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LICKING COUNTY 5-YEAR BRIDGE PROGRAM

Managing and Replacing
158 Deteriorated Structure Assets

How does a rural Ohio county deal with a bridge crisis?

Managing and Replacing 158 Deteriorated Structure Assets

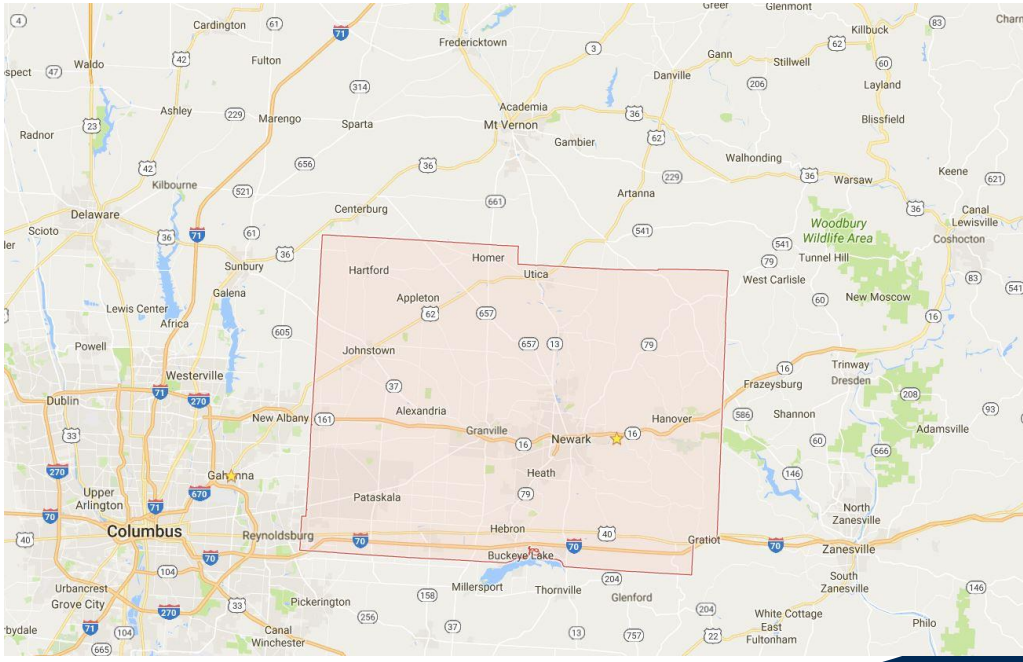
- **Where is Licking County, Ohio?**

Located just east of Columbus, Ohio

- County limits extend just south of I-70 to Buckeye Lake, Ohio
- Extends just east of Hanover and Gratiot, Ohio
- Extends just north of Utica, Ohio

County Seat is in Newark, Ohio

- Population: 172,198 (2016)
  - Newark Advocate, March 24, 2017
- Rural, farming county
- Population density ~ 250/sq. mile



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- **In 2013 Licking County started to evaluate their bridge and culvert assets and reached out to Gannett Fleming to assist**
  - The county staff anticipated a small number of the 340 bridges were in need of significant repair or replacement
  - Licking County identified 70 bridges and culverts that they thought were the worst
  - We developed a coding system to prioritize bridges and culverts with significant deterioration or problems

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- **Initial plan to spend 15-30 minutes at each bridge to locate and document "The Critical Problem" for each structure**
  - "The Critical Problem" was anticipated to be the condition that put the bridge in a NBIS condition code of 4 or less

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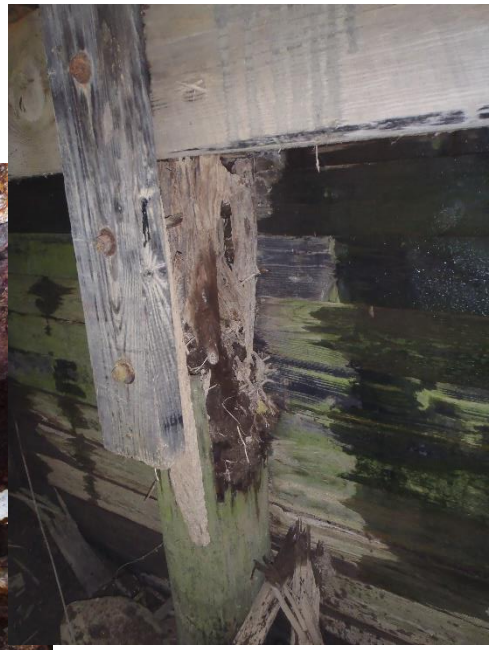
- **More Examples of "The Critical Problem"**



