



**CITY OF ALLEGAN
CITY COUNCIL STUDY SESSION MEETING
Monday, October 9, 2023, 5:30PM
City Council Chambers - 231 Trowbridge Street
Allegan, Michigan**

*****NO ACTION IS TAKEN DURING THE STUDY SESSION*****

1. Call to Order
2. Public Comment Period
3. Round Table Discussion amongst Council Members
4. Presentation on PASER Ratings of Roads in the City of Allegan
5. Discussion regarding City Proclamations
6. Review of the 2017, 2020, and 2023, Allegan City Dam Inspection Reports
7. Review of Council Agenda
8. Adjourn to regular meeting to begin at 7:00 pm



City of Allegan
Department of Public Works
269.686.1115
691 Airway Drive
Allegan, MI 49010

MEMORANDUM

TO: Allegan City Council
FROM: Doug Kadzban, Director of Public Works
REVIEWED BY: Joel Dye, City Manager
DATE: October 2, 2023

SUBJECT: PaSER 10-Year Road Strategies Reports

Action Requested:

That the City Council accept for review the updated PaSER 10-Year Road Strategies and presentation by Abonmarche Consultants.

Background:

It is requested that the City Council accept for review the updated PaSER road strategies and presentation prepared by Abonmarche Consultants.

Earlier this year, Abonmarche presented various road improvement strategies to get our road surfaces into a "Good" PaSER category within a 10-year timeline. Abonmarche was asked to prepare additional strategies based on the current PaSER ratings performed by Abonmarche and city staff. The various 10-year strategies are attached, and a presentation will be made by Abonmarche staff.

Attachments: 50% Strategy Report
75% Strategy Report
85% Strategy Report



City of Allegan
Department of Public Works
269.686.1115
691 Airway Drive
Allegan, MI 49010

25% Strategy Report

Strategy Comprehensive Report

2023 City of Allegan 50% Good over 10 Years (Excluding Upcoming Projects)

Base Year 2023
 Percent Inflation 3
 Number of Years 10
 Optimized Yes
 Current Filter City Streets (Excluding Upcoming Road Projects)

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt w/ Curb and Gutter	PM (CPM) Crack Seal	6 - 7	8	\$2,112.00			
					\$13,711	6.492	2023
					\$5,064	2.328	2024
					\$9,160	4.088	2025
					\$14,869	6.443	2026
					\$10,191	4.287	2027
					\$12,989	5.305	2028
					\$13,479	5.345	2029
					\$12,933	4.979	2030
					\$13,939	5.210	2031
					\$14,272	5.179	2032
Asphalt-Standard	RC (SI) Reconstruction - 8" Base, 4" top	1 - 2	10	\$842,756.80			
					\$269,598	0.320	2031
					\$269,266	0.310	2032
	RH (SI) 2" Mill & Overlay or 3" Crush and Shape	3 - 4	9	\$229,973.33			
					\$277,601	1.207	2023
					\$288,487	1.218	2024
					\$281,234	1.153	2025
					\$273,287	1.088	2026
					\$276,981	1.070	2027
					\$272,601	1.023	2028
					\$270,454	0.985	2029
					\$270,563	0.957	2030

Strategy Comprehensive Report

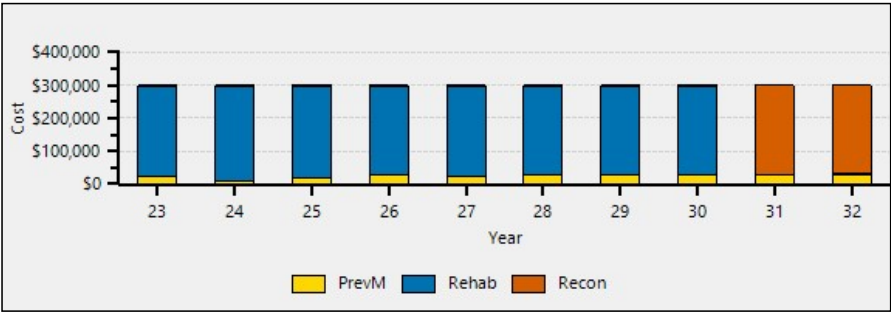
PM (CPM) Crack Seal

6 - 7 8

\$1,642.67

\$8,680	5.284	2023
\$6,451	3.813	2024
\$9,609	5.514	2025
\$11,833	6.592	2026
\$12,829	6.939	2027
\$14,408	7.566	2028
\$16,054	8.185	2029
\$16,500	8.167	2030
\$16,500	7.929	2031
\$16,500	7.698	2032

Cost Distribution

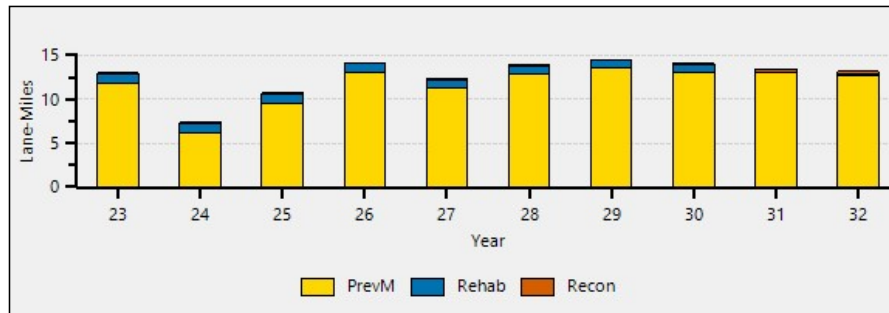


2023 City of Allegan 50% Good over 10 Years (Excluding Upcoming Projects)

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	\$22,391	\$11,516	\$18,769	\$26,702	\$23,020	\$27,397	\$29,534	\$29,433	\$30,439	\$30,772
Rehab	\$277,601	\$288,487	\$281,234	\$273,287	\$276,981	\$272,601	\$270,454	\$270,563	\$0	\$0
Recon	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$269,598	\$269,266
Total	\$299,992	\$300,003	\$300,003	\$299,989	\$300,001	\$299,998	\$299,988	\$299,996	\$300,037	\$300,038

Strategy Comprehensive Report

Maintenance Performed

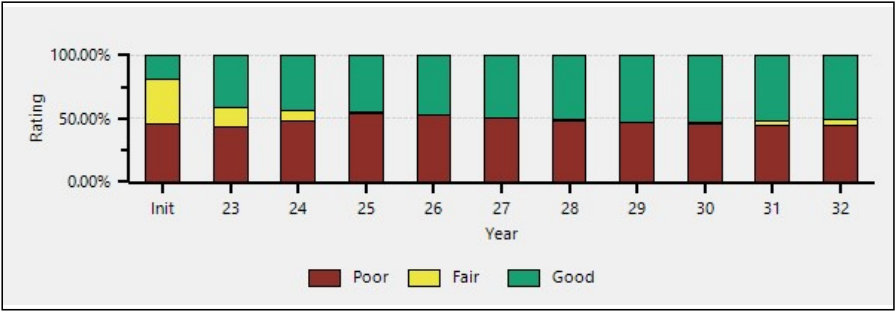


2023 City of Allegan 50% Good over 10 Years (Excluding Upcoming Projects)

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	11.776	6.141	9.602	13.035	11.226	12.871	13.530	13.146	13.139	12.877
Rehab	1.207	1.218	1.153	1.088	1.070	1.023	0.985	0.957	0.000	0.000
Recon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.320	0.310
Total	12.983	7.359	10.755	14.123	12.296	13.894	14.515	14.103	13.459	13.187

Strategy Comprehensive Report

Rating Distribution

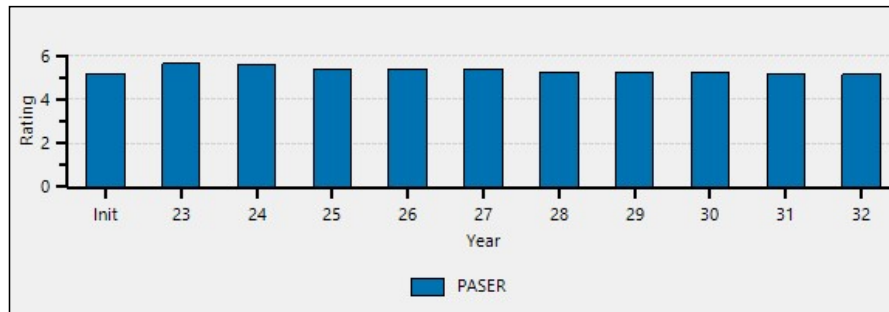


2023 City of Allegan 50% Good over 10 Years (Excluding Upcoming Projects)

Initial Values					2023		2024		2025		2026		2027		2028		2029		2030		2031		2032	
Lane Miles	%	Rating																						
10.499	18.4	Good	23.481	41.1	24.699	43.2	25.853	45.2	26.941	47.1	28.011	49.0	29.032	50.8	30.017	52.5	30.490	53.3	29.698	52.0	28.590	50.0		
20.666	36.2	Fair	8.890	15.6	4.858	8.5	0.244	0.4	0.244	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.484	0.9	1.597	2.8	3.013	5.3		
26.004	45.5	Poor	24.797	43.4	27.611	48.3	31.072	54.4	29.985	52.5	29.159	51.0	28.136	49.2	27.151	47.5	26.195	45.8	25.875	45.3	25.565	44.7		
57.169	100.0	Total																						

Strategy Comprehensive Report

PASER Distribution

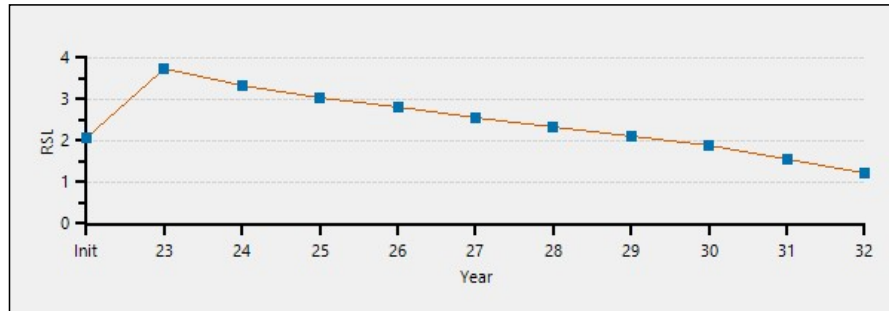


2023 City of Allegan 50% Good over 10 Years (Excluding Upcoming Projects)

Initial Value		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lane Miles	PASER										
0.365	10	0.365	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.320	0.310
0.426	9	1.633	1.583	1.153	1.088	1.070	1.022	0.985	0.957	0.000	0.320
9.708	8	21.483	23.116	24.700	25.853	26.941	28.010	29.032	29.533	29.378	27.960
5.040	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.484	1.597	3.013
6.736	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8.890	5	8.890	4.858	0.244	0.244	0.000	0.000	0.000	0.000	0.000	0.000
16.234	4	16.234	17.034	14.390	8.646	4.858	0.244	0.244	0.244	0.000	0.000
6.646	3	5.439	6.959	10.527	15.147	15.964	13.368	7.761	3.757	0.244	0.244
2.037	2	2.037	1.668	4.095	3.760	5.637	11.401	15.528	16.038	19.758	17.614
1.087	1	1.087	1.950	2.060	2.432	2.700	3.124	3.618	6.155	5.872	7.707
5.166	Average	5.616	5.558	5.398	5.384	5.360	5.253	5.249	5.226	5.169	5.150

Strategy Comprehensive Report

RSL Distribution



2023 City of Allegan 50% Good over 10 Years (Excluding Upcoming Projects)

Initial Value		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lane Miles	RSL										
0.365	14	0.365	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.320	0.310
0.426	13	1.633	1.583	1.153	1.088	1.070	1.022	0.985	0.957	0.000	0.320
3.862	12	7.787	3.680	4.784	5.498	4.830	5.360	5.532	5.367	5.337	4.292
3.630	11	7.555	9.834	6.881	9.129	9.240	9.120	9.870	9.914	9.747	9.629
2.216	10	6.141	9.602	13.035	11.226	12.871	13.530	13.630	14.252	14.294	14.039
0.000	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.484	1.597	3.013
1.116	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.782	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.142	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.580	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.134	4	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.266	3	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.614	2	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.032	1	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000
5.644	0	5.644	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000
7.358	-1	7.358	5.644	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000
3.232	-2	3.232	7.358	5.644	4.032	4.614	0.000	0.244	0.000	0.000	0.000
1.190	-3	1.190	3.232	7.358	5.644	4.032	4.614	0.000	0.244	0.000	0.000
4.402	-4	3.755	1.190	3.232	7.358	5.644	4.032	4.614	0.000	0.244	0.000
1.054	-5	0.494	2.537	0.037	2.145	6.288	4.622	3.047	3.657	0.000	0.244
0.424	-6	0.424	0.494	2.537	0.037	2.145	6.288	4.622	3.047	3.657	0.000
0.268	-7	0.268	0.424	0.494	2.537	0.037	2.145	6.288	4.622	3.047	3.657
0.372	-8	0.372	0.268	0.424	0.494	2.537	0.037	2.145	6.288	4.622	3.047
0.110	-9	0.110	0.372	0.268	0.424	0.494	2.537	0.037	2.145	6.288	4.622
0.863	-10	0.863	0.110	0.372	0.268	0.424	0.494	2.537	0.037	2.145	6.288

Strategy Comprehensive Report

0.256	-11	0.256	0.863	0.110	0.372	0.268	0.424	0.494	2.537	0.037	2.145
0.618	-12	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.494	2.537	0.037
0.057	-13	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.494	2.537
0.000	-14	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.494
0.156	-15	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424
0.000	-16	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268
0.000	-17	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372
0.000	-18	0.000	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110
0.000	-19	0.000	0.000	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.863
0.000	-20	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.057	0.511	0.256
0.000	-21	0.000	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.000	0.201
0.000	-22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.000
2.086	Average	3.732	3.330	3.029	2.827	2.557	2.329	2.112	1.874	1.541	1.209

Strategy Comprehensive Report

2023 City of Allegan 75% Good over 10 Years (Excluding Upcoming Projects)

Base Year	2023
Percent Inflation	3
Number of Years	10
Optimized	Yes
Current Filter	City Streets (Excluding Upcoming Road Projects)

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt w/ Curb and Gutter	RH (SI) 2" Mill & Overlay or 3" Crush and Shape	3 - 4	9	\$342,774.16			
					\$20,909	0.061	2028
					\$635,080	1.799	2029
	PM (CPM) Crack Seal	6 - 7	8	\$2,112.00	\$632,277	1.739	2030
					\$13,711	6.492	2023
					\$5,064	2.328	2024
					\$9,160	4.088	2025
					\$14,869	6.443	2026
					\$10,191	4.287	2027
					\$12,989	5.305	2028
					\$13,479	5.345	2029
					\$12,933	4.979	2030
					\$13,939	5.210	2031
					\$14,440	5.240	2032
Asphalt-Standard	RC (SI) Reconstruction - 8" Base, 4" top	1 - 2	10	\$842,756.80	\$628,107	0.745	2031
					\$624,381	0.719	2032
	RH (SI) 2" Mill & Overlay or 3" Crush and Shape	3 - 4	9	\$229,973.33	\$647,605	2.816	2023
					\$658,482	2.780	2024
					\$651,228	2.669	2025
					\$643,298	2.560	2026
					\$644,012	2.488	2027
					\$617,690	2.317	2028

Strategy Comprehensive Report

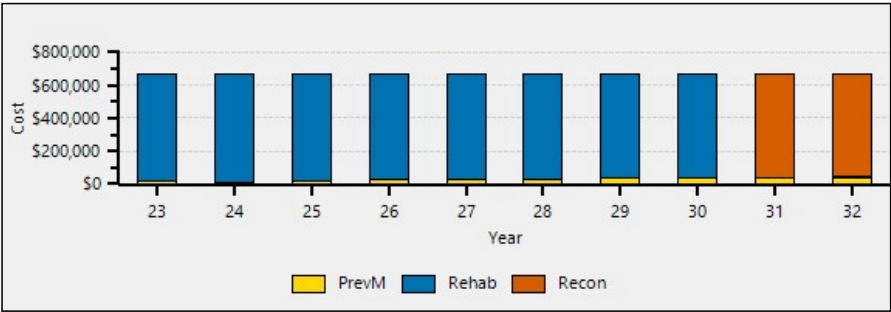
PM (CPM) Crack Seal

6 - 7 8

\$1,642.67

\$8,680	5.284	2023
\$6,451	3.813	2024
\$9,609	5.514	2025
\$11,833	6.592	2026
\$15,804	8.548	2027
\$18,403	9.664	2028
\$21,450	10.936	2029
\$24,799	12.275	2030
\$27,980	13.446	2031
\$31,155	14.536	2032

Cost Distribution

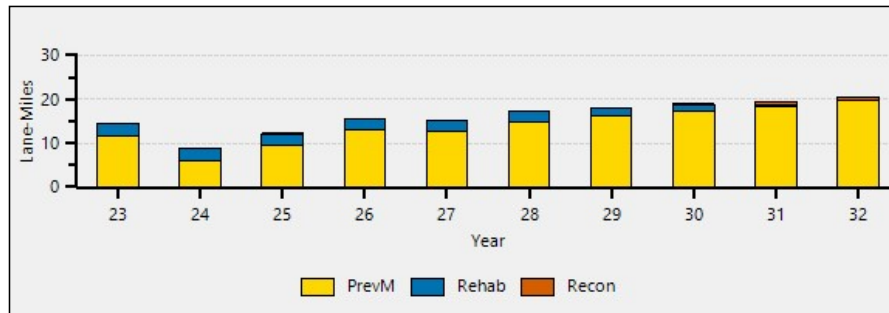


2023 City of Allegan 75% Good over 10 Years (Excluding Upcoming Projects)

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	\$22,391	\$11,516	\$18,769	\$26,702	\$25,994	\$31,392	\$34,929	\$37,732	\$41,919	\$45,595
Rehab	\$647,605	\$658,482	\$651,228	\$643,298	\$644,012	\$638,600	\$635,080	\$632,277	\$0	\$0
Recon	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$628,107	\$624,381
Total	\$669,996	\$669,998	\$669,997	\$670,000	\$670,006	\$669,992	\$670,009	\$670,009	\$670,026	\$669,976

