MUNICIPALITY OF ARRAN-ELDERSLIE
Bridge Infrastructure Master Plan

Council Presentation

February 13 2023

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Agenda

- Project Background
- Master Plan Process
- Evaluation Approach
- Bridge Alternatives
- Preferred Approach
- Next Steps

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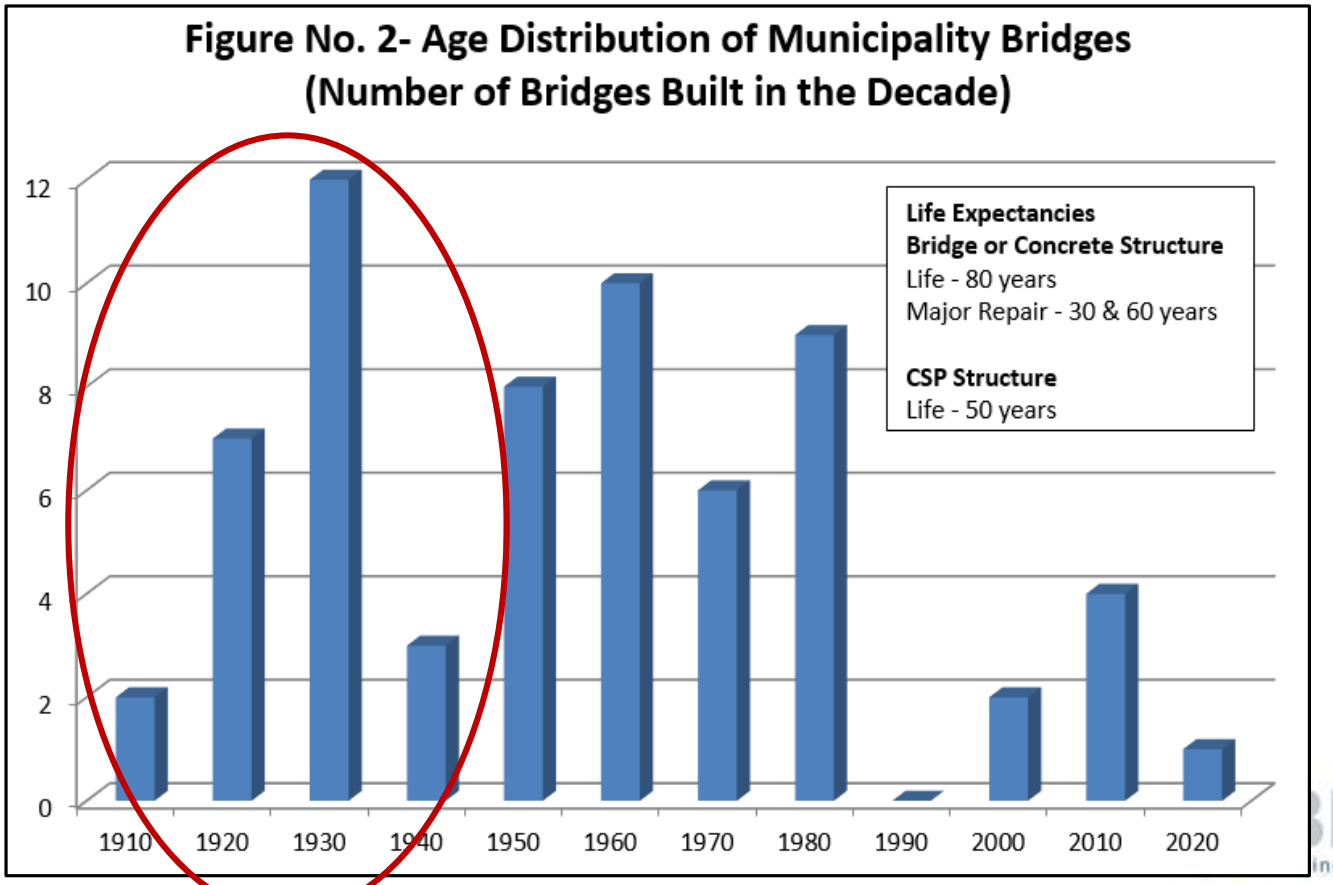
Project Background

- Arran-Elderslie maintains 64 Bridges (>3m in length)
- The Infrastructure Master Plan is considering outcomes for only 17 of the oldest crossings in the Municipality



Background Investigations

- Visited bridge sites to evaluate the condition of the 17 identified crossings
- Based on the reviews and our professional opinion, completed evaluation to determine if it would be more practical to repair or replace each of the structures
- Based upon current condition, tried to predict when repairs and/or replacements would be necessary
- Probable replacement costs and repair costs, when practical, were calculated for each structure
- Developed methods to compare the value of each crossing relative to the cost to maintain it
- Summarized the Results

