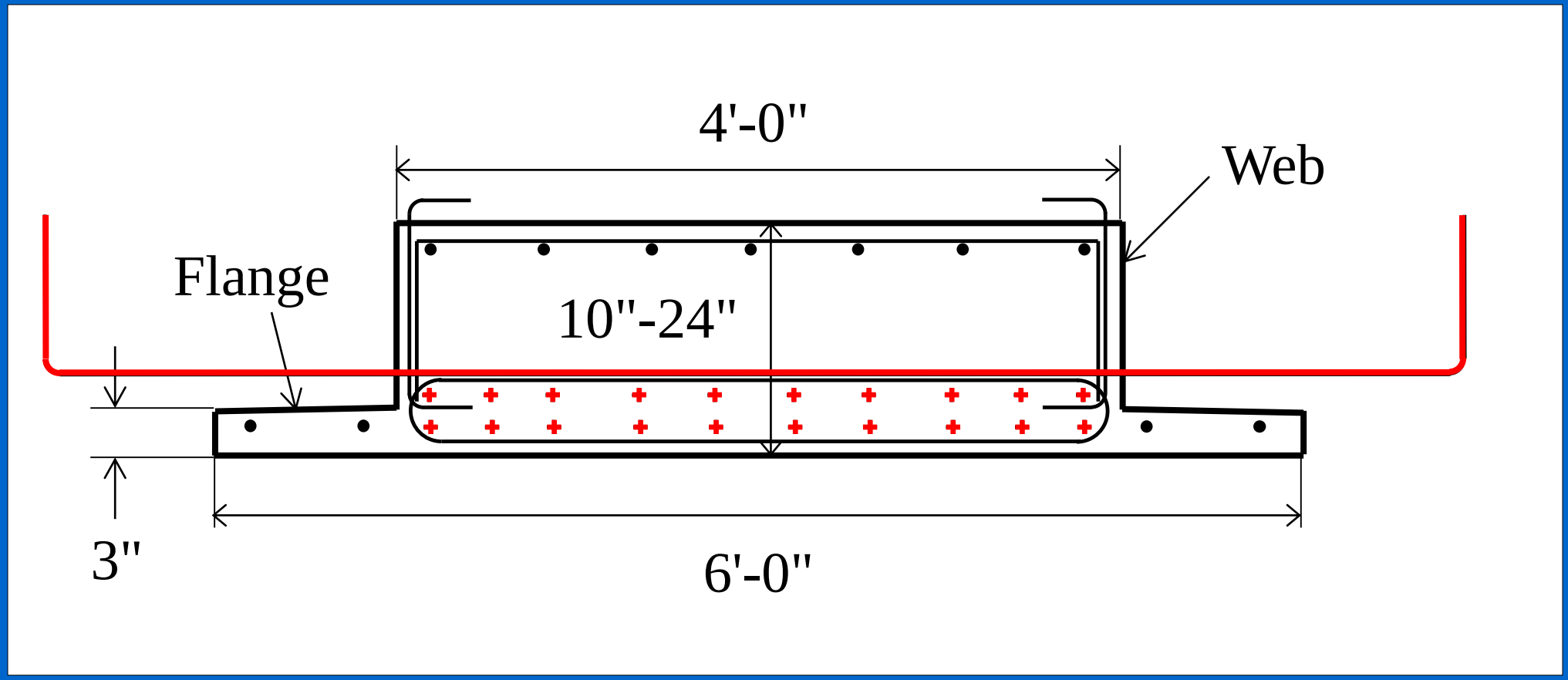
SHRP2 Solutions R04 Toolkit
March 20, 2018