Strategy Comprehensive Report

Maintenance Performed



2023 City of Allegan 75% Good over 10 Years (Excluding Upcoming Projects)

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	11.776	6.141	9.602	13.035	12.835	14.969	16.281	17.254	18.656	19.776
Rehab	2.816	2.780	2.669	2.560	2.488	2.378	1.799	1.739	0.000	0.000
Recon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.745	0.719
Total	14.592	8.921	12.271	15.595	15.323	17.347	18.080	18.993	19.401	20.495

Strategy Comprehensive Report

Rating Distribution



2023 City of Allegan 75% Good over 10 Years (Excluding Upcoming Projects)

Initial Values					2023		2024		2025		2026		2027		2028		2029		2030		2031		2032	
Lane Miles	%	Rating																						
10.499	18.4	Good	25.090	43.9	27.870	48.8	30.540	53.4	33.100	57.9	35.587	62.3	37.963	66.4	39.762	69.6	41.503	72.6	42.249	73.9	42.968	75.2		
20.666	36.2	Fair	8.890	15.6	4.858	8.5	0.244	0.4	0.244	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0		
26.004	45.5	Poor	23.188	40.6	24.440	42.8	26.385	46.2	23.825	41.7	21.581	37.8	19.203	33.6	17.404	30.4	15.666	27.4	14.920	26.1	14.201	24.8		
57.169	100.0	Total																						

Strategy Comprehensive Report

PASER Distribution

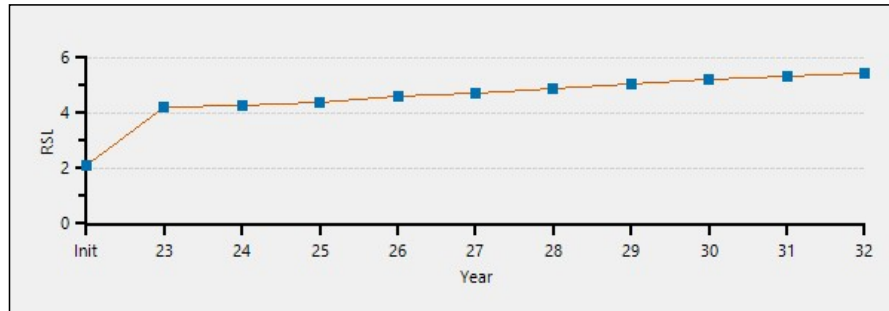


2023 City of Allegan 75% Good over 10 Years (Excluding Upcoming Projects)

Initial Value		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lane Miles	PASER										
0.365	10	0.365	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.745	0.719
0.426	9	3.242	3.145	2.669	2.560	2.488	2.378	1.799	1.739	0.000	0.745
9.708	8	21.483	24.725	27.871	30.540	33.099	35.585	37.963	39.764	41.504	41.504
5.040	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6.736	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8.890	5	8.890	4.858	0.244	0.244	0.000	0.000	0.000	0.000	0.000	0.000
16.234	4	16.234	17.034	14.390	8.646	4.399	0.244	0.244	0.244	0.000	0.000
6.646	3	3.830	3.788	7.409	10.593	11.890	8.571	2.219	0.199	0.244	0.244
2.037	2	2.037	1.668	2.526	2.154	2.592	7.264	11.323	10.636	10.836	10.130
1.087	1	1.087	1.950	2.060	2.432	2.700	3.124	3.618	4.586	3.841	3.827
5.166	Average	5.785	5.863	5.862	5.977	6.093	6.130	6.189	6.318	6.397	6.485

Strategy Comprehensive Report

RSL Distribution



2023 City of Allegan 75% Good over 10 Years (Excluding Upcoming Projects)

Initial Value		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lane Miles	RSL										
0.365	14	0.365	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.745	0.719
0.426	13	3.242	3.145	2.669	2.560	2.488	2.378	1.799	1.739	0.000	0.745
3.862	12	7.787	5.289	6.346	7.014	6.838	7.477	7.805	7.551	7.958	6.592
3.630	11	7.555	9.834	8.490	10.691	11.292	11.827	12.904	13.557	13.770	14.550
2.216	10	6.141	9.602	13.035	12.835	14.969	16.281	17.254	18.656	19.776	20.362
0.000	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1.116	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.782	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.142	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.580	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.134	4	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.266	3	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.614	2	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.032	1	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000
5.644	0	5.644	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000
7.358	-1	7.358	5.644	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000
3.232	-2	3.232	7.358	5.644	4.032	4.155	0.000	0.244	0.000	0.000	0.000
1.190	-3	1.190	2.820	6.803	4.691	2.080	1.838	0.000	0.244	0.000	0.000
4.402	-4	2.146	0.000	0.706	5.196	4.614	2.080	1.838	0.000	0.244	0.000
1.054	-5	0.494	0.968	0.000	0.706	5.196	4.553	0.281	0.099	0.000	0.244
0.424	-6	0.424	0.494	0.968	0.000	0.706	5.196	4.553	0.281	0.099	0.000
0.268	-7	0.268	0.424	0.494	0.968	0.000	0.706	5.196	4.553	0.281	0.099
0.372	-8	0.372	0.268	0.424	0.494	0.968	0.000	0.706	5.196	4.553	0.281
0.110	-9	0.110	0.372	0.268	0.424	0.494	0.968	0.000	0.706	5.196	4.553
0.863	-10	0.863	0.110	0.372	0.268	0.424	0.494	0.968	0.000	0.706	5.196

Strategy Comprehensive Report

0.256	-11	0.256	0.863	0.110	0.372	0.268	0.424	0.494	0.968	0.000	0.706
0.618	-12	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.494	0.968	0.000
0.057	-13	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.494	0.968
0.000	-14	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.494
0.156	-15	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424
0.000	-16	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268
0.000	-17	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372
0.000	-18	0.000	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110
0.000	-19	0.000	0.000	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.485
0.000	-20	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.057	0.086	0.000
0.000	-21	0.000	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.000	0.000
0.000	-22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.000
2.086	Average	4.210	4.265	4.385	4.586	4.724	4.915	5.051	5.203	5.308	5.422

Strategy Comprehensive Report

2023 City of Allegan 85% Good over 10 Years (Excluding Upcoming Projects)

Base Year	2023
Percent Inflation	3
Number of Years	10
Optimized	Yes
Current Filter	City Streets (Excluding Upcoming Road Projects)

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt w/ Curb and Gutter	RH (SI) 2" Mill & Overlay or 3" Crush and Shape	3 - 4	9	\$332,790.44			
					\$619,556	1.862	2027
					\$866,122	2.527	2028
					\$861,707	2.441	2029
					\$537,219	1.477	2030
	PM (CPM) Crack Seal	6 - 7	8	\$2,112.00			
					\$13,711	6.492	2023
					\$5,064	2.328	2024
					\$9,160	4.088	2025
					\$14,869	6.443	2026
					\$10,191	4.287	2027
					\$12,989	5.305	2028
					\$13,479	5.345	2029
					\$12,933	4.979	2030
					\$18,921	7.072	2031
					\$22,944	8.326	2032
Asphalt-Standard	RC (SI) Reconstruction - 8" Base, 4" top	1 - 2	10	\$818,210.49			
					\$320,493	0.392	2030
					\$852,617	1.012	2031
	RH (SI) 2" Mill & Overlay or 3" Crush and Shape	3 - 4	9	\$229,973.33	\$847,901	0.977	2032
					\$877,601	3.816	2023
					\$888,485	3.751	2024
					\$881,227	3.612	2025
					\$873,286	3.475	2026
					\$252,599	0.976	2027

Strategy Comprehensive Report

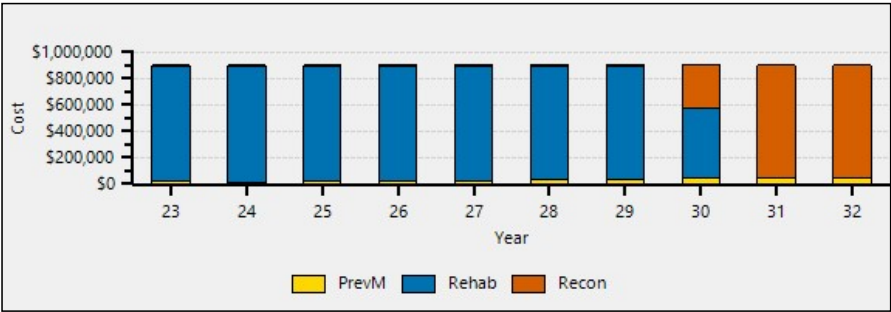
PM (CPM) Crack Seal

6 - 7 8

\$1,642.67

\$8,680	5.284	2023
\$6,451	3.813	2024
\$9,609	5.514	2025
\$11,833	6.592	2026
\$17,653	9.548	2027
\$20,888	10.969	2028
\$24,808	12.648	2029
\$29,355	14.530	2030
\$28,489	13.691	2031
\$29,198	13.623	2032

Cost Distribution

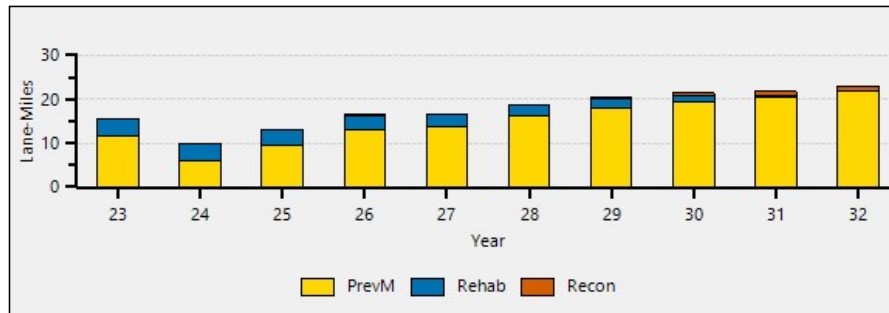


2023 City of Allegan 85% Good over 10 Years (Excluding Upcoming Projects)

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	\$22,391	\$11,516	\$18,769	\$26,702	\$27,843	\$33,877	\$38,287	\$42,288	\$47,410	\$52,142
Rehab	\$877,601	\$888,485	\$881,227	\$873,286	\$872,155	\$866,122	\$861,707	\$537,219	\$0	\$0
Recon	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$320,493	\$852,617	\$847,901
Total	\$899,992	\$900,001	\$899,996	\$899,988	\$899,998	\$899,999	\$899,994	\$900,000	\$900,027	\$900,043

Strategy Comprehensive Report

Maintenance Performed

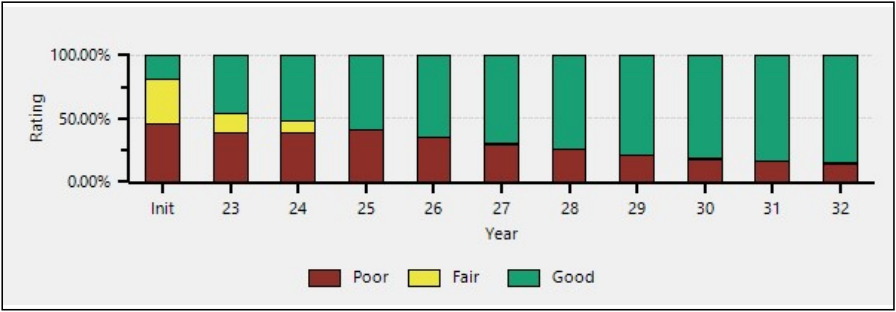


2023 City of Allegan 85% Good over 10 Years (Excluding Upcoming Projects)

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	11.776	6.141	9.602	13.035	13.835	16.274	17.993	19.509	20.763	21.949
Rehab	3.816	3.751	3.612	3.475	2.838	2.527	2.441	1.477	0.000	0.000
Recon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.392	1.012	0.977
Total	15.592	9.892	13.214	16.510	16.673	18.801	20.434	21.378	21.775	22.926

Strategy Comprehensive Report

Rating Distribution

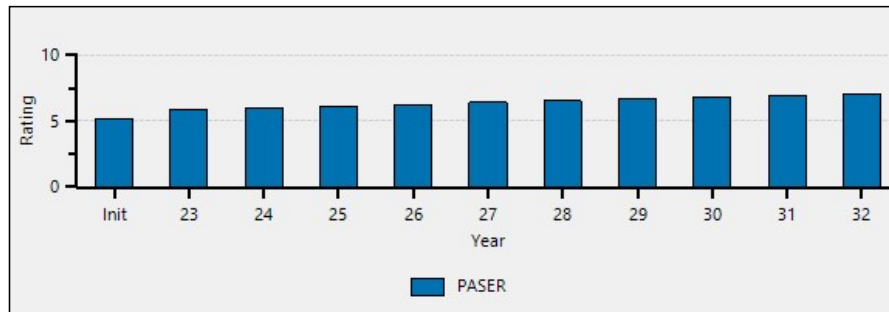


2023 City of Allegan 85% Good over 10 Years (Excluding Upcoming Projects)

Initial Values					2023		2024		2025		2026		2027		2028		2029		2030		2031		2032	
Lane Miles	%	Rating																						
10.499	18.4	Good	26.090	45.6	29.841	52.2	33.454	58.5	36.929	64.6	39.768	69.6	42.293	74.0	44.735	78.3	46.604	81.5	47.616	83.3	48.592	85.0		
20.666	36.2	Fair	8.890	15.6	4.858	8.5	0.244	0.4	0.244	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0		
26.004	45.5	Poor	22.188	38.8	22.469	39.3	23.471	41.1	19.996	35.0	17.402	30.4	14.876	26.0	12.435	21.8	10.566	18.5	9.554	16.7	8.577	15.0		
57.169	100.0	Total																						

Strategy Comprehensive Report

PASER Distribution

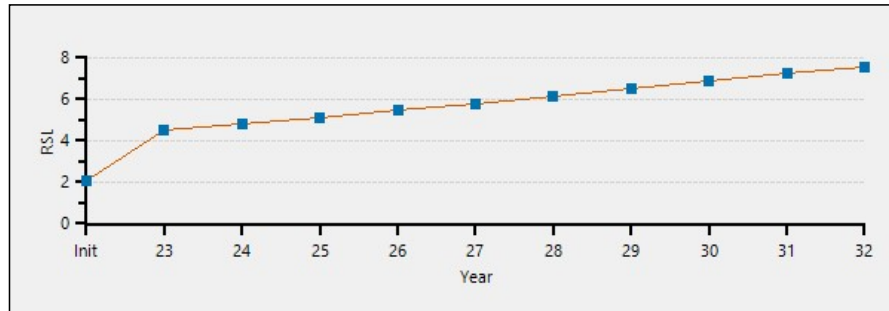


2023 City of Allegan 85% Good over 10 Years (Excluding Upcoming Projects)

Initial Value		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lane Miles	PASER										
0.365	10	0.365	0.000	0.000	0.000	0.000	0.000	0.000	0.392	1.012	0.977
0.426	9	4.242	4.116	3.612	3.475	2.838	2.527	2.441	1.477	0.392	1.012
9.708	8	21.483	25.725	29.842	33.454	36.930	39.766	42.294	44.735	46.212	46.603
5.040	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6.736	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8.890	5	8.890	4.858	0.244	0.244	0.000	0.000	0.000	0.000	0.000	0.000
16.234	4	16.234	17.034	13.083	4.894	2.082	0.244	0.244	0.244	0.000	0.000
6.646	3	2.830	1.817	5.802	10.516	10.028	6.105	1.577	0.100	0.244	0.244
2.037	2	2.037	1.668	2.526	2.154	2.592	5.402	6.996	6.028	6.128	5.422
1.087	1	1.087	1.950	2.060	2.432	2.700	3.124	3.618	4.194	3.183	2.912
5.166	Average	5.890	6.052	6.110	6.262	6.424	6.544	6.710	6.868	6.988	7.105

Strategy Comprehensive Report

RSL Distribution



2023 City of Allegan 85% Good over 10 Years (Excluding Upcoming Projects)

Initial Value		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lane Miles	RSL										
0.365	14	0.365	0.000	0.000	0.000	0.000	0.000	0.000	0.392	1.012	0.977
0.426	13	4.242	4.116	3.612	3.475	2.838	2.527	2.441	1.477	0.392	1.012
3.862	12	7.787	6.289	7.317	7.957	8.087	8.262	8.525	8.944	8.398	7.708
3.630	11	7.555	9.834	9.490	11.662	12.569	13.511	14.260	15.028	15.865	15.714
2.216	10	6.141	9.602	13.035	13.835	16.274	17.993	19.509	20.763	21.949	23.181
0.000	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1.116	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.782	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.142	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.580	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.134	4	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.266	3	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.614	2	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.032	1	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000
5.644	0	5.644	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000
7.358	-1	7.358	5.644	3.755	2.814	0.000	0.244	0.000	0.000	0.000	0.000
3.232	-2	3.232	7.358	4.614	2.080	1.838	0.000	0.244	0.000	0.000	0.000
1.190	-3	1.190	0.849	5.196	4.614	2.080	1.838	0.000	0.244	0.000	0.000
4.402	-4	1.146	0.000	0.706	5.196	4.614	2.080	1.477	0.000	0.244	0.000
1.054	-5	0.494	0.968	0.000	0.706	3.334	2.087	0.000	0.000	0.000	0.244
0.424	-6	0.424	0.494	0.968	0.000	0.706	3.334	2.087	0.000	0.000	0.000
0.268	-7	0.268	0.424	0.494	0.968	0.000	0.706	3.334	2.087	0.000	0.000
0.372	-8	0.372	0.268	0.424	0.494	0.968	0.000	0.706	3.334	2.087	0.000
0.110	-9	0.110	0.372	0.268	0.424	0.494	0.968	0.000	0.706	3.334	2.087
0.863	-10	0.863	0.110	0.372	0.268	0.424	0.494	0.968	0.000	0.706	3.334

Strategy Comprehensive Report

0.256	-11	0.256	0.863	0.110	0.372	0.268	0.424	0.494	0.968	0.000	0.706
0.618	-12	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.494	0.968	0.000
0.057	-13	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.494	0.968
0.000	-14	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.494
0.156	-15	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424
0.000	-16	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268
0.000	-17	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.052
0.000	-18	0.000	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.547	0.000
0.000	-19	0.000	0.000	0.000	0.000	0.156	0.000	0.057	0.439	0.000	0.000
0.000	-20	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.000	0.000	0.000
0.000	-21	0.000	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.000	0.000
2.086	Average	4.507	4.799	5.121	5.457	5.783	6.148	6.540	6.923	7.235	7.554