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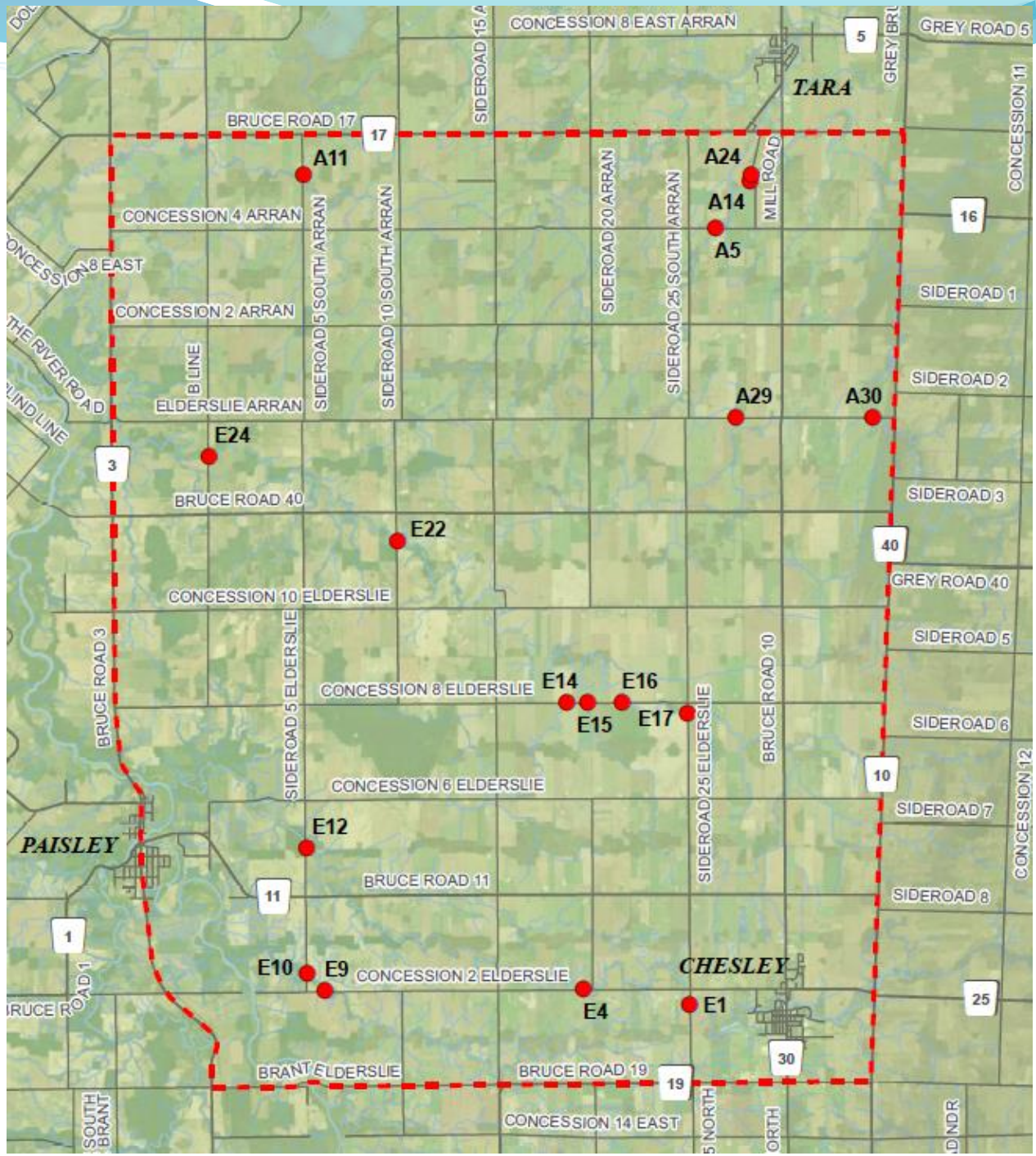
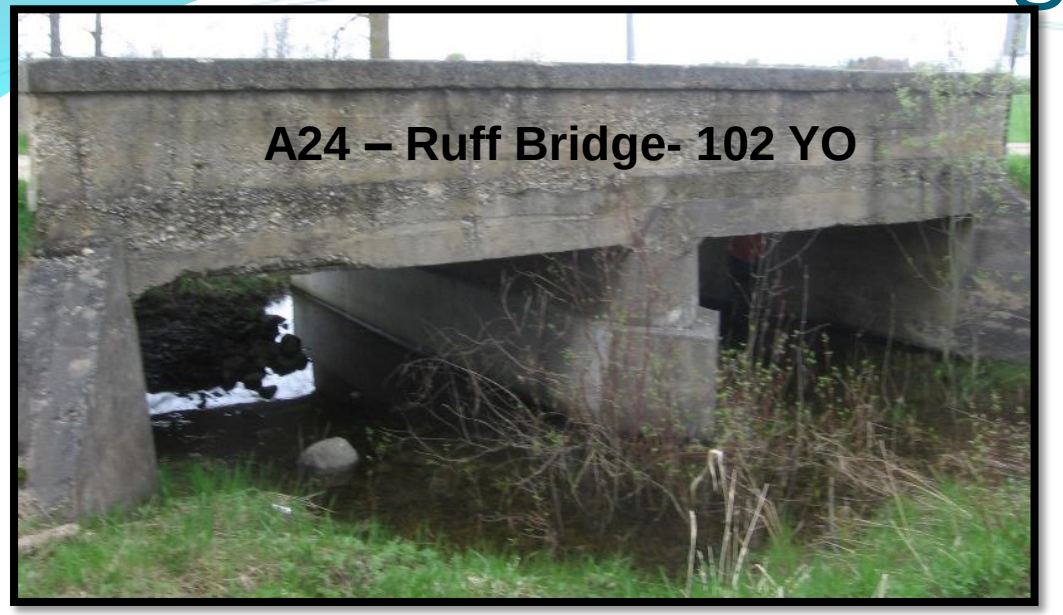
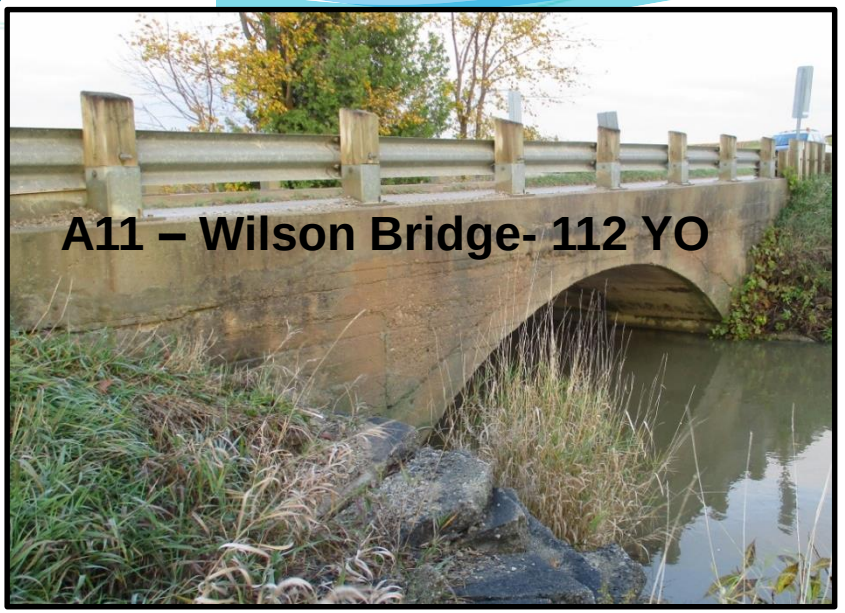
Study Bridges

