

APPENDIX A –
CAPITAL IMPROVEMENT PLAN

Appendix A - Commerce Township Capital Improvement Plan

No.	System	Year	Description	Estimated Cost	Notes
1	WWTP	2013	Heat Recovery System to reduce energy costs for heating and cooling existing buildings.	\$600,000	Building codes require 12 air exchanges per hour in several of the buildings at the WWTP. A heat recovery system will reduce the cost of heating and cooling the air. The heat recovery system will remove heat from the treated effluent to the air handling units using heat pumps.
2	Sludge Handling		No improvements planned at this time		
3	Collection System	2013	Newton Rd. Forcemain	\$2,800,000	The Newton Rd. Forcemain provides a redundant loop in the trunk forcemain system which will make the system more reliable, and will reduce energy costs at the pump stations
4	Collection System	2014 - 2020	Odor and Hydrogen Sulfide Control Systems	No Cost Estimate	There are several places where forcemains dump into gravity sewers. Hydrogen sulfide spews out of the sewage resulting in odors and corrosion issues. Past investigations have found potential solutions that were not cost effective, as compared to simply controlling odor emissions and replacing damaged facilities. Some additional research should be done to determine if new hydrogen sulfide control systems may be cost effective.
5	Collection System	2014 -2020	Sleeth Rd. Sewer manhole rehabilitation	\$50,000	Manholes in the Sleeth Rd. sewer east of the Northwest sewer forcemain have deteriorated due to corrosion related to hydrogen sulfide.
6	Collection System	2015 -2020	New lining in 36" Welch Rd. gravity sewer between Easy St. and WWTP	\$500,000	The sewer is deteriorating due to corrosion related to hydrogen sulfide
7	Collection System	2015 -2020	Welch Rd. Forcemain, between Pontiac Trail and Easy St.	\$400,000	The Welch Rd. Forcemain provides a redundant loop in the trunk forcemain system, and will reduce energy costs at pump stations
8	Collection System	2015-2020	New lining in parts of Section 36 sewer	\$500,000	Video tapes show that parts of the 21" & 24" reinforce concrete pipe sewer that runs between Maple/Welch & Fourteen Mile Rd. have minor to moderate corrosion related to hydrogen sulfide
9	Collection System	2015 -2020	New sewer/abandonment of Haggerty Rd. Pump Station (PS 2.1)	No Cost Estimate	The Martin Rd. Parkway Pump Station is deep enough and has capacity for the sewage flow that is currently pumped by the Haggerty Rd. Pump Station. A sewer between the two pump stations would be necessary. At least part of the sewer can be built as the DDA's property is developed. The easterly leg will be difficult due to high water table, soils, and adjacent wetlands.
10	Collection System	2015 -2020	New sewer/abandonment of Campbell Creek Pump Station	No Cost Estimate	The Martin Rd. Parkway Pump Station is deep enough and has capacity for the sewage flow that is currently pumped by the Campbell Creek Pump Station. A sewer between the two pump stations would be necessary. At least part of the sewer can be built as the DDA's property is developed. The section along Welch Rd. may be difficult to construct.
11	Collection System	2020 -2032	Oakley Park Rd. Forcemain	No Cost Estimate	The Oakley Park Rd. Forcemain provides a redundant loop in the trunk forcemain system, and will reduce energy costs at pump stations.
12	Collection System	2020 -2032	Diversion Sewer at Wise Rd. and Huron River	No Cost Estimate	The gravity sewer that runs south from Wise Rd., west of the Huron River, may not have capacity for the ultimate build-out of its tributary area. There is a plan to divert some flow to the sewer on the east side of the Huron River.
13	Collection System	2032+	Add capacity to Welch Rd. system between Easy St. and WWTP	No Cost Estimate	The 36" gravity sewer does not have capacity for 8.5 mgd
14	Pump Stations	2013 - 2015	Replace SCADA system	\$500,000	The existing SCADA system is over 20 years old; it is outdated and obsolete. A new SCADA system is planned that will collect and organize data better; have remote access capabilities; be capable of controlling pump stations; and more
15	Pump Stations	2015	Replace pumps at Oakley Park Rd. Pump Station	\$50,000	The pump station was designed so that it could be expanded as demands increased, and as pressures in the trunk forcemain system increased.

16	Pump Stations	2015 -2020	Upgrade Huron River Pump Station (PS 3.0)	\$2,000,000	The original plan was to replace the existing submersible pump station with a wet-well dry well station. An alternative might be the installation of a booster station to reduce pressure and increase capacity.
17	Pump Stations	2015 -2020	Install Carey/Commerce Booster Station	\$600,000	The Northwest Sanitary Sewer Forcemain that runs between the Huron Valley Hospital, and Commerce/Driftwood was planned with a future booster station. An analysis should first be done to determine if and when this station will be necessary. SCADA controls, and smaller flows may make this booster station unnecessary.

**APPENDIX B –
COMMERCE WWTP DATA**

Commerce Township- Act 451, Part 41 Permit Tracking System District Summary

Flows to the Commerce Township Treatment Plant

Segment	POPULATIONS			PEAKING FACTORS		PUMP STATION FLOWS- Ave Daily (cfs)			Qa- Total Flow at outlet (cfs)	NOTES:			
	Tributary Designed	Part 41 Permitted	Current REUs as of 7-17-08 per OCDC (7-17-08)	Connected Pop. based on OCDC (7-17-08)	Designed	Permitted	Current	Ultimate Design			Based on Permitted Pop.	Based on Current Connections	Actual based on SCADA (12 Month Ave) as of 09-08
PS 1.2	1254	483	9.66	26,082	3.73	3.98	4.36	0.73	0.30	0.02	0.0044	15,12011	<p>Pump Station 2.1 has been evaluated, and when the actual flows reach 0.245 cfs (80% of the initial design population of 1972), a third pump will be added, unless all flow is redirected to the new Pump Station 2.8 before hand.</p> <p>Pump Station 2.4 has been evaluated, and when the actual flows reach 0.187 cfs (80% of the initial design population), a third pump will be added, per the 2006 recalibration approved by the MDEQ.</p> <p>Will ultimately take the flow from Pump Stations 2.1 and 2.0 (CC).</p> <p>Pump Station 4.0 has been evaluated, and when the actual flows reach 0.682 cfs (80% of the initial design population of 1500), the pumps need to be upgraded to 47 HP pumps to service the ultimate population.</p> <p>Includes flow and population from White Lake</p> <p>WARNING: THE TEMPORARY OUTLET FOR PUMP STATION 7.1 IS REACHING IT MAXIMUM POPULATION. TIME TO EVALUATE DIVERTING FLOW TO SEGMENT 5.3.</p> <p>All current connections are directly to the force main via grinder pumps, but are included in the pump station district. Commerce Township is investigating why so much current flow is coming into this station without any connection to it.</p> <p>Includes flow and population from Novi</p>
PS 2.1	3630	3670.5	341.41	921,807	3.37	3.37	3.82	1.90	1.92	0.55	0.0672	1,915307	
PS 2.4	5087	2619.4	435.13	1174,851	3.24	3.49	3.75	2.55	1.42	0.68	0.1316	1,41769	
PS 2.5	2285	1133.2	166.28	448,956	3.54	3.76	4.00	1.25	0.66	0.28	0.0571	10,52628	
PS 2.7	1620	970.1	301.37	813,699	3.66	3.81	3.86	0.92	0.33	0.49	0.0317	10,15703	
PS 2.8	14085	0	68.6	185,22	2.81	4.50	4.16	6.13	0.00	0.12	0.0000	5,35475	
PS 2.9	1135	564.8	122.6	331,02	3.76	3.95	4.06	0.66	0.34	0.21	0.0274	5,14632	
PS 3.0	40900	4357.6	823.57	2223,639	2.35	3.30	3.55	14.88	5.87	1.22	0.5386	5,645245	
PS 4.0	2500	3085.7	259.58	700,866	3.51	3.43	3.89	1.36	1.52	0.42	0.0988	4,463273	
PS 4.1	21000	9702.95	2327.16	6283,332	2.63	2.97	3.15	8.56	4.46	3.07	0.6435	3,624832	
PS 5.1	2905	918	81	218,7	3.45	3.82	4.13	1.56	2.21	0.14	0.0185	1,915076	
CP 5.3	5874	225.7	72.62	196,074	3.18	4.13	4.15	2.89	0.00	0.13		0,272653	
PS 7.1	2443	439.5	142	383,4	3.52	4.00	4.03	1.33	0.27	0.24	0.0128	3,203856	
PS 7.2	1650	1449.7	394	1063,8	3.65	3.69	3.78	0.93	0.83	0.62	0.1071	2,581597	
PS 7.4	2260	1683	430.66	1162,782	3.54	3.64	3.76	1.24	0.95	0.68	0.1254	1,821644	
PS 7.7	2730	2462.3	509	1374,3	3.48	3.51	3.71	1.47	1.35	0.79	0.1492	0,558696	
PS 7.8	1599	915.5	162.4	438,48	3.66	3.82	4.00	0.91	0.56	0.27	0.0247	1,82197	
PS 9.4	3756	3680.1	1001.1	2702,97	3.36	3.37	3.48	1.95	1.81	1.46	0.4646	0,041339	
PS 9.5	1072	62.1	5	13,5	3.78	4.29	4.40	0.63	0.00	0.01	0.0214	13,82711	
2.0 (CC)	351	281	96.65	260,955	4.05	4.09	4.10	0.22	0.12	0.17	0.0793	13,84785	
LP 1	0	68.1	19.15	51,705	4.50	4.29	4.31	0.00	0.00	0.03		0	
LP 2	500	0	0	0	3.97	4.50	4.50	0.31	0.00	0.00		16,85851	
WWTP	31481.48	5900,0392	1728,71	4667,517	1.23	3.18	3.27	601,62	0.87	2.37			
	3,266,784.0	44,672.3	9,497.7	25,643,66									

Commerce Township Flow to the Novi/Walled Lake Treatment Plant (Per agreement with Novi)

PS 8.1	1019	884.09	223.59	603,693	3.79	3.83	3.93	0.60	2.22	0.37		1,845677
PS 8.2	1378.3	1123	249.4	673,38	3.71	3.77	3.90	0.79	0.00	0.41		0,655695
PS 8.3	2970	822	5.57	15,039	3.45	3.85	4.40	1.59	0.00	0.01	0.0162	0,862431
PS 8.4	1080	691.3	257.6	695,52	3.78	3.90	3.90	0.63	25.20	0.42	0.0668	0,417643
5/3/2012	6447.3	3520.39	736.16	1987,632								

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INFLUENT SHEET
COMMERCE TOWNSHIP WWTP

December 2011

PAGE 1
OF 6

COMMERCE TOWNSHIP WWTP
649 WELCH ROAD
WALLED LAKE, MI 48390

RAW INFLUENT

DATE December 2011	FLOW (MGD) 50050	pH (SU) 00400	BOD 5-DAY (mg/L) 80082	BOD LDG (Lbs/Day) #80082	SS (mg/L) 00530	SS LDG (Lbs/Day) #00530	VSS (mg/L) 00535	PHOS (mg/L) 00665	PHOS LDG (Lbs/Day) #00665	NH3-N (mg/L) 00610	NH3-N LDG (Lbs/Day) #00610	TEMP (F) 00010
1	2.1230	7.5	227.5	4028.0	244	4320.18	220	5.45	96.50	24.95	441.76	65
2	2.0001	7.5	215.0	3586.3	292	4870.71	232	6.50	108.42	25.57	426.52	65
3	2.0542	7.4	345.0	5910.6	204	3494.98	176	4.95	84.80	26.76	458.46	66
4	2.2033	7.5	237.5	4364.1	224	4116.06	188	4.97	91.33	28.49	523.51	64
5	2.1731	7.4	197.5	3579.4	176	3189.73	164	4.85	87.90	24.62	446.20	64
6	2.0830	7.5	195.0	3387.6	176	3057.55	144	5.28	91.73	25.99	451.51	67
7	2.0312	7.6	280.0	4743.3	256	4336.74	236	6.06	102.66	29.06	492.29	66
8	2.0403	7.5	205.0	3488.3	220	3743.57	204	5.50	93.59	25.02	425.75	65
9	1.9964	7.6	232.5	3871.2	196	3263.46	188	5.71	95.07	28.79	479.36	66
10	2.0803	7.5	210.0	3643.4	204	3539.35	188	5.06	87.79	26.57	460.98	60
11	2.1473	7.9	285.0	5103.8	252	4512.83	216	5.70	102.08	27.09	485.13	61
12	2.0051	7.5	255.0	4264.3	236	3946.60	212	5.52	92.31	28.08	469.58	62
13	1.9994	7.5	230.0	3835.3	208	3468.47	184	5.49	91.55	27.61	460.41	64
14	2.1365	7.6	247.5	4410.0	288	5131.68	268	6.06	107.98	28.56	508.89	66
15	2.2321	7.5	245.0	4560.8	552	10275.71	480	5.63	104.80	24.67	459.24	68
16	2.0760	7.5	265.0	4588.1	304	5263.32	284	5.80	100.42	27.33	473.18	64
17	2.1650	7.5	265.0	4784.8	236	4261.19	228	4.69	84.68	26.54	479.20	63
18	2.1026	7.5	247.5	4340.1	240	4208.54	216	4.70	82.42	27.24	477.67	62
19	2.0568	7.5	315.0	5403.4	272	4665.78	256	5.94	101.89	29.11	499.34	64
20	2.0646	7.5	320.0	5510.0	328	5647.72	276	5.91	101.76	27.10	466.63	65
21	2.0412	7.5	360.0	6128.5	396	6741.40	348	6.20	105.55	32.48	552.93	66
22	2.0422	7.5	185.0	3150.9	88	1498.81	64	5.17	88.05	31.02	528.33	65
23	2.1944	7.5	205.0	3751.7	96	1756.91	76	4.95	90.59	29.04	531.47	63
24	2.1442	7.4	305.0	5454.1	240	4291.75	196	5.66	101.21	28.05	501.60	64
25	1.8184	7.4	260.0	3943.1	208	3154.45	176	5.25	79.62	29.60	448.90	61
26	2.0456	7.5	337.5	5757.9	304	5186.37	280	6.26	106.80	33.34	568.79	61
27	2.0365	7.4	230.0	3906.5	104	1766.41	100	4.80	81.53	34.20	580.88	62
28	2.0657	7.5	420.0	7235.9	488	8407.37	440	4.19	72.19	29.14	502.03	62
29	2.0039	7.5	195.0	3259.0	106	1771.55	98	6.47	108.13	32.06	535.81	59
30	2.1303	7.5	335.0	5951.8	316	5614.20	284	6.98	124.01	30.15	535.66	60
31	2.1680	7.4	400.0	7232.6	380	6870.93	352	6.12	110.66	30.89	558.53	57

TOTAL	64.4607	232.6	8252.5	143174.8	7834	136374.30	6974	171.82	2978.01	879.12	15230.53	1967
AVG	2.0794	7.5	266.2	4618.5	253	4399.17	225	5.54	96.06	28.36	491.31	63
MAX	2.2321	7.9	420.0	7235.9	552	10275.71	480	6.98	124.01	34.20	580.88	68
MIN	1.8184	7.4	185.0	3150.9	88	1498.81	64	4.19	72.19	24.62	425.75	57
MAX 7-DAY	2.1191	7.6	311.1	5326.7	333	5866.24	298	5.72	98.13	31.34	532.94	65
STD	0.0809	0.1	61.1	1085.7	102	1849.03	92	0.62	10.95	2.47	41.42	2

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COMMERCE TOWNSHIP WWTP
OUTFALL 002 - SEELEY CREEK
FILTER FINAL EFFLUENT SHEET 1

December 2011

PAGE 2
OF 6

COMMERCE TOWNSHIP WWTP
649 WELCH ROAD
WALLED LAKE, MI 48390

FINAL

DATE December 2011	FLOW (MGD) 50050	CBOD 5-DAY (mg/L) 80082	BOD LDG (Lbs/Day) #80082	BOD %REM (%) %80082	SS (mg/L) 00530	SS LDG (Lbs/Day) #00530	SS %REM (%) %00530	VSS (mg/L) 00535	PHOS (mg/L) 00665	PHOS LDG LB #00665	PHOS %REM (%) %00665
1	1.940	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
2	2.006	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
3	2.004	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
4	2.137	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
5	2.021	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
6	2.074	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
7	2.061	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
8	1.987	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
9	2.145	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
10	2.035	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
11	1.866	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.100	1.556	98.48%
12	1.953	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
13	1.833	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
14	1.997	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.110	1.832	98.30%
15	1.926	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
16	1.955	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.110	1.793	98.21%
17	1.893	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
18	1.959	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.110	1.797	97.82%
19	1.960	<2.0	0.00	100.00%	1.0	16.35	99.65%	<1.0	0.130	2.125	97.91%
20	1.954	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.130	2.119	97.92%
21	2.032	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.140	2.373	97.75%
22	2.002	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.130	2.171	97.53%
23	1.027	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.120	1.028	98.87%
24	1.157	<2.0	0.00	100.00%	1.1	10.62	99.75%	<1.0	0.120	1.158	98.86%
25	1.931	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.100	1.611	97.98%
26	1.772	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	<0.100	0.000	100.00%
27	1.946	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.110	1.785	97.81%
28	1.843	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.110	1.690	97.66%
29	1.916	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.110	1.757	98.37%
30	1.875	<2.0	0.00	100.00%	<1.0	0.00	100.00%	<1.0	0.160	2.502	97.98%
31	1.928	<2.0	0.00	100.00%	1.3	20.91	99.70%	1.1	0.100	1.608	98.55%

TOTAL	59.135	0.0	0.00	3100.00%	3.4	47.87	3099.10%	1.1	1.890	28.906	3070.00%
AVG	1.908	0.0	0.00	100.00%	0.1	1.54	99.97%	0.0	0.061	0.932	99.03%
MAX	2.145	0.0	0.00	100.00%	1.3	20.91	100.00%	1.1	0.160	2.502	100.00%
MIN	1.027	0.0	0.00	100.00%	0.0	0.00	99.65%	0.0	0.000	0.000	97.53%
MAX 7-DAY	2.066	0.0	0.00	100.00%	0.3	3.85	100.00%	0.2	0.126	1.824	100.00%
STD	0.229	0.0	0.00	0.00%	0.3	4.90	0.09%	0.2	0.060	0.943	0.98%

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COMMERCE TOWNSHIP WWTP
OUTFALL 002 - SEELEY CREEK
FILTER FINAL EFFLUENT SHEET 1