Strategy Comprehensive Report

2023 City of Allegan 25% Good over 10 Years (Excluding Upcoming Projects)

Base Year 2023
 Percent Inflation 3
 Number of Years 10
 Optimized Yes
 Current Filter City Streets (Excluding Upcoming Road Projects)

Subtype	Treatment	Trigger	Reset	Cost/Ln Mile	Budget	Lane Miles	Year
Asphalt w/ Curb and Gutter	PM (CPM) Crack Seal	6 - 7	8	\$2,112.00			
					\$7,750	3.670	2023
					\$7,750	3.563	2024
					\$7,750	3.459	2025
					\$7,750	3.358	2026
					\$7,750	3.260	2027
					\$7,750	3.165	2028
					\$7,750	3.073	2029
					\$7,750	2.984	2030
					\$7,750	2.897	2031
					\$7,750	2.812	2032
Asphalt-Standard	RC (SI) Reconstruction - 8" Base, 4" top	1 - 2	10	\$842,756.80			
					\$124,475	0.148	2031
					\$124,477	0.143	2032
	RH (SI) 2" Mill & Overlay or 3" Crush and Shape	3 - 4	9	\$229,973.33			
					\$124,508	0.541	2023
					\$125,163	0.528	2024
					\$124,502	0.510	2025
					\$124,493	0.495	2026
					\$124,501	0.481	2027
					\$124,503	0.467	2028
					\$124,504	0.453	2029
					\$124,505	0.440	2030

Strategy Comprehensive Report

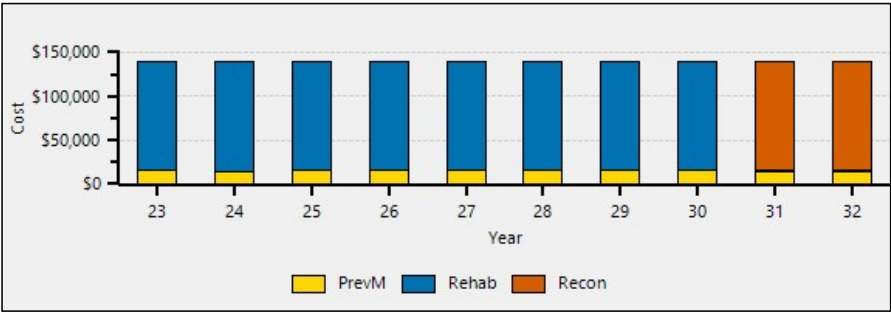
PM (CPM) Crack Seal

6 - 7 8

\$1,642.67

\$7,750	4.718	2023
\$7,091	4.191	2024
\$7,750	4.447	2025
\$7,750	4.318	2026
\$7,750	4.192	2027
\$7,750	4.070	2028
\$7,750	3.951	2029
\$7,750	3.836	2030
\$7,750	3.724	2031
\$7,750	3.616	2032

Cost Distribution

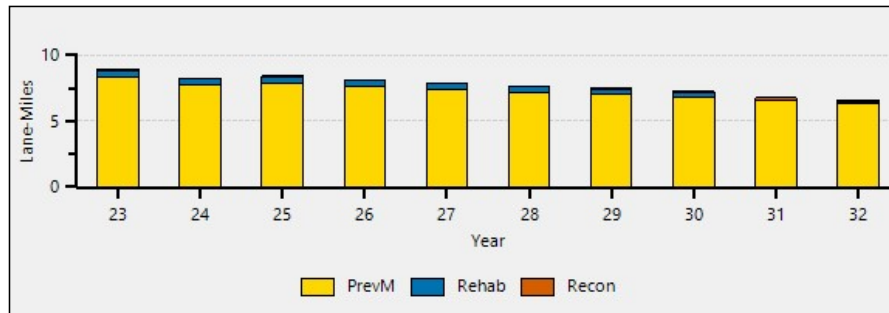


2023 City of Allegan 25% Good over 10 Years (Excluding Upcoming Projects)

Maintenance Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	\$15,500	\$14,841	\$15,500	\$15,500	\$15,500	\$15,500	\$15,500	\$15,500	\$15,500	\$15,500
Rehab	\$124,508	\$125,163	\$124,502	\$124,493	\$124,501	\$124,503	\$124,504	\$124,505	\$0	\$0
Recon	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$124,475	\$124,477
Total	\$140,008	\$140,004	\$140,002	\$139,993	\$140,001	\$140,003	\$140,004	\$140,005	\$139,975	\$139,977

Strategy Comprehensive Report

Maintenance Performed

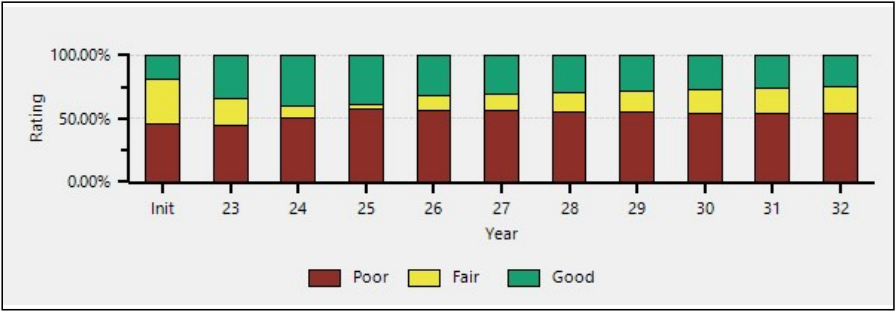


2023 City of Allegan 25% Good over 10 Years (Excluding Upcoming Projects)

Maintenance Type in Lane Miles	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Prev Maint	8.387	7.754	7.906	7.676	7.452	7.235	7.024	6.820	6.621	6.428
Rehab	0.541	0.528	0.510	0.495	0.481	0.467	0.453	0.440	0.000	0.000
Recon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.148	0.143
Total	8.928	8.282	8.416	8.171	7.933	7.702	7.477	7.260	6.769	6.571

Strategy Comprehensive Report

Rating Distribution

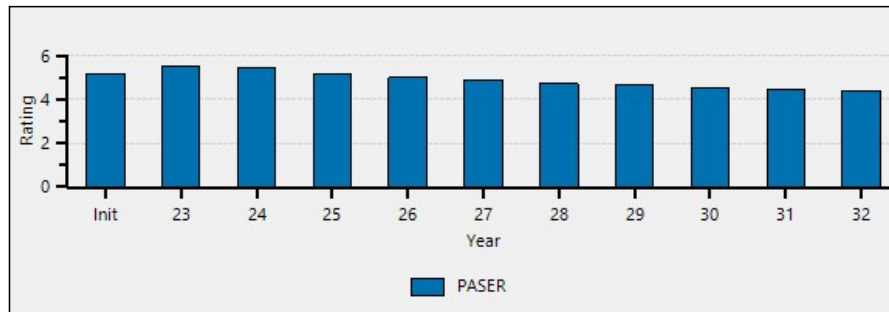


2023 City of Allegan 25% Good over 10 Years (Excluding Upcoming Projects)

Initial Values					2023		2024		2025		2026		2027		2028		2029		2030		2031		2032	
Lane Miles	%	Rating																						
10.499	18.4	Good	19.428	34.0	22.699	39.7	22.103	38.7	18.394	32.2	17.582	30.8	16.715	29.2	16.227	28.4	15.757	27.6	15.018	26.3	14.298	25.0		
20.666	36.2	Fair	12.279	21.5	5.505	9.6	1.996	3.5	6.198	10.8	7.247	12.7	8.582	15.0	9.522	16.7	10.434	18.3	11.321	19.8	12.182	21.3		
26.004	45.5	Poor	25.463	44.5	28.966	50.7	33.070	57.9	32.575	57.0	32.338	56.6	31.871	55.8	31.417	55.0	30.977	54.2	30.829	53.9	30.686	53.7		
57.169	100.0	Total																						

Strategy Comprehensive Report

PASER Distribution

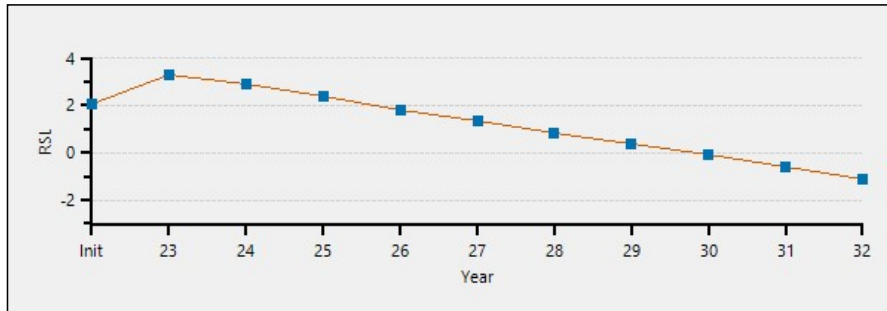


2023 City of Allegan 25% Good over 10 Years (Excluding Upcoming Projects)

Initial Value		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lane Miles	PASER										
0.365	10	0.365	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.148	0.143
0.426	9	0.967	0.893	0.510	0.495	0.481	0.467	0.453	0.440	0.000	0.148
9.708	8	18.096	21.806	21.593	17.899	17.101	16.248	15.774	15.317	14.870	14.007
5.040	7	3.389	0.647	1.752	5.954	7.247	8.582	9.522	10.434	11.321	12.182
6.736	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8.890	5	8.890	4.858	0.244	0.244	0.000	0.000	0.000	0.000	0.000	0.000
16.234	4	16.234	17.034	14.390	8.646	4.858	0.244	0.244	0.244	0.000	0.000
6.646	3	6.105	8.296	11.170	15.739	16.553	13.923	8.293	4.274	0.244	0.244
2.037	2	2.037	1.687	5.450	5.758	8.227	14.580	19.244	18.949	22.543	19.806
1.087	1	1.087	1.950	2.060	2.432	2.700	3.124	3.637	7.510	8.042	10.635
5.166	Average	5.487	5.416	5.157	5.008	4.900	4.711	4.634	4.526	4.435	4.392

Strategy Comprehensive Report

RSL Distribution



2023 City of Allegan 25% Good over 10 Years (Excluding Upcoming Projects)

Initial Value		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lane Miles	RSL										
0.365	14	0.365	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.148	0.143
0.426	13	0.967	0.893	0.510	0.495	0.481	0.467	0.453	0.440	0.000	0.148
3.862	12	6.658	3.552	3.528	3.068	2.979	2.893	2.808	2.727	2.647	2.142
3.630	11	6.426	9.243	6.187	6.086	5.552	5.391	5.234	5.082	4.934	4.789
2.216	10	5.012	9.011	11.878	8.745	8.570	7.964	7.732	7.508	7.289	7.076
0.000	9	0.000	0.647	1.752	5.954	7.247	8.455	7.964	7.732	7.508	7.289
1.116	8	0.918	0.000	0.000	0.000	0.000	0.127	1.558	2.702	3.813	4.893
0.782	7	0.146	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.142	6	2.325	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.580	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.134	4	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.266	3	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.614	2	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4.032	1	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000	0.000
5.644	0	5.644	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000	0.000
7.358	-1	7.358	5.644	4.032	4.614	0.000	0.244	0.000	0.000	0.000	0.000
3.232	-2	3.232	7.358	5.644	4.032	4.614	0.000	0.244	0.000	0.000	0.000
1.190	-3	1.190	3.232	7.358	5.644	4.032	4.614	0.000	0.244	0.000	0.000
4.402	-4	4.402	1.190	3.232	7.358	5.644	4.032	4.614	0.000	0.244	0.000
1.054	-5	0.513	3.874	0.680	2.737	6.877	5.177	3.579	4.174	0.000	0.244
0.424	-6	0.424	0.513	3.874	0.680	2.737	6.877	5.177	3.579	4.174	0.000
0.268	-7	0.268	0.424	0.513	3.874	0.680	2.737	6.877	5.177	3.579	4.174
0.372	-8	0.372	0.268	0.424	0.513	3.874	0.680	2.737	6.877	5.177	3.579
0.110	-9	0.110	0.372	0.268	0.424	0.513	3.874	0.680	2.737	6.877	5.177
0.863	-10	0.863	0.110	0.372	0.268	0.424	0.513	3.874	0.680	2.737	6.877

Strategy Comprehensive Report

0.256	-11	0.256	0.863	0.110	0.372	0.268	0.424	0.513	3.874	0.680	2.737
0.618	-12	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.513	3.874	0.680
0.057	-13	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.513	3.874
0.000	-14	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424	0.513
0.156	-15	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268	0.424
0.000	-16	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372	0.268
0.000	-17	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110	0.372
0.000	-18	0.000	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.863	0.110
0.000	-19	0.000	0.000	0.000	0.000	0.156	0.000	0.057	0.618	0.256	0.863
0.000	-20	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.057	0.618	0.256
0.000	-21	0.000	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.057	0.540
0.000	-22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.156	0.000	0.000
0.000	-23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000
2.086	Average	3.272	2.912	2.360	1.815	1.331	0.856	0.369	-0.106	-0.616	-1.123



City of Allegan
City Manager's Office
269.673.5511
231 Trowbridge Street
Allegan, MI 49010

MEMORANDUM

TO: Allegan City Council
FROM: Michaela Kleehammer, City Clerk
REVIEWED BY: Joel Dye, City Manager
DATE: October 9, 2023

SUBJECT: Discussion regarding City Proclamations

Action Requested:

It is requested that the City Council discuss city proclamations and provide City Staff with guidance for what sort of proclamations Council would like to support.

Background:

Upon occasion, an individual or organization will approach city staff with a proclamation that they or their organization would like the Mayor to read aloud during a regular City Council meeting. Typically, staff will add the requested proclamation to the agenda for the next meeting with little to no input from City Council. In acknowledgement that proclamations are meant to represent Council's support for a cause or issue, staff would prefer that City Council sets a loose standard for staff to follow in determining which proclamations should be added to a regular Council meeting agenda.

Attachments:

None



City of Allegan
Department of Public Works
269.686.1115
691 Airway Drive
Allegan, MI 49010

MEMORANDUM

TO: Allegan City Council
FROM: Doug Kadzban, Director of Public Works
REVIEWED BY: Joel Dye, City Manager
DATE: October 2, 2023

SUBJECT: Dam Inspection Reports

Action Requested:

That the City Council accept for review the current and two previous dam inspection reports.

Background:

It is requested that the City Council accept the three most recent dam inspection reports prepared by EGLE staff.

EGLE inspects dams on a three-year cycle upon request from the dam operator. The recent dam inspection was performed on August 18, 2023, by EGLE and DPW staff members. The EGLE report from this inspection is attached for your reference, along with the 2020 and 2017 EGLE inspection reports.

Below are a few quick comparisons from each report. Blank spaces indicate no reference found in that year's report.

<i>Description</i>	<i>Inspection Year</i>		
	<i>2017</i>	<i>2020</i>	<i>2023</i>
Principal spillway and earthen embankments	Satisfactory	Satisfactory	Not Addressed
Abandoned powerhouse structure	Fair to poor condition	Fair to poor condition	Not Addressed
Overall condition assessment of the dam	Fair	Fair	Poor
Apparent structural deficiencies that may lead to the dam's immediate failure.	No	No	Not Addressed



City of Allegan
Department of Public Works
269.686.1115
691 Airway Drive
Allegan, MI 49010

In addition to the inspection reports, it should be noted that the catwalk, which is chained off and the powerhouse, which is locked was last insurable on August 15, 2018. If something should happen to these two properties and cause damage to other properties, the city will not be able to use its liability insurance coverage to pay for those damages.

Attachments:

- 2023 EGLE Dam Inspection Report
- 2020 EGLE Dam Inspection Report
- 2017 EGLE Dam Inspection Report
- 2018 Insurance Certificate

**DAM SAFETY INSPECTION REPORT
ALLEGAN CITY DAM – DAM ID NO. 489
KALAMAZOO RIVER, ALLEGAN COUNTY
SE ¼ SECTION 28, T2N, R13W**



OWNER/OPERATOR:

City of Allegan
112 Locust Street
Allegan, Michigan 49010
269-686-1115

**HAZARD POTENTIAL
CLASSIFICATION:**

High

INSPECTION DATE:

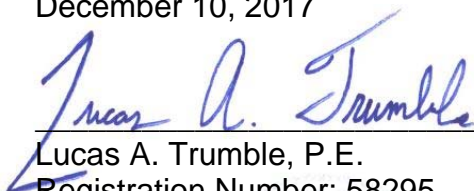
September 19, 2017

REPORT DATE:

December 10, 2017

PREPARED AND INSPECTED BY:





Lucas A. Trumble, P.E.
Registration Number: 58295
Hydrologic Studies and Dam Safety Unit
Water Resources Division, MDEQ
P.O. Box 30458
Lansing, Michigan 48909
517-420-8923

INTRODUCTION

The purpose of this inspection is to evaluate the structural condition and hydraulic capacity of the Allegan City Dam pursuant to the requirements of Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The Department of Environmental Quality (DEQ) conducted this inspection at the request of the dam's owner, the City of Allegan (City).

The report is limited to a discussion of observations based on a visual investigation and review of any previous inspection reports, plans, and data that are available. This report should not be considered an in-depth engineering investigation. All references to "upstream" indicate the lakeside of the embankment, and references to "downstream" indicate the outside of the embankment. All references to "right" or "left" are from the viewpoint of the observer facing downstream.

CONCLUSIONS AND RECOMMENDATIONS

The Allegan City Dam's principal spillway and earthen embankments are in satisfactory condition. However, the abandoned powerhouse structure is in fair to poor condition, warranting an overall condition assessment of fair for the dam. Based upon observations at the time of this inspection, there were no apparent structural deficiencies that may lead to the dam's immediate failure. The dam will be overtopped during the design flood, but this overtopping is not anticipated to cause the dam's failure. Therefore, the dam is considered to have adequate spillway capacity and embankment armoring in order to safely convey the design flood. The following recommended actions are listed by priority.

