

# Bridge Asset Management City of Battle Creek Planning and Projects

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# City of Battle Creek, Policy on Asset Management

- ◆ Roads and Bridges
  - Early 1980's in poor condition
    - Started Multi year plan to resurface and reconstruct streets
    - Started planning for bridge repairs based on bridge inspections
  
- ◆ Signs
  - 12 year replacement cycle
  
- ◆ Signals
  - Replacement of old mast arm signals
  - Replace other signals planned for improved traffic operations

# Road Conditions

- ◆ 41 year old pavement in good condition
- ◆ Rely on inspections, not age of asset



# Traffic signal poles

- ◆ Accident revealed thin walls



# Bridge Assets Inventory

- ◆ 18 bridges on the state inventory
  - Structure types
    - ◆ Steel beams
    - ◆ Precast concrete box and I-beams
    - ◆ Earth filled 2 span arch (Historic)
    - ◆ Precast three sided culverts
  - Crossings
    - ◆ Two major rivers, the Kalamazoo and Battle Creek Rivers
    - ◆ Designated trout stream, Minges Brook
    - ◆ CN Railroad and AmTrak
  - Multiple spans
    - ◆ 8 span bridge over the Kalamazoo River
    - ◆ 4 and 6 span bridges over the CNRR
  
- ◆ Pedestrian bridges and boardwalks on Linear Park Trail system.

# Other Structure Assets Inventory

- ◆ Three dams
  - Verona on the Battle Creek River
  - Monroe Street on the Kalamazoo River
  - Dam at Engineer Lake.
  
- ◆ Concrete channel section of the Kalamazoo River  
USCOE constructed 1950's Flood Control project.
  - Riprap lined levees
  - Concrete paved channel  $\frac{3}{4}$  mile long
  
- ◆ Culverts

# History of Bridge Maintenance and Rehabilitation

## 1990's - City funded projects

- Milling and overlay projects
  - ◆ Fountain, Capital, McCamly and Hamblin over the Kalamazoo River
- Painting and P&H replacement project
  - ◆ Elm Street over the Battle Creek River
- New Emmett Street Bridge over CNRR
  - ◆ replaced at grade crossing
  - ◆ located in middle of switch yard and fuel station
- Replacement of Capital Ave culvert

# Governmental Accounting Standards Board (GASB)

- ◆ Prior to 1999
  - “Depreciation of general fixed assets should not be recorded in the accounts of governmental funds” GASB Codification Sec. 1400.118
- ◆ GASB 34 adopted in 1999
  - Requires that fixed assets, such as roads and bridges, be depreciated to show current value in annual statements
  - Provides incentive to maintain roads and bridges



# Bridge Inspections and Identification of Needs

## Prioritized work items

- ◆ Grouped items of similar work for repair and PM
  - Concrete repairs
  - Joints
  - Surface treatments
- ◆ Applied to MDOT for TEA-21 Funds for Historic Bridge restoration
- ◆ Applied for Superstructure Replacement with Critical Bridge Funds for 2 bridges