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- **What is the 0-5 Year Coding System?**
  - 0-5 indicates which year in the 5-year program the asset is targeted for repair or replacement
  - Purpose of the coding system to:
    - Enable the most critical structures to be identified
    - Prioritize repair funds to those assets first
    - Consideration is given to whether the bridge is closed or reduced to a single lane of traffic
    - Is the bridge on a prominent county route

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- **What is the 0-5 Year Coding System?**
  - GF and Licking County staff worked together to develop the list and understand the level of risk for the bridges in the 0-2 year groups.
    - Some bridges and culverts were closed
    - Some were reduced to a single lane of traffic
    - Most of these bridges were posted
    - Some were posted and reduced to a single lane of traffic to move vehicles away from the deteriorated areas

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- **0-5 Year Coding System**

Numerical Code	Condition	Situation	Action
5	Poor	Structure is monitored on a frequent basis (6 months or less)	Perform Major Repairs or Replace Structure
4	Poor	Structure is monitored on a frequent basis (6 months or less) and posted to reduce loads if necessary until replaced or repaired	Perform Major Repairs or Replace Structure
3	Poor	Structure is monitored on a frequent basis (every 3-6 months) and posted to reduce loads until replaced or repaired	Replace Structure
2	Critical	Structure is monitored on a frequent basis (every 1-3 months) and posted to reduce loads until replaced	Replace Structure
1	Critical	Structure is monitored on a weekly basis or every month and posted to reduce loads or closed until replaced	Replace Structure
0	Closed	Structure is closed until replaced	Replace Structure

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- **How does 70 bridges increase to 158?**
  - Database information in ODOT's BMS was not correct for Licking County assets
  - Bridges were not coded correctly
    - Various conditions were identified that were not considered in the past on ODOT BR86 forms and overall bridge appraisal ratings
    - GF helped Licking County staff understand the conditions that directly affect bridge capacity and load rating factors
  - Approximately 40 new structural plate arch culverts that were not part of the bridge record in 2013 were discovered and added
  - Many "Orphan Structures", ones that were found while Licking County engineer interns drove every road in the county to verify the total bridge number
- **70 bridges is now 158!**

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- **How were the bridges coded after the field assessments were complete?**
  - 4 Bridges with a Code 0, Red
  - 21 Bridges with a Code 1, Orange
  - 23 Bridges with a Code 2, Yellow
  - 34 Bridges with a Code 3, Green
  - 30 Bridges with a Code 4, Blue
  - 46 Bridges with a Code 5, Purple
  - The tabular list of bridges enabled the county to focus on the 25 bridges coded 0 or 1 as the 2014 replacements began. Most of these bridges were successfully replaced in 2014.

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Engineers and Architects, P.C.
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Licking County 2014-2015 Bridge Field Review