1. Repair or replace the catwalk structure over Spillway Bays #1 and #2 as soon as possible so the right embankment can be properly maintained and thoroughly inspected. City staff stated that there is no reasonable access to the right embankment since the catwalk has been closed off.
2. Clear all trees and brush from both earthen embankments by January 1, 2019. After clearing, mow both embankments a minimum of two times per year to prevent future establishment of woody vegetation and to facilitate visual inspection.
3. Repair or replace the right catwalk structure of the principal spillway as soon as possible.
4. Continue to have the abandoned powerhouse inspected by a structural engineer until repair, replacement, or removal can occur. Provide inspection reports to the Dam Safety Program as they become available.
5. Develop, and keep up-to-date, an Operation and Maintenance Plan (O&M Plan) for the dam. Provide updated copies to the Dam Safety Program.

The dam's current high hazard potential rating remains appropriate.

PROJECT INFORMATION

According to our records, the Allegan Dam was originally constructed in 1860. The radial gates were added to the principal spillway structure around 1910. The eastern portion of the powerhouse was added some time prior to 1928. The dam was purchased in 1999 by the City of Allegan from the Imperial Carving Company.

The dam was originally constructed to provide power to a mill at the dam location. Hydroelectric generation was abandoned in 1997, and the dam currently maintains an impoundment used solely for aesthetic and recreational purposes. The dam consists of a 100-foot long right earthen embankment, a 200-foot wide principal spillway section, and a 575-foot long left earthen embankment. An abandoned powerhouse exists at the downstream end of a millrace located approximately 500 feet north of the principal spillway. The earthen embankments have approximate crest widths of 33 feet, approximate upstream slopes of 2.5 horizontal to 1 vertical (2.5H:1V), and downstream slopes of 2H:1V.

The principal spillway consists of four separate spillway sections: a 51.5-foot wide south stoplog section (spillway bay #1), a 52-foot wide north stoplog section (spillway bay #2), and two 24-foot wide radial gates (spillway bays #3 and #4). The four spillway bays are separated by concrete piers and needle sections.

The powerhouse structure consists of two sections: an older section to the west and a newer section to the east. The western section of the powerhouse structure contains generating equipment that has long since been abandoned. A concrete bulkhead was constructed upstream of the intake structure. The eastern section contains generating equipment that was abandoned in 1997. The intake structure is still intact, but both gates are closed, blocking any flow through the eastern section of the powerhouse.

The dam has structural height and hydraulic heights of 14 feet and maintains approximately 9 feet of head with 3 feet of freeboard, creating a 135-acre impoundment under normal flow conditions.

Significant repairs to the dam were completed in 2000 (Phase 1) and 2003 (Phase 2).

The Allegan City Dam was previously inspected under Part 315 in 1999, 2002, 2005, and 2008 by Lawson-Fisher Associates, P.C. (LFA). Subsequently, DEQ staff inspected the dam under Part 315 in 2008, 2011, and 2014. LFA also conducted structural inspections of the abandoned powerhouse in 2008, 2011, 2013, 2015, and 2017. Granger Underwater Services inspected the submerged portions of the powerhouse in 2005. Copies of these inspection reports, along with engineering plans for the dam, are on file with the Dam Safety Program. Prior to surrendering its license to generate hydroelectricity in 1999, the dam fell under the jurisdiction of the Federal Energy Regulatory Commission (FERC) and was subject to FERC's inspection criteria.

SITE INVESTIGATION

The following discussion of the dam's physical condition and appurtenances is based on observations and photographs obtained on the date of this inspection.

The dam's earthen embankments, shown in Photographs 1 through 9, are in satisfactory condition. No sloughs, slumps, cracking, differential settlement, or major erosion were observed. The crest of the left embankment is largely covered in dense, well-maintained grass. The upstream and downstream faces are lined with large riprap. Brush was observed to be growing from voids in the riprap lining the upstream face of the left embankment, as shown in Photographs 1 and 4. This condition does not currently pose a threat to the stability of the embankment, however, trees and brush can provide shortened seepage pathways along their root systems, resulting in internal erosion (piping) of embankment materials and large section loss in the event of a blow down. They can also provide a haven for burrowing animals and obscure underlying deficiencies. As such, all brush should be removed from the left embankment by January 1, 2019.

The right earthen embankment was inaccessible on the date of this inspection due to closure of the catwalk over Spillway Bays #1 and #2 following the 2017 structural analysis completed by LFA. City staff indicated that there is no reasonable access to the right embankment since the catwalk has been closed off. As such, the embankment is not currently being maintained. From a distance, small trees and brush were observed to be growing over the entire right embankment. Repairs or replacement of the catwalk should be implemented as soon as reasonably possible so the right embankment can be cleared and thoroughly inspected. After clearing, both embankments should be mowed a minimum of two times per year to prevent further establishment of woody vegetation and to facilitate visual inspection.

The principal spillway structure, shown in Photographs 10 through 24, is also in satisfactory condition. No misalignment, differential settlement, or major cracking or deterioration was observed. The spillway gates and stoplog hoist were not operated during this inspection, but City staff indicated that both radial gates and the stoplog hoist system are operated regularly to pass flood flows and are in sound working order. No remedial action is required at this time.

Principal Spillway Bay #2 has a separate catwalk system for operation of the stoplog hoist system, as shown in Photograph 17. As such, operation of Bay #2 stoplogs is easily achieved when needed. However, Spillway Bay #1 does not have its own catwalk system. Rather, it relies on access from the shared catwalk which was closed off in 2017, as shown in Photograph 18. As such, operation of Spillway Bay #1 stoplogs could be difficult or impossible during a flood. Repairs or replacement of the catwalk system should be implemented as soon as possible such that access to Spillway Bay #1 and the right earthen embankment are restored.

The abandoned powerhouse structure, shown in Photographs 25 through 27, is in poor condition. Deteriorated concrete and masonry is present throughout the older western section of the structure. A detailed structural inspection of the powerhouse structures was performed by LFA in 2017. This report indicates that failure of the western section of the building could happen suddenly. However, since the western section has a

newer concrete bulkhead blocking flow and the eastern, gated, section is in considerably better condition; sudden failure of the dam due to continued deterioration or failure of the western section of the powerhouse building is unlikely. Regular structural inspection should continue until such a time that the powerhouse structure can be repaired, replaced, or removed. Those inspection reports should be provided to the Dam Safety Program as they become available.

STRUCTURAL STABILITY

Based upon observations during the inspection, there were no indicators of any conditions that represent an immediate threat to the dam's stability. A detailed structural inspection of the powerhouse and right principal spillway catwalk were performed by LFA on June 22, 2017. A copy of that report, dated June 30, 2017, was provided to the Dam Safety Program on the date of this inspection. The report outlines significant deterioration of both the powerhouse and catwalk structures. Though neither poses an immediate threat to the safety of the dam, both pose public safety concerns. Regular structural inspection of the powerhouse should continue until repairs, replacement, or removal can occur.

Deterioration of the catwalk has advanced to the point that City staff, at the advice of their consultant and insurance company, have prohibited access. As such, there is currently no way to access the right portion of the principal spillway or right earthen embankment for operation of the stoplogs or maintenance. Repairs or replacement of the catwalk should be implemented as soon as possible to restore access Spillway Bay #1 and the right earthen embankment.

HYDROLOGY AND HYDRAULICS

The contributing drainage area to the Kalamazoo River at the Allegan City Dam is approximately 1,554 square miles. The design discharge for this high hazard potential dam is the 0.5 percent chance (200-year) flood discharge of 14,000 cubic feet per second (cfs). A detailed hydraulic analysis of the dam was provided to this office in 2001, which included a United States Army Corps of Engineers Hydrologic Engineering Center River Analysis System (HEC-RAS) model of the Kalamazoo River from the Allegan City Dam down to the Calkins Bridge Dam. The model assumed that all radial and vertical gates of the principal spillway would be completely opened, all stoplogs of the principal spillway would remain in place, and that all gates of the abandoned powerhouse would remain closed. Under these conditions, impoundment levels would rise to an elevation of 631.2 feet and overtop a portion of the earthen embankment. The tailwater elevation would be 628.9 feet, resulting in a head differential of 2.3 feet across the dam.

An additional analysis of the overtopping velocities was also conducted. The maximum overtopping velocity during the design flood was determined to be 7.3 feet per second. Given the minimal head differential across the dam and the riprap erosion protection on the downstream embankment, it was determined the dam embankment could withstand this overtopping event with minimal damage. Therefore, the dam is considered to have adequate spillway capacity and armoring to safely convey the design flood.

High flow conditions were observed during the flooding of September 2008. While sandbagging was conducted on the impoundment, the spillways functioned as intended, and no overtopping flow occurred.

Copies of the hydraulic calculations and HEC-RAS model outputs used to make this determination are on file with the Dam Safety Program.

OPERATION AND MAINTENANCE

According to our records, a written O&M Plan, outlining procedures for the dam's upkeep and operation, has never been prepared. It is strongly suggested that such a document be developed and kept up-to-date. O&M Plans can prove to be very useful in training new dam O&M staff. Updated copies should be provided to the Dam Safety Program.

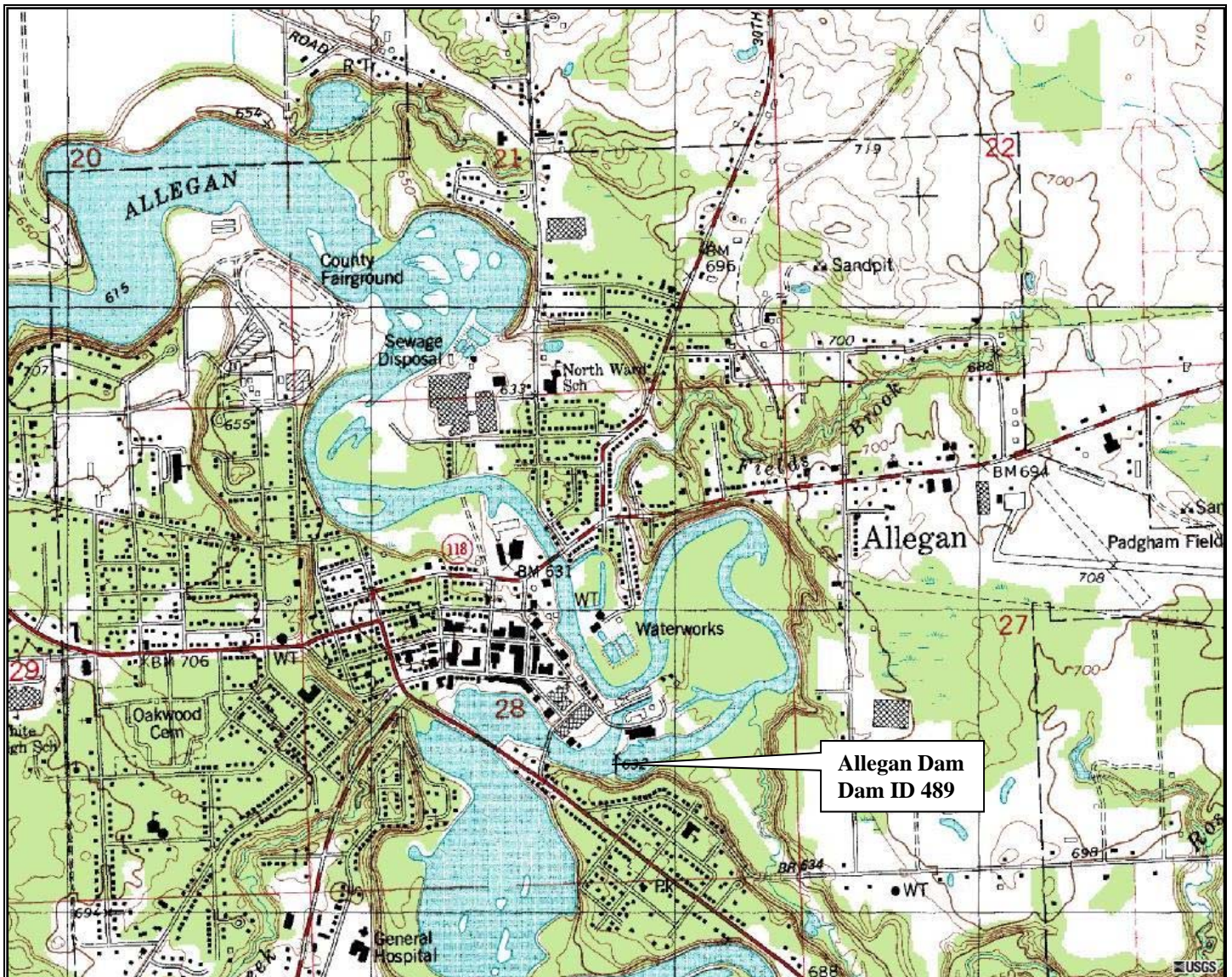
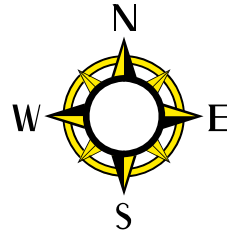
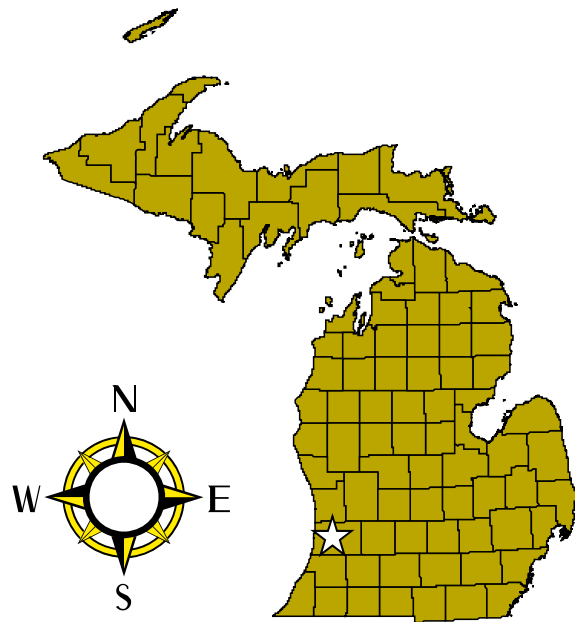
EMERGENCY ACTION PLAN

An Emergency Action Plan (EAP) is required for this high hazard potential dam. An updated copy of the EAP was last provided to this office on January 9, 2015. This fulfills your periodic EAP review requirements for this inspection cycle.

APPENDICES

A location map, inspection photographs, and the 2017 DEQ estimated flood flows are attached.

Allegan City Dam
Dam ID No. 489
Section 28, T02N, R13W
Allegan County



**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



**Photograph 1 – Upstream face of left embankment viewed from right
Note the brush along the waterline**



Photograph 2 – Left embankment crest viewed from right

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 3 – Downstream face of left embankment viewed from right



**Photograph 4 – Upstream face of left embankment viewed from left
Note brush along the waterline**

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 5 – Left embankment crest viewed from left



Photograph 6 – Downstream face of left embankment viewed from left

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



**Photograph 7 – Upstream face of right embankment viewed from left
Note that deterioration of the catwalk prevents access**



**Photograph 8 – Right embankment crest viewed from left
Note that deterioration of the catwalk prevents access**

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



**Photograph 9 – Downstream face of right embankment viewed from left
Note that deterioration of the catwalk prevents access**



Photograph 10 – Principal spillway viewed from downstream

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



**Photograph 11 – Upstream right abutment wall
Note the overgrowth of vegetation and spalled concrete**



Photograph 12 – Downstream right abutment wall

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 13 – Upstream left abutment wall



Photograph 14 – Downstream left abutment wall

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 15 – Spillway Bay #1, stoplog crests



Photograph 16 – Spillway Bay #2, stoplog crests

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 17 – Spillway Bay #2 hoist system



**Photograph 18 – Catwalk over Spillway Bays #1 and #2
Note access has been prevented due to
deterioration of the structure**

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 19 – Pier between Spillway Bays #2 and #3



Photograph 20 – Needle section between Spillway Bays #2 and #3

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 21 – Gated Spillway Bays #3 and #4



Photograph 22 – Typical radial gate viewed from downstream

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 23 – Typical radial gate hoist chain



Photograph 24 – Radial gate operator

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 25 – Abandoned powerhouse viewed from upstream



Photograph 26 – Concrete bulkhead at inlet to west section of powerhouse

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 27 – Gated inlet to east section of powerhouse



Photograph 28 – Impoundment viewed from principal spillway

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 29 – Millrace viewed from left embankment



Photograph 30 – Downstream Kalamazoo River viewed from principal spillway

Tue 3/7/2017 6:20 PM

deq-wrd-qreq deq-wrd-qreq@michigan.gov

RE: flood or low flow discharge request (ContentID - 168812)

To: Trumble, Luke (DEQ) TrumbleL@michigan.gov

We have estimated the flood frequency discharges requested in your email of March 3, 2017 (Process No. 20170135), as follows:

Kalamazoo River at Allegan City Dam, Dam ID 489, Section 28, T2N, R13W, City of Allegan, Allegan County, has a drainage area of 1554 square miles. The design discharge for this dam is the 0.5% chance (200-year) flood. The 1% and 0.5% chance peak flows are estimated to be 12000 cubic feet per second (cfs) and 14000 cfs, respectively. (Watershed Basin No. 17 Kalamazoo).

These estimates should be confirmed by our office if an application is not submitted within one year. If you have any questions concerning the discharge estimates, please contact Ms. Susan Greiner, Hydrologic Studies and Dam Safety Unit, at 517-284-5579, or by email at: GreinerS@michigan.gov.

From: trumblel@michigan.gov [<mailto:trumblel@michigan.gov>]

Sent: Friday, March 03, 2017 10:41 AM

To: deq-wrd-qreq <deq-wrd-qreq@michigan.gov>

Subject: flood or low flow discharge request (ContentID - 168812)

Requestor: Luke Trumble

Company: MDEQ

Address: 525 W Allegan

City: Lansing, MI

Zip: 48933

Phone: 5174208923

Date:

F1percent: Yes

F0.5percent: Yes

ContactAgency: None Selected

ContactPerson:

Watercourse: Kalamazoo River

LocalName: Allegan City Dam Impoundment

CountyLocation: Allegan

CityorTownship: City of Allegan

Section: 28

Town: 02N

Range: 13W

Location: Request is for the Allegan City Dam, Dam ID 489, located on the Kalamazoo River in the City of Allegan. The previous request was made by Luke Trumble in 2014, and processed by Susi Greiner (File No. 20140200).