December 2011

PAGE 3
OF 6

COMMERCE TOWNSHIP WWTP
649 WELCH ROAD
WALLED LAKE, MI 48390

FINAL

DATE December 2011	NH3-N (mg/L) 50050	NH3-N LDG (Lbs/Day) 80082	NH3-N %REM (%) #80082	pH (SU) %80082	DISS OXYGEN (mg/L) 00530	FEC COLI-M (#/100ml) #00530	TEMPERATURE (F) %00530	MERCURY (ng/L) #00665	MERCURY LDG (Lbs/Day) %00665
1	<0.02	0.00	100.00%	7.60	10.1	<20	65		
2	<0.02	0.00	100.00%	7.60	10.2	<20	65		
3	<0.02	0.00	100.00%	7.50	10.2	<20	65		
4	<0.02	0.00	100.00%	7.60	9.9	<20	66		
5	<0.02	0.00	100.00%	7.70	10.0	<20	66		
6	<0.02	0.00	100.00%	7.70	10.0	<20	67		
7	<0.02	0.00	100.00%	7.70	10.0	<20	64		
8	<0.02	0.00	100.00%	7.70	10.3	<20	65		
9	<0.02	0.00	100.00%	7.70	10.3	<20	66		
10	<0.02	0.00	100.00%	7.70	10.5	<20	63		
11	0.02	0.31	99.94%	7.70	10.8	<20	61		
12	0.02	0.33	99.93%	7.60	10.5	<20	62		
13	<0.02	0.00	100.00%	7.70	10.9	<20	61		
14	<0.02	0.00	100.00%	7.70	10.8	<20	64		
15	<0.02	0.00	100.00%	7.70	10.3	<20	65		
16	<0.02	0.00	100.00%	7.70	10.3	<20	64		
17	<0.02	0.00	100.00%	7.80	10.6	<20	64		
18	<0.02	0.00	100.00%	7.60	10.2	<20	64		
19	<0.02	0.00	100.00%	7.60	10.0	<20	66		
20	<0.02	0.00	100.00%	7.60	10.4	<20	64		
21	<0.02	0.00	100.00%	7.60	10.2	<20	66		
22	<0.02	0.00	100.00%	7.60	10.2	<20	65		
23	<0.02	0.00	100.00%	7.60	10.4	<20	64		
24	<0.02	0.00	100.00%	7.70	10.5	<20	64		
25	<0.02	0.00	100.00%	7.70	10.5	<20	62		
26	<0.02	0.00	100.00%	7.70	10.7	<20	62		
27	<0.02	0.00	100.00%	7.60	10.1	<20	63		
28	<0.02	0.00	100.00%	7.70	10.5	<20	62		
29	<0.02	0.00	100.00%	7.60	10.3	<20	58		
30	<0.02	0.00	100.00%	7.80	10.4	<20	54		
31	<0.02	0.00	100.00%	7.60	10.6	<20	55		

TOTAL	0.04	0.64	3099.87%	237.40	320.7	0	1962	
AVG	0.00	0.02	100.00%	7.66	10.3	1	63	
MAX	0.02	0.33	100.00%	7.80	10.9	0	67	
MIN	0.00	0.00	99.93%	7.50	9.9	0	54	
MAX 7-DAY	0.01	0.09	100.00%	7.70	10.6	1	66	
STD	0.00	0.08	0.02%	0.07	0.3	0	3	

OPERATOR'S SIGNATURE

SUPERINTENDENT'S SIGNATURE

NPDES PERMIT NO. MI0025071

DATE PRINTED
TIME PRINTED

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COMMERCE TOWNSHIP WWTP
OUTFALL 002 - SEELEY CREEK
OUTLET OF CONSTRUCTED WETLAND

December 2011

PAGE 4
OF 6

COMMERCE TOWNSHIP WWTP
649 WELCH ROAD
WALLED LAKE, MI 48390

WETLANDS

DATE December 2011	FLOW (MGD) 50050	CBOD (mg/L) 80082	SS (mg/L) 00530	VSS (mg/L) 00535	PHOS (mg/L) 00665	PHOS LDG (Lbs/Day) #00665	NH3-N (mg/L) 00610	DISS OXYGEN (mg/L) 00300	TEMP (F) 00011	pH (SU) 00400
1								11.5	43	7.80
2								10.6	44	7.70
3								10.2	44	7.70
4								9.7	47	7.70
5								10.3	46	7.90
6								11.3	44	7.80
7								10.4	42	7.80
8								10.7	41	7.80
9								10.0	41	7.60
10								10.4	40	7.60
11								10.2	40	7.80
12								10.1	37	7.60
13								10.8	38	7.70
14								10.1	41	7.90
15								11.0	44	7.70
16								12.1	42	7.80
17								10.2	41	7.70
18								10.6	44	7.70
19								11.2	43	7.70
20								11.2	43	7.80
21								12.1	46	7.70
22								12.4	46	7.80
23								11.6	43	7.70
24								14.2	36	8.00
25								12.1	39	7.80
26								10.7	41	7.90
27								10.9	40	7.90
28								11.4	38	7.90
29								11.3	40	8.00
30								11.6	43	7.60
31								11.2	44	7.60

TOTAL								342.1	1301	240.70
AVG								11.0	42	7.76
MAX								14.2	47	8.00
MIN								9.7	36	7.60
MAX 7-DAY STD								12.1	44	7.89
								0.9	3	0.11

OPERATOR'S SIGNATURE _____

SUPERINTENDENT'S SIGNATURE _____

NPDES PERMIT NO. MI0025071

DATE PRINTED
TIME PRINTED

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COMMERCE TOWNSHIP WWTP
OUTFALL 003 - LAKE BERRY

December 2011

PAGE 5
OF 6

COMMERCE TOWNSHIP WWTP
649 WELCH ROAD
WALLED LAKE, MI 48390

003 - LAKE BERRY

DATE December 2011	FLOW (MGD) 50050	CBOD (mg/L) 80082	SS (mg/L) 00530	VSS (mg/L) 00535	PHOS (mg/L) 00665	PHOS LDG (Lbs/Day) #00665	NH3-N (mg/L) 00610	DISS OXYGEN (mg/L) 00300	TEMP (F) 00011	pH (SU) 00400	PHOS (Lbs/Yr) 00665
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23	1.104				0.12	1.10		10.4		7.60	
24	0.788				0.12	0.79		10.5		7.70	
25											
26											
27											
28											
29											
30											
31											

TOTAL	1.892				0.24	1.89		20.9		15.30	1.89
AVG	0.946				0.12	0.95		10.5		7.65	
MAX	1.104				0.12	1.10		10.5		7.70	
MIN	0.788				0.12	0.79		10.4		7.60	
MAX 7-DAY	1.104				0.12	1.10		10.5		7.70	
STD	0.158				0.00	0.16		0.1		0.05	

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SUPERINTENDENT'S SIGNATURE _____

NPDES PERMIT NO. MI0025071

DATE PRINTED
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DITCH #5 ACTIVATED
COMMERCE TOWNSHIP WWTP

December 2011

PAGE 6
OF 6

COMMERCE TOWNSHIP WWTP
649 WELCH ROAD
WALLED LAKE, MI 48390

DATE December 2011	AERAT VOL (MG)	DETENTION (Hours) 81001	CRT (Days) RAS SS	F/M RATIO (:) F00310	SS (mg/L) 00530	VSS (mg/L) 00535	SETT SOL% (%) 81004	SVI 81007	DISS OXYG (mg/L) 00300	RAS SS (mg/L)	WAS FLOW (MGD)
1	2.85	32.22	15.76	0.06	3576	2645	25	69.91	1.4	11100	0.058
2	2.85	34.20	15.77	0.06	3553	2642	25	70.36	1.5	12382	0.052
3	2.85	33.30	18.90	0.09	3533	2636	25	70.76	1.2	11940	0.045
4	2.85	31.04	18.90	0.07	3465	2550	24	69.26	1.1	12776	0.041
5	2.85	31.48	15.81	0.06	3712	2736	25	67.35	1.3	12432	0.054
6	2.85	32.84	15.76	0.05	3727	2813	25	67.08	1.1	12998	0.052
7	2.85	33.67	17.17	0.07	3562	2667	25	70.19	1.1	11862	0.050
8	2.85	33.52	18.90	0.05	3592	2722	25	69.60	1.2	12612	0.043
9	2.85	34.26	18.91	0.06	3625	2730	24	66.21	1.2	11836	0.046
10	2.85	32.88	18.91	0.06	3516	2654	24	68.26	1.4	12480	0.042
11	2.85	31.85	18.96	0.08	3466	2566	23	66.36	1.2	12620	0.041
12	2.85	34.11	18.98	0.07	3599	2696	25	69.46	1.2	11642	0.046
13	2.85	34.21	18.88	0.06	3650	2724	25	68.49	1.5	13480	0.041
14	2.85	32.02	18.90	0.07	3442	2587	25	72.63	1.2	11584	0.045
15	2.85	30.64	17.19	0.07	3751	2810	25	66.65	1.3	12736	0.049
16	2.85	32.95	17.19	0.07	3642	2778	25	68.64	1.3	12546	0.048
17	2.85	31.59	18.88	0.07	3586	2721	25	69.72	1.1	13134	0.041
18	2.85	32.53	18.92	0.07	3500	2625	25	71.43	1.3	12686	0.042
19	2.85	33.26	18.92	0.09	3531	2665	24	67.97	1.4	11156	0.048
20	2.85	33.13	18.91	0.08	3595	2748	25	69.54	1.4	12294	0.044
21	2.85	33.51	18.92	0.10	3516	2685	25	71.10	1.3	11432	0.046
22	2.85	33.49	17.20	0.05	3709	2828	24	64.71	1.3	12668	0.049
23	2.85	31.17	18.87	0.05	3777	2875	25	66.19	1.2	13424	0.043
24	2.85	31.90	18.90	0.08	3586	2831	24	66.93	1.1	11804	0.046
25	2.85	37.62	17.18	0.06	3667	2784	24	65.45	1.2	12604	0.048
26	2.85	33.44	18.87	0.10	3331	2537	22	66.05	1.5	13782	0.036
27	2.85	33.59	18.92	0.06	3600	2756	24	66.67	1.3	13008	0.042
28	2.85	33.11	18.88	0.11	3629	2803	24	66.13	1.4	13080	0.042
29	2.85	34.13	18.90	0.05	3737	2890	24	64.22	1.0	11492	0.049
30	2.85	32.11	18.91	0.08	3837	2984	25	65.16	1.3	12970	0.045
31	2.85	31.55	18.90	0.11	3730	2874	25	67.02	1.3	11994	0.047

TOTAL	88.35	1021.32	564.95	2.21	111742	84562	760	2109.50	39.3	384554	1.420
AVG	2.85	32.95	18.22	0.07	3605	2728	25	68.05	1.3	12405	0.046
MAX	2.85	37.62	18.98	0.11	3837	2984	25	72.63	1.5	13782	0.058
MIN	2.85	30.64	15.76	0.05	3331	2537	22	64.22	1.0	11100	0.036

OPERATOR'S SIGNATURE

SUPERINTENDENT'S SIGNATURE

NPDES PERMIT NO. MI0025071

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME COMMERCE TWP WWTP
ADDRESS OAKLAND COUNTY CDRAIN COMMISSIONER
 ONE PUBLIC WORKS DRIVE
 WATERFORD MI 48328-1907
FACILITY COMMERCE TWP WWTP
LOCATION COMMERCE MI 48390

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
 DISCHARGE MONITORING REPORT (DMR)**

MI0025071	003 A
PERMIT NUMBER	DISCHARGE NUMBER

MINOR
 (SUBR DD)
 F - FINAL
 003A MUN. WASTE - LAKE BERRY

Form Approved.
 OMB No. 2040-0004

MONITORING PERIOD							
FROM	YEAR	MO	DAY	TO	YEAR	MO	DAY
	11	12	01		11	12	31

Check here if No Discharge

NOTE: Read instructions before completing this form.

PARAMETER	SAMPLE MEASUREMENT / PERMIT REQUIREMENT	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE	
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS				
FLOW, THROUGH TREATMENT PLANT	SAMPLE MEASUREMENT	0.946	1.104	(03)	****	****	****	****	0	DAILY	DAILAV	
50050	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	****	****	****	****		DAILY	DAILAV	
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	****	****	****	10.4	****	****	(19)	0	DAILY	GRAB	
00300	PERMIT REQUIREMENT	****	****	****	7.0 DAILY MN	****	****	MG/L		DAILY	GRAB	
PH	SAMPLE MEASUREMENT	****	****	****	7.6	****	7.7	(12)	0	DAILY	GRAB	
00400	PERMIT REQUIREMENT	****	****	****	6.5 DAILY MN	****	9.0 DAILY MX	SU		DAILY	GRAB	
PHOSPHORUS (P), MONTHLY TOTAL	SAMPLE MEASUREMENT	****	1.8933	(76)	****	****	****	****	0	SEE PERMIT	CALC	
00665	PERMIT REQUIREMENT	****	REPORT MO TOTAL	LBS/ MON	****	****	****	****		SEE PERMIT	CALC	
PHOSPHORUS (P), ANNUAL TOTAL	SAMPLE MEASUREMENT	****	2	(50)	****	****	****	****	0	SEE PERMIT	CALC	
00665	PERMIT REQUIREMENT	****	100 ANNL TOT	LBS/ YR	****	****	****	****		SEE PERMIT	CALC	
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.				SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT			TELEPHONE		DATE		
DOUGLAS A. BUCHHOLZ P.E. DIRECTOR OF OPERATIONS								248	858-1119	12	01	10
TYPED OR PRINTED	AREA CODE	NUMBER	YEAR	MO	DAY							

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME COMMERCE TWP WWTP
ADDRESS OAKLAND COUNTY WATER RESOURCES COMMISSIONER
 ONE PUBLIC WORKS DRIVE
 WATERFORD MI 48328-1907
FACILITY COMMERCE TWP WWTP
LOCATION COMMERCE MI 48390

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
 DISCHARGE MONITORING REPORT (DMR)**

MI0025071	002 A
PERMIT NUMBER	DISCHARGE NUMBER

MINOR
 (SUBR DD)
 F - FINAL
 002A MUN. WASTE - SEELEY CREEK

Form Approved.
 OMB No. 2040-0004

MONITORING PERIOD							
FROM	YEAR	MO	DAY	TO	YEAR	MO	DAY
	11	12	01		11	12	31

Check here if No Discharge

NOTE: Read instructions before completing this form.

PARAMETER	X	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
FLOW, THROUGH TREATMENT PLANT	SAMPLE MEASUREMENT	1.91	2.15	(03)	*****	*****	*****	*****	0	7 / 7	DAILAV
50050	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	*****	*****	*****	*****		DAILY	DAILAV
TEMPERATURE, WATER DEG. FAHRENHEIT	SAMPLE MEASUREMENT	*****	*****	****	36	*****	47	(15)	0	7 / 7	INSTAN
00011 W	PERMIT REQUIREMENT	*****	*****		REPORT DAILY MIN	*****	REPORT DAILY MX	DEG.F		DAILY	INSTAN
OXYGEN, DISSOLVED, (DO)	SAMPLE MEASUREMENT	*****	*****	****	9.7	*****	*****	(19)	0	7 / 7	GRAB
00300 W	PERMIT REQUIREMENT	*****	*****		7.0 DAILY MIN	*****	*****	MG/L		DAILY	GRAB
PH	SAMPLE MEASUREMENT	*****	*****	****	7.6	*****	8.0	(12)	0	7 / 7	GRAB
00400 W	PERMIT REQUIREMENT	*****	*****		6.5 DAILY MIN	*****	9.0 DAILY MX	SU		DAILY	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	1.5	3.9	(26)	*****	0.1	0.3	(19)	0	7 / 7	COMP24
00530	PERMIT REQUIREMENT	500 MO AVG	750 7 DA AVG	LBS/DY	*****	20 MO AVG	30 7 DA AVG	MG/L		DAILY	COMP24
BOD, CARBONACEOUS 05 DAY, 20C	SAMPLE MEASUREMENT	0.0	0.0	(26)	*****	0.0	0.0	(19)	0	7 / 7	COMP24
80082	PERMIT REQUIREMENT	100 MO AVG	250 7 DA AVG	LBS/DY	*****	4.0 MO AVG	10 DAILY MX	MG/L		DAILY	COMP24
NITROGEN, AMMONIA TOTAL (N)	SAMPLE MEASUREMENT	0.02	0.09	(26)	*****	0.00	0.02	(19)	0	7 / 7	COMP24
00610	PERMIT REQUIREMENT	REPORT MO AVG	50 7 DA AVG	LBS/DY	*****	REPORT MO AVG	2.0 DAILY MAX	MG/L		DAILY	COMP24
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.				TELEPHONE		DATE			
DOUGLAS A. BUCHHOLZ P.E. DIRECTOR OF OPERATIONS						SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		248	858-1119	12	01
TYPED OR PRINTED		AREA CODE		NUMBER		YEAR	MO	DAY			

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
 0 = Actual result or less than quantification limit.

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME COMMERCE TWP WWTP
ADDRESS OAKLAND COUNTY WATER RESOURCES COMMISSIONER
 ONE PUBLIC WORKS DRIVE
 WATERFORD MI 48328-1907
FACILITY COMMERCE TWP WWTP
LOCATION COMMERCE MI 48390

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
 DISCHARGE MONITORING REPORT (DMR)**

MI0025071	002 A
PERMIT NUMBER	DISCHARGE NUMBER

MINOR
 (SUBR DD)
 F - FINAL
 002A MUN. WASTE - SEELEY CREEK

Form Approved.
 OMB No. 2040-0004

MONITORING PERIOD					
FROM	YEAR	MO	DAY	TO	DAY
	11	12	01		31

Check here if No Discharge

NOTE: Read instructions before completing this form.

PARAMETER	SAMPLE MEASUREMENT / PERMIT REQUIREMENT	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
COLIFORM, FECAL	SAMPLE MEASUREMENT	*****	*****		*****	1	1	(13)	0	7 / 7	GRAB
74055	PERMIT REQUIREMENT	*****	*****		*****	200 MO AVG	400 7 DA AVG	#/ 100ML		DAILY	GRAB
PHOSPHORUS, TOTAL (P)	SAMPLE MEASUREMENT	.932	*****	(26)	*****	.061	*****	(19)	0	7 / 7	COMP24
00665	PERMIT REQUIREMENT	REPORT MO AVG	*****	LBS/DY	*****	REPORT MO AVG	*****	MG/L		DAILY	COMP24
PHOSPHORUS, TOTAL (P) 4-MONTH ROLLING AVG.	SAMPLE MEASUREMENT	2	*****	(26)	*****	0.11	*****	(19)	0	1 / 30	CALC
00665	PERMIT REQUIREMENT	10 4-MO AVG	*****	LBS/DY	*****	0.4 4-MO AVG	*****	MG/L		MONTH	CALC
MERCURY, TOTAL	SAMPLE MEASUREMENT	*H	*****	(26)	*****	*H	*****	(3M)	0	1 / 90	GRAB
71900	PERMIT REQUIREMENT	REPORT MO AVG	*****	LBS/DY	*****	REPORT MO AVG	*****	NG/L		QTRLY	GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.	TELEPHONE		DATE	
DOUGLAS A. BUCHHOLZ P.E. DIRECTOR OF OPERATIONS		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	248	858-1119	12
TYPED OR PRINTED		AREA CODE	NUMBER	YEAR	MO
					DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
 0 = Actual result or less than quantification limit.

