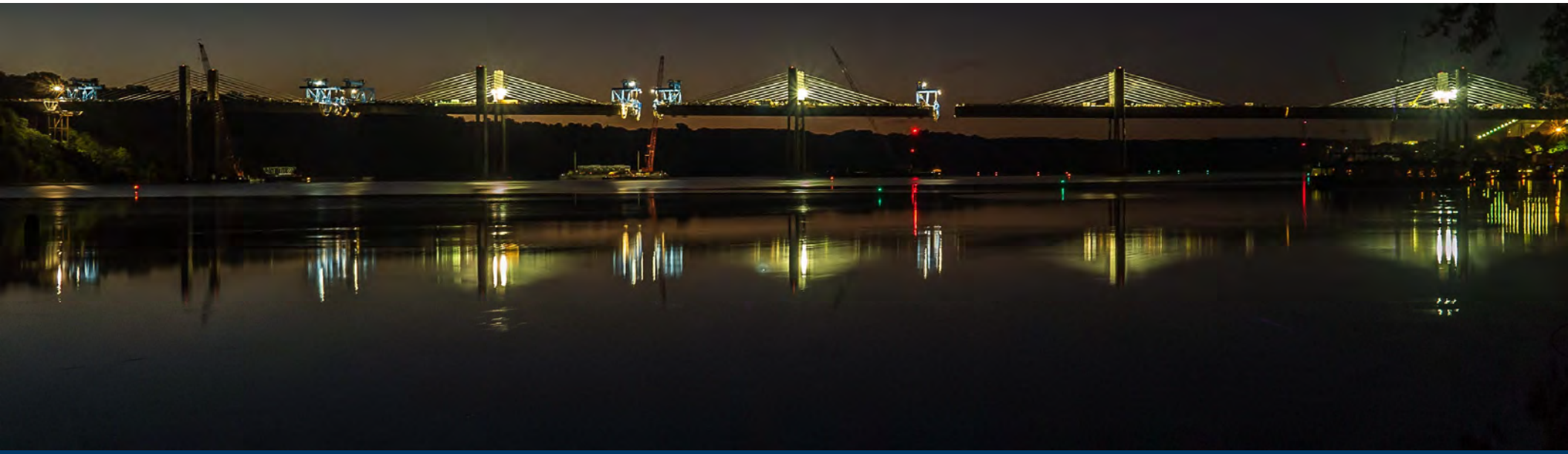


Preservation/Rehabilitation/Evaluation

Kyle Fritz | Bridge Scoping Engineer

Bridge Office

June 3rd, 2021

DEPARTMENT OF TRANSPORTATION

mndot.gov

Topics

- Bridge Load Rating and Evaluation Manual (BLREM)
- Scoping
- Pier Evaluation – when is it required?
- Bridge Management Plans

Bridge Load Rating and Evaluation Manual (BLREM)

Bridge Load Rating and Evaluation Manual

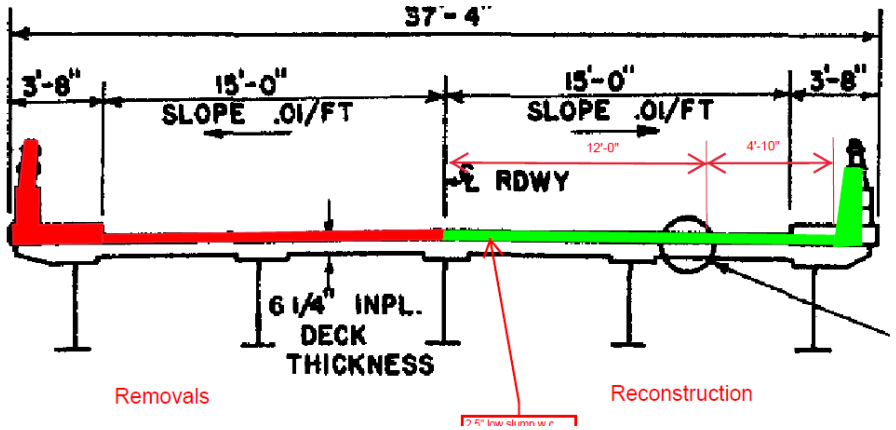
- Manual was published in 2018
- Prior to manual -> Chapter 15 in the Bridge Design Manual
- MnDOT Bridge Load Rating Website
  http://www.dot.state.mn.us/bridge/datamanagement.html