MnDOT's 3 Stage ABC Project Selection Process

Paul Rowekamp
Bridge Standards Unit
MnDOT Bridge Office

DEPARTMENT OF TRANSPORTATION

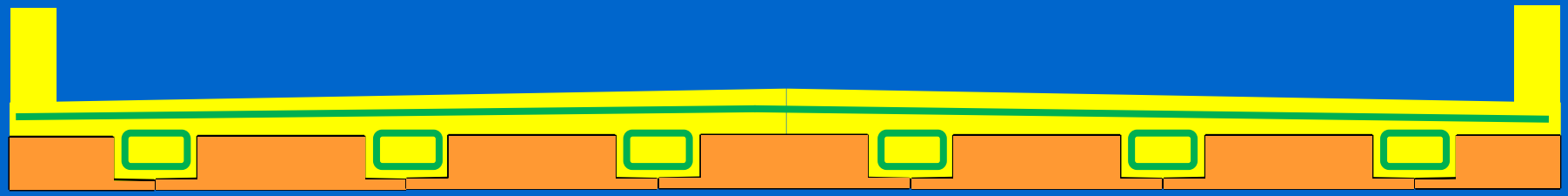
Inverted Tees
2004-2005



Alternative to slab span bridge

MnDOT Inverted Tee System

Rapid Construction w/o Falsework



4 Substructures & Superstructure – 4 Weeks

MnDOT Inverted Tee System

2012

2013


AMES
CONSTRUCTION, INC.
Safety
is job 1

2014


MAMMOET
MAMMOET
MAMMOET


SPEED LIMIT
60
40


MAMMOET

ABC Implementation

- Precast substructures (piers, abut., wing walls)
- Full depth concrete deck panel bridges (w/PT)
  - 2018/2019 w/ UHPC?
- Lateral bridge slides
- SPMT projects
- Geosynthetic Reinforced Soil (GRS)
  Integrated Bridge System (IBS)
- Ultra High Performance Concrete (UHPC)
- Inverted tee bridges

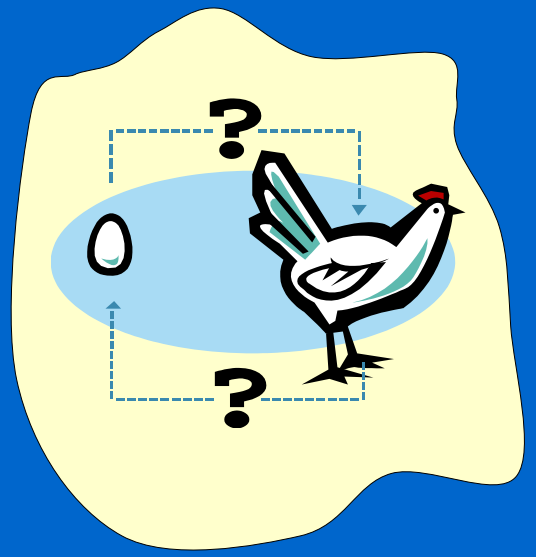
ABC Project Selection

Selection by Committee

- Identify candidates
- Select techniques/products
- Technology transfer

Issues

- Inconsistent implementation
- Late in design process
- Less than ideal letting dates
- Funding issues
- Driven by Bridge Office



ABC Project Selection

Need:

A methodology to provide a consistent, objective, and defensible method of selecting appropriate ABC projects, driven by the owner (district). Early identification is critical!

Team of Experts:

District: Planning, Design, Construction
Economic Policy, Construction Innovative Cont
Bridge: Planning, Design, Construction

ABC Project Selection

Available Tools:

- FHWA – Ben Beerman
- Utah DOT
- Wisconsin DOT (Bridge Design Manual)
- Iowa DOT (Bridge Design Manual)
- Oregon DOT Pooled Fund Project
  - Oregon State Univ.
    - Analytic Hierarchy Process (AHP)
    - Pair wise comparison – tradeoffs

ABC Project Selection

3 Stage Process

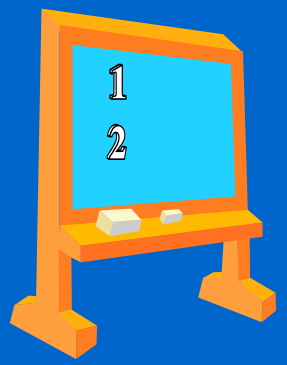
Stage 1 – First Cut

- Is ABC viable?