**COT SSO's
(2004 to 2012)**

CVT	Date	Location	Reason
Commerce Twp	9/29/2004	Commerce Rd & Edgewood Pk Blvd	Forcemain break
Commerce Twp	8/4/2005	Polvadera Dr btwn Sherbrooke & Creedmore	Contractor damaged
Commerce Twp	8/8/2005	Polvadera Dr btwn Sherbrooke & Creedmore	Pressure on repair clamp
Commerce Twp	10/10/2005	Benstein & Best Dr	Failed ARV
Commerce Twp	2/26/2006	4891 Winewood Ln	Failed pressure sewer
Commerce Twp	5/1/2007	Maple Rd	circuit breaker for grinder off
Commerce Twp	6/16/2007	Union Lake @ Golfside Dr	Failed ARV
Commerce Twp	6/20/2007	Benstein & Best Dr	Failed grinder pump
Commerce Twp	6/24/2007	5171 Surfwood	Failed ARV
Commerce Twp	9/13/2007	1705 Oakley Park Rd	Failed grinder pump
Commerce Twp	9/30/2007	Marilyn Terrace	Failed grinder pump
Commerce Twp	11/9/2007	N. Crumb Rd & W. Haggerty Rd	Plugged Sewer
Commerce Twp	12/1/2007	3101 Union Lake Rd	Leaking near stop box
Commerce Twp	1/28/2008	13 Mile Rd near M-5 PS	Contractor damaged
Commerce Twp	2/27/2008	Ravinewood Dr & Turtlewood Ct.	Failed grinder pump
Commerce Twp	3/7/2008	3101 Union Lake Rd	4" pressure sewer
Commerce Twp	4/18/2008	Commerce Rd & Sandlewood Dr	Failed ARV
Commerce Twp	5/4/2008	Ravinewood Dr & Turtlewood Ct.	Failed ARV
Commerce Twp	5/10/2008	Surfwood	Failed service lead
Commerce Twp	6/11/2008	Lakeview & Dicker Dr	Contractor damaged
Commerce Twp	7/5/2008	Commerce Rd	Failed ARV
Commerce Twp	10/3/2008	Pontiac Trail	Grease plug
Commerce Twp	10/7/2008	Union Lake Rd	Contractor damaged
Commerce Twp	1/31/2009	Maple Rd	Collapsed sewer
Commerce Twp	2/13/2009	Flagstaff St.	Forcemain break
Commerce Twp	2/20/2009	Haggerty Rd	Plugged Sewer
Commerce Twp	3/19/2009	Juniper	Failed ARV
Commerce Twp	4/1/2009	Union Lake Rd	Forcemain break
Commerce Twp	4/13/2009	Dickert St & Gitzen	Contractor damaged
Commerce Twp	5/3/2009	Newton	Failed grinder pump
Commerce Twp	7/6/2009	Union Lake Rd	Forcemain failure
Commerce Twp	7/21/2009	Benstein Rd	Failed ARV
Commerce Twp	10/1/2009	Benstein Rd	Failed ARV
Commerce Twp	1/26/2010	SE corner Benstein & Darlene St	Leaky gate valve
Commerce Twp	5/5/2011	Commerce Rd btwn Oakwood & Ledgewood	Failed ARV
Commerce Twp	8/30/2011	Sandelwood St	Failed ARV
Commerce Twp	4/4/2012	4775 White Tail Ct	Forcemain break



SSO Event Details

Reporting Entity: Commerce Twp
Event Type: SSO
Notification Date/Time: 4/4/2012 8:00:00 PM
Event Start Date/Time: 4/4/2012 5:50:00 PM
Event End Date/Time: 4/4/2012 9:00:00 PM
Volume: 6000 gallons
Characterization: The reported discharge was caused by a party other than the reporting entity over which the reporting entity had no control, or knowledge of the actions which resulted in the discharge.
Precipitation Type:
Precipitation Amount:
Reason For Discharge: Broken 2" forcemain at entry into manhole
Entity Actions to Stop/Min Discharge: repaired, cleaned up
Discharge Locations:
Outfall Description: 2" pressure sewer force main into manhole break
Outfall Location: 4775 White Tail Court - in public ROW
Receiving Water: Storm Water Detention Pond
Land Impacted: 40 square feet
Volume from this Outfall: 0.006 Million Gallons
Discharge Water Quality: Raw sewage
Outfall Discharge Start: 4/4/2012 5:50:00 PM
Outfall Discharge End: 4/4/2012 9:00:00 PM
Actions by MDEQ:
Schedule of Compliance: This Outfall is not subject to a Schedule of Compliance

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SSO Event Details

Reporting Entity: Commerce Twp
Event Type: SSO
Notification Date/Time: 8/31/2011 9:56:00 AM
Event Start Date/Time: 8/30/2011 10:15:00 PM
Event End Date/Time: 8/30/2011 11:30:00 PM
Volume: 20 gallons
Characterization: The reported discharge was caused by a party other than the reporting entity over which the reporting entity had no control, or knowledge of the actions which resulted in the discharge.
Precipitation Type: None
Precipitation Amount:
Reason For Discharge: failed arv in struture
Entity Actions to Stop/Min Discharge: cleaned up, replaced arv
Discharge Locations:
Outfall Description: pressure relief chamber
Outfall Location: Sandelwood Street, structure 103
Receiving Water: land impacted
Land Impacted: yes
Volume from this Outfall: 0.00005 Million Gallons
Discharge Water Quality: Raw sewage
Outfall Discharge Start: 8/30/2011 10:15:00 AM
Outfall Discharge End: 8/30/2011 11:30:00 AM
Actions by MDEQ: Review of SSO event information determined that no further action is necessary at this time.
Schedule of Compliance: This Outfall is not subject to a Schedule of Compliance

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SSO Event Details

Reporting Entity: Commerce Twp
Event Type: SSO
Notification Date/Time: 5/5/2011 4:58:00 PM
Event Start Date/Time: 5/5/2011 3:50:00 PM
Event End Date/Time: 5/5/2011 5:15:00 PM
Volume: 0.0001 MG
Characterization: The discharge was reported per statutory requirements.
Precipitation Type: None
Precipitation Amount:
Reason For Discharge: Broken ARV
Entity Actions to Stop/Min Discharge: Vactored station. Continued to vactor until ARV could be changed.
Discharge Locations:
Outfall Description:
Outfall Location: Commerce Road b/w Oakwood and Ledgewood
Receiving Water: None
Land Impacted: Area of ground surrounding sation
Volume from this Outfall: 0.0001 Million Gallons
Discharge Water Quality: Raw sewage
Outfall Discharge Start: 5/5/2011 3:50:00 PM
Outfall Discharge End: 5/5/2011 5:15:00 PM
Actions by MDEQ: Review of SSO event information determined that no further action is necessary at this time.
Schedule of Compliance: This Outfall is not subject to a Schedule of Compliance

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SSO Event Details

Reporting Entity: Commerce Twp
Event Type: SSO
Notification Date/Time: 1/26/2010 1:52:00 PM
Event Start Date/Time: 1/26/2010 10:15:00 AM
Event End Date/Time: 1/26/2010 12:00:00 PM
Volume: 0.0001 MG
Characterization: The discharge was reported per statutory requirements.
Precipitation Type:
Precipitation Amount:
Reason For Discharge: Leaky gate valve on 6" diameter force main.
Entity Actions to Stop/Min Discharge: A vactor tanker is being utilized to clean the area and remove sewage while repairs to the gate valve are ongoing.
Discharge Locations:
Outfall Description: SE corner of Benstein Rd and Darlene St
Outfall Location: Benstein Road
Receiving Water: North Commerce Lake
Land Impacted: Grass ground surrounding ARV manhole.
Volume from this Outfall: 0.0001 Million Gallons
Discharge Water Quality: Raw sewage
Outfall Discharge Start: 1/26/2010 10:15:00 AM
Outfall Discharge End: 1/26/2010 12:00:00 PM
Actions by MDEQ: Review of SSO event information determined that no further action is necessary at this time.
Schedule of Compliance: This Outfall is not subject to a Schedule of Compliance

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JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



STEVEN E. CHESTER
DIRECTOR

February 21, 2008

Mr. Thomas K. Zoner, Supervisor
Commerce Charter Township
2840 Fisher Avenue
Commerce Township, Michigan 48390

Dear Mr. Zoner:

**SUBJECT: National Pollutant Discharge Elimination System (NPDES); Permit No. MI0025071
Designated Name: Commerce Twp WWTP**

Your National Pollutant Discharge Elimination System (NPDES) Permit has been processed in accordance with the appropriate state and federal regulations. It contains the requirements necessary for you to comply with state and federal water pollution control laws.

The issuance of this permit does not authorize the violation of any federal, state, or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Department of Environmental Quality (DEQ) permits, or approvals from other units of government as may be required by law.

REVIEW THE PERMIT EFFLUENT LIMITS AND COMPLIANCE SCHEDULES CAREFULLY. These are subject to the criminal and civil enforcement provisions of both state and federal law. Permit violations are audited by the DEQ and the United States Environmental Protection Agency (USEPA), and may appear in a published quarterly noncompliance report made available to agencies and the public.

Issuance of this permit is one of the independent steps that must be completed prior to discharging treated wastewater. This permit establishes effluent limitations and other requirements for the discharge of treated wastewater to the surface waters of the state. It does not indicate that a construction permit will be issued. A construction permit is required pursuant to Part 41 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, prior to construction of wastewater treatment facilities. Part 41 requires that a detailed technical review of the proposed treatment system be conducted including, but not limited to, proposed treatment technology, isolation distances, and reliability.

Your monitoring and reporting responsibilities must be complied with in accordance with this permit. If required by the permit, self-monitoring data shall be reported via the Michigan DEQ Electronic Environmental Discharge Monitoring Reporting (e2-DMR) system. Other reports, notifications, or questions regarding the enclosed permit or the NPDES program should be directed to the following address:

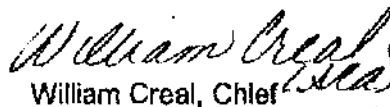
Ms. Hae-Jin Yoon, District Supervisor
Southeast Michigan District Office, Water Bureau, DEQ
27700 Donald Court

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Commerce Township WWTP
NPDES Permit No. MI0025071
Page 2

Warren, Michigan 48092-2793
Telephone: 586-753-3700, Fax: 586-753-3751

Sincerely,



William Creal, Chief
Permits Section
Water Bureau
517-241-1346

wc/sea

Enclosure: Permit No. MI0025071

cc/enc: USEPA-Region 5

208 Agency – Southeast Michigan Council of Governments

Mr. Michael C. Walsh, P.E., Operations Engineer, Oakland Co. Drain Commissioner

Mr. Chris Coffey, Supervisor, Wastewater Treatment Plant, Commerce Township

Ms. Linda S. Mayer, Adkison, Need & Allen, P.L.L.C.

Ms. Hae-Jin Yoon, Southeast Michigan District Supervisor, Water Bureau (electronic)

PCS Unit, Water Bureau

File

RECEIVED

FEB 27 2008

ADKISON NEED

PERMIT NO. MI0025071

**STATE OF MICHIGAN**
DEPARTMENT OF ENVIRONMENTAL QUALITY

**AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et seq; the "Federal Act"), Michigan Act 451, Public Acts of 1994, as amended (the "Michigan Act"), Parts 31 and 41, and Michigan Executive Orders 1991-31, 1995-4 and 1995-18,

Charter Township of Commerce
2840 Fisher Avenue
Commerce Township, Michigan 48390

is authorized to discharge from the **Commerce Township Wastewater Treatment Plant** located at

649 Welch Road
Commerce Township, Michigan 48390

designated as **Commerce Twp WWTP**

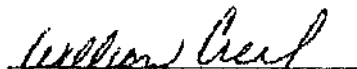
to the receiving water an unnamed tributary to Seeley Creek, in accordance with effluent limitations, monitoring requirements, and other conditions set forth in this permit.

This permit is based on a complete application submitted on April 17, 2006.

This permit takes effect immediately on the date of issuance. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules. On its effective date this permit shall supersede NPDES Permit No. MI0025071, expiring October 1, 2006, and Certificate of Coverage No. MIS710004, issued March 25, 2004, which is hereby revoked upon the effective date of this permit.

This permit and the authorization to discharge shall expire at midnight, **October 1, 2011**. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application which contains such information, forms, and fees as are required by the Department by **April 4, 2011**.

Issued September 28, 2006. Based on a request submitted on April 4, 2007, this permit was modified on October 19, 2007. Based on a request submitted on December 13, 2007, this permit was modified on February 21, 2008


William Creal, Chief
Permits Section
Water Bureau

PERMIT FEE REQUIREMENTS

In accordance with Section 324.3120 of the Michigan Act, the permittee shall make payment of an annual permit fee to the Department for each October 1 the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by January 15 for notices mailed by December 1. The fee is due no later than 45 days after receiving the notice for notices mailed after December 1.

In accordance with Section 324.3118 of the Michigan Act, the permittee shall make payment of an annual storm water fee to the Department for each January 1 the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by March 15 for notices mailed by February 1. The fee is due no later than 45 days after receiving the notice for notices mailed after February 1.

In accordance with Section 324.3132 of the Michigan Act, the permittee shall make payment of an annual biosolids land application fee to the Department. In response to the Department's annual notice, the permittee shall submit the fee, which shall be postmarked no later than January 31 of each year.

CONTACT INFORMATION

Unless specified otherwise, all contact with the Michigan Department of Environmental Quality (the "Department") required by this permit shall be made to the Southeast Michigan District Supervisor of the Water Bureau. The Southeast Michigan District Office is located at 27700 Donald Court, Warren, Michigan 48092-2793, telephone: 586-753-3700, fax: 586-753-3751.

CONTESTED CASE INFORMATION

Any person who is aggrieved by this permit may file a sworn petition with the State Office of Administrative Hearings and Rules of the Michigan Department of Labor and Economic Growth, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department may reject any petition filed more than 60 days after issuance as being untimely.

PART I

Section A. Limitations and Monitoring Requirements

1. Final Effluent Limitations, Monitoring Point 002A

During the period beginning on the effective date of this permit and lasting until the facility monthly flow exceeds 3 MGD as an annual average flow rate or until 180 days after start-up of the expanded facility, whichever is first, the permittee is authorized to discharge treated municipal wastewater from Monitoring Point 002A. Monitoring point 002A discharges through Outfall 002. Outfall 002 discharges to an unnamed tributary to Seeley Creek. Such discharge shall be limited and monitored by the permittee as specified below.

Parameter	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Frequency of Analysis	Sample Type
	Monthly	7-Day	Daily	Units	Monthly	7-Day	Daily	Units		
Flow	(report)	--	(report)	MGD	--	--	--	--	Daily	Report Total Daily Flow
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	100	250	---	lbs/day	4.0	--	10	mg/l	Daily	24-Hr Composite
Total Suspended Solids	500	750	---	lbs/day	20	30	---	mg/l	Daily	24-Hr Composite
Ammonia Nitrogen (as N)										
Apr. 1 to Nov. 30	13	50	--	lbs/day	0.50	---	2.0	mg/l	Daily	24-Hr Composite
Dec. 1 to Mar. 31	(report)	50	--	lbs/day	(report)	---	2.0	mg/l	Daily	24-Hr Composite
Fecal Coliform Bacteria	--	--	--	--	200	400	--	cts/100 ml	Daily	Grab
Total Copper	(report)	--	--	lbs/day	(report)	--	--	ug/l	Monthly	24-Hr Composite
Total Phosphorus (as P)	(report)	--	--	lbs/day	(report)	--	--	mg/l	Daily	24-Hr Composite
Total Mercury	(report)	--	--	lbs/day	(report)	--	--	ng/l	Quarterly	Grab
Total Phosphorus (as P)										
	<u>4-Month Rolling Average</u>				<u>4-Month Rolling Average</u>					
Total Phosphorus (as P)	10	--	--	lbs/day	0.4	--	--	mg/l	Daily	Calculation
Temperature	--	--	--	--	<u>Minimum Daily (report)</u>	--	<u>Maximum Daily (report)</u>	°F	Daily	Reading
Dissolved Oxygen	--	--	--	--	7.0	--	--	mg/l	Daily	Grab
pH	--	--	--	--	6.5	--	9.0	S.U.	Daily	Grab

The following design flow was used in determining the above limitations, but is not to be considered a limitation or actual capacity: 3 MGD.

a. Narrative Standard

The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.

PART I**Section A. Limitations and Monitoring Requirements**

- b. **Sample Locations**
Refer to the Monitoring Locations diagram, Part I.A.4. (page 9 of this permit). Samples for flow, CBOD₅, total suspended solids, ammonia nitrogen, total phosphorus, total copper, and total mercury shall be taken prior to disinfection. Samples for fecal coliform bacteria shall be taken immediately after ultra-violet disinfection. Samples for temperature, dissolved oxygen and pH shall be taken immediately prior to discharge to the unnamed tributary to Seeley Creek (Outfall 002). The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative of the effluent.
- c. **Ultraviolet Disinfection**
It is understood that ultraviolet light will be used to achieve compliance with the fecal coliform limitations. If disinfection other than ultraviolet light will be used, the permittee shall notify the Department in accordance with Part II.C.11. - Changes in Facility Operations.
- d. **Analytical Method(s) and Quantification Level(s) for Total Copper**
The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for Total Copper shall be in accordance with an EPA Approved Method. The quantification level for Total Copper shall be 1 ug/l unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination. Upon approval of the Department, the permittee may use alternate analytical methods (for parameters with methods specified in 40 CFR 136, the alternate methods are restricted to those listed in 40 CFR 136).
- e. **Monitoring Frequency Reduction / Elimination for Total Copper**
After the submittal of 24 months of data, the permittee may request, in writing, Department approval of a reduction or elimination of monitoring frequency for Total Copper. This request shall contain an explanation as to why the reduced monitoring is appropriate. Upon receipt of written approval and consistent with such approval, the permittee may reduce or eliminate the monitoring frequency indicated in Part I.A.1. of this permit. The Department may revoke the approval for reduced / eliminated monitoring at any time upon notification to the permittee.
- f. **Final Effluent Limitation for Total Phosphorus**
The 4-month rolling average final limit for Total Phosphorus shall be determined by adding the present monthly average result to the preceding 3 monthly average results then dividing the sum by 4.
- g. **Total Mercury Testing Requirements**
The analytical protocol for total mercury shall be in accordance with EPA Method 1631, Revision E, "Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry". The quantification level for total mercury shall be 0.5 ng/l, unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination.

The use of clean technique sampling procedures is strongly recommended. Guidance for clean technique sampling is contained in: EPA Method 1669, *Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (Sampling Guidance)*, EPA-821-R96-001, July 1996. Information and data documenting the permittee's sampling and analytical protocols and data acceptability shall be submitted to the Department upon request.

- 1) If it is determined that the effluent has a reasonable potential to exceed 1.3 ng/l of total mercury and upon written notification by the Department, the permittee shall implement the Pollutant Minimization Program for Total Mercury contained in Part I.A.8. of this permit.
- 2) If it is determined that the effluent does not have a reasonable potential to exceed 1.3 ng/l of total mercury and upon receipt of written approval and consistent with such approval, the permittee may reduce the monitoring frequency or eliminate monitoring for total mercury indicated in Part I.A.1. of this permit. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittee.

PART I

Section A. Limitations and Monitoring Requirements

2. Final Effluent Limitations, Monitoring Point 002A

During the period beginning when the facility monthly flow first exceeds 3 MGD as an annual average flow rate or 180 days after start-up of the expanded facility, whichever is first, and lasting until the expiration date of this permit, the permittee is authorized to discharge treated municipal wastewater from Monitoring Point 002A. Monitoring point 002A discharges through Outfall 002. Outfall 002 discharges to an unnamed tributary to Seeley Creek. Such discharge shall be limited and monitored by the permittee as specified below. The permittee shall notify the PCS-Data Unit 180 days prior to these effluent limitation taking effect (see Part II.C.2. for notification address).

Parameter	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Frequency of Analysis	Sample Type
	Monthly	7-Day	Daily	Units	Monthly	7-Day	Daily	Units		
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	280	710	---	lbs/day	4	---	10	mg/l	Daily	24-Hr Composite
Total Suspended Solids	1400	2100	---	lbs/day	20	30	---	mg/l	Daily	24-Hr Composite
Ammonia Nitrogen (as N)	35	140	---	lbs/day	0.5	---	2	mg/l	Daily	24-Hr Composite
Fecal Coliform Bacteria	---	---	---	---	200	400	---	cts/100 ml	Daily	Grab
Total Copper	(report)	---	---	lbs/day	(report)	---	---	ug/l	Monthly	24-Hr Composite
Total Phosphorus (as P)	(report)	---	---	lbs/day	(report)	---	---	mg/l	Daily	24-Hr Composite
Total Mercury	(report)	---	---	lbs/day	(report)	---	---	ng/l	Quarterly	Grab
Total Phosphorus (as P)	12	---	---	lbs/day	0.2	---	---	mg/l	Daily	Calculation
					<u>4-Month Rolling Average</u>	<u>4-Month Rolling Average</u>				
Temperature	---	---	---	---	(report)	---	(report)	°F	Daily	Reading
Dissolved Oxygen	---	---	---	---	7.0	---	---	mg/l	Daily	Grab
pH	---	---	---	---	6.5	---	9.0	S.U.	Daily	Grab

The following design flow was used in determining the above limitations, but is not to be considered a limitation or actual capacity: 8.5 MGD.