# Bridge Repair Matrix

## City of Battle Creek - Capital Improvement Project BRIDGE REPAIR ITEMS

Item	BRAMETT ST OVER THE BATTLE CREEK RIVER	UNION ST OVER THE BATTLE CREEK RIVER	ELM STREET OVER THE BATTLE CREEK RIVER	CAPITAL AVENUE OVER THE BATTLE CREEK RIVER	MCCAMELY ST OVER THE BATTLE CREEK RIVER	MICHIGAN AVE OVER THE BATTLE CREEK RIVER	BURNHAM ST OVER THE KALAMAZOO RIVER	FOUNTAIN ST OVER THE KALAMAZOO RIVER	MCCAMELY ST S OVER THE KALAMAZOO RIVER	20th STREET OVER THE KALAMAZOO RIVER	Quantity	Unit	Unit Cost	Amount
Aggregate Base, 12 inch	1	1	1			9					9	Syd	\$5.00	\$45.00
Bridge Joints, Clean and Seal (Linear Feet of Bridge Joints)	1	133	181			60			50	273	749	Ls		
Clearing				500							500	Sft	\$2.00	\$1,000.00
Concrete, Grade S2				9	31		5				65	Cyd	\$510.00	\$33,195.00
Deck Sealant (type needs to be determined)		7020	7130				4512		3200		21862	Sft	\$1.00	\$21,862.00
Embedded Galvanic Anodes				82	264		90				436	Ea	\$5.00	\$2,180.00
Expansion Joint Device				82			45				127	Ft	\$125.00	\$15,875.00
Fence, Chain Link								5			5	Ft	\$7.00	\$35.00
Flushing Cracks, Water		36									36	Ft	\$6.00	\$216.00
Guardrail Approach Terminal, Type 1B		1					2				3	Ea	\$1,400.00	\$4,200.00
Guardrail, Ram							75				75	Ft	\$3.00	\$225.00
Guardrail, Type B		100									100	Ft	\$10.00	\$1,000.00
Hand Chipping, Deep				33			20				53	Syd	\$170.00	\$9,010.00
Hand Chipping, Other Than Deck		25			440					30	495	Cft	\$70.00	\$34,650.00
Historic Bridge Railing					240						240	Ft	\$100.00	\$24,000.00
HMA, 6 inch (for pedestrian/bike path)						27					27	Syd	\$30.00	\$810.00
Joint, Expansion, E3							45				45	Ft	\$8.00	\$360.00
Painting Existing Piles										2770	2770	Sft	\$5.00	\$13,850.00
Patch, Forming		50			960						1066	Sft	\$25.00	\$26,650.00
Patching Conc. C-L		1									3	Cyd	\$1,190.00	\$3,570.00
Reinforcement, Steel, Epoxy Coated				150	800		75				1025	Lbs	\$9.00	\$9,225.00
Riprap, Heavy							213				213	Ton	\$45.00	\$9,585.00
Riprap, Plain						6					6	Ton	\$40.00	\$240.00
Sidewalk Ramp							50				50	Sft	\$4.00	\$200.00
Sidewalk, Conc. 6 inch							250				250	Sft	\$25.00	\$6,250.00
Sidewalk, Ram							28				28	Syd	\$5.00	\$140.00
Sodding, Slope Restoration											56	Syd	\$2.00	\$112.00
Structural Crack, Repr		36									36	Ft	\$58.00	\$2,088.00
	\$290.00	\$16,139.00	\$8,035.00	\$21,995.00	\$104,850.00	\$1,125.00	\$36,164.50	\$35.00	\$3,450.00	\$19,987.00			TOTAL =	\$214,430.50

**NOTES:**

- BID COST FOR EACH ITEM INCLUDES MOBILIZATION AND TRAFFIC CONTROL IF REQUIRED.
- TRAFFIC CONTROL SHALL BE PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MMUTCD)
- REMOVAL ITEMS INCLUDE DISPOSAL OF OLD MATERIALS BY CONTRACTOR

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Date: 02/28/03

## 2005 Contract for work on five bridges Funded by Capital Improvement Program (CIP)

- ◆ Replacement of deteriorated concrete sidewalks
- ◆ Replacement of expansion joints
- ◆ Thin epoxy overlays on 3 bridges
  - Alkali Silica Reaction (ASR) in 20 year old bridge
  - Box Beams with shallow concrete overlay, longitudinal cracking
  - Reinforced concrete deck on steel beams, transverse with minor spalling

# Thin Epoxy Overlay

- ◆ Concrete patching
- ◆ Shotblasting
- ◆ Application (2 layers)
- ◆ 1 day operation in warm weather