FFR1: Dam

**DAM SAFETY INSPECTION REPORT
ALLEGAN CITY DAM – DAM ID NO. 489
KALAMAZOO RIVER, ALLEGAN COUNTY
SE ¼ SECTION 28, T2N, R13W**



OWNER/OPERATOR:

City of Allegan
112 Locust Street
Allegan, Michigan 49010
269-686-1115

**HAZARD POTENTIAL
CLASSIFICATION:**

High

INSPECTION DATE:

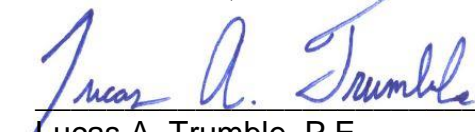
July 28, 2020

REPORT DATE:

December 29, 2020

PREPARED AND INSPECTED BY:





Lucas A. Trumble, P.E.
Registration Number: 58295
Hydrologic Studies and Dam Safety Unit
Water Resources Division, EGLE
P.O. Box 30458
Lansing, Michigan 48909
517-420-8923

INTRODUCTION

The purpose of this inspection is to evaluate the structural condition and hydraulic capacity of the Allegan City Dam pursuant to the requirements of Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The Department of Environment, Great Lakes, and Energy (EGLE) conducted this inspection at the request of the dam's owner, the City of Allegan (City).

The report is limited to a discussion of observations based on a visual investigation and review of any previous inspection reports, plans, and known available data. This report should not be considered an in-depth engineering investigation. All references to "upstream" indicate the lakeside of the embankment, and references to "downstream" indicate the outside of the embankment. All references to "right" or "left" are from the viewpoint of the observer facing downstream.

CONCLUSIONS AND RECOMMENDATIONS

The Allegan City Dam's principal spillway and earthen embankments are in satisfactory condition. However, the abandoned powerhouse structure is in fair to poor condition, warranting an overall condition assessment of fair for the dam. Based upon observations at the time of this inspection, there were no apparent structural deficiencies that may lead to the dam's immediate failure. The dam will be overtopped during the design flood, but this overtopping is not anticipated to cause the dam's failure. Therefore, the dam is considered to have adequate embankment armoring in order to safely convey the design flood. The following recommended actions are listed by priority:

1. Continue current efforts to clear all trees and brush from the earthen embankments. This recommendation is repeated from previous inspection reports and should be completed as soon as possible. After clearing, the embankments should be mowed a minimum of two times per year to prevent future establishment of woody vegetation and to facilitate visual inspection.
2. Repair or replace the deteriorated catwalk structure of the principal spillway such that operation of the right stoplog section and access to the right earthen embankment are achieved. This recommendation is repeated from the 2017 inspection report and should be completed as soon as possible.
3. Continue to have the abandoned powerhouse inspected by a structural engineer until repair, replacement, or removal can occur. Provide inspection reports to the Dam Safety Program as they become available.
4. Review, and update as necessary, the dam's emergency action plan in coordination with Allegan County Emergency Management. Provide the results of this review, and any updates, to the Dam Safety Program by December 31, 2020, or as soon as possible following this due date.

5. Develop, and keep up-to-date, an Operation and Maintenance Plan (O&M Plan) for the dam. Provide updated copies to the Dam Safety Program.

The dam's current high hazard potential rating remains appropriate.

PROJECT INFORMATION

According to our records, the Allegan Dam was originally constructed in 1860. The radial gates were added to the principal spillway structure around 1910. The eastern portion of the powerhouse was added some time prior to 1928. The dam was purchased in 1999 by the City of Allegan from the Imperial Carving Company.

The dam was originally constructed to provide power to a mill at the dam location. Hydroelectric generation was abandoned in 1997, and the dam currently maintains an impoundment used solely for aesthetic and recreational purposes. The dam consists of a 100-foot long right earthen embankment, a 200-foot wide principal spillway section, and a 575-foot long left earthen embankment. An abandoned powerhouse exists at the downstream end of a millrace located approximately 500 feet north of the principal spillway. The earthen embankments have approximate crest widths of 33 feet, approximate upstream slopes of 2.5 horizontal to 1 vertical (2.5H:1V), and downstream slopes of 2H:1V.

The principal spillway consists of four separate spillway sections: a 51.5-foot wide south stoplog section (spillway bay #1), a 52-foot wide north stoplog section (spillway bay #2), and two 24-foot wide radial gates (spillway bays #3 and #4). The four spillway bays are separated by concrete piers and needle sections.

The powerhouse structure consists of two sections: an older section to the west and a newer section to the east. The western section of the powerhouse structure contains generating equipment that has long since been abandoned. A concrete bulkhead was constructed upstream of the intake structure. The eastern section contains generating equipment that was abandoned in 1997. The intake structure is still intact, but both gates are closed, blocking any flow through the eastern section of the powerhouse.

The dam has structural height and hydraulic heights of 14 feet and maintains approximately 9 feet of head with 3 feet of freeboard, creating a 135-acre impoundment under normal flow conditions.

Significant repairs to the dam were completed in 2000 (Phase 1) and 2003 (Phase 2).

The Allegan City Dam was previously inspected under Part 315 in 1999, 2002, 2005, and 2008 by Lawson-Fisher Associates, P.C. (LFA). Subsequently, EGLE staff inspected the dam under Part 315 in 2008, 2011, 2014, and 2017. LFA also conducted structural inspections of the abandoned powerhouse in 2008, 2011, 2013, 2015, and 2017. Granger Underwater Services inspected the submerged portions of the powerhouse in 2005. Copies of these inspection reports, along with engineering plans for the dam, are on file with the Dam Safety Program. Prior to surrendering its license

to generate hydroelectricity in 1999, the dam fell under the jurisdiction of the Federal Energy Regulatory Commission (FERC) and was subject to FERC's inspection criteria.

SITE INVESTIGATION

The following discussion of the dam's physical condition and appurtenances is based on observations and photographs obtained on the date of this inspection.

The dam's earthen embankments, shown in Photographs 1 through 9, are in satisfactory condition. No sloughs, slumps, cracking, differential settlement, or major erosion were observed. The crests and downstream slopes of the left and right millrace embankments are largely covered in dense, well-maintained grass and riprap. City staff have done a great job in removing small trees and brush previously observed along the upstream slope of the embankments, however, some tall weeds and brush have regrown, as shown in Photographs 1 and 7. All large trees have been removed from the right embankment, however tall weeds, brush, and small trees remain, as shown in Photographs 4 through 6. This condition does not currently pose a threat to the stability of the embankment; however, trees and brush can provide shortened seepage pathways along their root systems, resulting in internal erosion (piping) of embankment materials and large section loss in the event of a blow down. They can also provide a haven for burrowing animals and obscure underlying deficiencies. As such, the City should continue current efforts to remove all remaining trees and brush from the embankments. The 2017 inspection report recommended that this be completed by January 1, 2019. Keeping with this timeframe, the embankments should be cleared as soon as possible. After clearing, all embankments should be mowed a minimum of two times per year to prevent further establishment of woody vegetation and to facilitate visual inspection.

The principal spillway structure, shown in Photographs 10 through 24, is also in satisfactory condition. No misalignment, differential settlement, or major cracking or deterioration was observed. The spillway gates and stoplog hoist were not operated during this inspection, but City staff indicated that both radial gates and the stoplog hoist system are operated regularly to pass flood flows and are in sound working order. No remedial action is required at this time.

The central stoplog spillway section has a separate catwalk system for operation of the stoplog hoist system, as shown in Photograph 20. As such, operation of these stoplogs is easily achieved when needed. However, the right stoplog spillway section does not have its own catwalk system. Rather, it relies on access from the shared catwalk which was closed off in 2017 due to deterioration of the steel structural members, as shown in Photographs 23 and 24. As such, operation of these stoplogs could be difficult or impossible during a flood. Repairs or replacement of the catwalk system should be implemented as soon as possible such that access to the right stoplog spillway section and right earthen embankment are restored.

The abandoned powerhouse structure, shown in Photographs 25 through 28, is in poor condition. Deteriorated concrete and masonry are present throughout the older left section of the structure. A detailed structural inspection of the powerhouse structures

was performed by LFA in 2017. This report indicates that failure of the left section of the building could happen suddenly. However, since the left section has a newer concrete bulkhead blocking flow and the eastern, gated, section is in considerably better condition; sudden failure of the dam due to continued deterioration or failure of the western section of the powerhouse building is unlikely. Regular structural inspection should continue until such a time that the powerhouse structure can be repaired, replaced, or removed. Those inspection reports should be provided to the Dam Safety Program as they become available.

STRUCTURAL STABILITY

Based upon observations during the inspection, there were no indicators of any conditions that represent an immediate threat to the dam's stability. A detailed structural inspection of the powerhouse and right principal spillway catwalk were performed by LFA on June 22, 2017. A copy of that report, dated June 30, 2017, was provided to the Dam Safety Program during the 2017 inspection of the dam. The report outlines significant deterioration of both the powerhouse and catwalk structures. Though neither poses an immediate threat to the safety of the dam, both pose public safety concerns. Regular structural inspection of the powerhouse should continue until repairs, replacement, or removal can occur.

Deterioration of the catwalk that accesses the right portions of the principal spillway has advanced to the point that City staff, at the advice of their consultant and insurance company, have prohibited access. As such, there is currently no way to access the right portion of the principal spillway or right earthen embankment for operation of the stoplogs or maintenance. Repairs or replacement of the catwalk should be implemented as soon as possible to restore access to the right stoplog spillway section and the right earthen embankment.

HYDROLOGY AND HYDRAULICS

The contributing drainage area to the Kalamazoo River at the Allegan City Dam is approximately 1,554 square miles. The design discharge for this high hazard potential dam is the 0.5-percent annual chance (200-year) flood discharge of 14,000 cubic feet per second (cfs). A detailed hydraulic analysis of the dam was provided to this office in 2001, which included a United States Army Corps of Engineers Hydrologic Engineering Center River Analysis System (HEC-RAS) model of the Kalamazoo River from the Allegan City Dam down to the Calkins Bridge Dam. The model assumed that all radial and vertical gates of the principal spillway would be completely opened, all stoplogs of the principal spillway would remain in place, and that all gates of the abandoned powerhouse would remain closed. Under these conditions, impoundment levels would rise to an elevation of 631.2 feet and overtop a portion of the earthen embankment. The tailwater elevation would be 628.9 feet, resulting in a head differential of 2.3 feet across the dam.

An additional analysis of the overtopping velocities was also conducted. The maximum overtopping velocity during the design flood was determined to be 7.3 feet per second.

Given the minimal head differential across the dam and the riprap erosion protection on the downstream embankment, it was determined the dam embankment could withstand this overtopping event with minimal damage. Therefore, the dam is considered to have adequate armoring to safely convey the design flood.

High flow conditions were observed during the flooding of September 2008. While sandbagging was conducted on the impoundment, the spillways functioned as intended, and no overtopping flow occurred.

Copies of the hydraulic calculations and HEC-RAS model outputs used to make this determination are on file with the Dam Safety Program.

OPERATION AND MAINTENANCE

According to our records, a written Operation and Maintenance (O&M) Plan, outlining procedures for the dam's upkeep and operation, has never been prepared. It is strongly suggested that such a document be developed and kept up-to-date. O&M Plans can prove to be very useful in training new dam O&M staff. Updated copies should be provided to the Dam Safety Program.

EMERGENCY ACTION PLAN

The Allegan City Dam has been assigned a High Hazard Potential rating. As such, the owner is required under Part 315 to develop, and keep up to date, an Emergency Action Plan (EAP) for the dam. An EAP has been developed and is on file with the Dam Safety Program. An updated copy of the EAP was last provided on January 9, 2015. The City shall review, and update as necessary, the EAP in coordination with Allegan County Emergency Management. The results of this review, and any updates, shall be provided to the Dam Safety Program by December 31, 2020, or as soon as possible following this due date.

APPENDICES

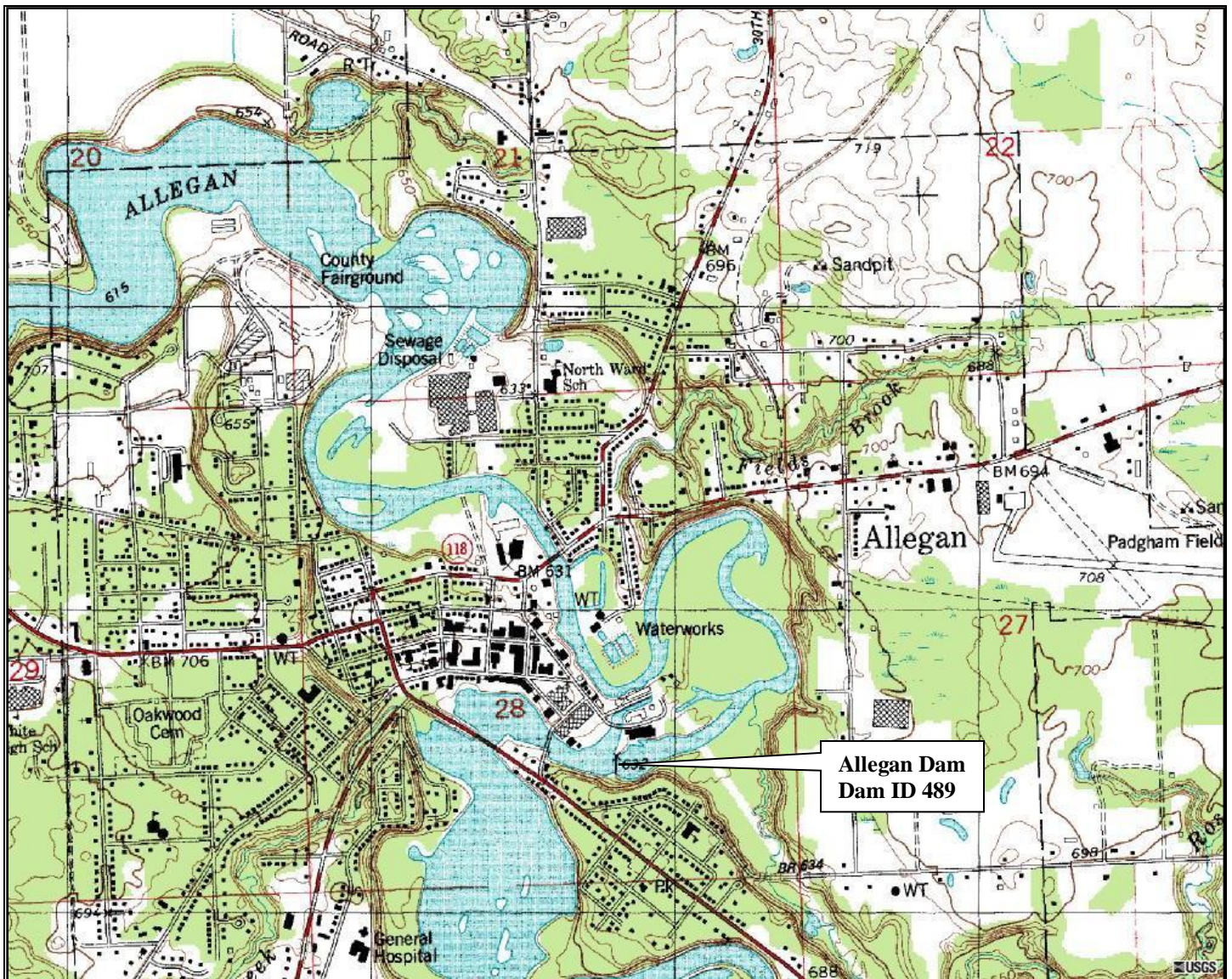
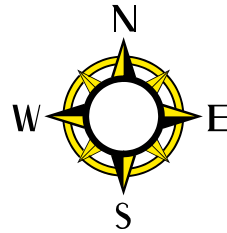
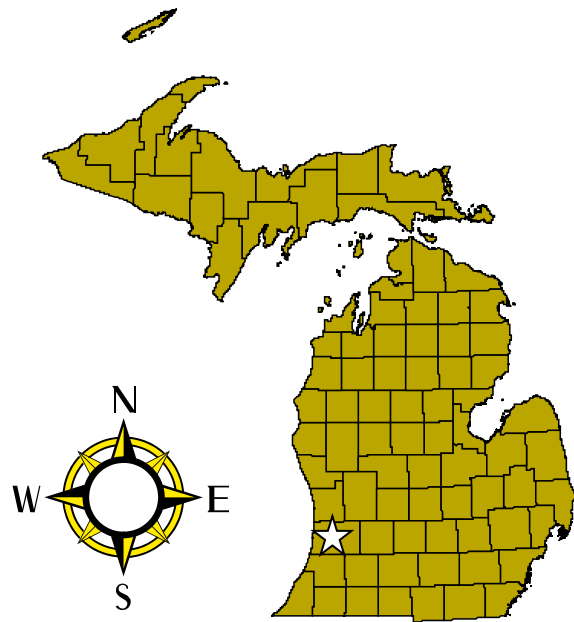
Appendix A – Location Map

Appendix B – Inspection Photographic Log

Appendix C – 2020 EGLE Flood Flow Estimates

APPENDIX A – Location Map

Allegan City Dam
Dam ID No. 489
Section 28, T02N, R13W
Allegan County



APPENDIX B – Inspection Photographic Log

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



**Photograph 1 – Upstream face of left embankment viewed from left
Note the tall weeds along the waterline**



Photograph 2 – Left embankment crest viewed from left

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 3 – Downstream face of left embankment viewed from left



**Photograph 4 – Upstream face of right embankment viewed from right
Note the tall weeds, brush, and small trees**

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



**Photograph 5 – Right embankment crest viewed from right
Note the tall weeds, brush, and small trees**



**Photograph 6 – Downstream face of right embankment viewed from right
Note the tall weeds, brush, and small trees**

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



**Photograph 7 – Upstream face of millrace embankment viewed from right
Note the tall weeds and brush near the waterline**



Photograph 8 – Millrace embankment crest viewed from right

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 9 – Downstream face of millrace embankment viewed from right



Photograph 10 – Principal spillway viewed from downstream

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



**Photograph 11 – Upstream left abutment wall
Note the cracks near the catwalk connection**



Photograph 12 – Downstream left abutment wall

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 13 – Upstream right abutment wall



Photograph 14 – Downstream right abutment wall

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**

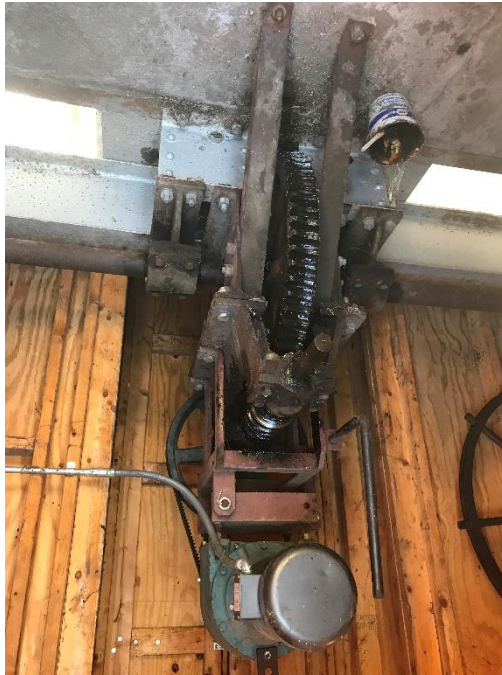


Photograph 15 – Gated spillway bays viewed from downstream



Photograph 16 – Typical radial gate viewed from downstream

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 17 – Gate operator



Photograph 18 – Gate hoist and chain

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 19 – Center stoplog spillway viewed from downstream



Photograph 20 – Catwalk and stoplog hoist system of center spillway

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



**Photograph 21 – Stoplog and hoist cables viewed from downstream
Note the significant leakage between stoplogs**



Photograph 22 – Right stoplog spillway viewed from downstream

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 23 – Spillway crest and catwalk viewed from left



Photograph 24 – Deteriorated beam of catwalk

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 25 – Abandoned powerhouse viewed from upstream



Photograph 26 – Concrete bulkhead at inlet to left section of powerhouse

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 27 – Gated inlet to right section of powerhouse



Photograph 28 – Powerhouse outlet viewed from right

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 29 – Impoundment viewed from principal spillway



Photograph 30 – Headrace viewed from former powerhouse

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**



Photograph 31 – Downstream Kalamazoo River viewed from principal spillway



**Photograph 32 – Downstream tailrace and Kalamazoo River
viewed from former powerhouse**

APPENDIX C – 2020 EGLE Flood Flow Estimates

RE: flood or low flow discharge request (ContentID - 168812)

EGLE-wrd-qreq EGLE-wrd-qreq@michigan.gov

To: Trumble, Luke (EGLE) TrumbleL@michigan.gov

Wed 1/13/2021 8:48 PM

We have estimated the flood frequency discharges requested in your email of December 28, 2020 (Process No. 20200647), as follows:

Kalamazoo River at Allegan City Dam, Dam ID 489, Section 28, T2N, R13W, City of Allegan, Allegan County, has a total drainage area of 1557 square miles and a contributing drainage area of 1366 square miles. The design discharge for this dam is the 0.5% chance (200-year) flood. The 0.5% chance peak flow is estimated to be 14000 cubic feet per second. (Watershed Basin No. 17 Kalamazoo).