Stage 2 – Site specific questions

Stage 3 – Select Method/Technique

- Alternative Contracting Options



Project Selection – Stage 1

Selection of Accelerated Bridge Construction Projects
Draft MnDOT Decision Making Tool (DMT) V9 07/22/2013

Stage 1 - Score computed using Bridge Management Data:

30% Wt. Daily Vehicle Operating Costs - Dependent on Bridge Length

"On Bridge" AADT and HCAADT Only

	Distribution	Score	Criteria
Bridge Length Factor:	16.0%	0	No user costs
Total Length from 10'-100' = 1.0	16.7%	1	Less than $4,150
Total Length from 100'-300' = 1.2	16.9%	2	$4,150 to $9,250
Total Length from 300'-500' = 1.6	16.8%	3	$9,250 to $18,100
Total Length greater than 500' = 2.0	16.9%	4	$18,100 to $44,000
	16.7%	5	More than $44,000

User Cost Formula = (AADT x $0.31/mile + HCAADT x $0.64/mile) x Detour Length x Br Length Factor

20% Wt. Average Annual Daily Traffic (AADT)

Combined "On and Under" Bridge

	Distribution	Score	Criteria
	16.2%	0	Less than 2,400
	16.7%	1	2,400 to 6,650
	16.9%	2	6,650 to 13,500
	16.7%	3	13,500 to 31,000
	16.7%	4	31,000 to 75,000
	16.9%	5	More than 75,000

10% Wt. Heavy Commercial Average Annual Daily Traffic (HCAADT)

Combined "On and Under" Bridge

	Distribution	Score	Criteria
	16.0%	0	Less than 165
	16.7%	1	166 to 485
	16.7%	2	486 to 1,085
	16.9%	3	1,086 to 1,950
	16.7%	4	1,951 to 3,750
	16.9%	5	More than 3,750

30% Wt. Detour Length

Detour Length on Similar Functional Class Rdwy

	Distribution	Score	Criteria
	15.9%	0	No Detour
	9.8%	1	Less than 1 mile
	24.2%	2	1-2 miles
	17.9%	3	2-7 miles
	16.2%	4	7-14 miles
	15.9%	5	More than 14 miles

10% Wt. Traffic Density

AADT "ON" Bridge

	Distribution	Score	Criteria
Vehicles per Day/Ft of Bridge Roadway Width	16.0%	0	Less than 35
	16.7%	1	35-78
	16.9%	2	78-138
	16.9%	3	138-240
	16.7%	4	240-470
	16.7%	5	More than 470

Criteria:

User costs
Traffic volumes
Heavy commercial
Detour length
Traffic density

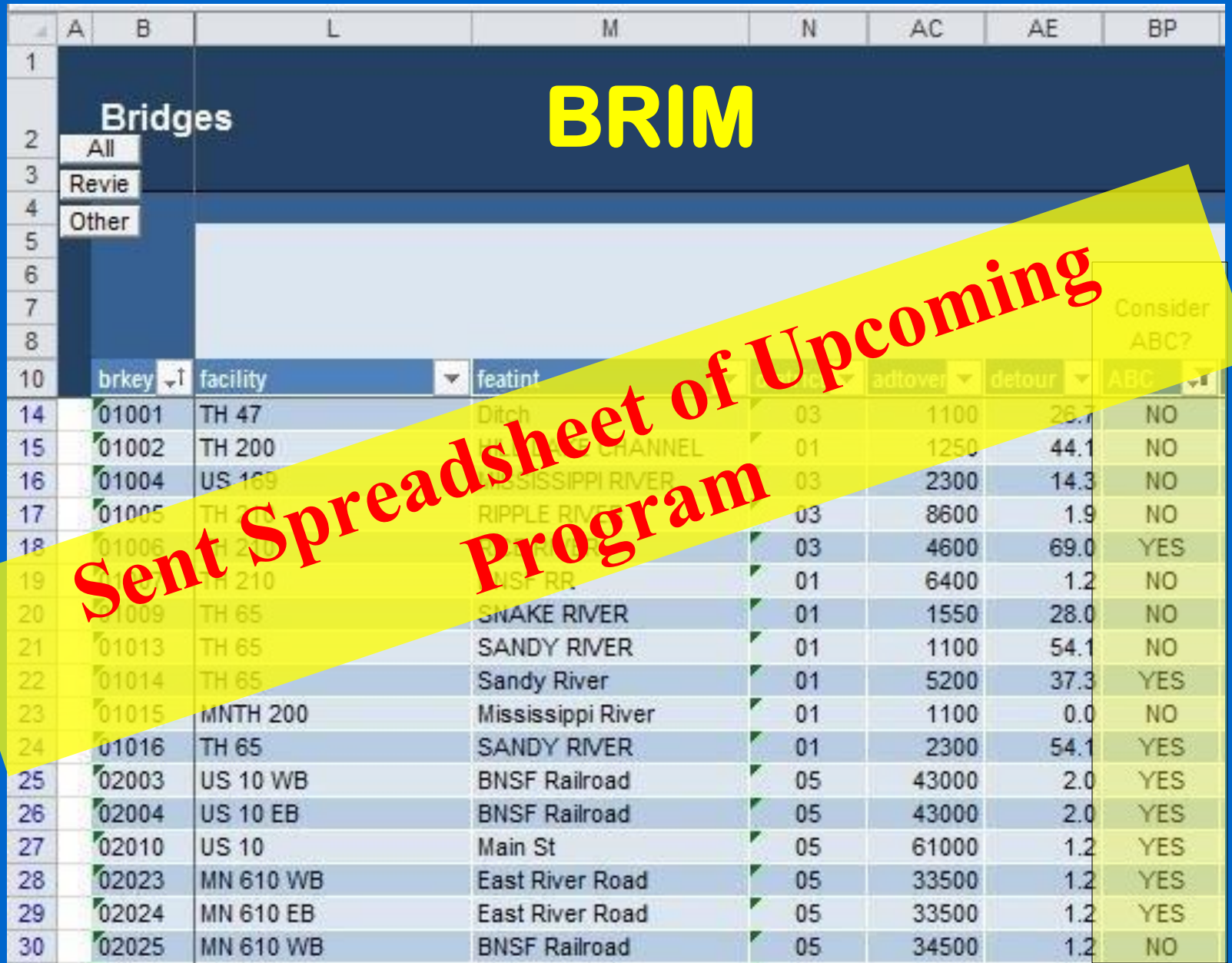
Run statewide

~~**Score ≥ 60**~~

YES/NO

(35% of bridges)
(50% of metro)

Project Selection – Stage 1



Bridges

All

Revie

Other

BRIM

brkey	facility	featint		adtover	detour	Consider ABC? ABC
01001	TH 47	Ditch	03	1100	26.7	NO
01002	TH 200	[illegible] CHANNEL	01	1250	44.1	NO
01004	US 169	MISSISSIPPI RIVER	03	2300	14.3	NO
01005	TH 200	RIPPLE RIVER	03	8600	1.9	NO
01006	TH 200	[illegible]	03	4600	69.0	YES
01008	TH 210	BNSF RR	01	6400	1.2	NO
01009	TH 65	SNAKE RIVER	01	1550	28.0	NO
01013	TH 65	SANDY RIVER	01	1100	54.1	NO
01014	TH 65	Sandy River	01	5200	37.3	YES
01015	MNTH 200	Mississippi River	01	1100	0.0	NO
01016	TH 65	SANDY RIVER	01	2300	54.1	YES
02003	US 10 WB	BNSF Railroad	05	43000	2.0	YES
02004	US 10 EB	BNSF Railroad	05	43000	2.0	YES
02010	US 10	Main St	05	61000	1.2	YES
02023	MN 610 WB	East River Road	05	33500	1.2	YES
02024	MN 610 EB	East River Road	05	33500	1.2	YES
02025	MN 610 WB	BNSF Railroad	05	34500	1.2	NO