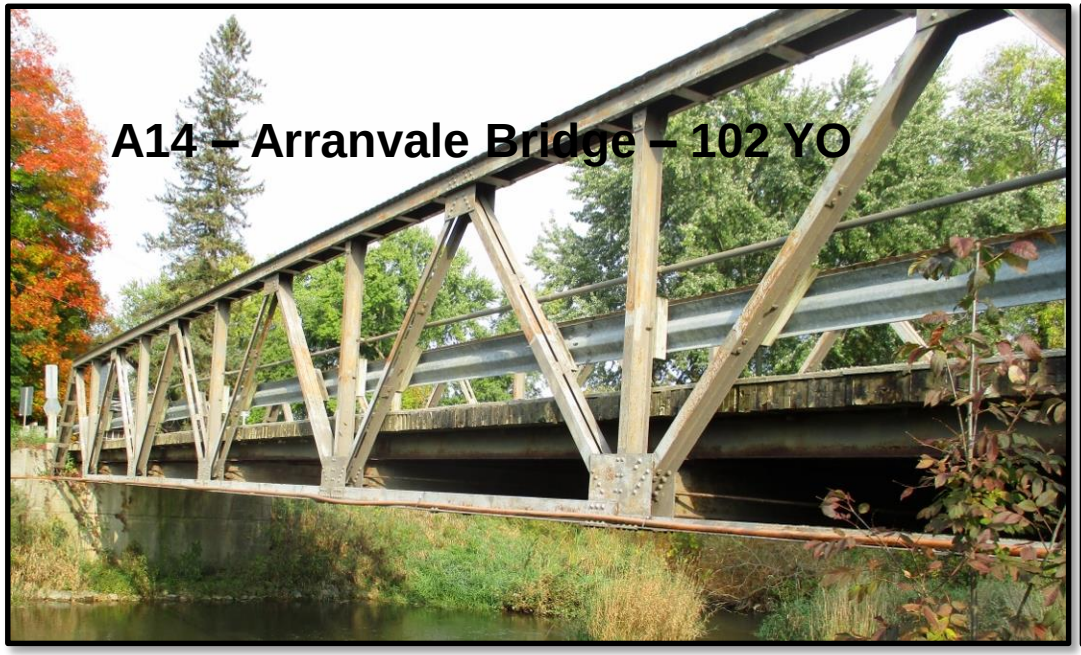
A11-Wilson
A24-Ruff
A14-Arranvale
A5-Hunts
A29, A30
E22, E24
E14, E15, E16, E17
E12-Pearces
E9, E10
E4-Allens
E1-Priebe



Bridges

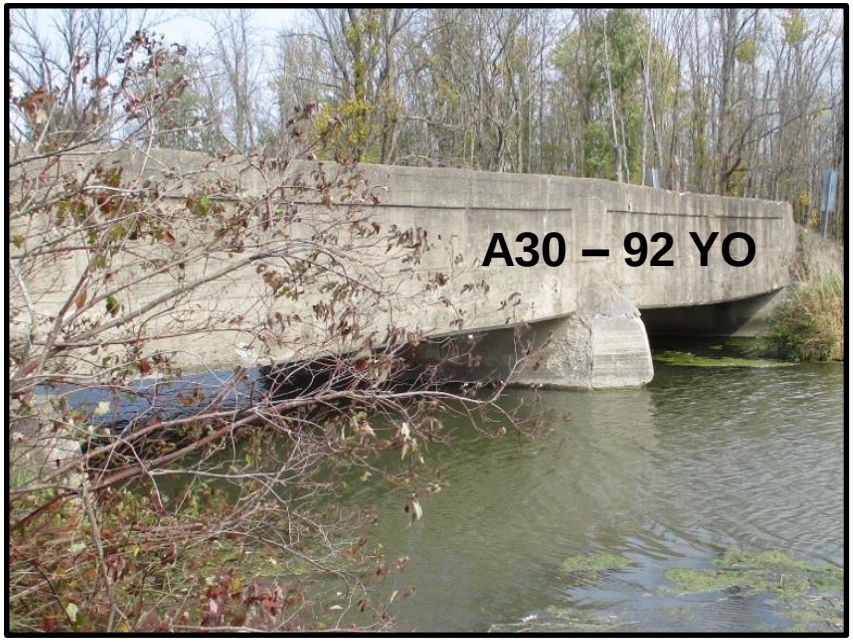

A24 – Ruff Bridge- 102 YO


A11 – Wilson Bridge- 112 YO


A14 – Arranvale Bridge – 102 YO


A5 – Hunts Bridge – 112 YO
10/09/20

Bridges



Bridges

Bridges

Bridges

E12 - Pearces Bridge – 92 YO

Master Plan Timeline

- Notice of Commencement — September 2019
- Agency/Indigenous Consultation — September 2019
- Cultural Heritage Evaluation Report — March 2020
- Engineering Evaluation of Crossings — 2021
- Evaluation of Bridges — 2021
  - Traffic Counts, Detour Options, BCI, Road Connectivity, Road Surface Condition, Load Limit
- Develop Possible Closure Recommendations — 2022
- Council Presentation — Winter 2023