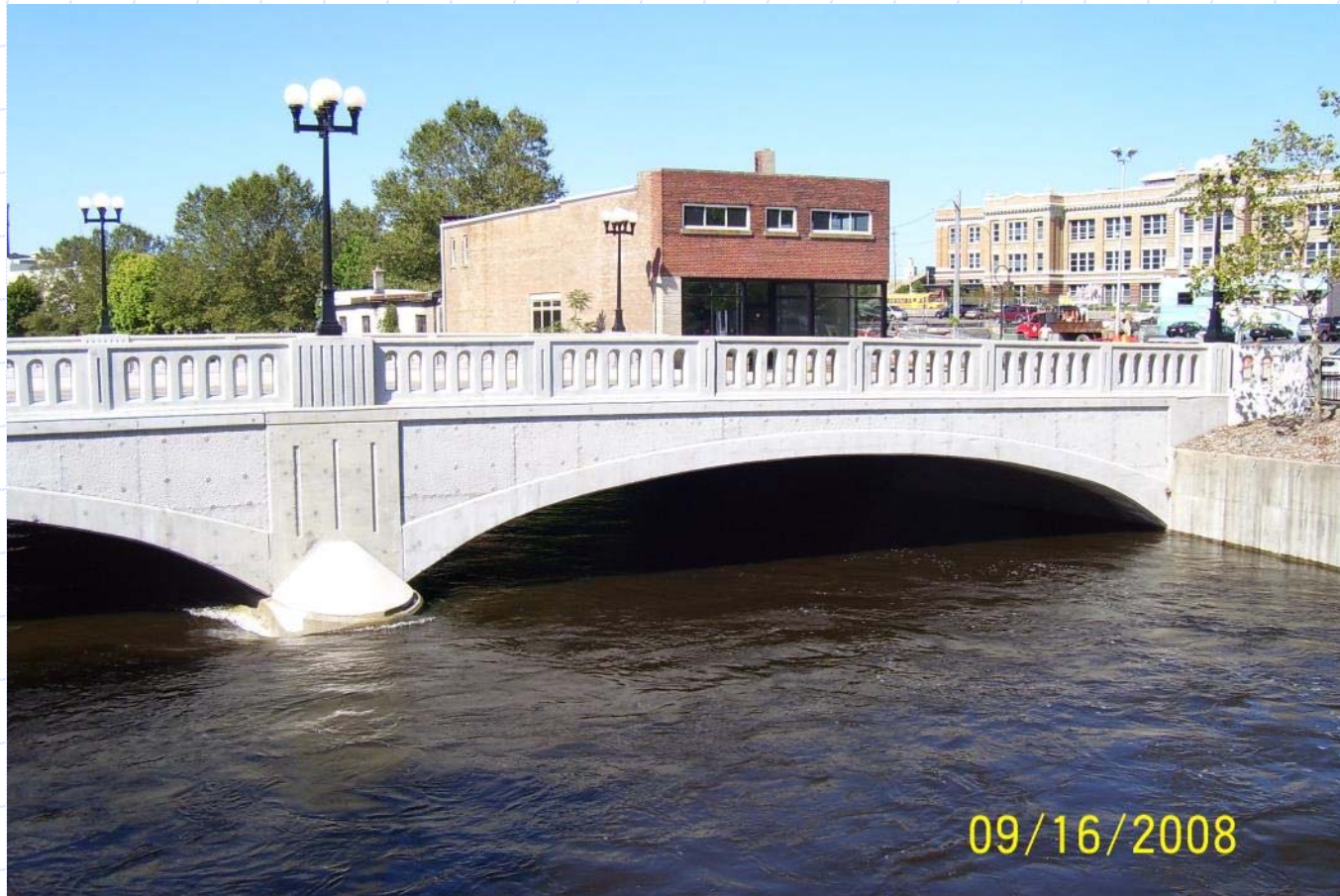
# 2006 Contract for Rehabilitation of McCamly Avenue over Battle Creek River

- ◆ Funded by MDOT **TEA-21 Program**.
- ◆ Work in 1980's replaced railing with modern style parapet
- ◆ Deterioration at interface between new and old concrete



# 2006 Contract for Rehabilitation of McCamly Avenue over Battle Creek River

- ◆ Replacement of railings with historical classic style and street lights
- ◆ Rebuilt concrete pier noses and spandrel walls
- ◆ Scour protection at piers and abutments