- a. Narrative Standard
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.

PART I**Section A. Limitations and Monitoring Requirements**

- b. **Sampling Locations**
Refer to the Monitoring Locations diagram, Part I.A.4. (page 9 of this permit). Samples for flow, CBODs, total suspended solids, ammonia nitrogen, total phosphorus, total copper, and total mercury shall be taken prior to disinfection. Samples for fecal coliform bacteria shall be taken immediately after ultra-violet disinfection. Samples for temperature, dissolved oxygen and pH shall be taken at immediately prior to discharge to the unnamed tributary to Seeley Creek (Outfall 002). The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative of the effluent.
- c. **Ultraviolet Disinfection**
It is understood that ultraviolet light will be used to achieve compliance with the fecal coliform limitations. If disinfection other than ultraviolet light will be used, the permittee shall notify the Department in accordance with Part II.C.11. - Changes in Facility Operations.
- d. **Analytical Method(s) and Quantification Level(s) for Total Copper**
The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for Total Copper shall be in accordance with an EPA Approved Method. The quantification level for Total Copper shall be 1 ug/l unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination. Upon approval of the Department, the permittee may use alternate analytical methods (for parameters with methods specified in 40 CFR 136, the alternate methods are restricted to those listed in 40 CFR 136).
- e. **Monitoring Frequency Reduction for Total Copper**
After the submittal of 24 months of data, the permittee may request, in writing, Department approval of a reduction or elimination of monitoring frequency for Total Copper. This request shall contain an explanation as to why the reduced monitoring is appropriate. Upon receipt of written approval and consistent with such approval, the permittee may reduce or eliminate the monitoring frequency indicated in Part I.A.1. of this permit. The Department may revoke the approval for reduced / eliminated monitoring at any time upon notification to the permittee.
- f. **Final Effluent Limitation for Total Phosphorus**
The 4-month rolling average final limit for Total Phosphorus shall be determined by adding the present monthly average result to the preceding 3 monthly average results then dividing the sum by 4.
- g. **Total Mercury Testing Requirements**
The analytical protocol for total mercury shall be in accordance with EPA Method 1631, Revision E, "Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry". The quantification level for total mercury shall be 0.5 ng/l, unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination.
- The use of clean technique sampling procedures is strongly recommended. Guidance for clean technique sampling is contained in: EPA Method 1669, *Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (Sampling Guidance)*, EPA-821-R96-001, July 1996. Information and data documenting the permittee's sampling and analytical protocols and data acceptability shall be submitted to the Department upon request.
- 1) If it is determined that the effluent has a reasonable potential to exceed 1.3 ng/l of total mercury and upon written notification by the Department, the permittee shall implement the Pollutant Minimization Program for Total Mercury contained in Part I.A.8. of this permit.
 - 2) If it is determined that the effluent does not have a reasonable potential to exceed 1.3 ng/l of total mercury and upon receipt of written approval and consistent with such approval, the permittee may reduce the monitoring frequency or eliminate monitoring for total mercury indicated in Part I.A.2. of this permit. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittee.

PART I**Section A. Limitations and Monitoring Requirements****h. Dissolved Oxygen Study**

The permittee may conduct a dissolved oxygen study to demonstrate that the discharge from Outfall 002 is in compliance with the dissolved oxygen effluent limitation in Part I.A.2 of this permit. The permittee shall submit an approvable study plan to the department that details the methods used of determining compliance with effluent limitations. Upon receipt of written approval from the department, the permittee shall conduct the study. The permittee may request suspension of the Dissolved Oxygen effluent monitoring from the Final Effluent limitations at Outfall 002 if the results of the study demonstrate that that the effluent discharged from Outfall 002 is consistently at or above 7 mg/l dissolved oxygen. Upon receipt of written approval from the department and consistent with such approval, the permittee may stop monitoring facility effluent for dissolved oxygen at Outfall 002. The Department may reinstate the Dissolved Oxygen effluent monitoring at any time upon notification to the permittee.

i. Temperature Study

The permittee may conduct a temperature study to demonstrate that the effluent temperature at Outfall 002 is consistently at or below the effluent temperature prior to disinfection. The permittee shall submit an approvable study plan to the department that details the methods used for conducting the study. Upon receipt of written approval from the department, the permittee shall conduct the study. The permittee may request that effluent temperature monitoring be conducted prior to disinfection if the results of the study demonstrate effluent temperature at Outfall 002 is consistently at or below the effluent temperature prior to disinfection. Upon receipt of written approval from the department and consistent with such approval, the permittee may monitor effluent temperature prior to disinfection. The Department may reinstate the effluent temperature monitoring at Outfall 002 at any time upon notification to the permittee.

PART I

Section A. Limitations and Monitoring Requirements

3. Final Effluent Limitations, Monitoring Point 003A

During the period beginning on the effective date of this permit and lasting until the expiration of this permit, the permittee is authorized to discharge treated municipal wastewater from Monitoring Point 002A, through Monitoring Point 003A. Monitoring Point 003A discharges through Outfall 003. Outfall 003 discharges to Lake Berry. This discharge is authorized only when Lake Berry water level has fallen below an elevation of 947.00 NGVD 29. Under no circumstances is the permittee authorized to discharge to Lake Berry when its water level is at or above an elevation of 947.50 NGVD 29. To maintain positive flow in Seeley Creek, no more than 50% of the facility discharge shall be directed to Lake Berry. Such discharge shall be limited and monitored by the permittee as specified below.

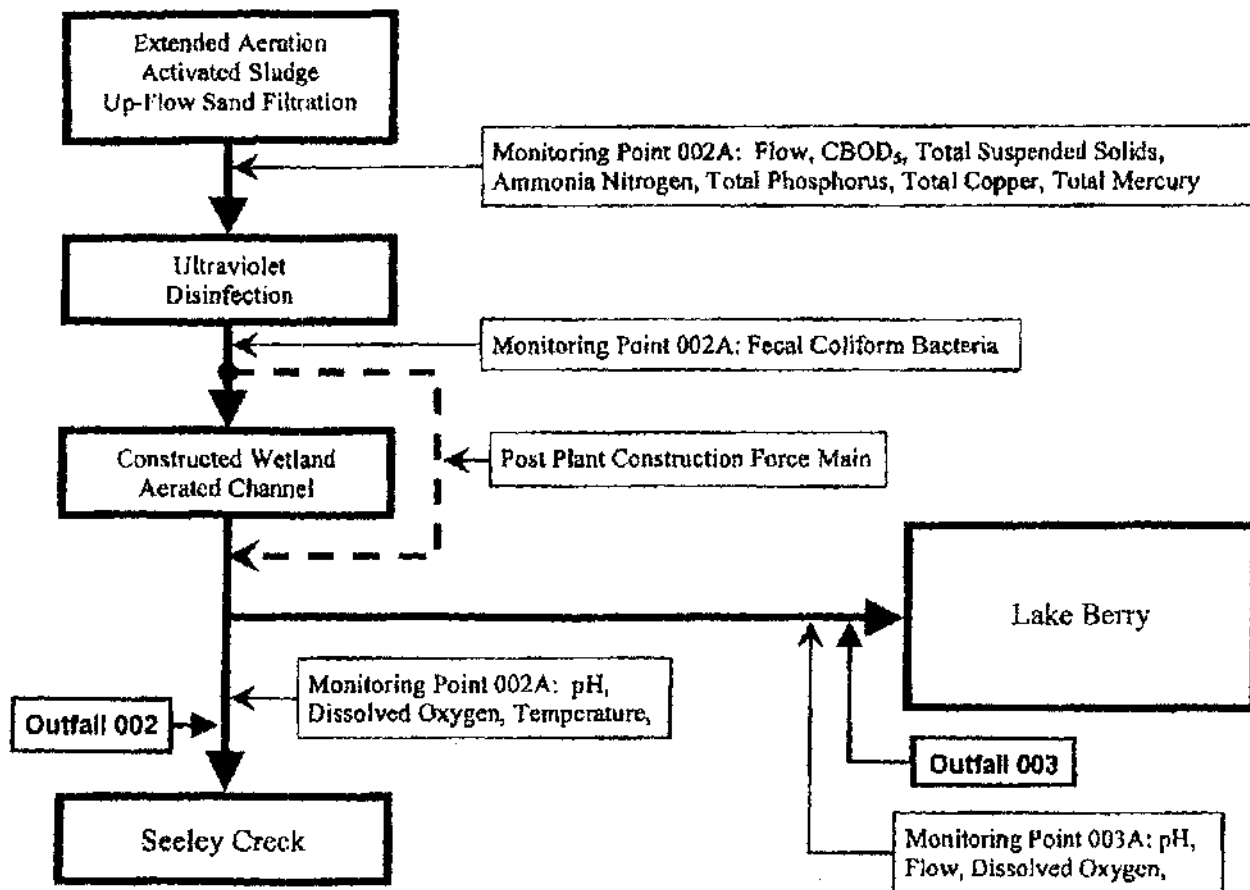
<u>Parameter</u>	<u>Maximum Limits for Quantity or Loading</u>				<u>Maximum Limits for Quality or Concentration</u>				<u>Frequency of Analysis</u>	<u>Sample Type</u>
	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>		
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
	<u>Total Monthly</u>	<u>Total Yearly</u>								
Total Phosphorus (as P)	(report)	---	---	lbs/month	---	---	---	---	See Part I.A.3.c. Calculation	
	---	100	---	lbs/year	---	---	---	---	See Part I.A.3.c. Calculation	
					<u>Minimum Daily</u>		<u>Maximum Daily</u>			
Dissolved Oxygen	---	---	---	---	7.0	---	---	mg/l	Daily	Grab
pH	---	---	---	---	6.5	---	9.0	S.U.	Daily	Grab

- a. **Narrative Standard**
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.
- b. **Sample Locations**
Refer to the Monitoring Locations diagram, Part I.A.4. (page 9 of this permit). During discharge events to Lake Berry, the permittee is required to comply with the effluent limitations and monitoring requirements for the parameters listed at Monitoring Point 002A. The permittee must also sample for Flow, Dissolved Oxygen and pH at Monitoring Point 003A. The total phosphorus concentrations and loads shall be calculated using total phosphorus data from Monitoring Point 002A. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative of the effluent.
- c. **Calculation for Total Phosphorous Reporting**
For each day a discharge occurs from Outfall 003, the daily total phosphorous load shall be determined. The total monthly total phosphorous load shall be the sum of all daily total phosphorous loads in a calendar month. The maximum yearly total phosphorous load shall be determined by summing the total monthly total phosphorous loads for the previous eleven months and adding the total monthly total phosphorous load for the current reporting month.

PART I

Section A. Limitations and Monitoring Requirements

4. Outfall and Monitoring Locations



5. Water Quality Studies

If determined necessary by the Department, Commerce Township shall conduct additional studies in the future to document the effects of the increased discharge from Commerce Township Wastewater Treatment Plant on the Redside Dace and other aquatic life located in downstream areas. When the flows from the wastewater treatment plant reach a monthly average of 4.8 MGD, and when flows reach 7.8 MGD, Commerce Township shall schedule a date to meet with the Department to discuss and identify the studies that will best determine the effects of the increased discharge on the survival of the Redside Dace and other aquatic species. Such studies may include, but are not limited to: evaluating the channel geomorphology, the in-stream habitat, downstream wetlands, in-stream temperature and nutrient studies. This condition is not intended to be a limitation on the volume of discharge otherwise authorized by this permit.

PART I

Section A. Limitations and Monitoring Requirements

6. Wetlands Water Level Baseline Study

The permittee shall conduct a twelve-month baseline study of the water levels in the wetlands downstream from the facility between 14 Mile and 13 Mile Roads, commonly known as Haverhill Farms Wetland (immediately downstream of 14 Mile Road) and Haggerty Road Wetland (spanning Haggerty Road immediately upstream of 13 Mile Road). Methods may include stream gauges coupled with topographic surveys of wetland elevation, continuous monitoring or representative sampling, or other appropriate methods reviewed and approved by the Department. The wetland water level baseline study shall be conducted in accordance with the following schedule.

- a. Within 180 days after the permit effective date, the permittee shall submit an approvable study plan for conducting the wetland water level baseline study and submitting a report of results to the Department.
- b. Within 1 year of the permit effective date, unless otherwise approved by the Department, the permittee shall initiate the twelve-month wetland water level baseline study.

This condition is not intended to be a limitation on the volume of discharge otherwise authorized by this permit.

7. Additional Monitoring Requirements

As a condition of this permit, the permittee shall monitor the discharge from Monitoring Point 002A for the constituents listed below. This monitoring is an application requirement of 40 CFR 122.21(j), effective December 2, 1999. Testing shall be conducted in August 2007, May 2008, March 2009, and October 2010. Grab samples shall be taken for available cyanide, total phenols, and parameters listed under Volatile Organic Compounds. For all other parameters, 24-hour composite samples shall be taken.

Test species for whole effluent toxicity monitoring shall include fathead minnow and *Ceriodaphnia dubia*. If the permittee has received Department approval to conduct chronic toxicity testing using the more sensitive species identified in the toxicity database, the first three (3) tests required above may be performed using the more sensitive species. The last (4th) test shall be conducted using both species. Testing and reporting procedures shall follow procedures contained in EPA-821-R-02-013, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (Fourth Edition)." When the effluent ammonia nitrogen (as N) concentration is greater than 3 mg/l, the pH of the toxicity test shall be maintained at a pH of 8 Standard Units. Acute and chronic toxicity data shall be included in the reporting for the toxicity test results. Toxicity test data acceptability is contingent upon the validation of the test method by the testing laboratory. Such validation shall be submitted to the Department upon request.

The results of such monitoring shall be submitted with the application for reissuance (see the cover page of this permit for the application due date). The permittee shall notify the Department within 14 days of completing the monitoring for each month specified above in accordance with Part II.C.5. Additional reporting requirements are specified in Part II.C.10. The permittee shall report to the Department any whole effluent toxicity test results greater than 1.0 TU_A or 1.0 TU_C within five (5) days of becoming aware of the result. If, upon review of the analysis, it is determined that additional requirements are needed to protect the receiving waters in accordance with applicable water quality standards, the permit may then be modified by the Department in accordance with applicable laws and rules.

Whole Effluent Toxicity
chronic toxicity

Hardness
calcium carbonate

Metals (Total Recoverable), Cyanide and Total Phenols (Quantification levels in parentheses)

antimony (1 µg/l)	arsenic (1 µg/l)	barium (5 µg/l)	beryllium (1 µg/l)
boron (20 µg/l)	cadmium (0.2 µg/l)	chromium (5 µg/l)	lead (1 µg/l)
nickel (5 µg/l)	selenium (1 µg/l)	silver (0.5 µg/l)	thallium (1 µg/l)
total phenolic compounds	zinc (5 µg/l)	available cyanide (2 µg/l) using Method OIA - 1677	

PART I

Section A. Limitations and Monitoring Requirements

Volatile Organic Compounds

acrolein	acrylonitrile	benzene	bromoform
carbon tetrachloride	chlorobenzene	chlorodibromomethane	chloroethane
2-chloroethylvinyl ether	chloroform	dichlorobromomethane	1,1-dichloroethane
1,2-dichloroethane	trans-1,2-dichloroethylene	1,1-dichloroethylene	1,2-dichloropropane
1,3-dichloropropylene	ethylbenzene	methyl bromide	methyl chloride
methylene chloride	1,1,2,2-tetrachloroethane	tetrachloroethylene	toluene
1,1,1-trichloroethane	1,1,2-trichloroethane	trichloroethylene	vinyl chloride

Acid-Extractable Compounds

p-chloro-m-creso	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol
4,6-dinitro-o-cresol	2,4-dinitrophenol	2-nitrophenol	4-nitrophenol
pentachlorophenol	phenol	2,4,6-trichlorophenol	

Base/Neutral Compounds

acenaphthene	acenaphthylene	anthracene	benzidine
benzo(a)anthracene	benzo(a)pyrene	3,4-benzofluoranthene	benzo(ghi)perylene
benzo(k)fluoranthene	bis(2-chloroethoxy)methane	bis(2-chloroethyl)ether	bis(2-chloroisopropyl)ether
bis(2-ethylhexyl)phthalate	4-bromophenyl phenyl ether	butyl benzyl phthalate	2-chloronaphthalene
4-chlorophenyl phenyl ether	chrysene	di-n-butyl phthalate	di-n-octyl phthalate
dibenzo(a,h)anthracene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene
3,3'-dichlorobenzidine	diethyl phthalate	dimethyl phthalate	2,4-dinitrotoluene
2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	fluorine
hexachlorobenzene	hexachlorobutadiene	hexachlorocyclo-pentadiene	hexachloroethane
indeno(1,2,3-cd)pyrene	isophorone	naphthalene	nitrobenzene
n-nitrosodi-n-propylamine	n-nitrosodimethylamine	n-nitrosodiphenylamine	phenanthrene
pyrene	1,2,4-trichlorobenzene		

8. Pollutant Minimization Program for Total Mercury

This condition is required only upon written notification by the Department, as specified in Part I.A.1.g and Part I.A.2.g. The goal of the Pollutant Minimization Program is to maintain the effluent concentration of total mercury at or below 1.3 ng/l. Within 180 days of the written notification, the permittee shall submit to the Department an approvable Pollutant Minimization Program for mercury designed to proceed toward the goal. The Pollutant Minimization Program shall include the following:

- a. an annual review and semi-annual monitoring of potential sources of mercury entering the wastewater collection system;
- b. a program for quarterly monitoring of influent and periodic monitoring of sludge for mercury; and
- c. implementation of reasonable cost-effective control measures when sources of mercury are discovered. Factors to be considered include significance of sources, economic considerations, and technical and treatability considerations.

On or before March 31 of each year, the permittee shall submit a status report for the previous calendar year to the Department that includes 1) the monitoring results for the previous year, 2) an updated list of potential mercury sources, and 3) a summary of all actions taken to reduce or eliminate identified sources of mercury.

Any information generated as a result of the Pollutant Minimization Program set forth in this permit may be used to support a request to modify the approved program or to demonstrate that the Pollutant Minimization Program requirement has been completed satisfactorily.

A request for modification of the approved program and supporting documentation shall be submitted in writing to the Department for review and approval. The Department may approve modifications to the approved program (approval of a program modification does not require a permit modification), including a reduction in the frequency of the requirements under items a. & b. if the data indicate that the 12-month rolling average mercury concentration is less than 5 ng/l.

PART I**Section A. Limitations and Monitoring Requirements**

The permittee may choose to demonstrate that the program is complete and request removal of the program from the permit. Such request and supporting documentation demonstrating that the goal is being achieved shall be submitted in writing to the Department. If the Department determines that the request is approvable, this permit may be modified in accordance with applicable laws and rules to remove this requirement.

This permit may be modified in accordance with applicable laws and rules to include additional mercury conditions and/or limitations as necessary.