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What are Master Plans

- Master Plans take a System Wide Approach to Planning which relates Infrastructure either Geographically or by Function
- Recommends projects to be implemented over an extended period
- Addresses at minimum the First Two Phases of the MEA Class EA which can be Implemented through separate individual projects

SCOPE OF MASTER PLAN STUDY

- Review a number of older bridges in Arran-Elderslie, complete required studies and provide recommendations for future
- Consult with Residents, Review Agencies and First Nations
- Develop a phasing plan for implementation of recommendations
- Consider possible closures

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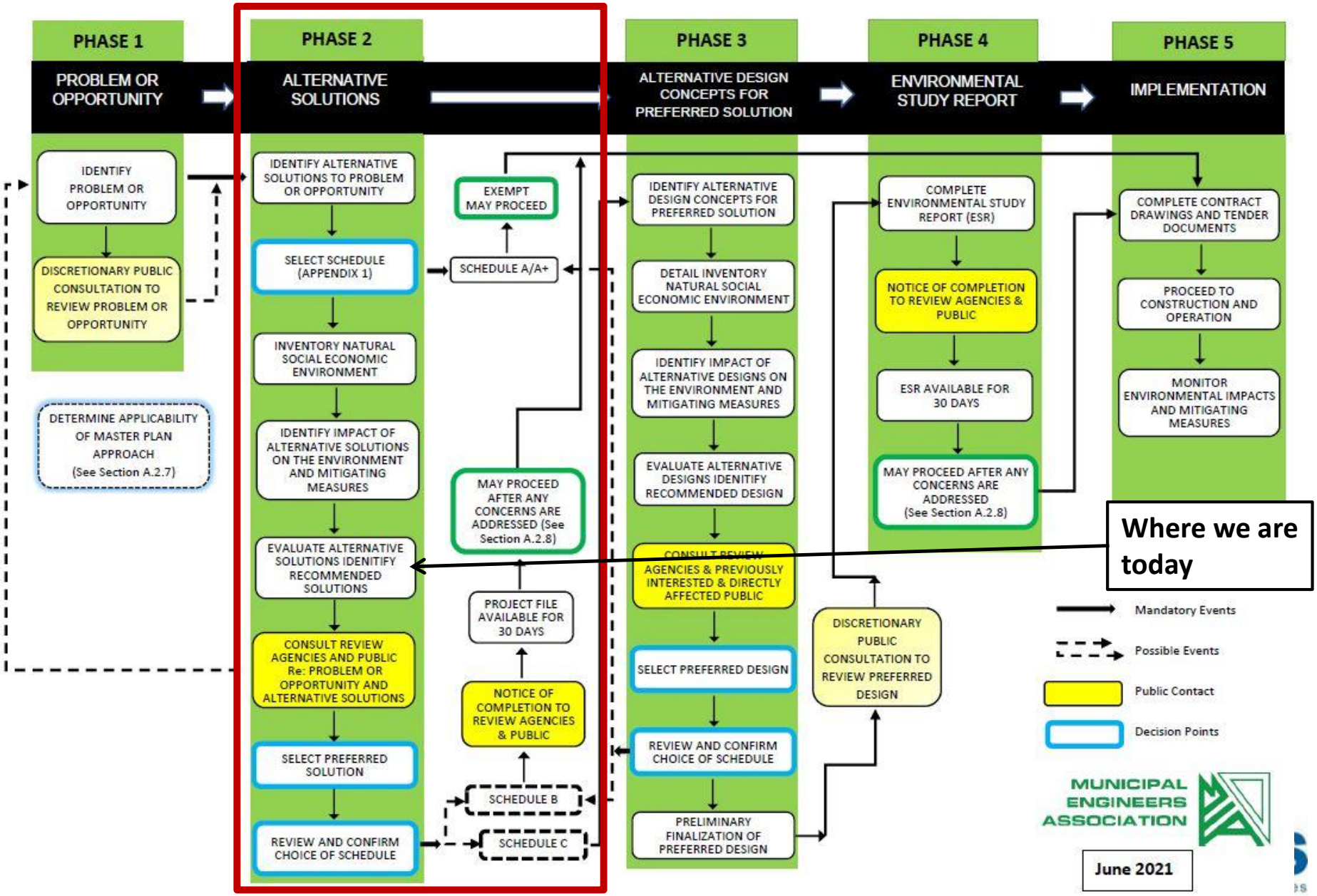
MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA



Master Plan Alternatives

- **Alternative 1** – Replace or repair all of the crossings, as required. This option means that each crossing would be either repaired or replaced, and none would be retired (closed).
- **Alternative 2** – Close some crossings and either replace or repair the remaining crossings. This option means that several bridges, will eventually be closed to traffic and removed, while the remaining crossings will be either repaired or replaced.
- **Alternative 3** – Do Nothing. The do nothing option, is a consideration during any Master Plan Class EA process. This option would propose that no commitment is made either way and improvements or changes to address problems will continue to be made on a case by case basis.