Topics Covered in BLREM

- Policies and Practices
- Methodology
- Load and Resistance Factor Rating (LRFR)
- Load Factor Rating (LFR) and Allowable Stress Rating (ASR)
- Special Topics
- Quality Control and Quality Assurance
- Forms and Documentation

Superstructure Load Rating

- When?
  - Bridge rehab
  - Construction loading
  - Change in dead load on the structure
  - Deterioration
  - Bridge hits
  - Change in load rating method



Load Rating Contacts

Trunk Highway Load Rating

Yihong Gao

yihong.gao@state.mn.us

Jim Pierce

james.pierce@state.mn.us

State Aid Bridge Load Rating

Moises Dimaculangan

moises.dimaculangan@state.mn.us

Scoping

What is a scope?

- “The **scope** is simply all the work that needs to be done in order to achieve a **project's** objectives. In other words, the **scope** involves the process of identifying and documenting specific **project** goals, outcomes, milestones, tasks, costs, and timeline dates specific to the **project** objectives.”

  -https://www.greycampus.com/blog/project-management/steps-involved-in-defining-project-scope

MnDOT Bridge Scoping Unit

- Scoping occurs 5 to 6 years from letting
- Right Fix at the Right Time
- Minimize project risk (load rating, pier analysis, scope creep and $$$)
- Meet all BPIG Requirements/Guidelines
  - BPIG stands for Bridge Preservation and Improvement Guidelines.
    - Typically updated every 4 years to reflect new policy and process changes

Right Fix? OPM, Preservation, Rehabilitation, or Replacement

- OPM (Ordinary Preventative Maintenance)
  - Ex. Flood Sealing, Crack Sealing, Local Patching
- Preservation
  - Ex. Mill & Overlay, Joint Replacement, Barrier Replacement, Painting
- Rehabilitation
  - Ex. Redeck, Superstructure Replacement
- Replacement
  - Ex. Bridge Replacement

OPM

Flood sealing

Local patching

Crack sealing

Preservation

Concrete surface repair

Barrier reconstruction

Mill & overlay

Joint replacement

Prioritize Preservation

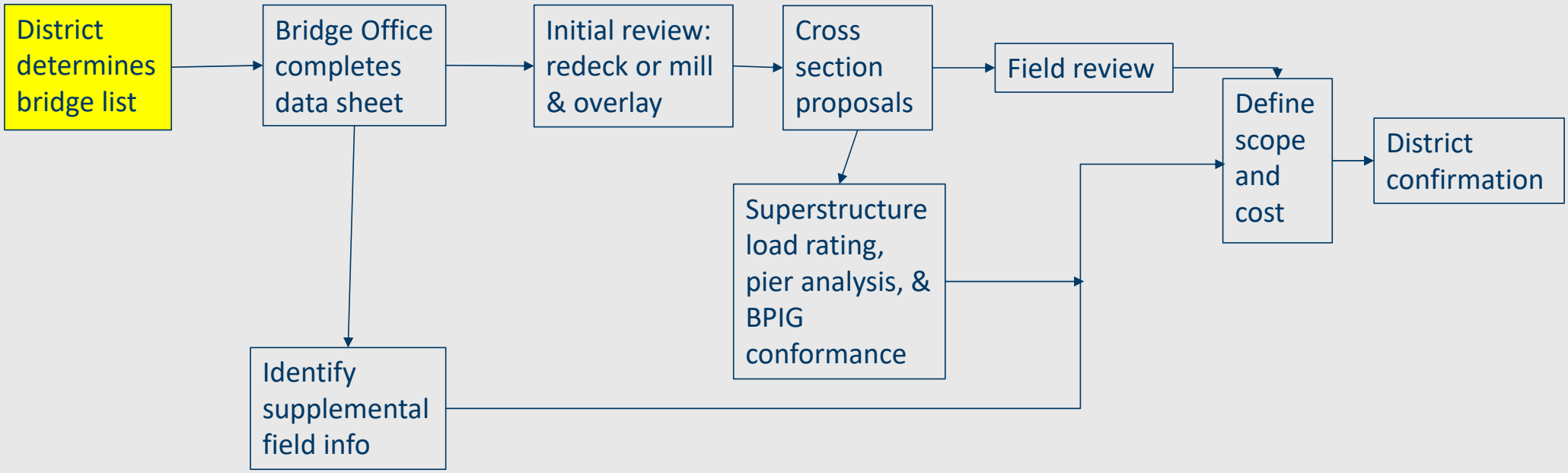
- Bridge Investment Advisory Committee (BIAC) form
  - Consists of BMT, District Bridge Reps, Planning Representatives
- Bridge Priority Preservation List
  - Statewide perspective
  - Contains roughly 10% of the state's bridge deck area