SFN #		LOCATION	BRIDGE TYPE	STRUCTURE LENGTH	CODE	REPAIR/REPLACE	NOTES	2013 CODE
4530160	HOP	POPLAR FORKS RD	Simple Concrete Slab	21.0 FT	0	Closed - Replace Bridge	Total of 4 Bridges at 0 Yrs.	3
4540034	JER	HARRISON ROAD	Steel Filled Culvert (CMP)	21.0 FT	0	Replace Bridge		1
4530586	PER	SMITH CHAPEL RD	Simple Span Steel	31.0 FT	0	Replace Superstructure		3
4532856	WAS	GINGER HILL RD	Steel Pony Truss	142.0 FT	0	Replace Bridge		
4534735	BEN	BENNINGTON CHAPEL ROAD	Steel Pony Truss	94.0 FT	1	Repair	Total of 21 Bridges at 1 Yr.	
4534867	BEN	DUTCH CROSS RD	Simple Concrete Slab	27.0 FT	1	Replace Bridge		1
4531892	BGR	RANKIN RD	Simple Span Steel	32.0 FT	1	Replace Bridge		
4532120	BGR	LAUREL HILL ROAD	Simple Span Concrete Box Beam	50.0 FT	1	Repair		1
4532163	BGR	CHERRY HILL RD	Simple Span Steel	39.0 FT	1	Replace Superstructure		1
4538838	EDE	EDEN CHURCH ROAD	Steel Filled Culvert (CMP)	14.0 FT	1	Replace Bridge		
4535669	ETN	REFUGEE RD	Steel Filled Culvert (CMP)	14.0 FT	1	Replace Bridge		2
4530500	HAN	JEFFRIES RD	Simple Span Steel	55.0 FT	1	Replace Bridge		1
4534034	HAR	PALMER RD	Simple Concrete Slab	12.0 FT	1	Replace Bridge		2
4537521	HRT	FAIRGROUNDS RD	Steel Filled Culvert (CMP)	17.0 FT	1	Replace Bridge		
4535448	JER	PATTERSON RD	Simple Span Steel	35.0 FT	1	Replace Superstructure		
4535456	JER	MINK ST	Simple Span Steel	34.0 FT	1	Replace Superstructure		
4534700	LIB	CASTLE RD	Simple Span Steel	60.0 FT	1	Replace Bridge		
4531639	MAD	LONDON HOLLOW LOPER RD	Simple Span Steel	30.0 FT	1	Replace Bridge		
4536436	MCK	DRY CREEK RD	Simple Span Steel	81.0 FT	1	Replace Bridge		
4537939	MCK	CATT RUN ROAD	Simple Span Steel	45.0 FT	1	Replace Bridge		
4535286	MON	MINK ST	Simple Span Steel	54.0 FT	1	Replace Bridge		3
4536975	PER	PATTON RD	Simple Span Steel	31.0 FT	1	Replace Bridge		1
4533755	UNI	GALE RD	Filled Aluminum Culvert (CMP)	12.0 FT	1	Repair		
4536959	UNI	PALMER RD	Simple Span Steel	31.0 FT	1	Replace Bridge		2
4540190	WAS	STICKLE ROAD	Steel Filled Culvert (CMP)	11.0 FT	1	Replace Bridge		
4540069	BEN	APPLETON ROAD	Steel Filled Culvert (CMP)	15.0 FT	2	Replace Bridge	Total of 23 Bridges at 2 Yrs.	
4531965	BGR	HONDA HILLS RD	Simple Concrete Slab	29.0 FT	2	Replace Bridge		
4532988	BUR	SMOKETOWN RD	Simple Span Concrete Beam	23.0 FT	2	Replace Bridge		
4532996	BUR	SMOKETOWN RD	Simple Span Steel	23.0 FT	2	Replace Superstructure		
4538382	ETN	REFUGEE RD	CMP	11.0 FT	2	Replace Bridge		2
4530926	FAL	PRIEST HOLLOW RD	Simple Span Steel	20.0 FT	2	Replace Bridge		2
4530977	FAL	MCKEE HILL RD	Steel Pony Truss	104.0 FT	2	Replace Superstructure		
4531019	FAL	LICKING VALLEY RD	Simple Concrete Slab	27.0 FT	2	Replace Bridge		2
4531027	FAL	LICKING VALLEY RD	Simple Concrete Slab	27.0 FT	2	Replace Bridge		
4537211	FAL	FRAMPTON RD	Steel Pony Truss	79.0 FT	2	Replace Superstructure		
ORPHAN	FAL	CULLISON ROAD	CMP	0.0 FT	2	Replace Bridge		
4530365	HAN	WOHLFORD RD	Steel Pony Truss	76.0 FT	2	Repair		
4530209	HOP	BEAR HOLLOW RD	Simple Span Steel	24.0 FT	2	Replace Bridge		2
4538501	HRT	REFUGEE ROAD	CMP	30.0 FT	2	Replace Bridge		2
4534581	LIB	NICHOLS LANE	Steel Pony Truss	50.0 FT	2	Repair		
4531418	MAD	KREAGER RD	Simple Concrete Slab	12.0 FT	2	Replace Bridge		2
4535162	MON	HARMONY CHURCH RD	Simple Span Steel	27.0 FT	2	Repair		
4532651	NWT	HORNS HILL RD	Simple Concrete Slab	25.0 FT	2	Replace Superstructure		
4532678	NWT	HORNS HILL RD	Filled Concrete Arch	18.0 FT	2	Replace Bridge		
4532686	NWT	HORNS HILL RD	Simple Concrete Slab	27.0 FT	2	Replace Bridge		
4532694	NWT	HILLCREST RD	Simple Span Steel	23.0 FT	2	Replace Bridge		2
4534697	STA	SADIE THOMAS ROAD	Simple Span Steel	40.0 FT	2	Replace Bridge		
4538293	WAS	TORRENCE ROAD	Steel Pony Truss	100.0 FT	2	Repair		

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Managing and Replacing 158 Deteriorated Structure Assets

- **How has Licking County addressed bridge repairs and replacements in past years?**
  - The average number of bridges being replaced before 2011 was 6 per year. With this approach it would take over 25 years to replace all 158 deteriorated structures
  - Bridges typically should have a 50-75 year life span
  - The county existing inventory contains varied types of bridges and culverts with most life spans less than 30 years:
    - Corrugated metal pipes (including structural plate arches)
    - Weathering steel truss bridges or steel beam bridges with no protective coatings
    - Numerous structures with timber piles in rivers and streams