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Additional Evaluations

- **Traffic Counts** – Provided by Arran-Elderslie
- **Detour Options** – Shortest Route around if Bridge Closed
- **BCI** – Bridge Condition Index (Condition Score)
- **Road Surface** – Gravel/Pavement
- **Load Limit** – Based on Engineering Review
- **Road Connectivity** – Connection to County Roads or corridors through the Municipality
- **Cost Estimates** – Replacement/Repair

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Evaluation of Alternatives

- Cost to Replace All Crossings > $28 Million
- Two Main Evaluation Approaches were Identified
- Approach #1
  - Approach #1 utilizes BCI, Load Limit, Traffic Counts, Road Types, Detour Lengths (if closed), Road Connectivity and Replacement Costs, to identify bridges for Closure.
- Approach #2
  - Approach #2 removes the BCI and Load Limit Scores and just focuses on Traffic Counts, Road Types, Detour Lengths (if closed) and Road Connectivity, to identify bridges for Closure. With this approach you are focusing more on the location and function of the bridges, rather than their current condition.

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Evaluation of Alternatives

- With both Approaches, 4 Bridges were initially identified for Closure (Option A), then an additional 4 bridges were identified for closure (Option B) – 8 Total
- Bridges identified for closure would remain open until required repair costs exceeded a pre-determined threshold or the condition of the bridge threatened public safety
- Ultimately, Arran-Elderslie will determine how many crossings it wants to permanently close and the timeline for closure
- A long range plan that identifies crossings that will eventually be closed will be helpful in making other infrastructure decisions (road work) and for the agricultural and Mennonite communities.

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Scoring System

- A scoring system was developed so that recommendations are defendable. Highest scores are recommended for Closure