# 2007 Bridge Repair Matrix for CIP developed into Bridge Asset Management Program

## City of Battle Creek - Bridge Asset Management Program

Bridge Repair Items	Emmett Street Bridges over Battle Creek River and CNRR	McCamy Street Bridge over Kakumazoo River	Fountain Street Bridge over Kakumazoo River	Capital Avenue Bridge over Kakumazoo River	Union and Elm Street Bridges over Battle Creek River	20th Street Bridge over Kakumazoo River	W. Columbia Avenue Bridge over CNRR	Quantity	Unit	Unit Cost	Amount
1 Traffic Control	5000	2500	2500	7500	5000	7500	2750	32750	Dir	\$1.00	\$32,750.00
2 Conc Surface Coating, Parapet Railing	1448	180	200	180	656	670	676	4010	Ft	\$15.00	\$60,150.00
3 Conc Surface Coating, Barrier	1325							1325	Ft	\$20.00	\$26,500.00
4 Thin Epoxy Overlay		380	485			1500		2365	Syd	\$40.00	\$94,600.00
5 HMA Milling, Hydro and Concrete (Silica Fume) Overlay				380				380	Syd	\$170.00	\$64,600.00
6 Bridge Joints, Clean and Seal				56		490		546	Ft	\$10.00	\$5,460.00
7 Deck Joint, Remove				186	78			264	Ft	\$115.00	\$30,360.00
8 Expansion Joint Device				56	66			122	Ft	\$125.00	\$15,250.00
9 Expansion Joint Device, Cover Plate				10	24			34	Ft	\$100.00	\$3,400.00
10 Concrete, Deck Joint Replacement				21	4			25	Cyd	\$1,000.00	\$25,000.00
11 Hand Chipping, Other Than Deck						315	20	335	Cft	\$75.00	\$25,125.00
12 Embedded Galvanic Anodes						630	10	640	Ea	\$25.00	\$16,000.00
13 Reinforcement, Steel, Epoxy Coated				1000		2000		3000	Lb	\$2.00	\$6,000.00
14 Patch, Forms						1260	50	1310	Sft	\$40.00	\$52,400.00
15 Patching Conc, C-L						12	1	13	Cyd	\$750.00	\$9,750.00
16 Cleaning and Coating, Existing Piles						1500		1500	Sft	\$20.00	\$30,000.00
17 Beam End Patching					10	10	10	30	Sft	\$150.00	\$4,500.00
Subtotal	\$53,220	\$20,400	\$24,900	\$127,750	\$39,960	\$216,725	\$18,890				<b>Subtotal</b> <b>\$501,845.00</b>
Mobilization, Inflation and Contingencies*	\$10,780	\$4,100	\$5,100	\$28,250	\$9,040	\$53,275	\$4,110				\$114,655.00
Total	\$64,000	\$24,500	\$30,000	\$156,000	\$49,000	\$270,000	\$23,000				<b>TOTAL</b> <b>\$616,500.00</b>
	* 20%	20%	20%	22%	23%	25%	22%				
Recommended Work in Year	2008	2008	2008	2010	2010	2011	2011				
			Total for 2008	\$118,500		Total for 2010	\$205,000				
						Total for 2011	\$293,000				

## 2008 Contract for work on five bridges Funded by City's CIP

- ◆ Deck patch and thin epoxy overlays
- ◆ Concrete surface coatings
- ◆ Partial coating of steel beams





# 2009 Contract for Repairs of USCOE Flood Control Channel

- ◆ Clearing and restoration of levees
- ◆ Repairs to drains, joints and concrete slope paving
- ◆ Repairs of spalled concrete at dam



## 2011 Contract for Rehabilitation 20th Street over Kalamazoo River

- ◆ Eight span bridge. Bridge widened and new superstructure in 1980's.
- ◆ Original pier caps spalling with rebar exposed and rusting.



# 20<sup>th</sup> Street Bridge Funded by MDOT Local Agency Program for Bridge Rehabilitation

- ◆ Spalled areas chipped and formed for patches



## 20<sup>th</sup> Street Bridge Substructure Repairs

- ◆ Fiber Reinforced Polymer (FRP) Wraps applied to pier caps after patches cured



# 20<sup>th</sup> Street Bridge Superstructure

- ◆ Joint replacements
- ◆ Thin epoxy overlay
- ◆ Flood coat on sidewalks
- ◆ Concrete surface coatings



# 2013 Contract for work on five bridges Funded by MDOT Local Agency Program Preventive Maintenance Funds and City

- ◆ Concrete overlay
- ◆ Sidewalk repair
- ◆ Joint replacement
- ◆ Scour mitigation



- ◆ Concrete patching for substructure repairs
- ◆ Railing Replacement

# Future work on culvert replacements



# Summary

- ◆ Plan ahead
- ◆ Package multiple bridges with similar work
- ◆ New materials
  - Coatings
  - Epoxy overlays
  - Joints
  - Patches - Cathodic protection
  - Strengthening
- ◆ Don't forget your culverts



**Finished!**

**Questions?**