Please include a copy of this letter with your inspection report or any subsequent application for permit. These estimates should be confirmed by our office if an application is not submitted within one year. If you have any questions concerning the discharge estimates, please contact Ms. Susan Greiner, Hydrologic Studies and Dam Safety Unit, at 517-927-3838, or by email at: GreinerS@michigan.gov.

-----Original Message-----

From: DoNotReply@michigan.gov <DoNotReply@michigan.gov>

Sent: Monday, December 28, 2020 11:24 PM

To: EGLE-wrd-qreq <EGLE-wrd-qreq@michigan.gov>

Subject: flood or low flow discharge request (ContentID - 168812)

Requestor: Luke Trumble

Company: EGLE

Address: 525 W Allegan St

City: Lansing, MI

Zip: 48933

Phone: 517-420-8923

Date: 2020-12-28

F0.5percent: Yes

ContactAgency: None Selected

ContactPerson:

Watercourse: Kalamazoo River

LocalName: Allegan City Dam Impoundment

CountyLocation: Allegan

CityorTownship: City of Allegan

Section: 28

Town: 02N

Range: 13W

Location: Request is for the Allegan City Dam, Dam ID No. 489, located on the Kalamazoo River in Allegan County. Previous request was made in 2017, process no. 20170135.

FFR1: Dam

fpReqEmailAddr: trumblel@michigan.gov



GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING



PHILLIP D. ROOS
DIRECTOR

September 20, 2023

VIA EMAIL

City of Allegan
Doug Kadzban, Public Works Director
691 Airway Drive
Allegan, Michigan 49010

Dear Doug Kadzban,

SUBJECT: Allegan City Dam, Dam ID No. 489, Allegan County

The enclosed Dam Safety Inspection Report for the Allegan City Dam was prepared by Luke A. Trumble, P.E., and Thomas Horak, E.I.T., of the Dam Safety Unit, Water Resources Division, Department of Environment, Great Lakes, and Energy (EGLE). The visual inspection and report were completed at your request, as provided by Section 31518(4) of Part 315, Dam Safety (Part 315), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

The purpose of this inspection was to evaluate the structural condition and hydraulic capacity of the dam, as required by Part 315 of the NREPA.

The Allegan City Dam is in Poor condition. Dam safety deficiency is recognized for loading conditions which may realistically occur. The poor condition is warranted primarily from failing stoplogs and the unknown condition of the powerhouse head gate. Remedial action is necessary. Poor rating may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency: further investigations and studies are necessary. The following recommended actions are listed by priority:

1. Replace the wooden stoplogs in the right most spillway bay within the next six months. Consult with your engineer on the most practical and effective ways to complete this repair.
2. Repair the popout on the left downstream abutment wall at spillway bay #3, the right radial gate before winter 2023. Monitor the other concrete deficiencies noted in this report, and review with your engineer if further repairs are necessary or if monitoring would be suitable until dam removal can occur.
3. Continue to have the abandoned powerhouse inspected by a structural engineer until repair, replacement, or removal can occur. Provide inspection reports to the Dam Safety Program as they become available. The latest report recommended removal of the powerhouse as soon as possible. Plan to either inspect the state

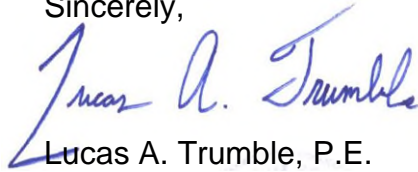
of the right side's headgates to determine its suitability to block flow until dam removal can occur, or install a concrete bulkhead on the right side similar to the left side's bulkhead.

4. Continue efforts to clear all trees and brush from the embankments, both the right embankment's entire surface and the left embankment's brush at the upstream slope. Plan to clear trees and brush adjacent to the powerhouse as well. Further, clear all woody vegetation growing within the slope armoring on the right embankment.
5. Repair or replace the deteriorated catwalk structure of the principal spillway such that operation of the right stoplog section and access to the right earthen embankment are achieved. This recommendation is repeated from the 2017 inspection report and should be completed as soon as possible.
6. Multiple sinkholes or rodent holes were observed, primarily on the left embankment between Mill District Road and the powerhouse. Fill/Repair these holes with suitable, compacted fill and establish proper growth.
7. Bare spots were observed on the upstream and downstream slopes where riprap has become displaced on the left embankment, primarily near the spillway. Additionally, the downstream slope is very steep and bare on a small portion of the embankment adjacent to the powerhouse. Replace the displaced riprap on the left embankment near the powerhouse and monitor the slope adjacent to the powerhouse for further degradation. Repair as necessary.
8. When the radial gates are next shut, investigate the condition of the concrete apron. For the stoplog bays, when flows are low, consider temporarily blocking flow with the stoplogs, if able, to investigate the aprons below the stoplogs as they were obscured by flow.
9. Monitor the water and vegetation growth in the needle section between spillway bays #2 and #3 for continued presence of water. If it remains constant if it is determined that the splashing is not responsible for its presence, consider investigating a potential seepage path through the concrete pier along the concrete and sheetpile interface.
10. Review, and update as necessary, the EAP in coordination with Allegan County Emergency Management. The results of this review, and any updates, shall be provided to the Dam Safety Program by December 31, 2023.

Doug Kadzban
Page 2
September 20, 2023

If you have any questions regarding these recommendations, please contact Mr. Thomas Horak at 517-231-8594, or HorakT@Michigan.gov, or you may contact me.

Sincerely,

A handwritten signature in blue ink that reads "Lucas A. Trumble". The signature is fluid and cursive, with the first name "Lucas" being the most prominent.

Lucas A. Trumble, P.E.
Dam Safety Unit
Water Resources Division
517-420-8923

Enclosure

cc: Jeff Morrie, City of Allegan
Sarah Clark, Allegan County Local Emergency Management Coordinator
Thomas Horak, EGLE

**DAM SAFETY INSPECTION REPORT
ALLEGAN CITY DAM – DAM ID NO. 489
KALAMAZOO RIVER
ALLEGAN COUNTY – SECTION 28, T 02N, R 13W**



OWNER(S)/OPERATOR(S): City of Allegan
691 Airway Drive
Allegan, MI 49010
(269) 686-1115

**HAZARD POTENTIAL
CLASSIFICATION:** High

INSPECTION DATE: August 18, 2023

REPORT DATE: September 20, 2023

PREPARED AND INSPECTED BY:

Handwritten signature of Thomas Horak in blue ink.

Thomas Horak, E.I.T.
Dam Safety Unit
Water Resources Division
Department of Environment, Great Lakes, and
Energy
P.O. Box 30458
Lansing, Michigan 48909
517-231-8594

Handwritten signature of Lucas A. Trumble in blue ink.

Lucas A. Trumble, P.E.
Dam Safety Unit
Water Resources Division
Department of Environment, Great Lakes, and Energy
P.O. Box 30458
Lansing, Michigan 48909
517-420-8923



INTRODUCTION

The purpose of this inspection was to evaluate the structural condition and hydraulic capacity of the Allegan City Dam, as required by Part 315, Dam Safety (Part 315), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This inspection was conducted by the Department of Environment, Great Lakes, and Energy (EGLE) in response to a request by the owner of the dam, City of Allegan. The report is limited to a discussion of observations based on a visual investigation and review of any available previous inspection reports, plans, and data. This report should not be considered an in-depth engineering investigation. All references to “right” and “left” in this report are based on the observer facing downstream.

CONCLUSIONS AND RECOMMENDATIONS

The Allegan City Dam is in Poor condition. Dam safety deficiency is recognized for loading conditions which may realistically occur. The poor condition is warranted primarily from failing stoplogs and the unknown condition of the powerhouse head gate. Remedial action is necessary. Poor rating may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency: further investigations and studies are necessary. The following recommended actions are listed by priority:

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4. Continue efforts to clear all trees and brush from the embankments, both the right embankment's entire surface and the left embankment's brush at the upstream slope. Plan to clear trees and brush adjacent to the powerhouse as well. Further, clear all woody vegetation growing within the slope armoring on the right embankment.
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8. When the radial gates are next shut, investigate the condition of the concrete apron. For the stoplog bays, when flows are low, consider temporarily blocking flow with the stoplogs, if able, to investigate the aprons below the stoplogs as they were obscured by flow.
9. Monitor the water and vegetation growth in the needle section between spillway bays #2 and #3 for continued presence of water. If it remains constant if it is determined that the splashing is not responsible for its presence, consider investigating a potential seepage path through the concrete pier along the concrete and sheetpile interface.
10. Review, and update as necessary, the EAP in coordination with Allegan County Emergency Management. The results of this review, and any updates, shall be provided to the Dam Safety Program by December 31, 2023.

The dam's current High hazard potential rating remains appropriate.

PROJECT INFORMATION

According to our records, the Allegan Dam was originally constructed in 1860. The radial gates were added to the principal spillway structure around 1910. The eastern portion of the powerhouse was added some time prior to 1928. The dam was purchased in 1999 by the City of Allegan from the Imperial Carving Company.

The dam was originally constructed to provide power to a mill at the dam location. Hydroelectric generation was abandoned in 1997, and the dam currently maintains an impoundment used solely for aesthetic and recreational purposes. The dam consists of a 100-foot long right earthen embankment, a 200-foot wide principal spillway section, and a 575-foot long left earthen embankment. An abandoned powerhouse exists at the downstream end of a millrace located approximately 500 feet north of the principal spillway. The earthen embankments have approximate crest widths of 30 feet, approximate upstream slopes of 2.5 horizontal to 1 vertical (2.5H:1V), and downstream slopes of 2H:1V.

The principal spillway consists of four separate spillway sections: a 51.5-foot wide south stoplog section (spillway bay #1), a 52-foot wide north stoplog section (spillway bay #2), and two 24-foot wide radial gates (spillway bays #3 and #4). The four spillway bays are separated by concrete piers and needle sections.

The powerhouse structure consists of two sections: an older section to the west and a newer section to the east. The western section of the powerhouse structure contains generating equipment that has long since been abandoned. A concrete bulkhead was constructed upstream of the intake structure. The eastern section contains generating equipment that was abandoned in 1997. The intake structure is still intact, but both gates are closed, blocking any flow through the eastern section of the powerhouse.

The dam has structural height and hydraulic heights of 14 feet and maintains approximately 9 feet of head with 3 feet of freeboard, creating a 135-acre impoundment under normal flow conditions.

Significant repairs to the dam were completed in 2000 (Phase 1) and 2003 (Phase 2).

The Allegan City Dam was previously inspected under Part 315 in 1999, 2002, 2005, and 2008 by Lawson-Fisher Associates, P.C. (LFA). Subsequently, EGLE staff inspected the dam under Part 315 in 2008, 2011, 2014, and 2017. LFA also conducted structural inspections of the abandoned powerhouse in 2008, 2011, 2013, 2015, and 2017. Abonmarche completed the powerhouse inspection in 2022. Granger Underwater Services inspected the submerged portions of the powerhouse in 2005. Copies of these inspection reports, along with engineering plans for the dam, are on file with the Dam Safety Program. Prior to surrendering its license to generate hydroelectricity in 1999, the dam fell under the jurisdiction of the Federal Energy Regulatory Commission (FERC) and was subject to FERC's inspection criteria.

SITE INVESTIGATION

The following discussion of the dam's physical condition and appurtenances is based on observations and photographs obtained on the inspection date.

In addition to the specific findings listed below, it is important to continue good maintenance practices. These practices include regular inspection of the dam embankments and hydraulic structures for any deficiencies. Some of the more common issues that are found include growth of trees and brush, development of erosion areas, and animal burrows.

If woody vegetation is allowed to mature, it could develop an extensive root system. These root systems can lead to piping failure or if the brush and trees are uprooting in a storm, can cause extensive deterioration of the embankment. Embankments should be clear of woody vegetation and mowed 10 feet past the toe of the embankment. Similarly, animal burrows and surface erosion, can propagate into increased seepage and potentially piping failure, as well as lead to slope stability issues.

The following data was collected on the date of the inspection and includes deficiencies observed during the inspection and necessary actions for remediation of the observed deficiencies.

Upstream Slope	
Pool elevation at time of inspection	<i>Approximately 32" below left upstream concrete headwall at abutment with left embankment</i>

Upstream slope ground cover	<i>Riprap near waterline on left embankment up to maintained grass. Concrete wall on right embankment and brush/trees up to crest.</i>
What issues are present on the upstream slope?	<i>Trees, Brush, Other</i>
Slope Protection	
What types of slope protection are used?	<i>Riprap on left embankment, concrete wall on right embankment. Some of the riprap on the left embankment has been displaced, presumably from public manipulation. Fabric is visible where riprap is lacking.</i>
Action required for other slope protection	<i>Maintenance</i>
Describe action required	<i>Add riprap where it is sparse on the upstream and downstream slopes</i>
Average diameter of riprap	<i>12"-36"</i>
Trees/Woody Vegetation	
Number of trees	<i>Sparse</i>
Tree DBH	<i><6"</i>
Tree location	<i>Right embankment, and at the water's edge along the left embankment</i>
Action required for trees	<i>Maintenance</i>
Describe action required	<i>Remove all trees and brush from both embankments. The right embankment has more significant woody vegetation growth than the left. City staff said the left embankment is to be cleared near the waterline in the coming month. Plan to begin clearing the entirety of the right embankment in the coming years also. Once cleared, all embankments should be cleared and mowed at least twice per year.</i>
Brush coverage	<i>Sparse</i>
Brush location	<i>Right embankment, and at the water's edge along the left embankment</i>
Action required for brush	<i>Maintenance</i>
Describe action required	<i>Remove all trees and brush from both embankments. The right embankment has more significant woody vegetation growth than the left. City staff said the left embankment is to be cleared near the waterline in the coming month. Plan to begin clearing the entirety of the right embankment in the coming years also. Once cleared, all embankments should be cleared and mowed at least twice per year.</i>

Crest	
Approximate width of crest (ft)	<i>30</i>
Approximate freeboard (ft)	<i>2.5-3 feet</i>
Crest ground cover	<i>Maintained grass and path/maintenance drive on left embankment. Brush and trees on right embankment</i>
What issues are present on the crest?	<i>Trees, Brush</i>
Trees/Woody Vegetation	

Number of trees	<i>Sparse</i>
Tree DBH	<i>6-12"</i>
Location of the trees	<i>Right embankment</i>
Action required for trees	<i>Maintenance</i>
Describe action required	<i>Remove all trees and brush from both embankments. The right embankment has more significant woody vegetation growth than the left. City staff said the left embankment is to be cleared near the waterline in the coming month. Plan to begin clearing the entirety of the right embankment in the coming years also. Once cleared, all embankments should be cleared and mowed at least twice per year.</i>
Brush coverage	<i>Sparse</i>
Location of the brush	<i>Right embankment</i>
Action required for brush	<i>Maintenance</i>
Describe action required	<i>Remove all trees and brush from both embankments. The right embankment has more significant woody vegetation growth than the left. City staff said the left embankment is to be cleared near the waterline in the coming month. Plan to begin clearing the entirety of the right embankment in the coming years also. Once cleared, all embankments should be cleared and mowed at least twice per year.</i>

Downstream Slope	
Downstream slope ground cover	<i>Riprap on both embankments</i>
What issues are present on the downstream slope?	<i>Trees, Brush, Other</i>
User Defined Issue	
Specify other.	<i>Armoring displacement. Similar to the upstream slope armoring on the left embankment, there are portions of the downstream armoring that are missing or displaced, especially the left embankment near the spillway. Some fabric is exposed and subject to foot traffic. There is also brush growing within the right embankment's downstream riprap armoring</i>
Action required for these other issues	<i>Maintenance</i>
Describe action required	<i>Replace riprap where it is sparse. Further, clear the woody vegetation within the riprap on the right embankment</i>
Trees/Woody Vegetation	
Number of trees	<i>Sparse</i>
Tree DBH (in)	<i>6-12"</i>
Location of trees	<i>Right embankment</i>
Action required for trees	<i>Maintenance</i>
Describe action required	<i>Remove all trees and brush from both embankments. The right embankment has more significant woody vegetation growth than the left. City staff said the left embankment is to be</i>