BCI: <30 = 20
31-40 = 15
41-50 = 10
> 50 = 5

Load Limit: < 10 = 15
11-20 = 10
> 20 = 5

Traffic: < 100 = 15
100-250 = 10
> 250 = 5

Road: Gravel = 15
HCB = 10
LCB = 5

Detour: < 8km = 15
9-10 = 10
> 11 = 5

Replace $: < 1mil = 5
1-2mil = 10
> 2mil = 15

Road Connection: None = 15
Some = 10
Yes = 5

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Approach #1

Replace All Crossings
> $28 Million

Option A Closures

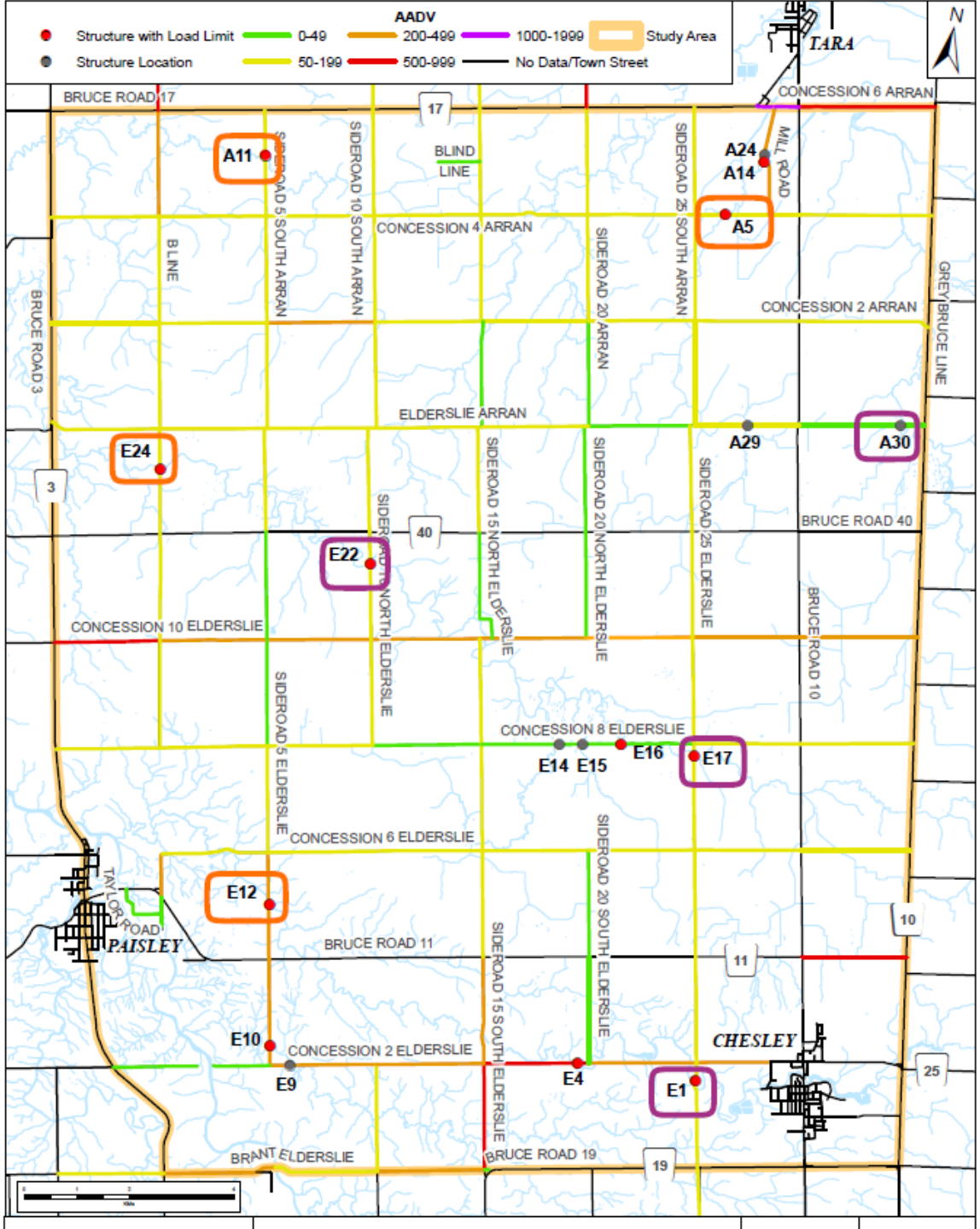
- A30, E22, E17, E1

$19.4 Million
Saves $8.7 Million

Option B Closures

- A11, A5, E24, E12

$12.4 Million
Saves $15.7 Million



Approach 1 – Matrix Results

Approach #1

Initial approach to identifying bridge closures, which utilizes BCI, Load Limit, Traffic Counts, Road Types, Detour Lengths (if closed), Road Connectivity and Replacement Costs, to identify bridges for Closure. Table 1.1 is the matrix used to identify the bridges. Table 1.2 is a proposed timeline for implementation of either closures, repairs or replacements.

Table 1.1: Potential Bridge Closure Assessment Matrix – Recommended Closures Option A - **Option B -** +

Structure ID	Type & Age	BCI	Score	Load Limit	Score	Traffic Count	Score X 2	Road Type[1]	Score	Detour	Score	Replace$	Score x 2	Road Connectivity	Score	Total
E1 – Priebe	Truss-1938	40	15	10	15	61	30	Gravel	15	8.1km	10	$ 2,559,045	30	Some	10	125
E4 - Allens	Truss-1920	50	10	18/29/36	10	591	10	HCB	5	8.2km	10	$2,362,020	30	Yes	5	80
A5 – Hunts	Conc. Arc-1910	63	5	9	15	125	20	Gravel	15	7.1km	15	$1,348,035	20	Some	10	100
E9	Beam-1930	26	20	25	5	272	10	LCB	10	12.2km	5	$1,019,175	20	Yes	5	75
E10	T-Beam-1930	48	10	11	10	349	10	LCB	10	12.2km	5	$1,183,605	20	Yes	5	70
A11 – Wilson	Conc. Arch-1910	45	10	12	10	90	30	Gravel	15	8.1km	10	$799,935	10	No	15	100
E12– Pearces	Truss-1930	46	10	8	15	252	10	Gravel	15	7.6km	15	$2,970,120	30	Yes	5	100
A14–Arranvale	Truss-1920	45	10	14	10	320	10	Gravel	15	5.2km	15	$2,958,390	30	Yes	5	95
E14	T-Beam-1930	34	15	25	5	19	30	Gravel	15	12.2km	5	$1,046,580	20	Yes	5	95
E15	T-Beam-1920	41	10	25	5	19	30	Gravel	15	12.2km	5	$1,019,175	20	Yes	5	90
E16	T-Beam-1930	31	15	15	10	0	30	Gravel	15	12.2km	5	$1,019,175	20	Yes	5	100
E17	Truss-1930	38	15	11	10	155	20	Gravel	15	8.2km	10	$2,298,075	30	No	15	115
E22	Truss 1920	46	10	3	15	0	30	Gravel	15	8.1 km	10	$1,978,350	20	No	15	105
E24	Truss-1920	53	5	10	15	166	20	Gravel	15	8.2km	10	$1,887,000	20	No	15	100
A24 – Ruff	Conc. slab-1920	29	20	25	5	320	10	Gravel	15	5.2km	15	$781,665	10	Some	10	85
A29	Conc. slab-1930	56	5	25	5	51	30	Gravel	15	7.9km	15	$964,365	10	Some	10	90
A30	Conc. slab-1930	38	10	12	10	34	30	Gravel	15	8.8km	10	$1,868,730	20	Some	10	105

Scoring System: [1]LCB – Low Class Bituminous, HCB – High Class Bituminous

BCI: <30 = 20, 30-40 = 15, 41-50 = 10, >50 = 5

Load Limit: <10 = 15, 11-20 = 10, > 20 = 5

Traffic: <100 = 15, 100-250 = 10, > 250 = 5

Road Type: Gravel = 15, LCB = 10, HCB = 5

Detour Length: < 8 = 15, 8-10= 10, >10 = 5

Replace Cost: < 1 mil = 5, 1–2 mil = 10, > 2 mil = 15

Road Connection: none = 15, some = 10, yes = 5

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Approach #1 Repair Timelines

Table 1.2: Recommended Outcomes for Approach #1 – Option #A - 4 Bridge Closures **Option #B– 4 additional closures**