9. Storm Water Pollution Prevention Plan

The permittee is authorized to discharge storm water associated with industrial activities as defined in 40 CFR 122.26(b)(14). These storm water discharges shall be controlled in accordance with the requirements of this special condition. The permittee has developed and implemented a Storm Water Pollution Prevention Plan (plan). The permittee shall continue implementation of the plan for maximum control of significant materials (as defined in Part II.A.) so that storm water discharges will not cause a violation of the Water Quality Standards. The plan shall be routinely reviewed and updated in accordance with the requirements of this Special Condition.

a. Source Identification

To identify potential sources of significant materials that can enter storm water and subsequently be discharged from the facility, the plan shall, at a minimum, include the following:

1) A site map identifying the following: buildings and other permanent structures; storage or disposal areas for significant materials; secondary containment structures; storm water discharge outfalls (numbered for reference); location of storm water inlets contributing to each outfall; location of NPDES permitted discharges other than storm water; outlines of the drainage areas contributing to each outfall; structural runoff controls or storm water treatment facilities; areas of vegetation; areas of exposed and/or erodible soils; impervious surfaces (roofs, asphalt, concrete); name and location of receiving water(s); and areas of known or suspected impacts on surface waters as designated under Part 201 (Environmental Response) of the Michigan Act.

2) A list of all significant materials that could enter storm water. For each material listed, the plan shall include the following descriptions:

- a) ways in which each type of material has been or has reasonable potential to become exposed to storm water (e.g., spillage during handling; leaks from pipes, pumps, and vessels; contact with storage piles; waste handling and disposal; deposits from dust or overspray, etc.);
- b) identification of the outfall or outfalls through which the material may be discharged if released;
- c) a listing of spills and leaks of polluting materials in quantities reportable under the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code) that occurred at areas that are exposed to precipitation or that otherwise discharge to a point source at the facility. The listing shall include spills and leaks that occurred over the three (3) years prior to the completion of the plan or latest update of the plan; the date, volume and exact location of release; and the action taken to clean up the material and/or prevent exposure to storm water runoff or contamination of surface waters of the state. Any release that occurs after the plan has been developed shall be controlled in accordance with the plan and is cause for the plan to be updated as appropriate within 14 calendar days of obtaining knowledge of the spill or loss; and
- d) If there is a Total Maximum Daily Load (TMDL) established by the Department for the receiving waters, which restricts the discharge of any of the identified significant materials or constituents of those materials, then the SWPPP shall identify the level of control for those materials necessary to comply with the TMDL, and an estimate of the current annual load of those materials via storm water discharges to the receiving stream.

3) An evaluation of the reasonable potential for contribution of significant materials to runoff from at least the following areas or activities: loading, unloading, and other material handling operations; outdoor storage,

PART I**Section A. Limitations and Monitoring Requirements**

including secondary containment structures; outdoor processing activities; significant dust or particulate generating processes; discharge from vents, stacks and air emission controls; on-site waste disposal practices; maintenance and cleaning of vehicles, machines and equipment; sites of exposed and/or erodible soil; sites of environmental contamination listed under Part 201 (Environmental Response) of the Michigan Act; areas of significant material residue; and other areas where storm water may contact significant materials.

4) a summary of existing storm water discharge sampling data (if available) describing pollutants in storm water discharges associated with industrial activity at the facility. This summary shall be accompanied by a description of the suspected source(s) of the pollutants detected.

b. **Preventive Measures and Source Controls, Non-Structural**

To prevent significant materials from contacting storm water at the source, the plan shall, at a minimum, include the following non-structural controls:

1) Description of a program for routine preventive maintenance which includes requirements for inspection and maintenance of storm water management and control devices (e.g., cleaning of oil/water separators and catch basins) as well as inspecting and testing plant equipment and systems to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to surface waters. A log of the inspection and corrective actions shall be maintained on file by the permittee, and shall be retained in accordance with Record Keeping, below.

2) A schedule for comprehensive site inspection to include visual inspection of equipment, plant areas, and structural pollution prevention and treatment controls to be performed at least once every six (6) months. A report of the results of the comprehensive site inspection shall be prepared and retained in accordance with Record Keeping, below. The report shall identify any incidents of non-compliance with the plan. If there are no reportable incidents of non-compliance, the report shall contain a certification that the facility is in compliance with this plan.

3) A description of good housekeeping procedures to maintain a clean, orderly facility.

4) A description of material handling procedures and storage requirements for significant materials. Equipment and procedures for cleaning up spills shall be identified in the plan and made available to the appropriate personnel. The procedures shall identify measures to prevent the spilled materials or material residues on the outside of containers from being discharged into storm water. The plan may include, by reference, requirements of either a Pollution Incident Prevention Plan (PIPP) prepared in accordance with the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code); a Hazardous Waste Contingency Plan prepared in accordance with 40 CFR 264 and 265 Subpart D, as required by Part 111 of the Michigan Act; or a Spill Prevention Control and Countermeasure (SPCC) plan prepared in accordance with 40 CFR 112.

5) Identification of areas that, due to topography, activities, or other factors, have a high potential for significant soil erosion. The plan shall also identify measures used to control soil erosion and sedimentation.

6) A description of employee training programs which will be implemented to inform appropriate personnel at all levels of responsibility of the components and goals of the plan. The plan shall identify periodic dates for such training.

7) Identification of actions to limit the discharge of significant materials in order to comply with TMDL requirements.

8) Identification of significant materials expected to be present in storm water discharges following implementation of non-structural preventative measures and source controls.

PART I**Section A. Limitations and Monitoring Requirements**

- c. **Structural Controls for Prevention and Treatment**
Where implementation of the measures required by Preventive Measures and Source Controls, Non-Structural, above, does not control storm water discharges in accordance with Water Quality Standards, below, the plan shall provide a description of the location, function, and design criteria of structural controls for prevention and treatment. Structural controls may be necessary:
- 1) to prevent uncontaminated storm water from contacting or being contacted by significant materials, and/or
 - 2) if preventive measures are not feasible or are inadequate to keep significant materials at the site from contaminating storm water. Structural controls shall be used to treat, divert, isolate, recycle, reuse or otherwise manage storm water in a manner that reduces the level of significant materials in the storm water and provides compliance with Water Quality Standards, below.
- d. **Keeping Plans Current**
- 1) The permittee shall review the plan on or before June 1 of each year, and maintain written summaries of the reviews. Based on the review, the permittee shall amend the plan as needed to ensure continued compliance with the terms and conditions of this permit.
 - 2) The plan shall also be updated or amended whenever changes or spills at the facility increase or have the potential to increase the exposure of significant materials to storm water, or when the plan is determined by the permittee or the Department to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with industrial activity. Updates based on increased activity at the facility shall include a description of how the permittee intends to control any new sources of significant materials or respond to and prevent spills in accordance with the requirements of Source Identification; Preventive Measures and Source Controls, Non-Structural; and Structural Controls for Prevention and Treatment, above.
 - 3) The Department may notify the permittee at any time that the plan does not meet minimum requirements. Such notification shall identify why the plan does not meet minimum requirements. The permittee shall make the required changes to the plan within 30 days after such notification from the Department, and shall submit to the Department a written certification that the requested changes have been made.
- e. **Certified Storm Water Operator**
The permittee shall have a storm water operator certified by the Department, as required by Section 3110 of the Michigan Act. The certified storm water operator shall have supervision over the facility's storm water treatment and control measures included in the plan. If the certified storm water operator is changed or an additional certified storm water operator is added, the permittee shall provide the name and certification number of the new operator to the Department. The new operator shall review and sign the plan.
- f. **Signature and Plan Review**
- 1) The plan shall be signed by the certified storm water operator and by either the permittee or an authorized representative in accordance with 40 CFR 122.22. The plan shall be retained on site of the facility that generates the storm water discharge.
 - 2) The permittee shall make plans, reports, log books, runoff quality data, and supporting documents available upon request to the Department or authorized representative.
- g. **Record Keeping**
The permittee shall maintain records of all inspection and maintenance activities. Records shall also be kept describing incidents such as spills or other discharges that can affect the quality of storm water runoff. All such records shall be retained for three (3) years.
- h. **Water Quality Standards**
At the time of discharge, there shall be no violation of the Water Quality Standards in the receiving waters as a result of this discharge. This requirement includes, but is not limited to, the following conditions:

PART I**Section A. Limitations and Monitoring Requirements**

- 1) In accordance with Rule 323.1050 of the Water Quality Standards, the receiving waters shall not have any of the following unnatural physical properties in quantities which are or may become injurious to any designated use: unnatural turbidity, color, oil film, floating solids, foams, settleable solids, suspended solids, or deposits as a result of this discharge.
 - 2) Any unusual characteristics of the discharge (i.e., turbidity, color, oil film, floating solids, foams, settleable solids, suspended solids, or deposits) shall be reported within 24 hours to the Department followed with a written report within five (5) days detailing the findings of the investigation and the steps taken to correct the condition.
 - 3) Any pollutant for which a level of control is specified to meet a Total Maximum Daily Load (TMDL) established by the Department shall be controlled at the facility so that its discharge is reduced by the amount specified in the waste load allocation of the TMDL. Any reduction achieved through implementation of the non-structural controls or structural controls in accordance with Preventive Measures and Source Controls, Non-Structural; and Structural Controls for Prevention and Treatment, above, shall count toward compliance with the TMDL.
- i. **Prohibition of Non-storm Water Discharges**
Discharges of material other than storm water shall be in compliance with an NPDES permit issued for the discharge. Storm water shall be defined to include the following non-storm water discharges provided pollution prevention controls for the non-storm water component are identified in the plan: discharges from fire hydrant flushing, potable water sources including water line flushing, fire system test water, irrigation drainage, lawn watering, routine building wash down which does not use detergents or other compounds, pavement wash water where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material have been removed) and where detergents are not used, air conditioning condensate, springs, uncontaminated groundwater, and foundation or footing drains where flows are not contaminated with process materials such as solvents. Discharges from fire fighting activities are authorized by this permit, but do not have to be identified in the plan.

10. Untreated or Partially Treated Sewage Discharge Requirements

In accordance with Section 324.3112a of the Michigan Act, if untreated sewage, including sanitary sewer overflows (SSO) and combined sewer overflows (CSO), or partially treated sewage is directly or indirectly discharged from a sewer system onto land or into the waters of the state, the entity responsible for the sewer system shall immediately, but not more than 24 hours after the discharge begins, notify, by telephone, the Department, local health departments, a daily newspaper of general circulation in the county in which the permittee is located, and a daily newspaper of general circulation in the county or counties in which the municipalities whose waters may be affected by the discharge are located that the discharge is occurring.

At the conclusion of the discharge, written notification shall be submitted in accordance with and on the "CSO/SSO Reporting Form" available via the internet at: http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3715---00.html, or, alternatively for combined sewer overflow discharges, in accordance with notification procedures approved by the Department.

In addition, in accordance with Section 324.3112a of the Michigan Act, each time a discharge of untreated sewage or partially treated sewage occurs, the permittee shall test the affected waters for *Escherichia coli* to assess the risk to the public health as a result of the discharge and shall provide the test results to the affected local county health departments and to the Department. The testing shall be done at locations specified by each affected local county health department but shall not exceed 10 tests for each separate discharge event. The affected local county health department may waive this testing requirement, if it determines that such testing is not needed to assess the risk to the public health as a result of the discharge event. The results of this testing shall be submitted with the written notification required above, or, if the results are not yet available, submit them as soon as they become available. This testing is not required, if the testing has been waived by the local health department, or if the discharge(s) did not affect surface waters.

Permittees accepting sanitary or municipal sewage from other sewage collection systems are encouraged to notify the owners of those systems of the above reporting and testing requirements.

PART I**Section A. Limitations and Monitoring Requirements****11. Facility Contact**

The "Facility Contact" was specified in the application. The permittee may replace the facility contact at any time, and shall notify the Department in writing within 10 days after replacement (including the name, address and telephone number of the new facility contact).

- a. The facility contact shall be (or a duly authorized representative of this person):
 - for a corporation, a principal executive officer of at least the level of vice president, or a designated representative, if the representative is responsible for the overall operation of the facility from which the discharge described in the permit application or other NPDES form originates,
 - for a partnership, a general partner,
 - for a sole proprietorship, the proprietor, or
 - for a municipal, state, or other public facility, either a principal executive officer, the mayor, village president, city or village manager or other duly authorized employee.
- b. A person is a duly authorized representative only if:
 - the authorization is made in writing to the Department by a person described in paragraph a. of this section; and
 - the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the facility (a duly authorized representative may thus be either a named individual or any individual occupying a named position).

Nothing in this section obviates the permittee from properly submitting reports and forms as required by law.

PART I**Section B. Schedule of Compliance****1. Schedule for Final Effluent Limits**

Based on the permit application, and the basis of design for expansion of the Commerce Township Wastewater Treatment Plant to provide treatment for up to 8.5 MGD of municipal wastewater a day, the permittee shall achieve compliance with the final effluent limitations for Monitoring Point 002A specified in Part I.A.2, in accordance with the following schedule. All submittals shall be to the Department. The Basis of Design Report for the expanded Wastewater Treatment Plant was approved by the Department on August 1, 2006.

- a. On or before January 1, 2007, the permittee shall submit approvable final plans and specifications for the expanded wastewater treatment plant and in accordance with the approved basis of design report.
- b. On or before September 1, 2007, the permittee shall commence construction of the expanded wastewater treatment plant in accordance with the approved final plans and specifications and the issued Part 41 construction permit.
- c. On or before February 1, 2011, the permittee shall complete construction and place into operation the expanded wastewater treatment plant. Upon placing the expanded wastewater treatment plant in to operation, the permittee shall comply with the requirements of Part I A.2 of this permit.
- d. On or before August 1, 2011, the permittee shall submit a Project Performance Certification (PPC) Report. This PPC Report shall demonstrate whether the expanded wastewater treatment plant was constructed in accordance with 1) the criteria in the approved Basis of Design Report, and 2) the approved plans and specifications.
- e. The permittee shall submit reports to the Department when monthly average flow first reaches 80 percent (1.92 MGD), and 90 percent (2.16 MGD) of the current wastewater treatment plant capacity (2.4 MGD). These reports are due by the 15th of the month following the month when these flows are first reached. The reports shall indicate the expected date when the annual average wastewater treatment plant capacity of 2.4 MGD is expected to be exceeded. Based on these reports, the Department may reopen this permit and revise the compliance schedule in items b. through d. as necessary. In addition, such reports may also serve to support a request by the permittee to modify the above schedule.

2. Nondomestic User Survey

- a. On or before January 1 of each year, the permittee shall submit the results of a detailed user survey which identifies all Nondomestic Users of the waste collection system. This survey shall include:
 - 1) A list of all Nondomestic users that includes the following information:
 - a) The user's names and mailing address, including both the local facility address and the main office address, if different;
 - b) The principal enterprise(s) of the user; the product(s) produced, and raw material(s) processed; the facility's production rate(s); and the Standard Industrial Classification (SIC) Code(s);
 - c) The quantity of process wastewater discharged daily and whether the discharge is intermittent or continuous;
 - d) A description of any pretreatment provided prior to being discharged to the municipal collection system;
 - e) A description of the wastewater characteristics in terms of pollutant parameters and concentrations; and
 - f) A list of any chemicals used, stored, or generated at the facility, including those used for processing, cooling water, boiler water, or other purposes, with an indication of the quantity used and the disposition of spent chemicals, that could potentially cause interference with the operation of the wastewater treatment plant if released into the sanitary sewer system.

PART I

Section B. Schedule of Compliance

- 2) The survey shall identify those Nondomestic Users which meet the definition in Part II.A. as Significant Industrial Users.
 - 3) The survey shall identify those Nondomestic Users that are hospitals, clinics, nursing homes, schools and commercial operations that use large quantities of cleaners and disinfectants.
- b. The permittee shall conduct sampling of Nondomestic User discharges and the collection system on an annual basis in accordance with the plan approved by the Department. The results of this sampling shall be submitted annually with the Nondomestic User Survey

3. Sewer Use Ordinance

The permittee shall develop and implement legal authority in accordance with the following schedule:

- a. On or before January 1, 2008, the permittee shall submit written documentation that it has the legal authority to:
 - 1) Require all new nondomestic users to receive approval to discharge to the Commerce Township Wastewater Treatment Plant prior to making application for a sewer connection permit.
 - 2) Require hospitals, clinics, nursing homes, schools, and commercial operations that use large quantities of cleaners and disinfectants to implement Best Management Practices that include substitution of less toxic products where possible and proper storage, use, and disposal of toxic chemicals where product substitution is not an option because of public health and safety concerns.
- b. On or before March 1, 2008, the permittee shall submit written procedures to implement the legal authority described in 3.a. to the Department for review and approval.
- c. The permittee shall implement the legal authority and procedures upon approval.

4. Facility Education Program

On or before January 1, 2008, the permittee shall submit an approvable program plan to provide education to the facilities that use, store or generate chemicals identified in Part I.B.2.a.1)f) in order to reduce/eliminate the potential for interference with the operation of the wastewater treatment plant due to a release into the sanitary sewer system. Elements of the plan shall include the methods used to provide education, the frequency of contact with the facilities, consideration of requirements under Act 451, Part 5 rules for storage of regulated chemicals, a detailed procedure to notify the wastewater treatment plant should there be a release into the sanitary sewer system from these facilities, as well as any other pertinent information.

The permittee shall implement the facility education program upon plan approval.

5. Influent Monitoring Program

If during any annual Nondomestic User Survey, Part I.B.2. of this permit, any chemicals are identified that could potentially cause interference with the operation of the wastewater treatment plant if released into the sanitary sewer system (Part I.B.2.a.1)f), the permittee shall conduct an influent monitoring program in accordance with the following:

- a. On or before April 1 the permittee shall submit to the Department for review and approval a report that details the following:
 - 1) A summary of chemicals itemized for each Non-Domestic User as required Part I.B.2.a.1)f) of this permit.
 - 2) For each Non-Domestic User that uses, stores or generates chemicals identified in Part I.B.2.a.1)f):
 - a) Identify the enforceable pretreatment and/or pollution prevention method used to prevent each chemical specified above from entering the waste collection system at levels that exceed acceptable concentrations.

PART I**Section B. Schedule of Compliance**

- b) Include a plan to acquire, use and maintain (reasonably available) monitoring equipment which will detect specific chemicals of concern or representative parameters, that exceed acceptable concentrations. These devices may be placed at the Nondomestic Users identified above, and/or at the head works of the wastewater treatment plant. Such equipment must be placed to allow sufficient time for the permittee to implement a contingency plan to contain and/or minimize chemicals discharged at levels that exceed acceptable concentrations.
 - c) Include a contingency plan that describes the actions that the permittee will take in the event that monitoring devices detect specific chemicals that exceed acceptable levels. The contingency plan shall describe the actions the permittee will take to isolate the specific chemicals, and/or minimize deleterious effects that the specific chemicals could have on the proper operations of the wastewater treatment plant.
- b. Upon approval by the Department, either the permittee or the identified Nondomestic Users (in accordance with the enforceable local ordinances that were submitted under Part I.B.3. of this permit), shall implement the pretreatment and/or pollution prevention methods, monitoring for chemicals, and contingency plans.

PART I**Section C. Industrial Waste Pretreatment Program****1. Industrial Waste Pretreatment Program**

It is understood that the permittee does not receive the discharge of any type or quantity of substance which may cause interference with the operation of the treatment works; and, therefore, the permittee is not required to immediately develop an industrial pretreatment program in accordance with Section 307 of the Federal Act. The permittee is required to obtain approval from the Department prior to accepting any such discharge for treatment. The permittee is required to comply with Section 307 of the Federal Act upon accepting any such discharge for treatment. The permittee is required to notify the Department within thirty days if any user discharges or proposes to discharge such wastes to the permittee for treatment.