Rehabilitation

Bridge widening

Redeck

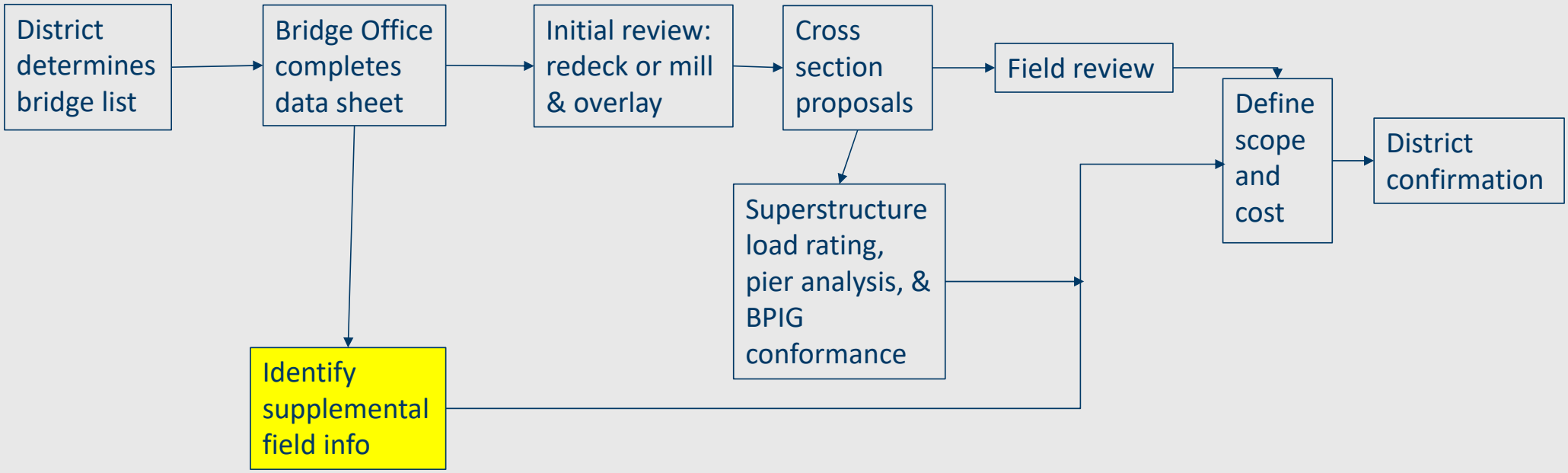
Scoping Process



Sources of Bridges to be Scoped

- BRIM (Bridge Replacement and Improvement Management)
- District Bridge Maintenance Staff
- Roadway Projects