Structure ID	Type & Age	BCI	Recommended Outcome	Repair Costs	Repair Timeline	Replacement Costs	Replacement Timeline
E1 – Priebe	Truss-1938	40	**Closure**	No Immediate Repairs		N/A	10-15 Years
E4 - Allens	Truss-1920	50	**Replace**	No Immediate Repairs		$2,362,020	15-20 Years
A5 – Hunts	Conc. Arc-1910	63	**Repair then Closure**	$75,000	**1-5 Years**	N/A	20-25 years
E9	Beam-1930	26	**Replace**	$212,000 (N/A)	**N/A**	$1,019,175	1-5 Years
E10	T-Beam-1930	48	**Replace**	No Immediate Repairs		$1,183,605	15-20 Years
A11 – Wilson	Conc. Arch-1910	45	**Closure**	No Immediate Repairs		N/A	15-20 Years
E12– Pearces	Truss-1930	46	**Closure**	No Immediate Repairs		N/A	15-20 Years
A14–Arranvale	Truss-1920	45	**Replace**	No Immediate Repairs		$2,958,390	15-20 Years
E14	T-Beam-1930	34	**Repair then Replace**	$81,000	**1-5 Years**	$1,046,580	10-15 Years
E15	T-Beam-1920	41	**Replace**	No Immediate Repairs		$1,019,175	10-15 Years
E16	T-Beam-1930	31	**Repair then Replace**	$146,000	**1-5 Years**	$1,019,175	10-15 Years
E17	Truss-1930	38	**Repair then Closure**	$98,000	**1-5 Years**	N/A	10-15 Years
E22	Truss 1920	46	**Repair then Closure**	$23,000	**1-5 Years**	N/A	15-20 Years
E24	Truss-1920	53	**Repair then Closure**	$13,000	**1-5 Years**	N/A	20-25 Years
A24 – Ruff	Conc. slab-1920	29	**Replace**	N/A	**N/A**	$781,665	1-5 Years
A29	Conc. slab-1930	56	**Repair then Replace**	$78,000	**1-5 Years**	$964,365	20-25 Years
A30	Conc. slab-1930	38	**Repair then Closure**	$150,000	**1-5 Years**	N/A	10-15 Years

Total Replacement Costs: $12,354,150

*Timelines and anticipated work are preliminary and will change based on the results of annual inspections and other bridge priorities

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Approach #2

Replace All Crossings
> $28 Million

Option A Closures

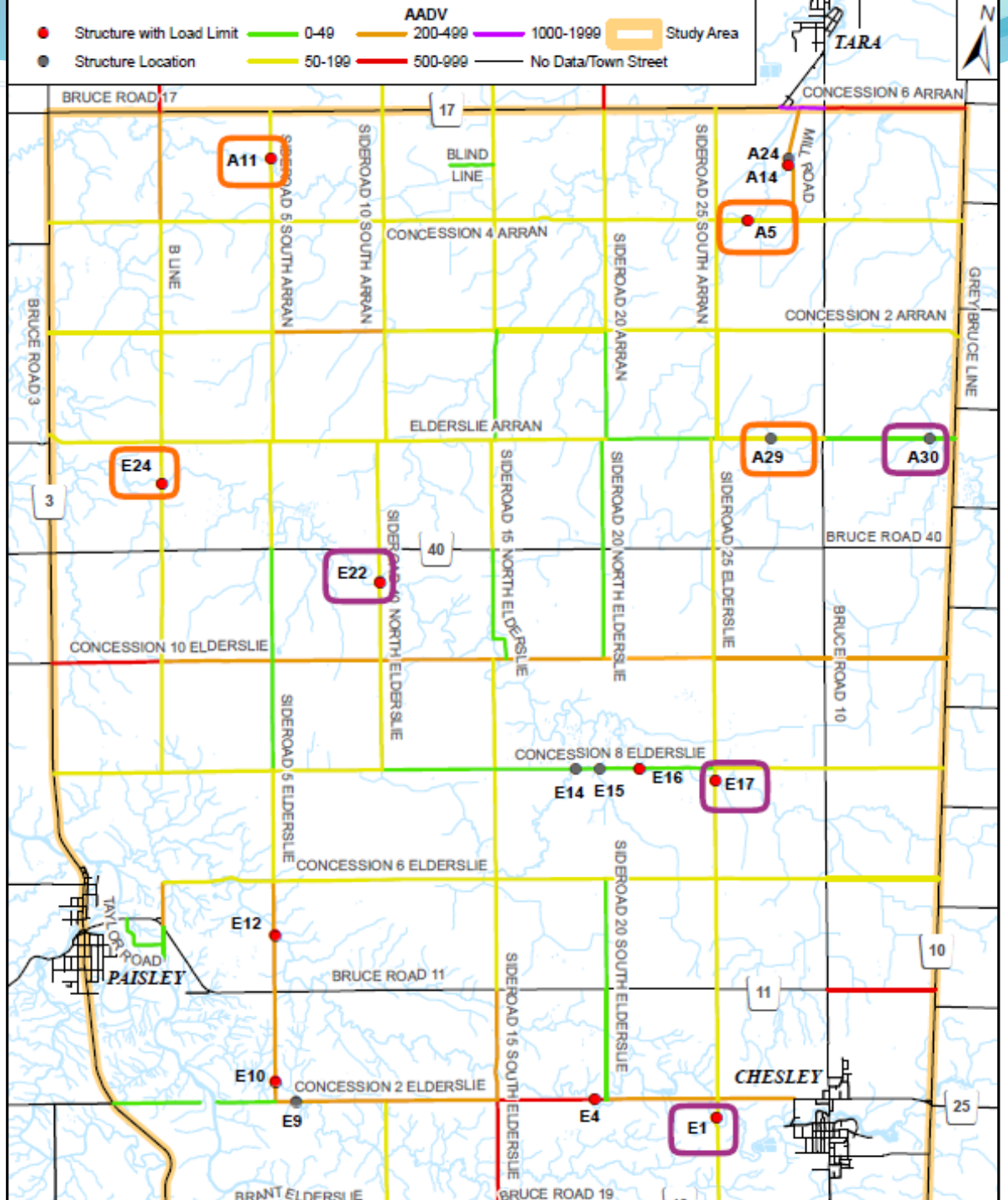
- E17, A30, E22, E1

$19.4 Million
Saves $8.7 Million

Option B Closures

- A11, A5, E24, A29

$14.4 Million
Saves $13.7 Million



Approach 2 – Matrix Results

*Evaluate based on only location, remove bridge condition components

Table 2.1: Potential Bridge Closure Assessment Matrix – Recommended Closures Option A - Option B - +