Sent Spreadsheet of Upcoming Program

Project Selection – Stage 1

Early Identification

MINNESOTA STRUCTURE INVENTORY REPORT

Bridge ID: 27910 SHINGLE CREEK PKWY over I 94; I 694 EB

Date: 11/13/2017

+ GENERAL +		+ ROADWAY +		+ INSPECTION +	
Agency Br. No	Crew 7627	Bridge Match ID (TIS)	4	Deficient Status	ADEQ
					2-2015
					TRICT
					ATINGS +
					7
					7
					7
					N
					N
					ATINGS +
					7
					9
					5
					N
					8
					URES +
					STANDARDS
					STANDARDS
Main Span Type	CSTL BEAM SPAN	Lateral Clr. - Lt/Rt		Appr. Guardrail	1-MEETS STANDARDS
Main Span Detail		Appr. Surface Width	74.0 ft	GR Termini	1-MEETS STANDARDS
Appr. Span Type	CONC DECK GIRD	Bridge Roadway Width	68.0 ft	+ IN DEPTH INSP. +	
Appr. Span Detail		Median Width on Bridge	6.0 ft	Frac. Critical	N
Skew		+ MISC. BRIDGE DATA +		Underwater	N
Culvert Type		Structure Flared	NO	Pinned Asbly.	N
Barrel Length		Parallel Structure	RIGHT		