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- **What are some cost effective replacement options?**
  - Replace shorter span structures with concrete box culverts or concrete arch culverts
  - Replace longer structures with single span prestressed concrete box beam bridges on integral abutments (provides less long-term county maintenance)
  - Deteriorated larger truss bridges created another category of repair.
    - With the county's limited funding, targeted member replacement with galvanized new steel was preferred since a new bridge may typically exceed $1,000,000 per truss bridge
    - Several truss bridges were repaired at the end bays with new stringers and/or floorbeams, while other truss bridges given new stringers and deck, choosing to reuse the existing truss lines and the floorbeams
  - County staff performed most of the culvert replacements and selected truss repairs which helped to minimize costs

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Total Number of Bridges Repaired or Replaced per year

- 2014 20 Bridges
- 2015 24 Bridges
- 2016 27 Bridges
- 2017 28 Bridges
- 2018 30 Bridges

Total of 129 Bridges Repaired or Replaced in The Program

Average Construction Costs per Bridge Type

- Clear Spans 25’ or less Avg. $125,000/Each
- Clear Spans greater than 25’
  Clear span x 1.1 x 24 x $225 = planning level estimate
- Total estimated at $17.7M
- Added a 10% Contingency

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Stretching The Dollars

- **Operational Savings ($651,535/Year)**
  - Retirement Buyout (reduced employees from 59 to 46
    More than 80 employees during the 1980's
  - Reduced snow routes from 25 to 22
  - Applied for Federal Grants for signing, striping and guardrail
  - Transitioned the bridge crew from building steel beam bridges to four sided box culverts
  - Greater use of pre-fabricated bridge elements
  - Reduced our overhead before we asked for more money

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The Commissioner's Bridge Program Funding

- **$5 Permissive Fee results in an additional $400,000**
- **$1 Real Estate Conveyance Fee results in an additional $500,000**
- **General Fund money available from increasing Sales Tax Revenue**
- **County Bonds used to fill in the gaps**
  Bonds will be retired along with the conveyance fee after the five year program is complete

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- **Funding Sources**
  - **County Engineer's budget $7.2M/yr.**
  - **County Commissioners were approached and agreed to fund a 5-year, $20 M bridge program.**
  - **The total goal is 129 bridges in 5 years**
  - **The Licking County Bridge Program includes LBR Bridges**
  - **The Licking County Bridge Program includes Ohio Partnership Bridges**

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- Refocusing the county bridge crew functions
- Focus on 20’ spans or less
- Increase the number of bridges replaced per year
- 2014 – 6 projects – average 44 days
- 2017 – 11 projects – average 20 days

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General Appraisal (GA) Comparison: 2014 - 2017

GA	2014	2017	Difference
9	4	50	+46
8	34	38	+4
7	87	92	+5
6	120	119	-1
5	84	65	-19
4	72	49	-23
3	19	13	-6
2	4	1	-3
1	4	0	-4

Managing and Replacing 158 Deteriorated Structure Assets

2017 Status

- **Two years left in the bridge program**
  - **To date the SMS query identifies**
    63 bridges with a General Appraisal (GA) of 4 or less
    65 bridges with a GA of 5
  - **28 bridges to be built in 2017**
  - **This leaves 100 bridges remaining to be repaired or replaced with a GA of 5 or less**
  - **Licking County staff inspected all 100 recently to confirm the 2018 priorities. Graded the group of bridges high, medium and low**
  - **To date 41 deteriorated bridges were added to the program**

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2018 Plan

- **Last year left of the bridge program**
  - **Plan to replace 28-30 bridges**
  - **10 bridges to be built by force account**
  - **The 2018 funding request will be presented to the Commissioners in October 2017**
  - **Anticipating another $4.5M to accomplish this**
  - **End of 2018 if all goes well 130 will be completed**

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2019 and Beyond (still in need of revenue)

- Even after the $19.1 million program, Licking County still has 70 bridges with a general appraisal rating of 5 or less
- 30 will be repaired or replaced using force account spread out over 3-4 years
- 6 will be LBR funded
- 34 will still need to locate a funding source. Estimated additional cost $11 million

Managing and Replacing 158 Deteriorated Structure Assets

Special thanks goes out to:

- Jared Knerr (Licking County Engineer), Bill Lozier (Retired LC Eng.), Tim Bubb, Duane Flowers, Rick Black, Doug Smith, Scott Ryan, Mike Smith
- County Engineer Staff
- Public Utilities
- Consultants and contractors

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Questions?

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