Under no circumstances shall the permittee allow introduction of the following wastes into the waste treatment system:

- a. pollutants which cause pass through or interference;
- b. pollutants which create a fire hazard or explosion hazard in the sewerage system, including, but not limited to wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21;
- c. pollutants which will cause corrosive structural damage to the sewerage system; but in no case, discharges with pH less than 5.0, unless the works is specifically designed to accommodate such discharges;
- d. solid or viscous pollutants in amounts which will cause obstruction to the flow in the sewerage system resulting in interference;
- e. any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the treatment plant;
- f. heat in amounts which will inhibit biological activity in the treatment plant resulting in interference; but in no case, heat in such quantities that the temperature at the treatment plant exceeds 40 degrees Centigrade (104 degrees Fahrenheit) unless the Department, upon request of the permittee, approves alternate temperature limits;
- g. pollutants which result in the presence of toxic gases, vapors or fumes within the sewerage system in a quantity that may cause acute worker health and safety problems; and
- h. any trucked or hauled pollutants, except at discharge points designated by the permittee.

2. Limited Federal Industrial Pretreatment Program

- a. If the Department determines that a limited Industrial Pretreatment Program is required, the permittee shall, upon written notification from the Department, develop and implement an Industrial Pretreatment Program that enables the permittee to detect and enforce against violations of federal, state, and local standards for the protection of the wastewater treatment works, its operation, worker health and safety, and the aquatic environment. This program is required under the authority of Section 307 (b) and (c) and Section 402(b)(8) of the Federal Act; Section 3111, 4102 and 4108 of the Michigan Act, and federal regulations 40 CFR 403, the General Pretreatment Regulations for existing and New Sources of Pollution.

Within 90 days of receiving written notification from the Department that an Industrial Pretreatment Program is required, the permittee shall submit for approval draft versions of sewer use ordinances, statutes, contracts, inter-jurisdictional agreements, and or joint powers agreements necessary to provide the permittee with adequate legal authorities described in 40 CFR 403.8(f)(1)(i through vii) throughout the area served by the permittee's facility. The legal authority shall enable the permittee to:

- 1) deny or condition new or increased contributions of pollutants or changes in the nature of pollutants to the waste collection system by Nondomestic Users;

PART I**Section C. Industrial Waste Pretreatment Program**

- 2) require compliance with applicable National Pretreatment Standards and other more restrictive requirements as may be imposed by the permittee, including the specific prohibitions of 40 CFR 403.5 (National Pretreatment Standards: Prohibited Discharges);
 - 3) control, through permit, the contribution to the waste collection system by all Significant Industrial Users;
 - 4) designate hospitals, clinics, nursing homes, schools and commercial operations that use large quantities of cleaners and disinfectants as Significant Industrial Users;
 - 5) require hospitals, clinics, nursing homes, schools and commercial operations that use large quantities of cleaners and disinfectants to implement Best Management Practices that include substitution of less toxic products where possible and proper storage, use and disposal of toxic chemicals where product substitution is not an option because of public health and safety concerns;
 - 6) require compliance schedules for the installation of treatment facilities needed by Nondomestic Users to meet applicable National Pretreatment Standards and other more restrictive requirements as may be imposed by the permittee;
 - 7) require the submission of notices and self-monitoring reports from Nondomestic Users to assess and ensure compliance with National Pretreatment Standards and other more restrictive requirements as may be imposed by the permittee;
 - 8) carry out all inspections, surveillance, and monitoring procedures to determine, independent of information supplied by Nondomestic Users, compliance or noncompliance with applicable National Pretreatment Standards and other more restrictive requirements as may be imposed by the permittee;
 - 9) seek injunctive relief and assess civil or criminal penalties for noncompliance with National Pretreatment Standards and other more restrictive requirements as may be imposed by the permittee;
 - 10) require Nondomestic Users to install containment facilities to protect the treatment works from accidental spills of any polluting materials;
 - 11) require Nondomestic Users to submit completed nondomestic user survey with sewer connection permit applications; and
 - 12) require installation of monitoring manholes.
- b. Within 180 days of the Department's approval of the sewer use ordinances, statutes, contracts, inter-jurisdictional agreements, and or joint powers agreements necessary to provide the permittee with adequate legal authorities described in 40 CFR 403.8(f)(1)(i through vii) throughout the area served by the permittee's facility the permittee shall submit for approval, and request to implement, a limited Industrial Pretreatment Program. A request for program approval shall include the following:
- 1) applicable statutes, ordinances, permits, and agreements which have been enacted or adopted by the permittee;
 - 2) a detailed description of the individual control mechanisms which will be used by the permittee to apply applicable Pretreatment Standards and requirements to the Nondomestic Users;
 - 3) a detailed description of the inspection monitoring and other program procedures as required by 40 CFR 403.8(f)(2)(i through vii);
 - 4) a procedure for updating the Nondomestic User list that includes:
 - i. review and approval of nondomestic user surveys by IPP inspector prior to issuance of sewer connection permits for all businesses;
 - ii. inspection of all Nondomestic users at least once every five years; and

PART I

Section C. Industrial Waste Pretreatment Program

- iii. notification from water department of significant changes in a Nondomestic User's water usage.
 - 5) an Enforcement Response Plan as required by 40 CFR 403.8(f)(5), which includes detailed procedures indicating how the permittee will investigate and respond to instances of Nondomestic User noncompliance;
 - 6) a description of the resources, equipment, and personnel necessary to implement the Industrial Pretreatment Program, including an indication of how the program will be fully funded; and
 - 7) a written technical evaluation of local discharge limits in accordance with 40 CFR 403.5(c).
- c. The permittee shall implement and enforce the Industrial Pretreatment Program within one month after approval.

PART II**Section A. Definitions**

This list of definitions may include terms not applicable to this permit.

Acute toxic unit (TU_A) means 100/LC₅₀ where the LC₅₀ is determined from a whole effluent toxicity (WET) test which produces a result that is statistically or graphically estimated to be lethal to 50% of the test organisms.

Bioaccumulative chemical of concern (BCC) means a chemical which, upon entering the surface waters, by itself or as its toxic transformation product, accumulates in aquatic organisms by a human health bioaccumulation factor of more than 1000 after considering metabolism and other physiochemical properties that might enhance or inhibit bioaccumulation. The human health bioaccumulation factor shall be derived according to R 323.1057(5). Chemicals with half-lives of less than 8 weeks in the water column, sediment, and biota are not BCCs. The minimum bioaccumulation concentration factor (BAF) information needed to define an organic chemical as a BCC is either a field-measured BAF or a BAF derived using the biota-sediment accumulation factor (BSAF) methodology. The minimum BAF information needed to define an inorganic chemical as a BCC, including an organometal, is either a field-measured BAF or a laboratory-measured bioconcentration factor (BCF). The BCCs to which these rules apply are identified in Table 5 of R 323.1057 of the Water Quality Standards.

Biosolids are the solid, semisolid, or liquid residues generated during the treatment of sanitary sewage or domestic sewage in a treatment works. This includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes and a derivative of the removed scum or solids.

Bulk biosolids means biosolids that are not sold or given away in a bag or other container for application to a lawn or home garden.

Chronic toxic unit (TU_C) means 100/MATC or 100/IC₂₅, where the maximum acceptable toxicant concentration (MATC) and IC₂₅ are expressed as a percent effluent in the test medium.

Class B Biosolids refers to material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with the Part 24 Rules. Processes include aerobic digestion, composting, anaerobic digestion, lime stabilization and air drying.

Daily concentration is the sum of the concentrations of the individual samples of a parameter divided by the number of samples taken during any calendar day. If the parameter concentration in any sample is less than the quantification limit, regard that value as zero when calculating the daily concentration. The daily concentration will be used to determine compliance with any maximum and minimum daily concentration limitations (except for pH and dissolved oxygen). When required by the permit, report the maximum calculated daily concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the Discharge Monitoring Reports (DMRs).

For pH, report the maximum value of any individual sample taken during the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs and the minimum value of any individual sample taken during the month in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs. For dissolved oxygen, report the minimum concentration of any individual sample in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Daily loading is the total discharge by weight of a parameter discharged during any calendar day. This value is calculated by multiplying the daily concentration by the total daily flow and by the appropriate conversion factor. The daily loading will be used to determine compliance with any maximum daily loading limitations. When required by the permit, report the maximum calculated daily loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMRs.

Department means the Michigan Department of Environmental Quality.

Detection Level means the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability.

EC₅₀ means a statistically or graphically estimated concentration that is expected to cause 1 or more specified effects in 50% of a group of organisms under specified conditions.

PART II

Section A. Definitions

Fecal coliform bacteria monthly is the geometric mean of the samples collected in a calendar month (or 30 consecutive days). The calculated monthly value will be used to determine compliance with the maximum monthly fecal coliform bacteria limitations. When required by the permit, report the calculated monthly value in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMRs.

Fecal coliform bacteria 7-day is the geometric mean of the samples collected in any 7-day period. The calculated 7-day value will be used to determine compliance with the maximum 7-day fecal coliform bacteria limitations. When required by the permit, report the maximum calculated 7-day concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Flow Proportioned sample is a composite sample with the sample volume proportional to the effluent flow.

Grab sample is a single sample taken at neither a set time nor flow.

IC₂₅ means the toxicant concentration that would cause a 25% reduction in a nonquantal biological measurement for the test population.

Interference is a discharge which, alone or in conjunction with a discharge or discharges from other sources, both: 1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and 2) therefore, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or, of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act. [This definition does not apply to sample matrix interference.]

Land Application means spraying or spreading biosolids or a biosolids derivative onto the land surface, injecting below the land surface, or incorporating into the soil so that the biosolids or biosolids derivative can either condition the soil or fertilize crops or vegetation grown in the soil.

LC₅₀ means a statistically or graphically estimated concentration that is expected to be lethal to 50% of a group of organisms under specified conditions.

Maximum acceptable toxicant concentration (MATC) means the concentration obtained by calculating the geometric mean of the lower and upper chronic limits from a chronic test. A lower chronic limit is the highest tested concentration that did not cause the occurrence of a specific adverse effect. An upper chronic limit is the lowest tested concentration which did cause the occurrence of a specific adverse effect and above which all tested concentrations caused such an occurrence.

MGD means million gallons per day.

Monthly frequency of analysis refers to a calendar month. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Monthly concentration is the sum of the daily concentrations determined during a reporting month (or 30 consecutive days) divided by the number of daily concentrations determined. The calculated monthly concentration will be used to determine compliance with any maximum monthly concentration limitations. When required by the permit, report the calculated monthly concentration in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMRs.

For minimum percent removal requirements, the monthly influent concentration and the monthly effluent concentration shall be determined. The calculated monthly percent removal, which is equal to 100 times the quantity [1 minus the quantity (monthly effluent concentration divided by the monthly influent concentration)], shall be reported in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

PART II

Section A. Definitions

Monthly loading is the sum of the daily loadings of a parameter divided by the number of daily loadings determined in the reporting month (or 30 consecutive days). The calculated monthly loading will be used to determine compliance with any maximum monthly loading limitations. When required by the permit, report the calculated monthly loading in the "AVERAGE" column under "QUANTITY OR LOADING" on the DMRs.

National Pretreatment Standards are the regulations promulgated by or to be promulgated by the Federal Environmental Protection Agency pursuant to Section 307(b) and (c) of the Federal Act. The standards establish nationwide limits for specific industrial categories for discharge to a POTW.

No observed adverse effect level (NOAEL) means the highest tested dose or concentration of a substance which results in no observed adverse effect in exposed test organisms where higher doses or concentrations result in an adverse effect.

Noncontact Cooling Water is water used for cooling which does not come into direct contact with any raw material, intermediate product, by-product, waste product or finished product.

Nondomestic user is any discharger to a POTW that discharges wastes other than or in addition to water-carried wastes from toilet, kitchen, laundry, bathing or other facilities used for household purposes.

Partially treated sewage is any sewage, sewage and storm water, or sewage and wastewater, from domestic or industrial sources that is treated to a level less than that required by the permittee's National Pollutant Discharge Elimination System permit, or that is not treated to national secondary treatment standards for wastewater, including discharges to surface waters from retention treatment facilities.

Pretreatment is reducing the amount of pollutants, eliminating pollutants, or altering the nature of pollutant properties to a less harmful state prior to discharge into a public sewer. The reduction or alteration can be by physical, chemical, or biological processes, process changes, or by other means. Dilution is not considered pretreatment unless expressly authorized by an applicable National Pretreatment Standard for a particular industrial category.

POTW is a publicly owned treatment works.

Quantification level means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

Quarterly frequency of analysis refers to a three month period, defined as January through March, April through June, July through September, and October through December. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Regional Administrator is the Region 5 Administrator, U.S. EPA, located at R-19J, 77 W. Jackson Blvd., Chicago, Illinois 60604.

Significant industrial user is a nondomestic user that: 1) is subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; or 2) discharges an average of 25,000 gallons per day or more of process wastewater to a POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up five (5) percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the permittee as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's treatment plant operation or violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

PART II

Section A. Definitions

Significant Materials Significant Materials means any material which could degrade or impair water quality, including but not limited to: raw materials; fuels; solvents, detergents, and plastic pellets; finished materials such as metallic products; hazardous substances designated under Section 101(14) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (see 40 CFR 372.65); any chemical the facility is required to report pursuant to Section 313 of Emergency Planning and Community Right-to-Know Act (EPCRA); polluting materials as identified under the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code); Hazardous Wastes as defined in Part 111 of the Michigan Act; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

Tier I value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier I toxicity database.

Tier II value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier II toxicity database.

Toxicity Reduction Evaluation (TRE) means a site-specific study conducted in a stepwise process designed to identify the causative agents of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

Water Quality Standards means the Part 4 Water Quality Standards promulgated pursuant to Part 31 of Act No. 451 of the Public Acts of 1994, as amended, being Rules 323.1041 through 323.1117 of the Michigan Administrative Code.

Weekly frequency of analysis refers to a calendar week which begins on Sunday and ends on Saturday. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Yearly frequency of analysis refers to a calendar year beginning on January 1 and ending on December 31. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

24-Hour Composite sample is a flow proportioned composite sample consisting of hourly or more frequent portions that are taken over a 24-hour period.

3-Portion Composite sample is a sample consisting of three equal volume grab samples collected at equal intervals over an 8-hour period.

7-day concentration is the sum of the daily concentrations determined during any 7 consecutive days in a reporting month divided by the number of daily concentrations determined. The calculated 7-day concentration will be used to determine compliance with any maximum 7-day concentration limitations. When required by the permit, report the maximum calculated 7-day concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

7-day loading is the sum of the daily loadings of a parameter divided by the number of daily loadings determined during any 7 consecutive days in a reporting month. The calculated 7-day loading will be used to determine compliance with any maximum 7-day loading limitations. When required by the permit, report the maximum calculated 7-day loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMRs.

PART II**Section B. Monitoring Procedures****1. Representative Samples**

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to Section 304(h) of the Federal Act (40 CFR Part 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants), unless specified otherwise in this permit. Requests to use test procedures not promulgated under 40 CFR Part 136 for pollutant monitoring required by this permit shall be made in accordance with the Alternate Test Procedures regulations specified in 40 CFR 136.4. These requests shall be submitted to the Chief of the Permits Section, Water Bureau, Michigan Department of Environmental Quality, P.O. Box 30273, Lansing, Michigan, 48909-7773. The permittee may use such procedures upon approval.

The permittee shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Control/Quality Assurance program.

3. Instrumentation

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

4. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information: 1) the exact place, date, and time of measurement or sampling; 2) the person(s) who performed the measurement or sample collection; 3) the dates the analyses were performed; 4) the person(s) who performed the analyses; 5) the analytical techniques or methods used; 6) the date of and person responsible for equipment calibration; and 7) the results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the Department.

PART II**Section C. Reporting Requirements****1. Start-up Notification**

If the permittee will not discharge during the first 60 days following the effective date of this permit, the permittee shall notify the Department within 14 days following the effective date of this permit, and then 60 days prior to the commencement of the discharge.

2. Submittal Requirements for Self-Monitoring Data

Unless instructed on the effluent limits page to conduct "retained self-monitoring," the permittee shall submit self-monitoring data on the Environmental Protection Agency's Discharge Monitoring Report (DMR) forms (monthly summary information) and the Department's Daily Discharge Monitoring Report forms (daily information) to PCS-Data Entry, Water Bureau, Michigan Department of Environmental Quality, P.O. Box 30273, Lansing, Michigan, 48909-7773, for each calendar month of the authorized discharge period(s). The forms shall be postmarked no later than the 10th day of the month following each month of the authorized discharge period(s). Electronic Environmental Discharge Monitoring Reporting (e2-DMR) System participants shall submit self-monitoring data for each month of the authorized discharge period(s). The electronic forms shall be submitted to the department no later than the 20th day of the month following each month of the authorized discharge period(s).

Alternative Daily Discharge Monitoring Report formats may be used if they provide equivalent reporting details and are approved by the Department. For information on the electronic submittal of this information, contact the Department or visit the *e²-Reporting* website @ <https://secure1.state.mi.us/e2rs/> - click on "about e-DMR" to download the Facility Participation Package.

3. Retained Self-Monitoring Requirements

If instructed on the effluent limits page to conduct retained self-monitoring, the permittee shall maintain a year-to-date log of retained self-monitoring results and, upon request, provide such log for inspection to the staff of the Water Bureau, Michigan Department of Environmental Quality (in the case of hospitals, nursing homes and extended care facilities, to the staff of the Division of Health Facilities and Services, Michigan Department of Consumer and Industry Services). Retained self-monitoring results are public information and shall be promptly provided to the public upon request.

The permittee shall certify, in writing, to the Department, on or before January 10th of each year, that: 1) all retained self-monitoring requirements have been complied with and a year-to-date log has been maintained; and 2) the application on which this permit is based still accurately describes the discharge.

4. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report. Such increased frequency shall also be indicated.

Monitoring required pursuant to Part 41 of the Michigan Act or Rule 35 of the Mobile Home Park Commission Act (Act 96 of the Public Acts of 1987) for assurance of proper facility operation shall be submitted as required by the Department.

5. Compliance Dates Notification

Within 14 days of every compliance date specified in this permit, the permittee shall submit a written notification to the Department indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the permittee to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the permittee accomplishes this, a separate written notification is not required.

PART II**Section C. Reporting Requirements****6. Noncompliance Notification**

Compliance with all applicable requirements set forth in the Federal Act, Parts 31 and 41 of the Michigan Act, and related regulations and rules is required. All instances of noncompliance shall be reported as follows:

- a. 24-hour reporting - Any noncompliance which may endanger health or the environment (including maximum daily concentration discharge limitation exceedances) shall be reported, verbally, within 24 hours from the time the permittee becomes aware of the noncompliance. A written submission shall also be provided within five (5) days.
- b. other reporting - The permittee shall report, in writing, all other instances of noncompliance not described in a. above at the time monitoring reports are submitted, or, in the case of retained self-monitoring, within five (5) days from the time the permittee becomes aware of the noncompliance.

Written reporting shall include: 1) a description of the discharge and cause of noncompliance; and 2) the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and the steps taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

7. Spill Notification

The permittee shall immediately report any release of any polluting material which occurs to the surface waters or groundwaters of the state, unless the permittee has determined that the release is not in excess of the threshold reporting quantities specified in the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code), by calling the Department at the number indicated on the first page of this permit, or if the notice is provided after regular working hours call the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706 (calls from out-of-state dial 1-517-373-7660).

Within ten (10) days of the release, the permittee shall submit to the Department a full written explanation as to the cause of the release, the discovery of the release, response (clean-up and/or recovery) measures taken, and preventative measures taken or a schedule for completion of measures to be taken to prevent recurrence of similar releases.