MN Year Remodeled 2011

FHWA Year Reconstructed

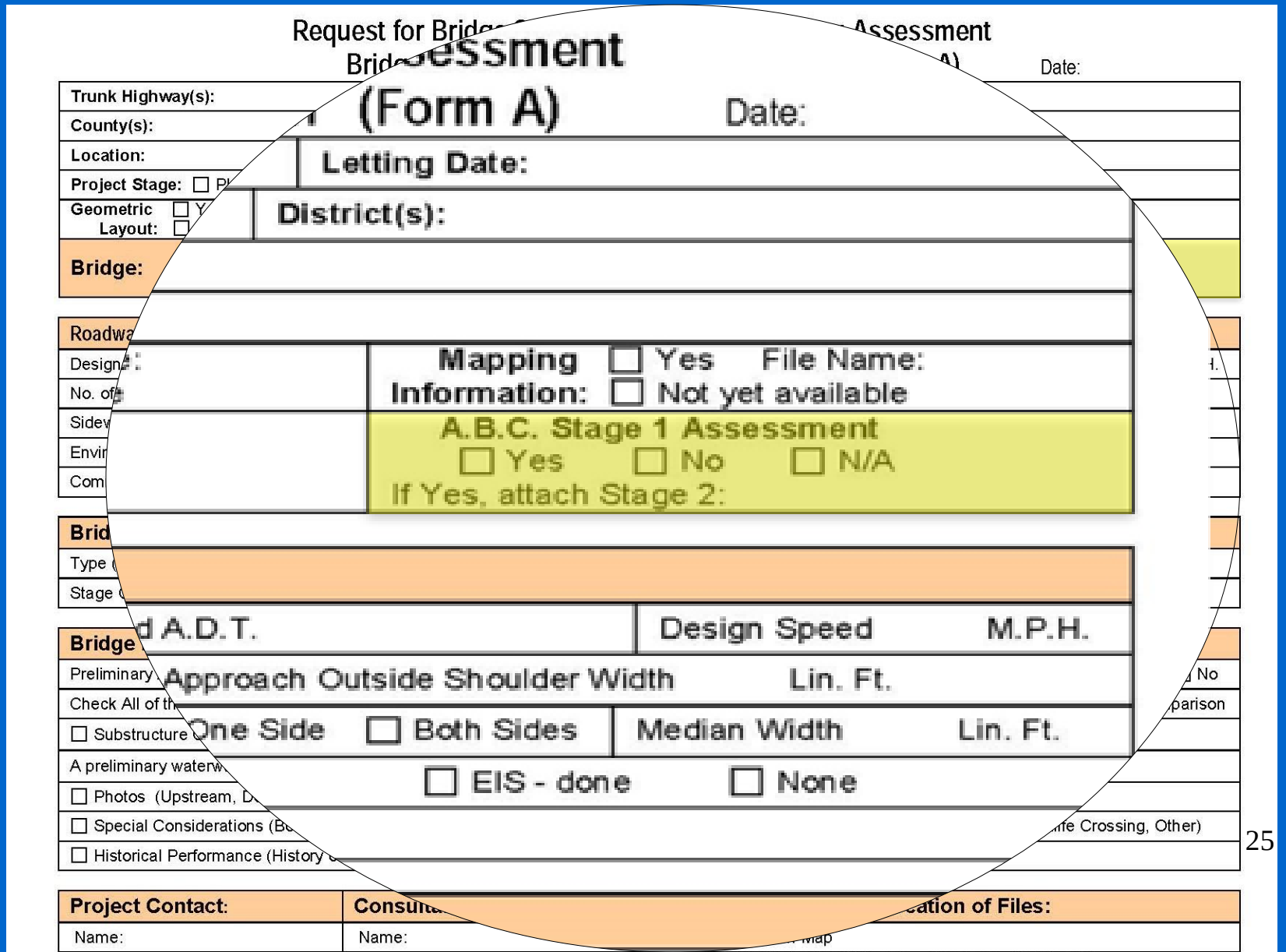
Bridge Plan Location CENTRAL

Potential ABC YES

+ STRUCTURE +

Service On HWY:PED

Project Selection – Stage 1



Project Selection – Stage 2

Site Specific Issues:

- Duration
- Traffic control complexity
- Bridge on critical path
- Temp structures or R/W
- Existing Br features
- Impact local businesses
- Risk mitigation
  - 21 Questions

ACCELERATED BRIDGE CONSTRUCTION (ABC) SELECTION TOOL

STAGE 2 CHECKLIST

Make a determination during scoping whether the following bridge related issues are present or should be considered during project development.

Prepared By: **Date:** **District:**

Project Information:

Bridge No.:	TH:	Let Date:	
Project Description (work type, major roadway work also required?, anticipated duration):			

Question/Issue	Yes	No	Poss	N/A	Comments
1. Is bridge construction on the critical path of this project?	☐	☐	☐	☐	
2. Is it likely that this project will include complex traffic control schemes, long detours, or significant user impacts due to bridge construction?	☐	☐	☐	☐	
3. Is it likely that this project will have an extended duration due to bridge construction?	☐	☐	☐	☐	
4. Could temporary structures be required?	☐	☐	☐	☐	
5. Could additional width be needed on culverts, bridges, or shoulders to maintain traffic?	☐	☐	☐	☐	
6. Are there any issues regarding construction timeframes (e.g. fish spawning, bird nesting, high water, permits, major events)?	☐	☐	☐	☐	
7. Are there critical features or services on the route that need to be considered (e.g. hospital, emergency services, transit, load restrictions)?	☐	☐	☐	☐	
8. Could there be a need to maintain railroad traffic?	☐	☐	☐	☐	

Project Selection – Stage 2

Sample questions

Question/Issue	Yes	No	Poss	N/A	Comments
3. Is it likely that this project will include complex traffic control schemes, long detours, or significant user impacts due to bridge construction?					