	<i>cleared near the waterline in the coming month. Plan to begin clearing the entirety of the right embankment in the coming years also. Once cleared, all embankments should be cleared and mowed at least twice per year.</i>
Embankment / Internal Drains	
What types of embankment drains are present?	<i>None observed</i>

Principal Spillway	
What type of spillway is present?	<i>Right spillway bay (#1) with wooden stoplogs, Middle spillway bay (#2) with aluminum stoplogs and two radial gate bays on the left side (#3 and #4)</i>
What is the primary material used in the spillway?	<i>Concrete piers and abutments. Aluminum stoplogs in middle bay. Wood stoplogs in right bay. Steel radial gates</i>
Which components are present?	<i>Stoplogs, gates</i>
What issues are present with the primary spillway?	<i>Stoplog Condition, Deteriorating Materials, Other</i>
User Defined Issue	
Define issue	<i>At concrete and sheetpile interface of needle section between spillway bays #2 and #2, there is some small vegetation growth and water present. It is likely that the water presence is due to splashing from the flow through spillway bay #3.</i>
Location of issue	<i>Needle section between spillway bays #2 and #3, near downstream extent</i>
Action required for the issue	<i>Monitor</i>
Describe action required	<i>Monitor the water and vegetation growth in the needle section for presence of water. If it remains constant if it is determined that the splashing is not responsible for that, consider investigating a potential seepage path through the concrete pier.</i>
Stoplogs	
What type of stoplog is in use?	<i>Metal stoplogs in bay #2 and wooden stoplogs in bay #1</i>
Describe the condition of the stoplogs	<i>Bay #2 stoplogs are in good shape. One stoplog was removed and set aside during the inspection. It appeared to be in satisfactory condition. The wooden stoplogs in bay #1 are in poor condition. Significant leakage already exists through the stoplogs and they are visibly bowed.</i>
Action required for the stoplogs	<i>Maintenance</i>
Describe action required	<i>Replace stoplogs in the next six months. Review options to complete this project with your engineer. New stoplogs may be able to be added downstream of the existing stoplogs to avoid potential sediment and water management issues with other alternatives.</i>
Material Deterioration	
What materials are deteriorating in the spillway?	<i>Concrete</i>
What issues are noted with the concrete components?	<i>Popouts, Other</i>
Specify issues.	<i>One larger chunk of concrete has popped out of the left wall of spillway bay #3, the right radial</i>

	<p>gate. Other locations of more significant concrete deterioration include:</p> <p>Spillway bay #4 left upstream abutment wall has large cracks from the top of the wall to at least the water surface; it does not appear to have significantly changed from the last inspection</p> <p>Minor spalling was observed on the right downstream abutment wall at spillway bay #3 near the waterline</p> <p>Minor cracking and spalling is present at the pier between spillway bays #2 and #3, on both the left and right sides – at the left end of the walkway bridge over bays #1 and #2, and at the right end of the deck over bays #3 and #4</p> <p>Older concrete is deteriorating and spalling off the right upstream wall of spillway bay #1, and there is a displaced joint in the upstream headwall at the right embankment</p>
How large is the impacted area (in)?	Could not get to hole on left wall of spillway bay #3 to measure, but it appears to be approximately 6" in diameter or slightly larger
Where are the issues located?	See description above
Action required for concrete components of the spillway	Maintenance
Describe action required	Repair the hole on the left downstream abutment wall of spillway bay #3 before the winter when freeze-thaw conditions could significantly worsen the issue. Monitor the rest of the concrete deficiencies and repair as necessary. Since the dam is to be removed in the near future, consult with your engineer to determine if the other concrete deficiencies are stable enough to only monitor, or only partially repair in the interim time until removal can occur.
Erosion Control / Energy Dissipation	
What type of erosion control structure is in place?	Apron present downstream of spillway
Are there any issues with the outlet erosion control structure?	None observed, although flow obscured most of aprons
Does the outlet erosion control structure include any drains?	None observed
Gates / Valves	
Does the spillway include a gate?	Yes, two radial gates
Are issues present with the gates?	Minor leakage is present at the ends of both gates, likely causing or at least contributing to the popout on the left downstream wall of spillway bay #3
Action required for concrete components of the spillway	Maintenance
Describe action required	Consider repairing the seals at the edges of each radial gate.
Additional comments	<p>Freeboard measurements at different concrete components are:</p> <p>32" down to water from left abutment wall top</p> <p>30" of freeboard at pier between spillway bays #2 and #3</p> <p>13" of freeboard at catwalk over spillway bays #1 and #2</p>

	<p>13" of freeboard between at pier between spillway bays #1 and #2</p> <p>16" at right spillway abutment. There is a lower notch in the right abutment where the walkway truss joins the concrete abutment where water would overtop before overflowing the abutment wall, although it would only be able to convey a very small amount of flow. Low spot is approximately 13" of freeboard – see photo #131</p> <p>Per City staff, water has only reached near the bottom of the catwalk bridge over bays #1 and #2, around 13" of rise</p>
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Auxiliary Spillway	
What type of spillway is present?	<i>Powerhouse previously used to generate power. There are two sides, an older left/west side and a newer right/east side. The left side has a concrete bulkhead on the upstream side of the powerhouse. The right side still has the historic headgates that restrict flow through the powerhouse.</i>
What is the primary material used in the spillway?	<i>Concrete, brick masonry</i>
What issues are present with the auxiliary spillway?	<p><i>The lack of bulkhead on right side is concerning. The state of the historic gates is largely unknown. Failure to the gates could result in an uncontrolled release of impoundment water to the Kalamazoo River.</i></p> <p><i>Concrete components of the powerhouse, excluding the left side's bulkhead, are significantly deteriorating, as well as portions of the building's superstructure, ceiling on the left side. It is not expected that ceiling failure will result in a full failure of the powerhouse and dam, although significant failure of concrete portions could jeopardize the stability and effectiveness of the bulkhead resulting in an uncontrolled release.</i></p>
Action required for auxiliary spillway	<i>Monitor, Investigate, Maintenance</i>
Describe action required	<i>To the extent possible, investigate the state of the powerhouse's right headgates and repair as necessary. Or, simply plan to bulkhead the spillway off completely like the left side and reduce the risk of failure during the interim time until removal can occur. Monitor the concrete components and repair as necessary as directed by your engineer so that the risk of failure ahead of removal can be reasonably reduced.</i>

The above monitoring and maintenance items should be addressed in accordance with the Conclusions and Recommendations section of this report.

STRUCTURAL STABILITY

Based upon observations during the inspection, there were no indicators of any conditions that represent an immediate threat to the dam's stability. A detailed structural inspection of the powerhouse and right principal spillway catwalk were performed by LFA on June 22, 2017. A copy of that report, dated June 30, 2017, was

provided to the Dam Safety Program during the 2017 inspection of the dam. The report outlines significant deterioration of both the powerhouse and catwalk structures. Though neither poses an immediate threat to the safety of the dam, both pose public safety concerns. Regular structural inspection of the powerhouse should continue until repairs, replacement, or removal can occur.

Deterioration of the catwalk that accesses the right portions of the principal spillway has advanced to the point that City staff, at the advice of their consultant and insurance company, have prohibited access. As such, there is currently no safe way to access the right portion of the principal spillway or right earthen embankment for operation of the stoplogs or maintenance. Repairs or replacement of the catwalk should be implemented as soon as possible to restore access to the right stoplog spillway section and the right earthen embankment.

HYDROLOGY AND HYDRAULICS

The contributing drainage area to the Kalamazoo River at the Allegan City Dam is approximately 1,554 square miles. The design discharge for this high hazard potential dam is the 0.5-percent annual chance (200-year) flood discharge of 14,000 cubic feet per second (cfs). A detailed hydraulic analysis of the dam was provided to this office in 2001, which included a United States Army Corps of Engineers Hydrologic Engineering Center River Analysis System (HEC-RAS) model of the Kalamazoo River from the Allegan City Dam down to the Calkins Bridge Dam. The model assumed that all radial and vertical gates of the principal spillway would be completely opened, all stoplogs of the principal spillway would remain in place, and that all gates of the abandoned powerhouse would remain closed. Under these conditions, impoundment levels would rise to an elevation of 631.2 feet and overtop a portion of the earthen embankment. The tailwater elevation would be 628.9 feet, resulting in a head differential of 2.3 feet across the dam.

An additional analysis of the overtopping velocities was also conducted. The maximum overtopping velocity during the design flood was determined to be 7.3 feet per second. Given the minimal head differential across the dam and the riprap erosion protection on the downstream embankment, it was determined the dam embankment could withstand this overtopping event with minimal damage. Therefore, the dam is considered to have adequate armoring to safely convey the design flood.

The analysis also estimated the 200-year flow conditions when the tainter gates are both open, and both sets of stoplogs are removed. The analysis shows that the headwater at the dam would be approximately 630.0, with a head difference of only approximately 1.1 feet. At this headwater elevation, the embankments would be expected to overtop very slightly, although the minimal head difference would result in lower flow velocities than the first scenario evaluated.

High flow conditions were observed during the flooding of September 2008. While sandbagging was conducted on the impoundment, the spillways functioned as intended, and no overtopping flow occurred.

Copies of the hydraulic calculations and HEC-RAS model outputs used to make this determination are on file with the Dam Safety Program.

OPERATION AND MAINTENANCE

According to our records, a written Operation and Maintenance (O&M) Plan, outlining procedures for the dam's upkeep and operation, has never been prepared. It is strongly suggested that such a document be developed and kept up-to-date. O&M Plans can prove to be very useful in training new dam O&M staff. Updated copies should be provided to the Dam Safety Program.

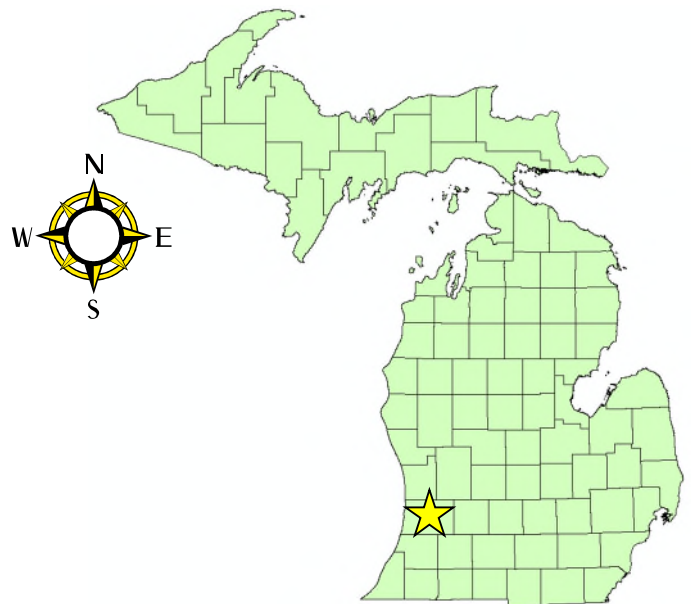
EMERGENCY ACTION PLAN

The Allegan City Dam has been assigned a High Hazard Potential rating. As such, the owner is required under Part 315 to develop, and keep up to date, an Emergency Action Plan (EAP) for the dam. An EAP has been developed and is on file with the Dam Safety Program. An updated copy of the EAP was last provided in January of 2015. The City shall review, and update as necessary, the EAP in coordination with Allegan County Emergency Management. The results of this review, and any updates, shall be provided to the Dam Safety Program by December 31, 2023.

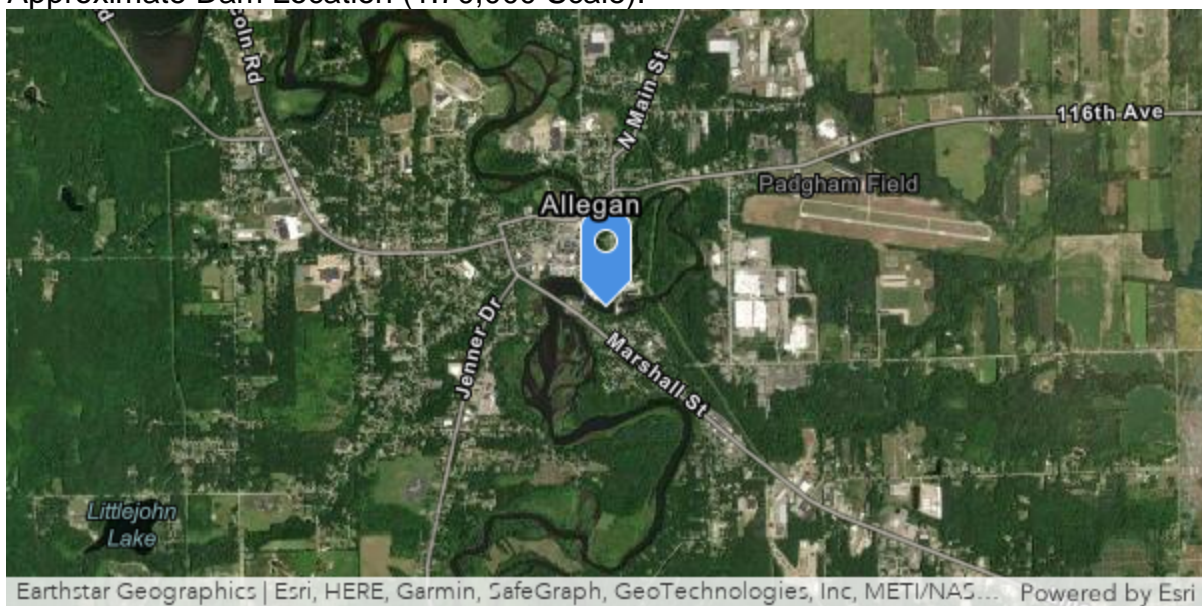
APPENDICES

A location map, inspection photographs, and 2023 EGLE estimated flood flows are attached.

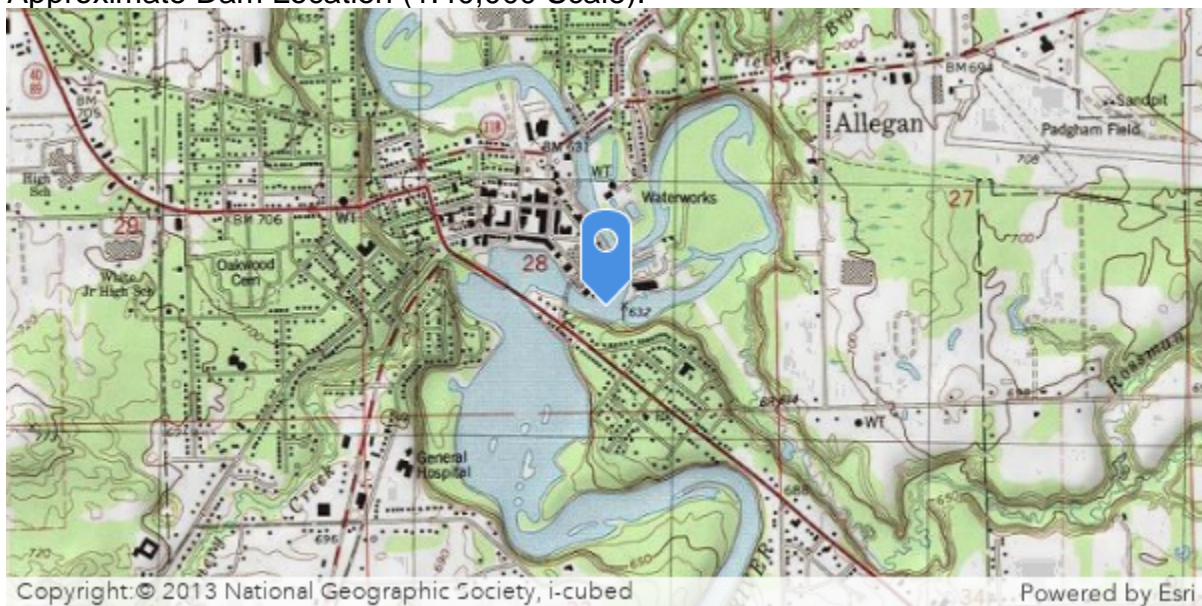
Allegan City Dam
Dam ID No. 489
Section 28
T 02N
R 13W
Allegan County



Approximate Dam Location (1:70,000 Scale):



Approximate Dam Location (1:40,000 Scale):



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Photo #1 - Aerial imagery of dam



Photo #2 - Upstream slope right embankment, note brush growth

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Photo #3 - Upstream slope right embankment



Photo #4 - Upstream slope right embankment

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Photo #5 - Upstream slope right embankment



Photo #6 - Concrete wall at upstream of right embankment near right end

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Photo #7 - Upstream slope of right embankment viewed from right end



Photo #8 - Upstream slope of right embankment

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Photo #9 - Upstream slope of right embankment, top of concrete wall. Note displaced joint



Photo #10 - Right end of left embankment upstream slope. Note riprap armoring

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Photo #11 - Upstream slope of left embankment near spillway. Note exposed fabric where riprap is displaced



Photo #12 - Upstream slope of left embankment. Note brush near waterline

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Photo #13 - Upstream slope of left embankment



Photo #14 - Upstream slope of left embankment

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Photo #15 - Upstream slope of left embankment near powerhouse, vertical concrete millrace wall



Photo #16 - Crest of right embankment

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Photo #17 - Crest of right embankment. Note brush growth



Photo #18 - Crest of right embankment

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Photo #19 - Crest of right embankment where tree growth starts



Photo #20 - Crest of right embankment

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Photo #21 - Crest of right embankment looking toward spillway



Photo #22 - Crest of left embankment

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Photo #23 - Crest of left embankment. Note access trail on crest



Photo #24 - Crest of left embankment

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Photo #25 - Crest of left embankment



Photo #26 - Crest of left embankment

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Photo #27 - Crest of left embankment



Photo #28 - Crest of left embankment viewed from Mill District Road

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Photo #29 - Crest of left embankment adjacent to powerhouse



Photo #30 - Downstream slope of right embankment adjacent to spillway. Note brush growth