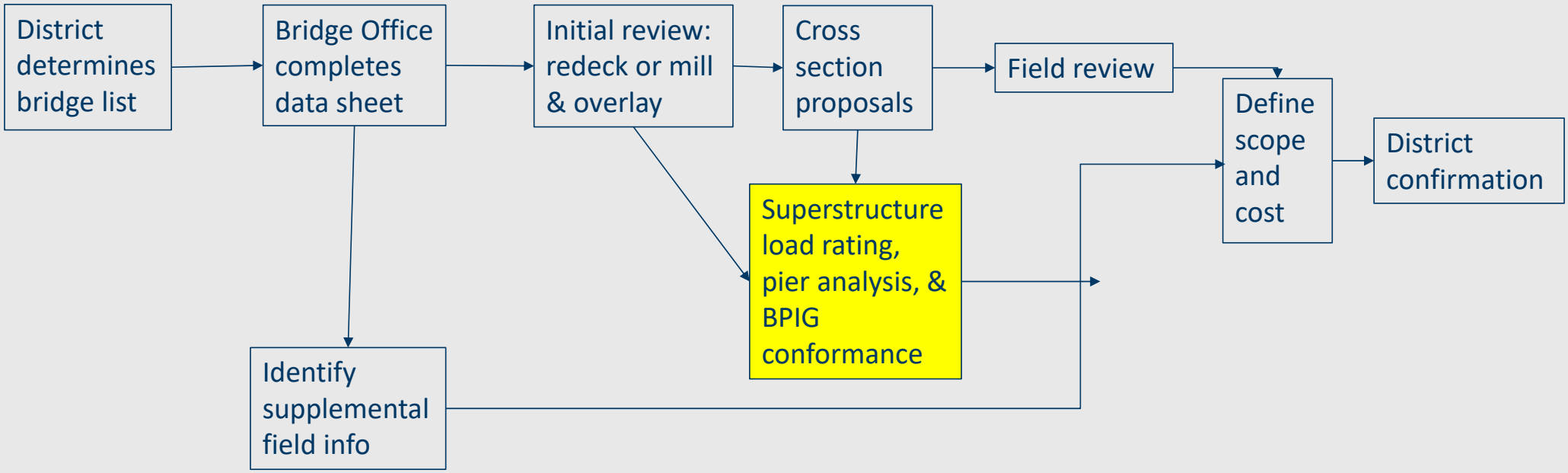
Scoping Process



Supplemental field info needed for scoping

- Deck chaining
- Deck cores (for strength or chlorides)
- Pier cap crack and delamination surveys

Scoping Process

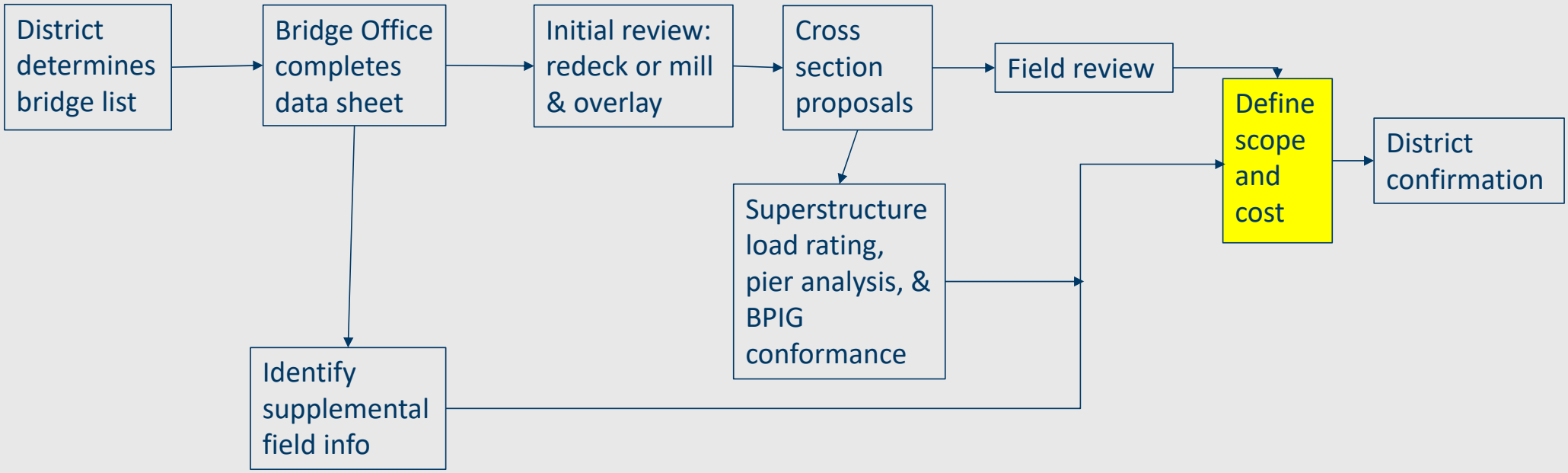


BPIG updates: Lessons Learned

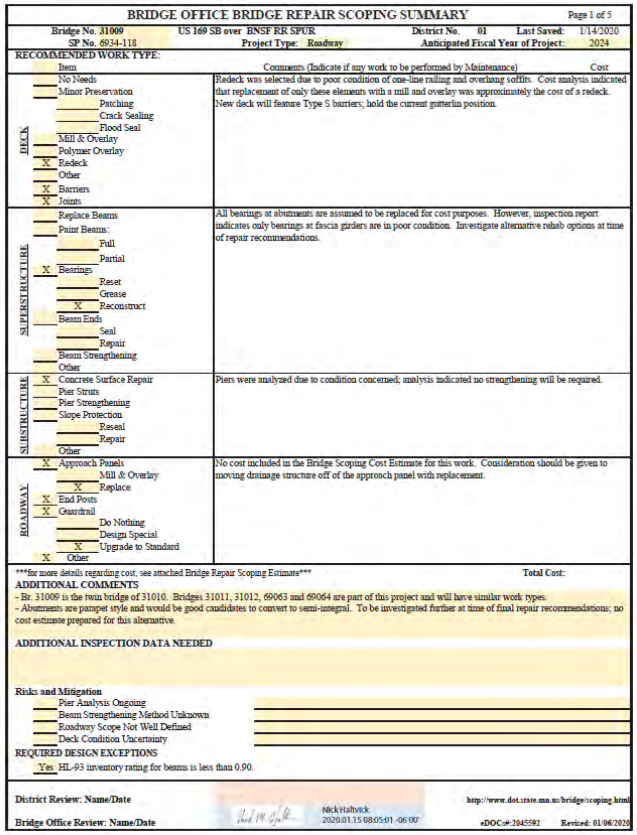
Updated every 4 years. Some key topics being updated this round include:

- Barrier upgrades
- End posts
  - Partial vs. full approach panel replacement
- Pier Strut Guidance

Scoping Process



Final Scope



BRIDGE OFFICE BRIDGE REPAIR SCOPING SUMMARY — Page 1 of 5

Bridge No. 31009 | US 169 SB over BNSF RR SPUR | District No. 01 | Last Saved: 1/14/2020
SP No. 6934-118 | Project Type: Roadway | Anticipated Fiscal Year of Project: 2024

RECOMMENDED WORK TYPE:

	Item	Comments (Indicate if any work to be performed by Maintenance)	Cost
DECK	No Needs	Redeck was selected due to poor condition of one-line railing and overhang soffits. Cost analysis indicated that replacement of only these elements with a mill and overlay was approximately the cost of a redeck. New deck will feature Type S barriers; hold the current gutterlin position.	
	Minor Preservation		
	Patching		
	Crack Sealing		
	Flood Seal		
	Mill & Overlay		
	Polymer Overlay		
X	Redeck		
	Other		
X	Barriers		
X	Joints		
SUPERSTRUCTURE	Replace Beams	All bearings at abutments are assumed to be replaced for cost purposes. However, inspection report indicates only bearings at fascia girders are in poor condition. Investigate alternative rehab options at time of repair recommendations.	
	Paint Beams:		
	Full		
	Partial		
X	Bearings		
	Reset		
	Grease		
X	Reconstruct		
	Beam Ends		
	Seal		
	Repair		
	Beam Strengthening		
	Other		
SUBSTRUCTURE	X Concrete Surface Repair	Piers were analyzed due to condition concerned; analysis indicated no strengthening will be required.	
	Pier Struts		
	Pier Strengthening		
	Slope Protection		
	Reseal		
	Repair		
	Other		
ROADWAY	X Approach Panels	No cost included in the Bridge Scoping Cost Estimate for this work. Consideration should be given to moving drainage structure off of the approach panel with replacement.	
	Mill & Overlay		
X	Replace		
X	End Posts		
X	Guardrail		
	Do Nothing		
	Design Special		
X	Upgrade to Standard		
X	Other		

for more details regarding cost, see attached Bridge Repair Scoping Estimate Total Cost:

ADDITIONAL COMMENTS
- Br. 31009 is the twin bridge of 31010. Bridges 31011, 31012, 69063 and 69064 are part of this project and will have similar work types.
- Abutments are parapet style and would be good candidates to convert to semi-integral. To be investigated further at time of final repair recommendations; no cost estimate prepared for this alternative.