Is it likely that this project will have an extended duration (more than one construction season, or extend into late fall) due to bridge construction?

Does the existing bridge have features that make it difficult to accommodate staging (such as a truss bridge, slab span, or beam spacing issues, etc.)?

Project Selection – Stage 2

Conclusion

Based on the findings & conclusions above, further consideration of accelerated bridge construction is warranted:

YES NO Project Manager Name: _____

Date: _____ Comments:

"Roadway user impacts and safety make ABC a viable alternative."
"Use of a lateral slide *(or other ABC alternative)* will be further investigated."

Please send a copy of pages 1 & 2 of this completed form to the Bridge Preliminary Plans Unit.*

If further consideration is warranted the Project Manager should contact the Bridge Office Preliminary Plans Unit and the Regional Bridge Construction Engineer for assistance in selecting appropriate ABC alternatives and techniques.

Project Selection – Stage 3

Select Method or Technique:

- **Staging (1/2 at time)**
- **Full-depth precast deck panels**
- **Precast substructures**
- **Lateral slide**
- **Superstructure move – SPMT's**

Alternative Contracting Options -

Alternative Const. & Contracting

- A+B bidding
- Lane rental
- Evening/weekend/non-peak/complete closure
- Incentive/Disincentive
- Value engineering workshops
- Performance specifications
- Design Build
- Const. Manager General Contractor –CMGC
  - Hybrid of DB & DBB

ABC Project Selection

3 Stage Process

Stage 1 – First Cut

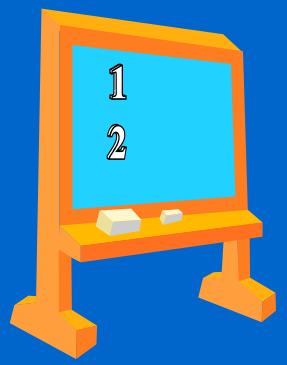
- **Fully Automated**
- **Bridge Management Data**
- **Objective – Yes/No - No Published Scores**