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Photo #31 - Downstream slope of right embankment. Note brush growth within armoring



Photo #32 - Downstream slope of right embankment

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Photo #33 - Downstream slope of right embankment at toe



Photo #34 - Downstream slope of right embankment

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Photo #35 - Typical armoring on downstream slope of right embankment



Photo #36 - Downstream slope of right embankment

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Photo #37 - Downstream slope of right embankment



Photo #38 - Downstream slope of right embankment

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Photo #39 - Downstream slope of left embankment adjacent to spillway. Note exposed fabric where armoring is missing



Photo #40 - Downstream slope of left embankment

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Photo #41 - Downstream slope of left embankment adjacent to spillway



Photo #42 - Downstream slope of left embankment

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Photo #43 - Downstream slope of left embankment



Photo #44 - Downstream slope of left embankment

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Photo #45 - Small animal burrow on left embankment



Photo #46 - Downstream slope of left embankment adjacent to powerhouse

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Photo #47 - Downstream slope of left embankment adjacent to powerhouse



Photo #48 - Downstream slope of left embankment adjacent to powerhouse

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**Photo #49 - Downstream slope of left embankment adjacent to powerhouse
viewed from toe**



Photo #50 - Burrow on embankment near powerhouse outlet

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Photo #51 - Burrow or sinkhole on left embankment adjacent to millrace



Photo #52 - Burrow or sinkhole on left embankment adjacent to millrace

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Photo #53 - Spillway right upstream abutment wall. Note concrete deterioration



Photo #54 - Spillway right upstream abutment wall. Note concrete deterioration

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Photo #55 - Spillway right upstream abutment wall. Note concrete joint displacement



Photo #56 - Spillway bay #1 inlet

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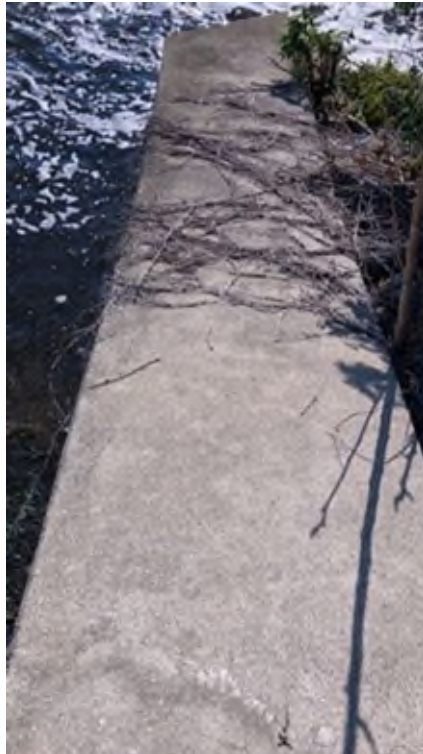


Photo #57 - Spillway right downstream abutment wall



Photo #58 - Downstream face of spillway right downstream abutment wall

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Photo #59 - Abutment between spillway bays #1 and #2, right face



Photo #60 - Wooden stoplogs of bay #1, significant leakage observed

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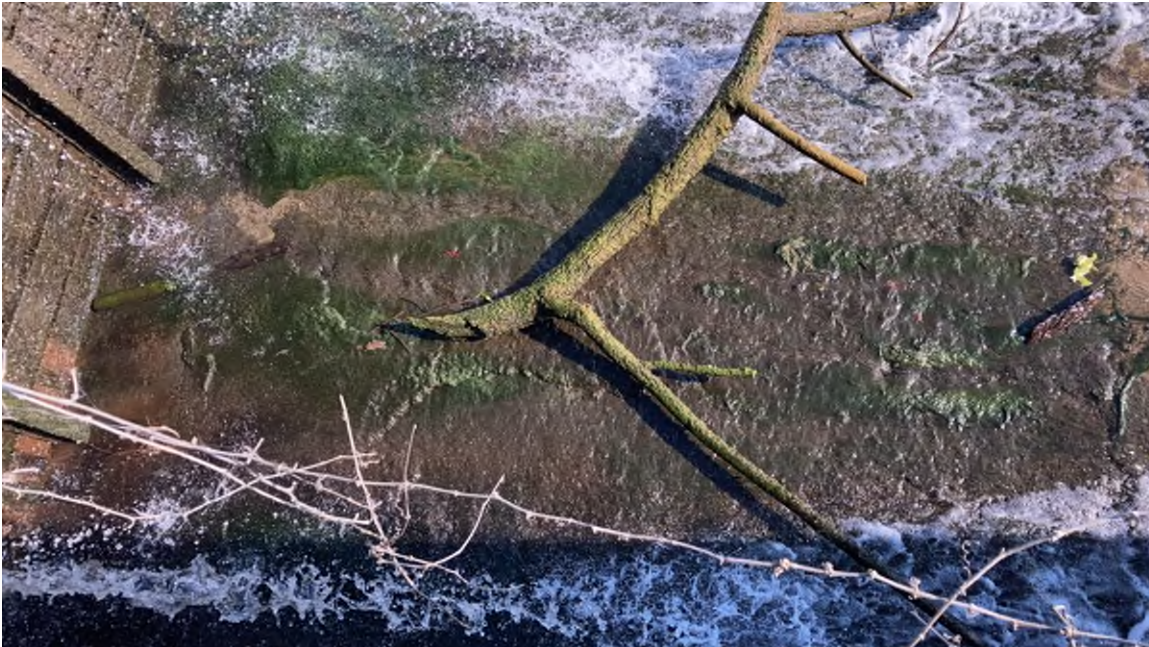


Photo #61 - Spillway bay #1 apron.



Photo #62 - Wooden stoplogs of bay #1, significant leakage observed

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Photo #63 - Spillway bay #1. Beam at top of stoplog grooves appears slightly sagged

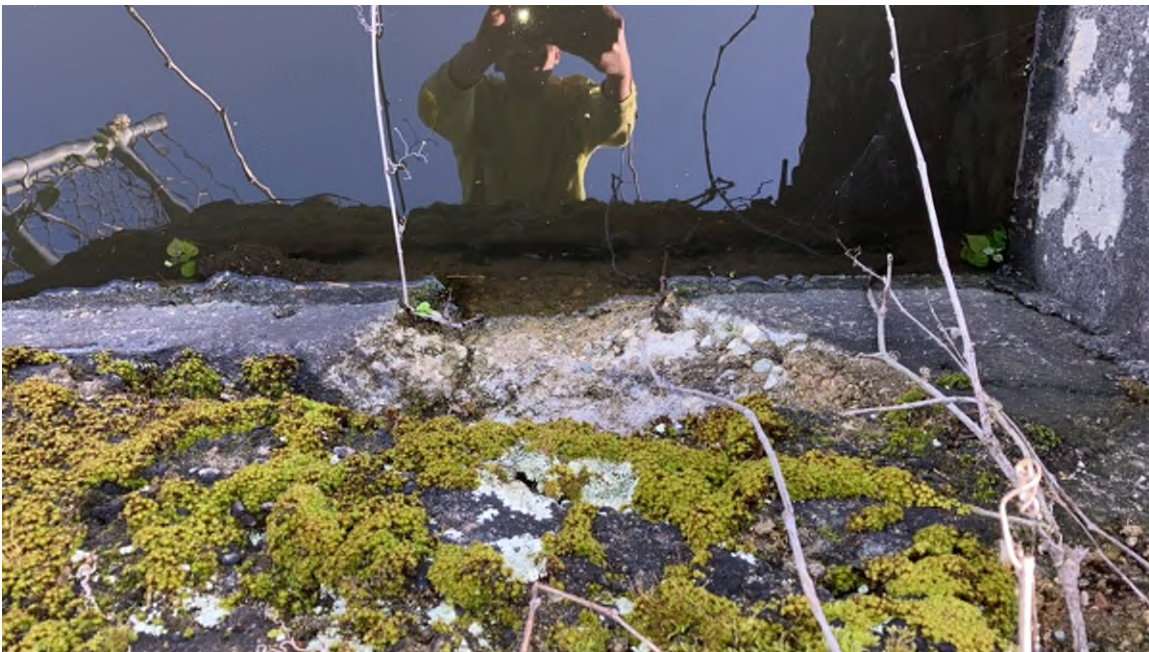


Photo #64 - Right upstream spillway abutment wall. Note some loss of concrete

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Photo #65 - Right upstream spillway abutment wall near walkway bridge



Photo #66 - Walkway over spillway bays

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Photo #67 - Plywood placed upstream of some leaking stoplogs in spillway bay #1



Photo #68 - Spillway bay #1 left end

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Photo #69 - Upstream abutment between spillway bays #1 and #2



Photo #70 - Typical walkway bridge truss connection

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Photo #71 - Spillway bay #2 left upstream abutment



Photo #72 - Spillway bay #1, very slight deflection in beam over crest

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Photo #73 - Spillway bay #1, minor deflection downstream



Photo #74 - Spillway right downstream abutment wall

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Photo #75 - Stoplog groove for spillway bay #1



Photo #76 - Spillway right downstream abutment wall joint

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Photo #77 - Downstream face of abutment between spillway bays #1 and #2



Photo #78 - Downstream receiving channel

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Photo #79 - Spillway bay #2 left abutment



Photo #80 - Spillway bay #2

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Photo #81 - Crest of spillway bay #2



Photo #82 - Spillway bay #2 crest

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Photo #83 - Pier between spillway bays #1 and #2



Photo #84 - Downstream needle section of abutment between spillway bays #2 and #3

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Photo #85 - Concrete pier and abutment section between spillway bays #2 and #3



Photo #86 - Left end of walkway bridge, cracking concrete

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Photo #87 - Lifting mechanism for stoplogs of bay #2



Photo #88 - Lifting mechanism for stoplogs of bay #2

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Photo #89 - Individual stoplog bay of spillway bay #2. Bays consist of three logs on top of one another that can all be removed



Photo #90 - Spillway bay #2 right downstream abutment

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Photo #91 - Lifting cables on spillway bay #2 stoplogs



Photo #92 - Typical stoplog from spillway bay #2

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Photo #93 - Teflon strip along edge of spillway bay #2 stoplogs



Photo #94 - Downstream needle section between spillway bays #2 and #3. Note some vegetation growing within joints and sheetpile interface with water seeping down

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Photo #95 - Vegetation and water at sheetpile and concrete interface



Photo #96 - Downstream face of needle section between spillway bays #2 and #3

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Photo #97 - Downstream view of two radial gate bays



Photo #98 - Left downstream spillway abutment wall

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Photo #99 - Left downstream abutment of spillway bay #3



Photo #100 - Spillway bay #3 left pin

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Photo #101 - Spillway bay #3 gate



Photo #102 - Minor leakage along left side of spillway bay #3

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Photo #103 - Hole in left wall of spillway bay #3



Photo #104 - Minor leakage on right side of spillway bay #3 gate

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Photo #105 - Spillway bay #3 right pin



Photo #106 - Deck over spillway bays #3 and #4. Note deteriorating concrete on downstream (right in photo) side of deck at joint with abutment

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Photo #107 - Left end of walkway bridge over spillway bays #1 and #2



Photo #108 - Upstream pier between radial gate bays

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Photo #109 - Spillway bay #4 left upstream abutment. Note cracking



Photo #110 - Spillway bay #3 right downstream abutment and right gate pin

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Photo #111 - Minor spalling on spillway bay #3 right downstream side



Photo #112 - Radial gate lifting chain and shaft

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Photo #113 - Radial gate lifting motor



Photo #114 - Radial gate lifting shaft

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Photo #115 - Radial gate lifting shaft



Photo #116 - Right edge of spillway bay #4 radial gate

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Photo #117 - Upstream pier between radial gate bays



Photo #118 - Cracking on spillway bay #4 left upstream abutment

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Photo #119 - Spillway bay #4 right downstream abutment wall and gate shaft



Photo #120 - Spillway bay #4 left downstream abutment wall

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Photo #121 - Spillway bay #4 gate's right pin



Photo #122 - Spillway bay #4 gate's left pin

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Photo #123 - Leakage at left edge of spillway bay #4 gate



Photo #124 - Spillway bay #4 gate

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Photo #125 - Spillway bay #4 gate



Photo #126 - Spillway bay #4 gate

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Photo #127 - Spillway bay #4 left downstream abutment wall



Photo #128 - Staff gage

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Photo #129 - Left upstream abutment wall of spillway



Photo #130 - Upstream face of left upstream abutment wall of spillway

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Photo #131 - Right end of walkway deck over spillway bay #1. Note this truss joint area is lower than the abutment walls, and water would overtop here first



Photo #132 - Downstream face left spillway abutment wall

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Photo #133 - Spillway bay #4



Photo #134 - Upstream impoundment

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Photo #135 - Principal spillway inlet



Photo #136 - Mill District Road bridge

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Photo #137 - Mill District Road bridge



Photo #138 - Powerhouse, left embankment north of Mill District Road

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Photo #139 - Powerhouse upstream walkway



Photo #140 - Inlet to left side of powerhouse

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Photo #141 - Inlet to left side of powerhouse



Photo #142 - Concrete bulkhead at left side of powerhouse

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Photo #143 - Right side of powerhouse, inlet. No bulkhead exists



Photo #144 - Right side of powerhouse, inlet upstream of gates inside powerhouse

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Photo #145 - Powerhouse outlet



Photo #146 - Powerhouse outlet, left end

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Photo #147 - Powerhouse outlet, right side



Photo #148 - Powerhouse outlet right wall

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Photo #149 - Downstream face of powerhouse. Note tree growing between old and new portions of powerhouse



Photo #150 - Downstream face of powerhouse

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Photo #151 - Downstream face of powerhouse



Photo #152 - Left embankment, millrace right side

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Photo #153 - Powerhouse, left face



Photo #154 - Interior of powerhouse, left side

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Photo #155 - Downstream face of bulkhead on left side of powerhouse



Photo #156 - Failing ceiling on left side of powerhouse

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Photo #157 - Failing ceiling on left side of powerhouse



Photo #158 - Previous generating equipment

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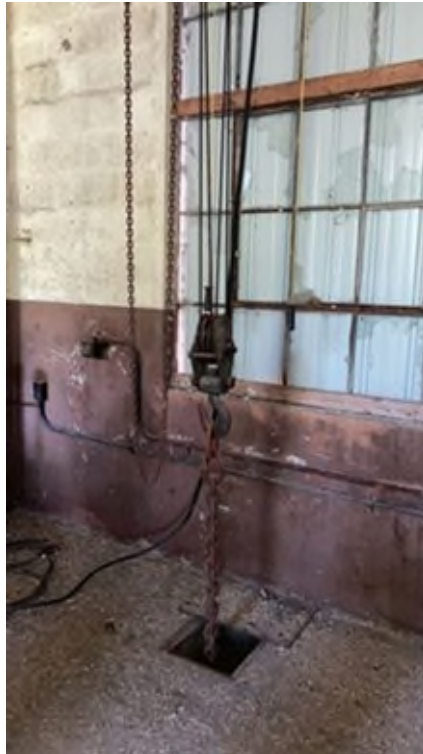


Photo #159 - Powerhouse right side headgate lifting mechanism



Photo #160 - Old powerhouse turbine interior

**ALLEGAN CITY DAM
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Photo #161 - Powerhouse left face. Note significant vegetation growth up wall



Photo #162 - Powerhouse left and downstream face

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Photo #163 - Powerhouse downstream face viewed from left



Photo #164 - Powerhouse receiving channel, looking upstream

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Photo #165 - Powerhouse receiving channel, looking downstream



Photo #166 - Millrace

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ALLEGAN COUNTY
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Photo #167 - Millrace viewed from Mill District Road bridge toward principal spillway

**ALLEGAN CITY DAM
ALLEGAN COUNTY
DAM ID NO. 489**

HYDROLOGIC DATA

From: EGLE-wrd-qreq <EGLE-wrd-qreq@michigan.gov>
Sent: Wednesday, April 26, 2023 3:30 PM
To: Horak, Thomas (EGLE) <HorakT@michigan.gov>
Subject: RE: Flood or Low Flow Discharge Request

We have processed the discharge request submitted by email on April 6, 2023 (Process No. 20230199), as follows:

Kalamazoo River at Allegan City Dam, Dam ID 489, Section 28, T2N, R13W, City of Allegan, Allegan County, has a total drainage area of 1556 square miles and a contributing drainage area of 1366 square miles. The design discharge for this dam is the 0.5% chance (200-year) flood. The 0.5% chance peak flow is estimated to be 14000 cubic feet per second. (Watershed Basin No. 17 Kalamazoo).

These estimates should be confirmed by our office if an application is not submitted within one year. If you have any questions concerning the discharge estimates, please contact Ms. Susan Greiner, Hydrologic Studies and Floodplain Management Unit, at 517-927-3838, or by email at: GreinerS@michigan.gov.

From: EGLE-Automated <EGLE-Automated@michigan.gov>
Sent: Thursday, April 6, 2023 9:54 AM
To: EGLE-wrd-qreq <EGLE-wrd-qreq@michigan.gov>
Subject: Flood or Low Flow Discharge Request

Requestor: Thomas Horak
Company: EGLE
Address: 525 W. Allegan
City/State: Lansing
ZIP Code: 48933
Phone: 5172318594
Date: 04/06/2023
0.5 percent
Contact Agency:
Contact Person:
Watercourse: Kalamazoo River
Local Name:
County: Allegan
City/Township: ?
Section: 28
Town: 02N
Range: 13W
Location: Allegan City Dam #489
FFR1: Dam
Email: HorakT@michigan.gov

**U.S. SPECIALTY INSURANCE COMPANY
PUBLIC RISK**

ENDORSEMENT NO. 3

ATTACHED TO AND FORMING A PART OF POLICY NUMBER	ENDORSEMENT EFFECTIVE (Standard Time)					INSURED	AGENCY AND CODE
	MO.	DAY	YR.	12:01 A.M.	NOON		
PKG81210069	08	15	2018	X		City of Allegan	00005

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated above.

Amend the following form:

GL000113 0413 DAM, RESERVOIR, LEVEE, DIKE COVERAGE

Exclude Catwalk and Powerhouse at 155 Mill District Rd, from Allegan City Dam, Dam ID No. 489 at location Section 28, T2N, R13W, Kalamazoo River, Allegan, MI

NO PREMIUM ADJUSTMENT DUE:

Agent: BHS - Portage
Entry Date: 8/16/2018
Entry Person: SCM