8. Upset Noncompliance Notification

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee) has occurred, the permittee who wishes to establish the affirmative defense of upset, shall notify the Department by telephone within 24-hours of becoming aware of such conditions; and within five (5) days, provide in writing, the following information:

- a. that an upset occurred and that the permittee can identify the specific cause(s) of the upset;
- b. that the permitted wastewater treatment facility was, at the time, being properly operated; and
- c. that the permittee has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with this permit.

In any enforcement proceedings, the permittee, seeking to establish the occurrence of an upset, has the burden of proof.

PART II**Section C. Reporting Requirements****9. Bypass Prohibition and Notification**

- a. Bypass Prohibition - Bypass is prohibited unless:
- 1) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
 - 2) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass; and
 - 3) the permittee submitted notices as required under 0.b. or 0.c. below.
- b. Notice of Anticipated Bypass - If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least ten (10) days before the date of the bypass, and provide information about the anticipated bypass as required by the Department. The Department may approve an anticipated bypass, after considering its adverse effects, if it will meet the three (3) conditions listed in 0.a. above.
- c. Notice of Unanticipated Bypass - The permittee shall submit notice to the Department of an unanticipated bypass by calling the Department at the number indicated on the first page of this permit (if the notice is provided after regular working hours, use the following number: 1-800-292-4706) as soon as possible, but no later than 24 hours from the time the permittee becomes aware of the circumstances.
- d. Written Report of Bypass - A written submission shall be provided within five (5) working days of commencing any bypass to the Department, and at additional times as directed by the Department. The written submission shall contain a description of the bypass and its cause; the period of bypass, including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass; and other information as required by the Department.
- e. Bypass Not Exceeding Limitations - The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of 0.a., 0.b., 0.c., and 0.d., above. This provision does not relieve the permittee of any notification responsibilities under Part II.C.10. of this permit.
- f. Definitions
- 1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.
 - 2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

10. Notification of Changes in Discharge

The permittee shall notify the Department, in writing, within 10 days of knowing, or having reason to believe, that any activity or change has occurred or will occur which would result in the discharge of: 1) detectable levels of chemicals on the current Michigan Critical Materials Register, priority pollutants or hazardous substances set forth in 40 CFR 122.21, Appendix D, or the Pollutants of Initial Focus in the Great Lakes Water Quality Initiative specified in 40 CFR 132.6, Table 6, which were not acknowledged in the application or listed in the application at less than detectable levels; 2) detectable levels of any other chemical not listed in the application or listed at less than detection, for which the application specifically requested information; or 3) any chemical at levels greater than five times the average level reported in the complete application (see the first page of this permit for the date(s) the complete application was submitted). Any other monitoring results obtained as a requirement of this permit shall be reported in accordance with the compliance schedules.

PART II**Section C. Reporting Requirements****11. Changes in Facility Operations**

Any anticipated action or activity, including but not limited to facility expansion, production increases, or process modification, which will result in new or increased loadings of pollutants to the receiving waters must be reported to the Department by a) submission of an increased use request (application) and all information required under Rule 323.1098 (Antidegradation) of the Water Quality Standards or b) by notice if the following conditions are met: 1) the action or activity will not result in a change in the types of wastewater discharged or result in a greater quantity of wastewater than currently authorized by this permit; 2) the action or activity will not result in violations of the effluent limitations specified in this permit; 3) the action or activity is not prohibited by the requirements of Part II.C.12.; and 4) the action or activity will not require notification pursuant to Part II.C.10. Following such notice, the permit may be modified according to applicable laws and rules to specify and limit any pollutant not previously limited.

12. Bioaccumulative Chemicals of Concern (BCC)

Consistent with the requirements of Rules 323.1098 and 323.1215 of the Michigan Administrative Code, the permittee is prohibited from undertaking any action that would result in a lowering of water quality from an increased loading of a BCC unless an increased use request and antidegradation demonstration have been submitted and approved by the Department.

13. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the permittee shall submit to the Department 30 days prior to the actual transfer of ownership or control a written agreement between the current permittee and the new permittee containing: 1) the legal name and address of the new owner; 2) a specific date for the effective transfer of permit responsibility, coverage and liability; and 3) a certification of the continuity of or any changes in operations, wastewater discharge, or wastewater treatment.

If the new permittee is proposing changes in operations, wastewater discharge, or wastewater treatment, the Department may propose modification of this permit in accordance with applicable laws and rules.

PART II**Section D. Management Responsibilities****1. Duty to Comply**

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit.

It is the duty of the permittee to comply with all the terms and conditions of this permit. Any noncompliance with the Effluent Limitations, Special Conditions, or terms of this permit constitutes a violation of the Michigan Act and/or the Federal Act and constitutes grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of an application for permit renewal.

2. Operator Certification

The permittee shall have the waste treatment facilities under direct supervision of an operator certified at the appropriate level for the facility certification by the Department, as required by Sections 3110 and 4104 of the Michigan Act. Permittees authorized to discharge storm water shall have the storm water treatment and/or control measures under direct supervision of a storm water operator certified by the Department, as required by Section 3110 of the Michigan Act.

3. Facilities Operation

The permittee shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

4. Power Failures

In order to maintain compliance with the effluent limitations of this permit and prevent unauthorized discharges, the permittee shall either:

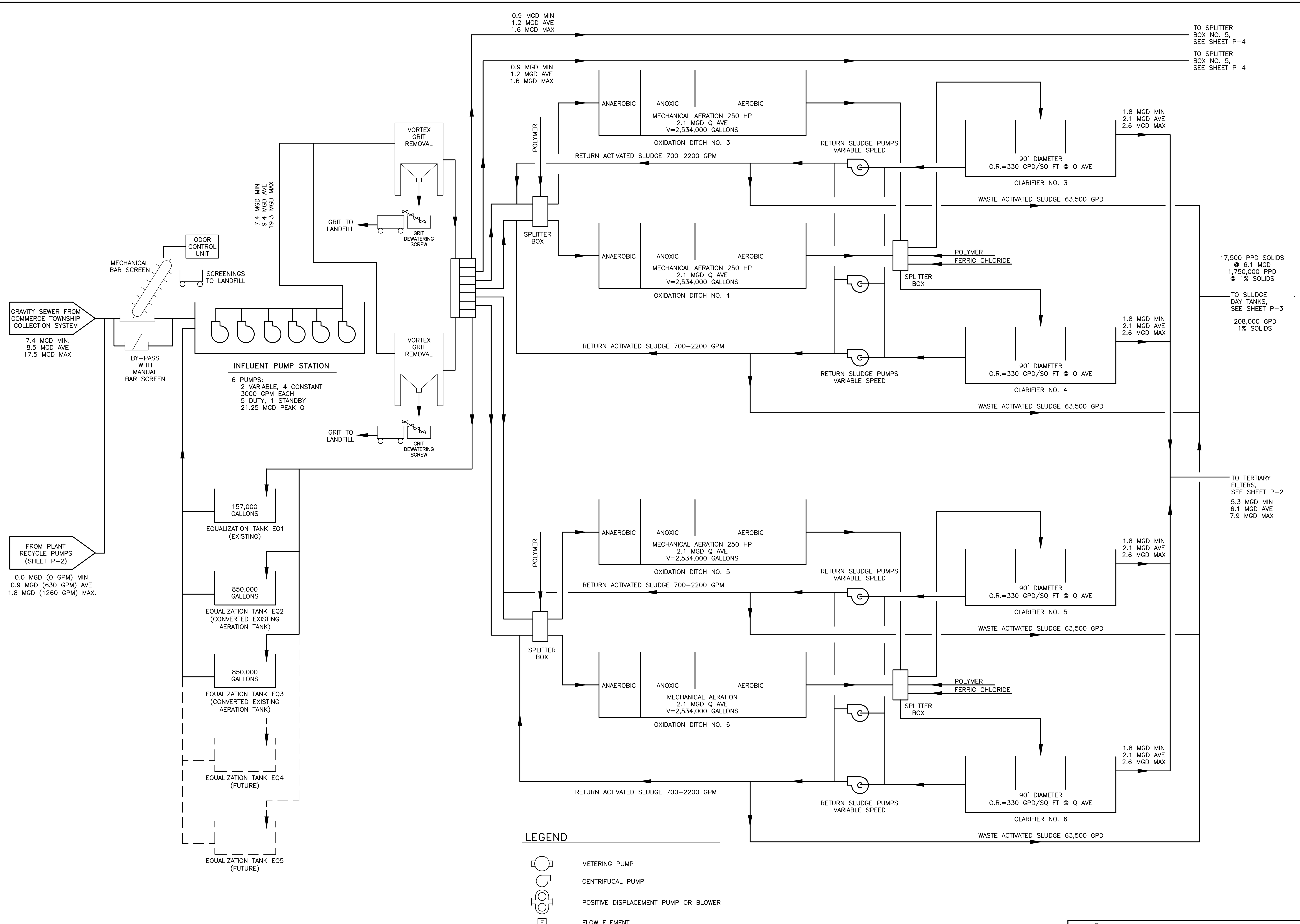
- a. provide an alternative power source sufficient to operate facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit; or
- b. upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the surface waters or ground waters of the state resulting from noncompliance with any effluent limitation specified in this permit including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the discharge in noncompliance.

6. Containment Facilities

The permittee shall provide facilities for containment of any accidental losses of polluting materials in accordance with the requirements of the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code). For a Publicly Owned Treatment Work (POTW), these facilities shall be approved under Part 41 of the Michigan Act.



GRAVITY SEWER FROM COMMERCE TOWNSHIP COLLECTION SYSTEM
7.4 MGD MIN, 8.5 MGD AVE, 17.5 MGD MAX

FROM PLANT RECYCLE PUMPS (SHEET P-2)
0.0 MGD (0 GPM) MIN, 0.9 MGD (630 GPM) AVE, 1.8 MGD (1260 GPM) MAX.

INFLUENT PUMP STATION
6 PUMPS:
2 VARIABLE, 4 CONSTANT
3000 GPM EACH
5 DUTY, 1 STANDBY
21.25 MGD PEAK Q

EQUALIZATION TANK EQ1 (EXISTING)
157,000 GALLONS

EQUALIZATION TANK EQ2 (CONVERTED EXISTING AERATION TANK)
850,000 GALLONS

EQUALIZATION TANK EQ3 (CONVERTED EXISTING AERATION TANK)
850,000 GALLONS

EQUALIZATION TANK EQ4 (FUTURE)

EQUALIZATION TANK EQ5 (FUTURE)

0.9 MGD MIN
1.2 MGD AVE
1.6 MGD MAX

0.9 MGD MIN
1.2 MGD AVE
1.6 MGD MAX

1.8 MGD MIN
2.1 MGD AVE
2.6 MGD MAX

1.8 MGD MIN
2.1 MGD AVE
2.6 MGD MAX

1.8 MGD MIN
2.1 MGD AVE
2.6 MGD MAX

1.8 MGD MIN
2.1 MGD AVE
2.6 MGD MAX

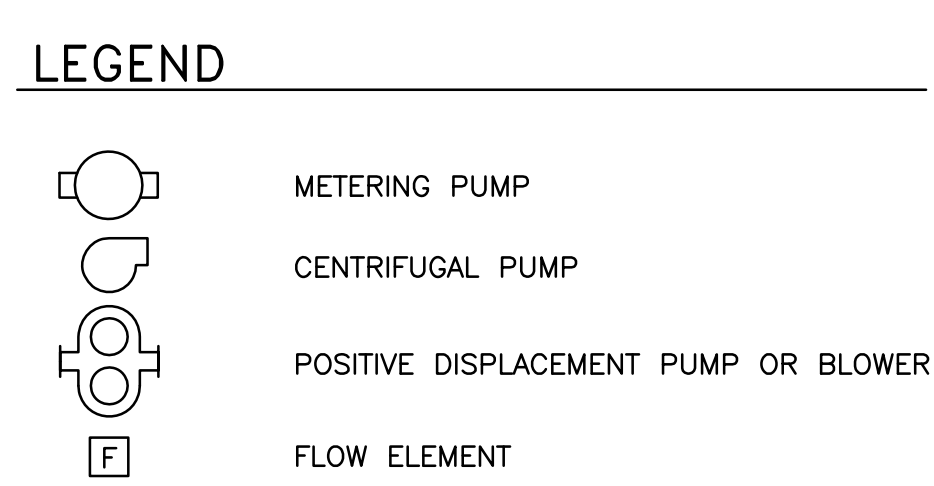
TO SPLITTER BOX NO. 5, SEE SHEET P-4

TO SPLITTER BOX NO. 5, SEE SHEET P-4

17,500 PPD SOLIDS @ 6.1 MGD
1,750,000 PPD @ 1% SOLIDS

TO SLUDGE DAY TANKS, SEE SHEET P-3
208,000 GPD
1% SOLIDS

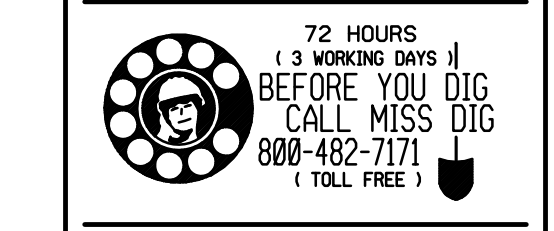
TO TERTIARY FILTERS, SEE SHEET P-2
5.3 MGD MIN
6.1 MGD AVE
7.9 MGD MAX



FOR PREVIOUS REVISIONS USE SEE CONSTRUCTION MGR. CAP. ENDS

DATE	FOR CONSTRUCTION
01/20/08	

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DESIGN: XXX
DRAWN: XXX
IND. REVIEW: XXX
SECTION: 35 T- 2-N-R- 8-E

PROFESSIONAL SEAL

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2840 FISHER AVENUE
COMMERCE TWP., OAKLAND COUNTY, MI (248) 960-7050

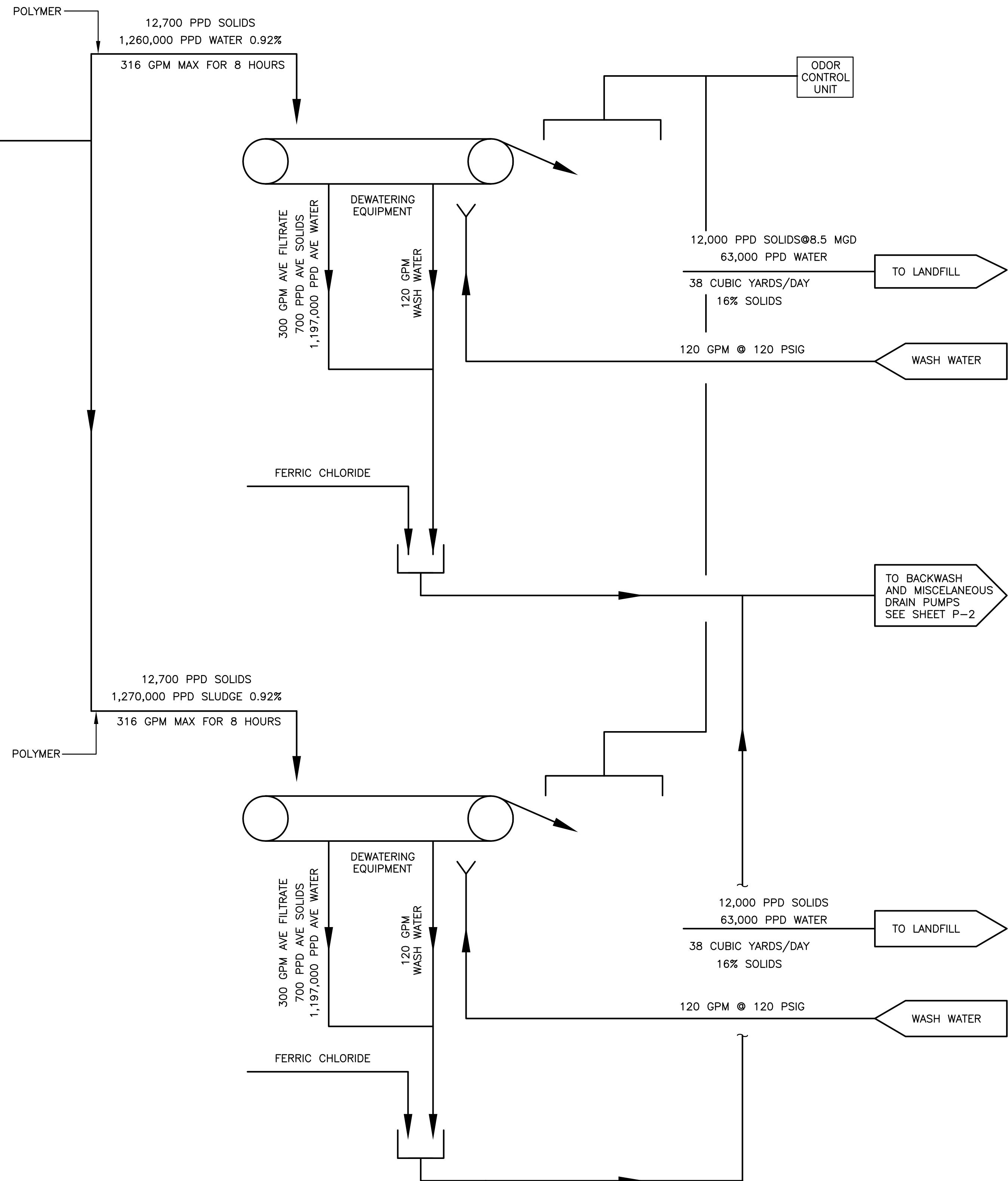
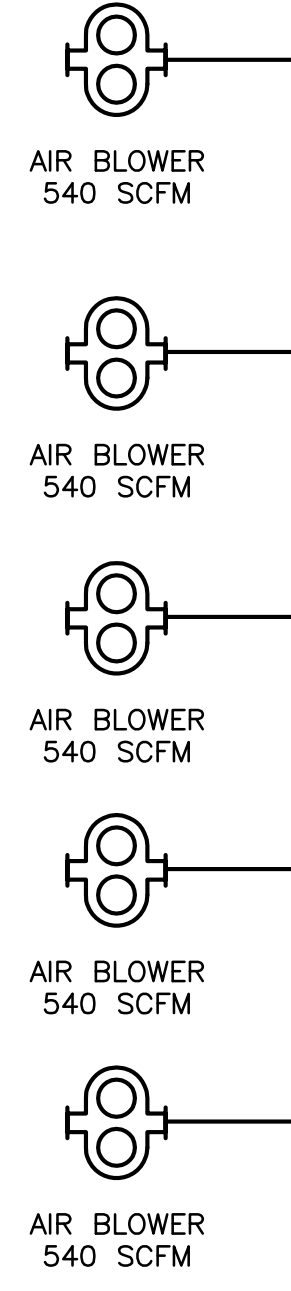
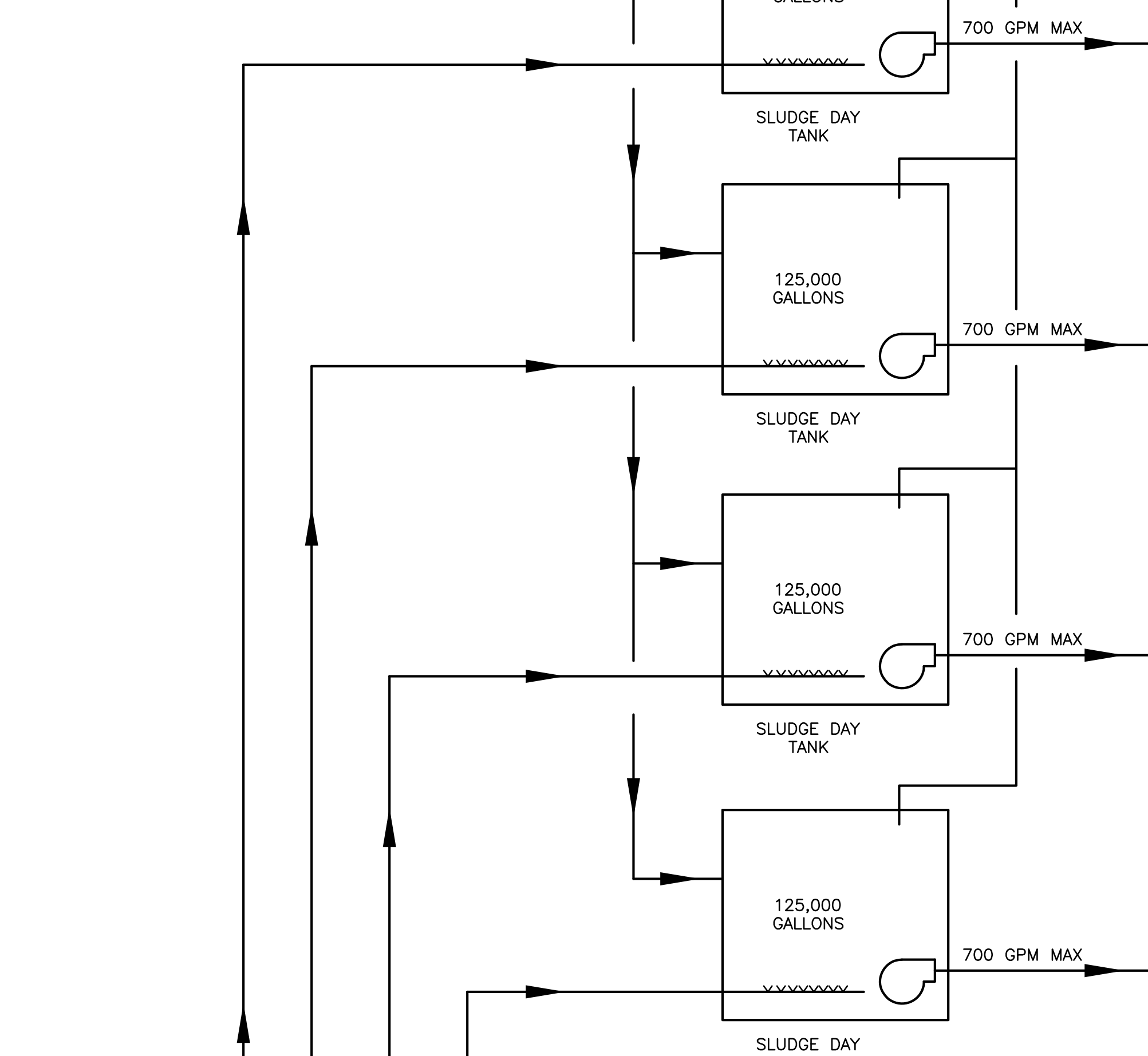
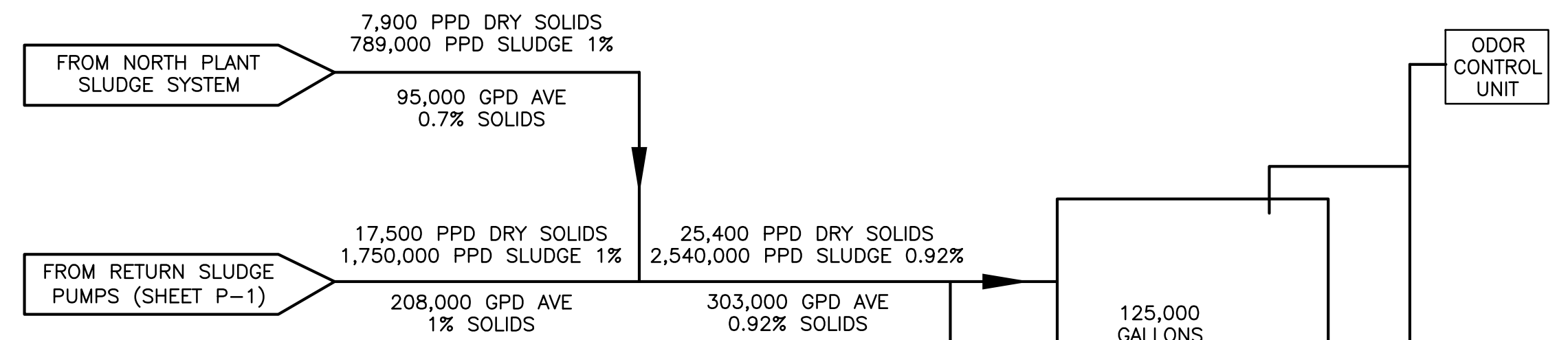
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PLANNERS-LANDSCAPE ARCHITECTS
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ROCHESTER HILLS, MI 48309
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EMAIL info@giffelswebster.com
www.giffelswebster.com