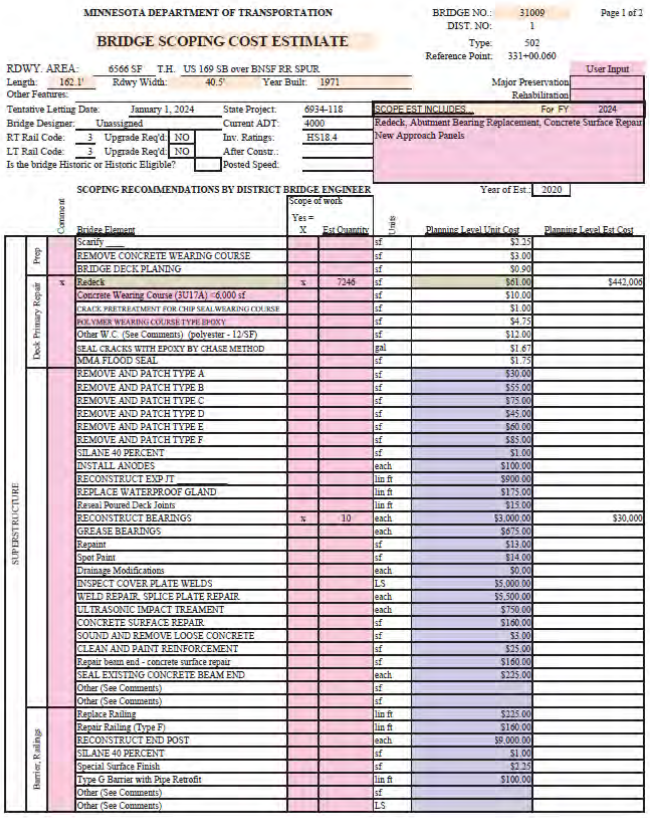
ADDITIONAL INSPECTION DATA NEEDED

Risks and Mitigation
- Pier Analysis Ongoing
- Beam Strengthening Method Unknown
- Roadway Scope Not Well Defined
- Deck Condition Uncertainty

REQUIRED DESIGN EXCEPTIONS
Yes HL-93 inventory rating for beams is less than 0.90.

District Review: Name/Date

Bridge Office Review: Name/Date — Nick Haltvick 2020.01.15 08:05:01 -06'00' — http://www.dot.state.mn.us/bridge/scoping.html — eDOC#:2945592 — Revised: 01/06/2020



MINNESOTA DEPARTMENT OF TRANSPORTATION — Page 1 of 2

BRIDGE SCOPING COST ESTIMATE

BRIDGE NO.: 31009
DIST. NO: 1
Type: 502
Reference Point: 331+00.060

RDWY. AREA: 6566 SF T.H. US 169 SB over BNSF RR SPUR
Length: 162.1' Rdwy Width: 40.5' Year Built: 1971
Other Features:

User Input
Major Preservation
Rehabilitation

Tentative Letting Date: January 1, 2024 State Project: 6934-118
Bridge Designer: Unassigned Current ADT: 4000
RT Rail Code: 3 Upgrade Req'd. NO Inv. Ratings: HS18.4
LT Rail Code: 3 Upgrade Req'd. NO After Constr.:
Is the bridge Historic or Historic Eligible? Posted Speed:

SCOPE EST INCLUDES... For FY 2024
Redeck, Abutment Bearing Replacement, Concrete Surface Repair
New Approach Panels

SCOPING RECOMMENDATIONS BY DISTRICT BRIDGE ENGINEER — Year of Est.: 2020

	Comment	Bridge Element	Scope of work Yes = X	Est Quantity	Units	Planning Level Unit Cost	Planning Level Est Cost
SUPERSTRUCTURE / Prep		Scarify			sf	$2.25	
		REMOVE CONCRETE WEARING COURSE			sf	$3.00	
		BRIDGE DECK PLANING			sf	$0.90	
Deck Primary Repair	x	Redeck	x	7246	sf	$61.00	$442,006
		Concrete Wearing Course (3U17A) <6,000 sf			sf	$10.00	
		CRACK PRETREATMENT FOR CHIP SEAL/WEARING COURSE			sf	$1.00	
		POLYMER WEARING COURSE TYPE EPOXY			sf	$4.75	
		Other W.C. (See Comments) (polyester - 12/SF)			sf	$12.00	
		SEAL CRACKS WITH EPOXY BY CHASE METHOD			gal	$1.67	
		MMA FLOOD SEAL			sf	$1.75	
		REMOVE AND PATCH TYPE A			sf	$30.00	
		REMOVE AND PATCH TYPE B			sf	$55.00	
		REMOVE AND PATCH TYPE C			sf	$75.00	
		REMOVE AND PATCH TYPE D			sf	$45.00	
		REMOVE AND PATCH TYPE E			sf	$60.00	
		REMOVE AND PATCH TYPE F			sf	$85.00	
		SILANE 40 PERCENT			sf	$1.00	
		INSTALL ANODES			each	$100.00	
		RECONSTRUCT EXP JT			lin ft	$900.00	
		REPLACE WATERPROOF GLAND			lin ft	$175.00	
		Reseal Poured Deck Joints			lin ft	$15.00	
		RECONSTRUCT BEARINGS	x	10	each	$3,000.00	$30,000
		GREASE BEARINGS			each	$675.00	
		Repaint			sf	$13.00	
		Spot Paint			sf	$14.00	
		Drainage Modifications			each	$0.00	
		INSPECT COVER PLATE WELDS			LS	$5,000.00	
		WELD REPAIR, SPLICE PLATE REPAIR			each	$5,500.00	
		ULTRASONIC IMPACT TREAMENT			each	$750.00	
		CONCRETE SURFACE REPAIR			sf	$160.00	
		SOUND AND REMOVE LOOSE CONCRETE			sf	$3.00	
		CLEAN AND PAINT REINFORCEMENT			sf	$25.00	
		Repair beam end - concrete surface repair			sf	$160.00	
		SEAL EXISTING CONCRETE BEAM END			each	$225.00	
		Other (See Comments)			sf		
		Other (See Comments)			sf		
Barrier, Railings		Replace Railing			lin ft	$225.00	
		Repair Railing (Type F)			lin ft	$160.00	
		RECONSTRUCT END POST			each	$9,000.00	
		SILANE 40 PERCENT			sf	$1.00	
		Special Surface Finish			sf	$2.25	
		Type G Barrier with Pipe Retrofit			lin ft	$100.00	
		Other (See Comments)			sf		
		Other (See Comments)			LS		