Structure ID	Type & Age	Traffic Count	Score X 2	Road Type[1]	Score	Detour	Score	Replace$	Score x 2	Road Connectivity	Score	Total*
E1 – Priebe	Truss-1938	61	30	Gravel	15	8.1km	10	$ 2,559,045	30	Some	10	95
E4 - Allens	Truss-1920	591	10	HCB	5	8.2km	10	$2,362,020	30	Yes	5	60
A5 – Hunts	Conc. Arc-1910	125	20	Gravel	15	7.1km	15	$1,348,035	20	Some	10	80
E9	Beam-1930	272	10	LCB	10	12.2km	5	$1,019,175	20	Yes	5	50
E10	T-Beam-1930	349	10	LCB	10	12.2km	5	$1,183,605	20	Yes	5	50
A11 – Wilson	Conc. Arch-1910	90	30	Gravel	15	8.1km	10	$799,935	10	No	15	80
E12– Pearces	Truss-1930	252	10	Gravel	15	7.6km	15	$2,970,120	30	Yes	5	75
A14–Arranvale	Truss-1920	320	10	Gravel	15	5.2km	15	$2,958,390	30	Yes	5	75
E14	T-Beam-1930	19	30	Gravel	15	12.2km	5	$1,046,580	20	Yes	5	75
E15	T-Beam-1920	19	30	Gravel	15	12.2km	5	$1,019,175	20	Yes	5	75
E16	T-Beam-1930	0	30	Gravel	15	12.2km	5	$1,019,175	20	Yes	5	75
E17	Truss-1930	155	20	Gravel	15	8.2km	10	$2,298,075	30	No	15	90
E22	Truss 1920	0	30	Gravel	15	8.1 km	10	$1,978,350	20	No	15	90
E24	Truss-1920	166	20	Gravel	15	8.2km	10	$1,887,000	20	No	15	80
A24 – Ruff	Conc. slab-1920	320	10	Gravel	15	5.2km	15	$781,665	10	Some	10	60
A29	Conc. slab-1930	51	30	Gravel	15	7.9km	15	$964,365	10	Some	10	80
A30	Conc. slab-1930	34	30	Gravel	15	8.8km	10	$1,868,730	20	Some	10	85

* If scores are tied for one or more structures, the structure with the lowest traffic count is moved to the higher category

Scoring System: [1]**LCB – Low Class Bituminous, HCB – High Class Bituminous**

Traffic: <100 = 15, 100-250 = 10, > 250 = 5

Road Type: Gravel = 15, LCB = 10, HCB = 5

Detour Length: < 8 = 15, 8-10 = 10, >10 = 5

Replace Cost: < 1 mil = 5, 1–2 mil = 10, > 2 mil = 15

Road Connectivity: none = 15, some = 10, yes = 5

Approach #2 Repair Timelines

Table 2.2: Recommended Outcomes for Approach #2 – Option #A - 4 Bridge Closures **Option #B – 4 more closures**

Structure ID	Type & Age	BCI	Recommended Outcome	Repair Costs	Repair Timeline	Replacement Costs	Replacement Timeline
E1 – Priebe	Truss-1938	40	**Closure**	No Immediate Repairs		N/A	10-15 Years
E4 - Allens	Truss-1920	50	**Replace**	No Immediate Repairs		$2,362,020	15-20 Years
A5 – Hunts	Conc. Arc-1910	63	**Repair then Closure**	$75,000	**1-5 Years**	N/A	20-25 years
E9	Beam-1930	26	**Replace**	$212,000 (N/A)	**N/A**	$1,019,175	1-5 Years
E10	T-Beam-1930	48	**Replace**	No Immediate Repairs		$1,183,605	15-20 Years
A11 – Wilson	Conc. Arch-1910	45	**Closure**	No Immediate Repairs		N/A	15-20 Years
E12– Pearces	Truss-1930	46	**Replace**	No Immediate Repairs		$2,970,120	15-20 Years
A14–Arranvale	Truss-1920	45	**Replace**	No Immediate Repairs		$2,958,390	15-20 Years
E14	T-Beam-1930	34	**Repair then Replace**	$81,000	**1-5 Years**	$1,046,580	10-15 Years
E15	T-Beam-1920	41	**Replace**	No Immediate Repairs		$1,019,175	10-15 Years
E16	T-Beam-1930	31	**Repair then Replace**	$146,000	**1-5 Years**	$1,019,175	10-15 Years
E17	Truss-1930	38	**Repair then Closure**	$98,000	**1-5 Years**	N/A	10-15 Years
E22	Truss 1920	46	**Repair then Closure**	$23,000	**1-5 Years**	N/A	15-20 Years
E24	Truss-1920	53	**Repair then Closure**	$13,000	**1-5 Years**	N/A	20-25 Years
A24 – Ruff	Conc. slab-1920	29	**Replace**	N/A	**N/A**	$781,665	1-5 Years
A29	Conc. slab-1930	56	**Repair then Closure**	$78,000	**1-5 Years**	N/A	20-25 Years
A30	Conc. slab-1930	38	**Repair then Closure**	$150,000	**1-5 Years**	N/A	10-15 Years

Total Replacement Costs: $14,359,905

*Timelines and anticipated work are preliminary and will change based on the results of annual inspections and other bridge priorities

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Next Steps

- Select a Preliminary Preferred Approach
- Seek Additional Input from Residents, Agencies & FN
- Public Information Meeting
- Based on Feedback, Confirm a Preferred Approach
- Finalize Master Plan Report
- Select a Phasing Timeline
  - Can be Modified as Bridge Conditions Change over Time
- Publish Notice of Master Plan Completion

Questions?

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