Stage 2 – Site specific

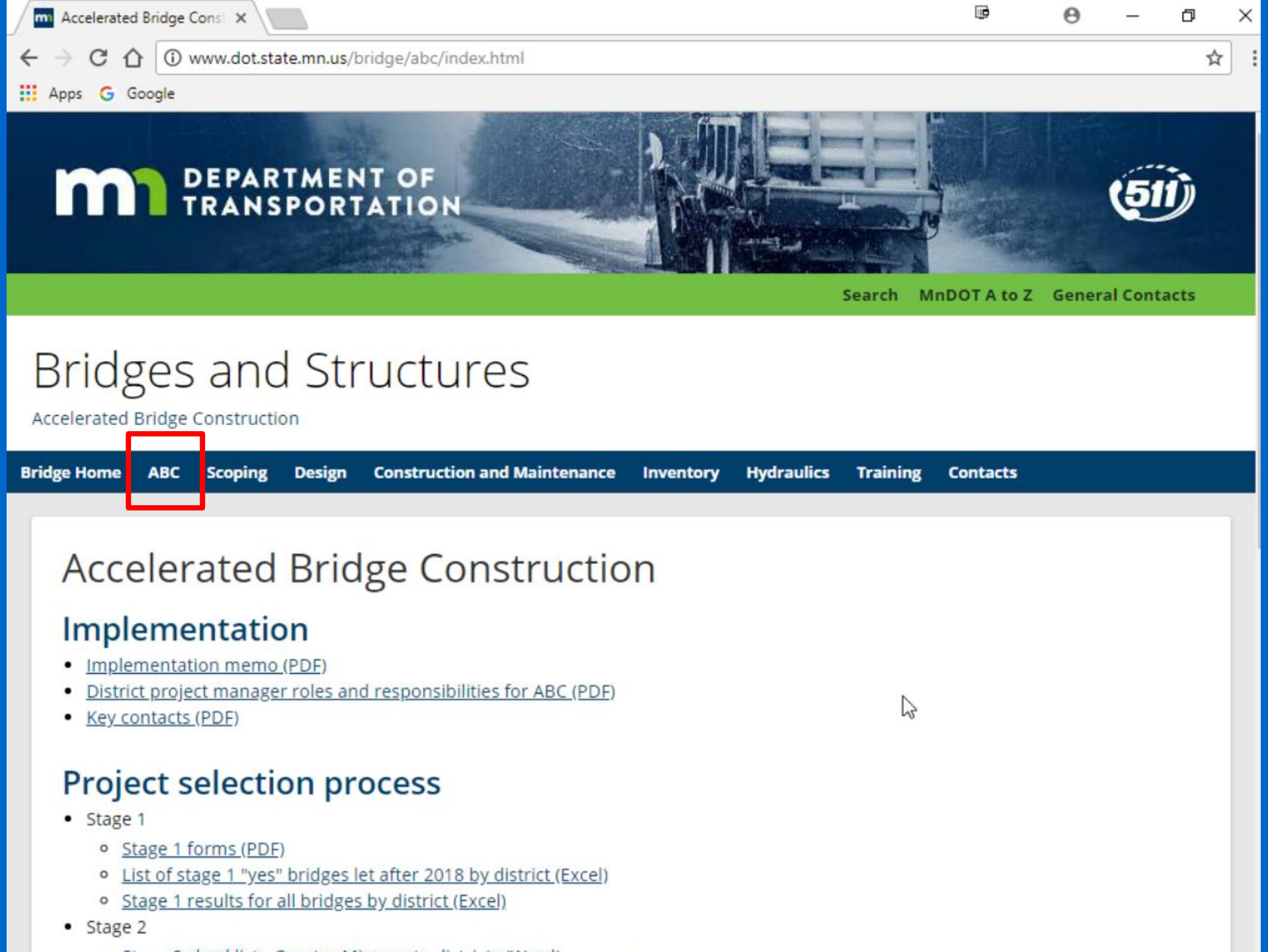
- **Occurs in District – Multi Discipline**
- **Subjective**
- **Early Determination/Funding**
- **District Signature/Ownership**

Stage 3 – Select Method/Technique

- **Alternative Contracting Options**



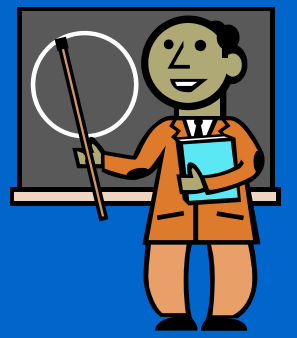
http://www.dot.state.mn.us/bridge/abc


Accelerated Bridge Cons
www.dot.state.mn.us/bridge/abc/index.html
Apps
Google
DEPARTMENT OF TRANSPORTATION
511
Search
MnDOT A to Z
General Contacts
Bridges and Structures
Accelerated Bridge Construction
Bridge Home
ABC
Scoping
Design
Construction and Maintenance
Inventory
Hydraulics
Training
Contacts
Accelerated Bridge Construction
Implementation
Implementation memo (PDF)
District project manager roles and responsibilities for ABC (PDF)
Key contacts (PDF)
Project selection process
Stage 1
Stage 1 forms (PDF)
List of stage 1 "yes" bridges let after 2018 by district (Excel)
Stage 1 results for all bridges by district (Excel)
Stage 2

Lessons Learned – Look Ahead

- Pilot Projects - District feedback
- Early project site identification
  - Get discussion started
- Project Manager ownership – Critical
- Get subject area experts involved early
- Refine options/costs – letting date

- Statewide implementation in 2017
- Tools available on the web



MnDOT's 3 Stage ABC Project Selection Process

Questions?

http://www.dot.state.mn.us/bridge/abc

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