Roadway Projects

End Posts

Approach Panels

Expansion Joints

Pier Struts

Pier Evaluation

Pier Evaluation - Screening Process

- Condition
- Geometry
- Loading
- Work Type

Pier Evaluation - Screening Process

- Exemptions
  - Minor work
  - Short term fixes
  - Types of piers (pile bents, integrated superstructures, etc.)
  - Roadway projects with no bridge work

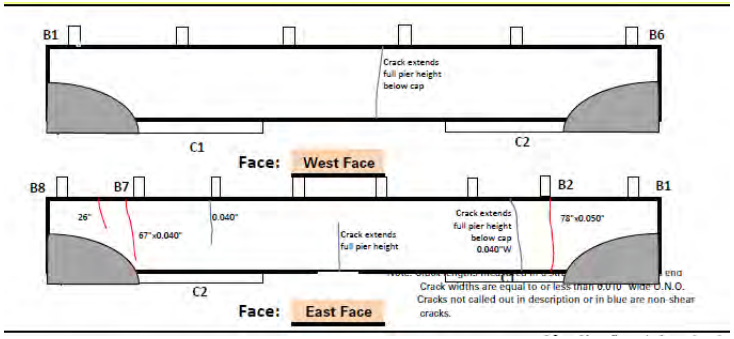
Pier Evaluation

- Please see Daniel Freiburger's presentation for guidance on **how** to complete the analysis

- Contact Bridge Office Evaluations Engineer (Jessica Duncan) or Bridge Office Scoping Engineer if working on a pier evaluation for scoping.

Analysis Completed – Now what?

- Dependent on Results
  - Meeting with Bridge Management Team, Evaluations Engineer, Regional Bridge Construction Engineer, and Designer



- Mitigation Strategies
  - Leave as is, monitoring, posting, infill or other repairs, replacement

Bridge Management Plans

Bridge Management Plans

What is included?

- Preservation Strategy to maintain structure at defined intervals to avoid costly or impossible redecks
  - St. Croix Crossing.
- A plan for a bridge nearing the end of it's service life
  - Blatnik
- Something in Between
  - 5060, Robert St., Dunwoody, Cedar

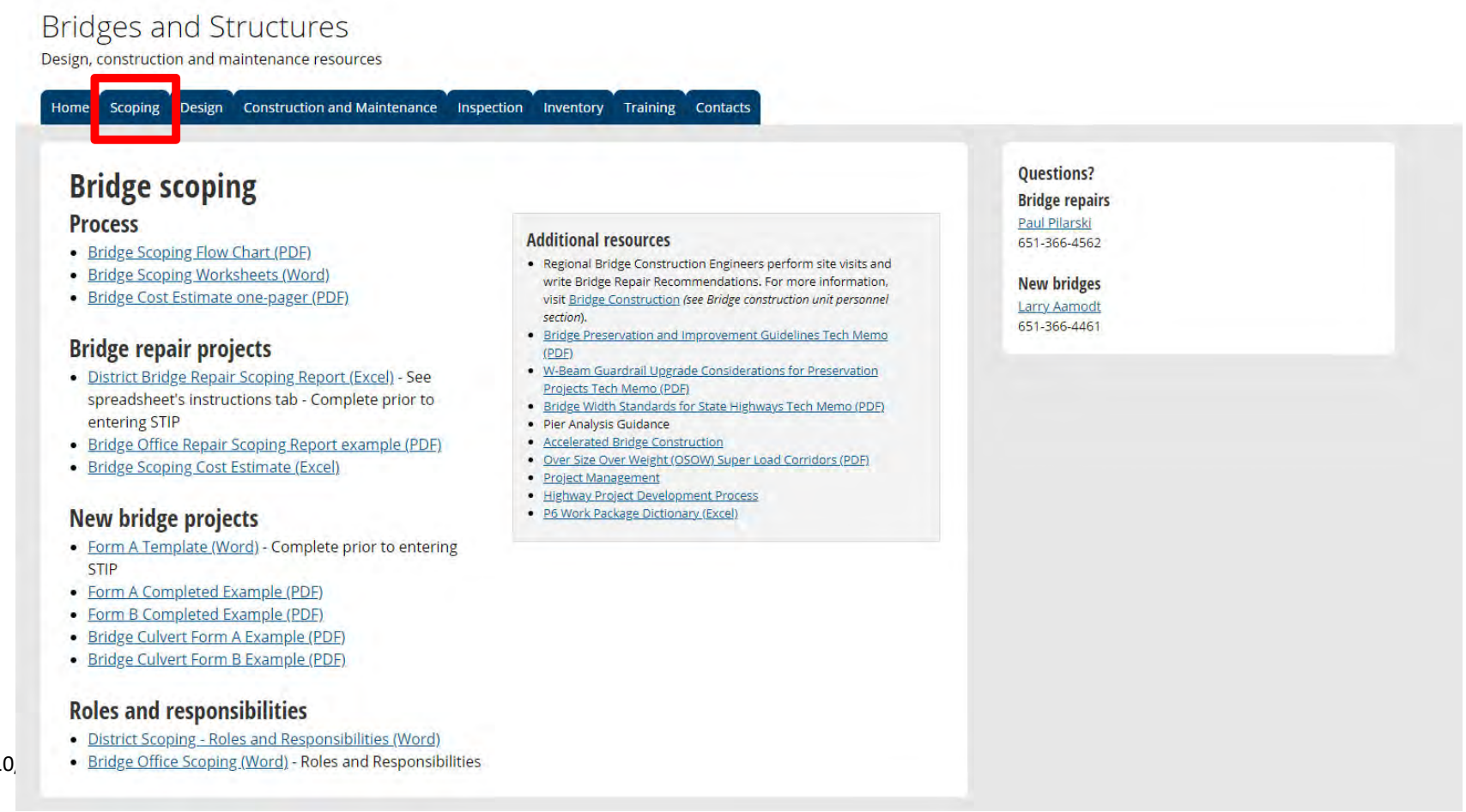
Future Presentation

- Plan on giving Bridge Management Plan Presentation.
  - Paul Kivisto
  - Understand the basics of management plans
  - Different levels of detail

Resources

Resources

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



Bridges and Structures

Design, construction and maintenance resources

Home | Scoping | Design | Construction and Maintenance | Inspection | Inventory | Training | Contacts

Bridge scoping

Process

- Bridge Scoping Flow Chart (PDF)
- Bridge Scoping Worksheets (Word)
- Bridge Cost Estimate one-pager (PDF)

Bridge repair projects

- District Bridge Repair Scoping Report (Excel) - See spreadsheet's instructions tab - Complete prior to entering STIP
- Bridge Office Repair Scoping Report example (PDF)
- Bridge Scoping Cost Estimate (Excel)

New bridge projects

- Form A Template (Word) - Complete prior to entering STIP
- Form A Completed Example (PDF)
- Form B Completed Example (PDF)
- Bridge Culvert Form A Example (PDF)
- Bridge Culvert Form B Example (PDF)

Roles and responsibilities

- District Scoping - Roles and Responsibilities (Word)
- Bridge Office Scoping (Word) - Roles and Responsibilities

Additional resources

- Regional Bridge Construction Engineers perform site visits and write Bridge Repair Recommendations. For more information, visit Bridge Construction *(see Bridge construction unit personnel section)*.
- Bridge Preservation and Improvement Guidelines Tech Memo (PDF)
- W-Beam Guardrail Upgrade Considerations for Preservation Projects Tech Memo (PDF)
- Bridge Width Standards for State Highways Tech Memo (PDF)
- Pier Analysis Guidance
- Accelerated Bridge Construction
- Over Size Over Weight (OSOW) Super Load Corridors (PDF)
- Project Management
- Highway Project Development Process
- P6 Work Package Dictionary (Excel)

Questions?

Bridge repairs

Paul Pilarski
651-366-4562

New bridges

Larry Aamodt
651-366-4461

Resources (cont.)

- Coming soon – Training presentations

Questions?

Thank you again!

Kyle Fritz

Kyle.fritz@state.mn.us

651-366-4538