SHEET TITLE:
Process Flow Diagram
COMMERCE TOWNSHIP W.W.T.P. EXPANSION
COMMERCE TOWNSHIP, OAKLAND COUNTY, MI

DATE: 03/23/06
SCALE: NONE
SHEET: P-1
JOB: 16933.00

J.A. LOMBARDO & ASSOCIATES, INC.
CONSULTING ENGINEERS
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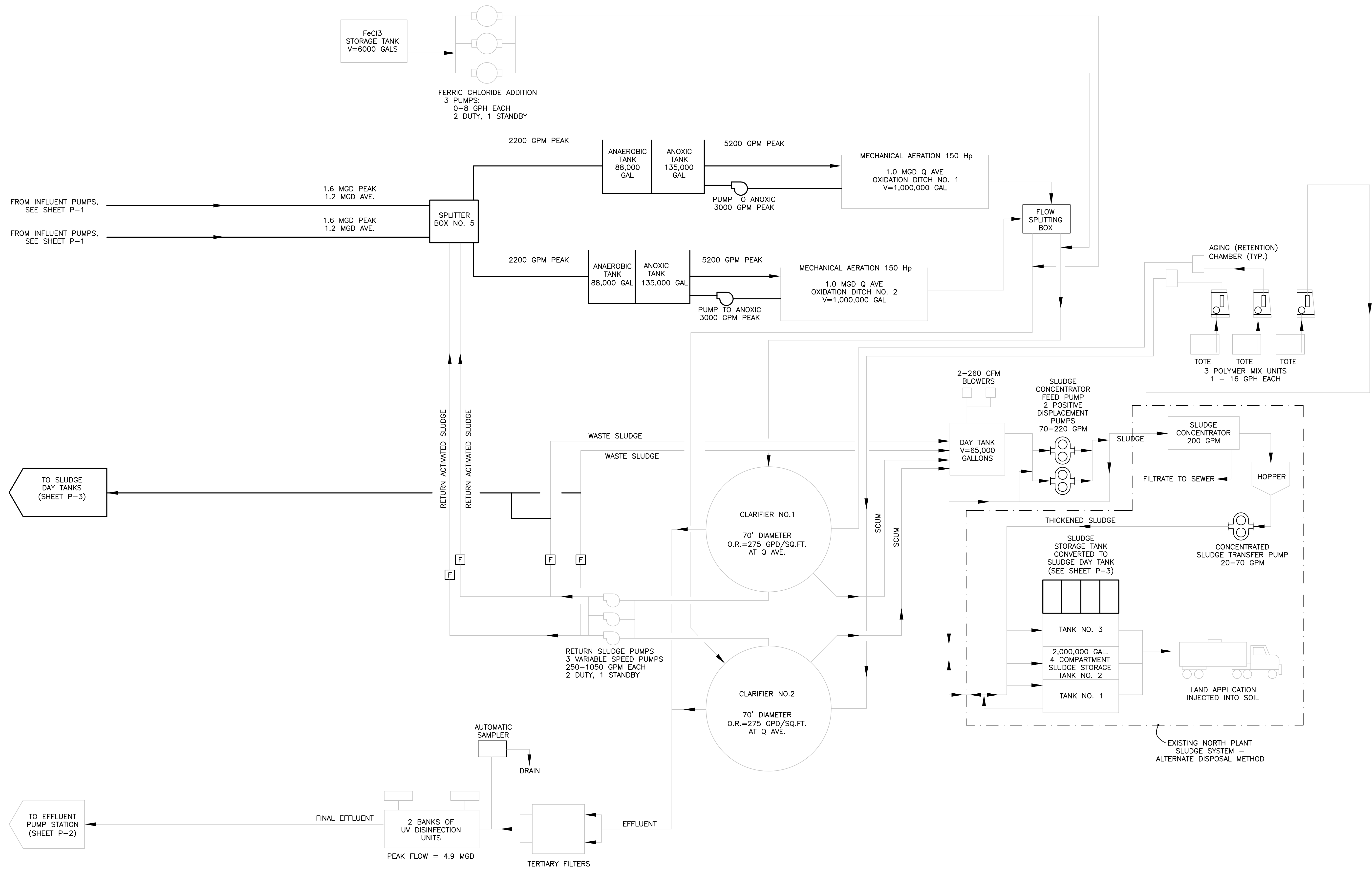
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SHEET TITLE:
Process Flow Diagram
 COMMERCE TOWNSHIP
 W. W. T. P.
 EXPANSION
 COMMERCE TOWNSHIP,
 OAKLAND COUNTY, MI

DATE: 03/23/06
 SCALE: NONE
 SHEET: P-3
 JOB: 16933.00

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NORTH PLANT

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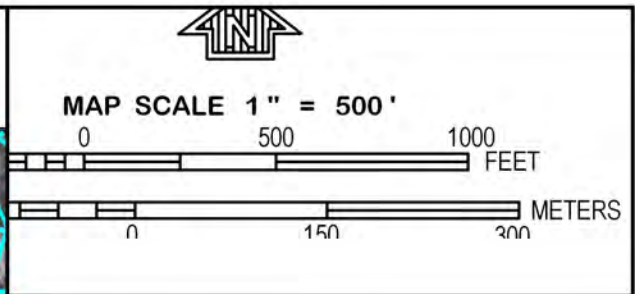
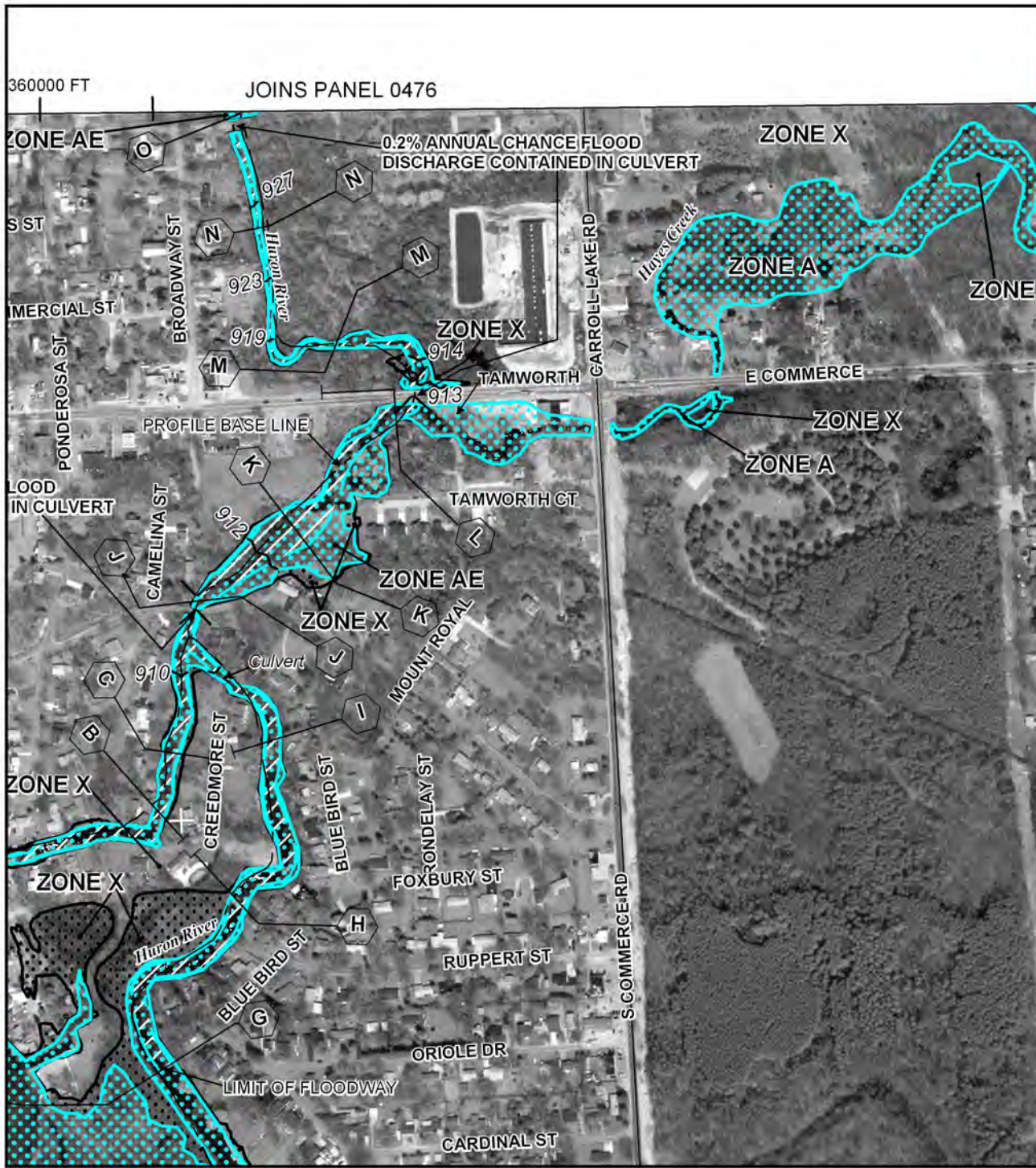
SHEET TITLE:
Process Flow Diagram
 COMMERCE TOWNSHIP
 W.W.T.P.
 EXPANSION
 COMMERCE TOWNSHIP,
 OAKLAND COUNTY, MI

DATE:	03/23/06
SCALE:	NONE
SHEET:	P-4
JOB:	16933.00

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APPENDIX C –
COMMERCE FEMA FLOOD PLAIN MAPS



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0478F

FIRM
FLOOD INSURANCE RATE MAP

OAKLAND COUNTY,
MICHIGAN
(ALL JURISDICTIONS)

PANEL 478 OF 704
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COMMERCE, TOWNSHIP OF	260473	0478	F
WOLVERINE LAKE, VILLAGE OF	260480	0478	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
26125C0478F

EFFECTIVE DATE
SEPTEMBER 29, 2006

Federal Emergency Management Agency

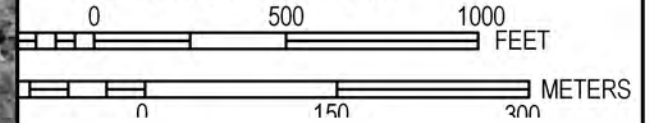
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NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 NORTH, RANGE 8 EAST.



MAP SCALE 1" = 500'



NFIIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0478F

FIRM
FLOOD INSURANCE RATE MAP

**OAKLAND COUNTY,
MICHIGAN**
(ALL JURISDICTIONS)

PANEL 478 OF 704
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COMMERCE, TOWNSHIP OF	260473	0478	F
WOLVERINE LAKE, VILLAGE OF	260480	0478	F

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MAP NUMBER
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EFFECTIVE DATE
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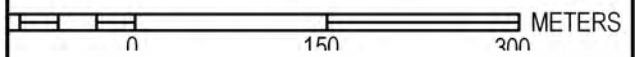
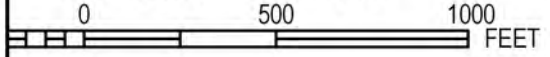


JOINS PANEL 0479

4716⁰⁰⁰ M^N



MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0478F

FIRM
FLOOD INSURANCE RATE MAP

**OAKLAND COUNTY,
MICHIGAN**
(ALL JURISDICTIONS)

PANEL 478 OF 704
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COMMERCE, TOWNSHIP OF	260473	0478	F
WOLVERINE LAKE, VILLAGE OF	260480	0478	F

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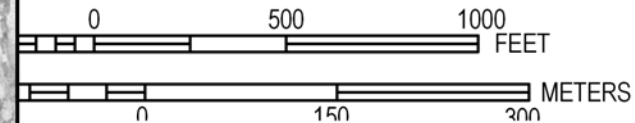
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MAP SCALE 1" = 500'



NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0487F

FIRM
FLOOD INSURANCE RATE MAP

**OAKLAND COUNTY,
 MICHIGAN**
 (ALL JURISDICTIONS)

PANEL 487 OF 704
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COMMERCE, TOWNSHIP OF	260473	0487	F
WALLED LAKE, CITY OF	260181	0487	F
WEST BLOOMFIELD, TOWNSHIP OF	260182	0487	F

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MAP NUMBER
26125C0487F

EFFECTIVE DATE
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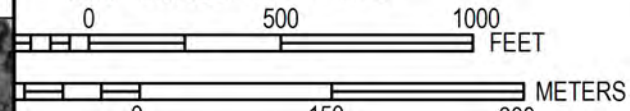
Federal Emergency Management Agency

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JOINS PANEL 0487



MAP SCALE 1" = 500'



NFIIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0489F

FIRM
FLOOD INSURANCE RATE MAP

**OAKLAND COUNTY,
MICHIGAN**
(ALL JURISDICTIONS)

PANEL 489 OF 704
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COMMERCE, TOWNSHIP OF	260473	0489	F
FARMINGTON HILLS, CITY OF	260172	0489	F
NOVI, CITY OF	260175	0489	F
WALLED LAKE, CITY OF	260181	0489	F
WEST BLOOMFIELD, TOWNSHIP OF	260182	0489	F

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APPENDIX D –
WETLAND PERMIT FOR
NEWTON ROAD FORCE MAIN

15822

Newton Sewer

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY PERMIT

ISSUED TO:

Commerce Charter Township
Attn: Thomas K Zoner
2840 Fisher
Commerce, MI 48390

Permit No.	08-63-0039-P
Issued	July 8, 2008
Extended	
Revised	
Expires	July 8, 2013

This permit is being issued by the Michigan Department of Environmental Quality (MDEQ) under the provisions of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) and specifically:

- Part 301 Inland Lakes and Streams
- Part 315 Dam Safety
- Part 325 Great Lakes Submerged Lands
- Part 323 Shorelands Protection and Management
- Part 303 Wetlands Protection
- Part 353 Sand Dune Protection and Management
- Part 31 Floodplain/Water Resources Protection

Permission is hereby granted, based on permittee assurance of adherence to State requirements and permit conditions to:

Permitted Activity:

Install a 24 inch sanitary line through approximately 450 linear feet of wetland using the open trench method.

Wetland shall be completely restored following installation of the sanitary line.

All work shall be in accordance with DEQ approved plans and the conditions of this permit.

Water Course Affected: wetlands

Property Location: Oakland County, Commerce Township, Section 14
Subdivision, Lot Town/Range 2N, 8E Property Tax No. 17-14-326-001+

Authority granted by this permit is subject to the following limitations:

- A. Initiation of any work on the permitted project confirms the permittee's acceptance and agreement to comply with all terms and conditions of this permit.
- B. The permittee in exercising the authority granted by this permit shall not cause unlawful pollution as defined by Part 31, Floodplain/Water Resources Protection of the NREPA.
- C. This permit shall be kept at the site of the work and available for inspection at all times during the duration of the project or until its date of expiration.
- D. All work shall be completed in accordance with the plans and the specifications submitted with the application and/or plans and specifications attached hereto.
- E. No attempt shall be made by the permittee to forbid the full and free use by the public of public waters at or adjacent to the structure or work approved herein.
- F. It is made a requirement of this permit that the permittee give notice to public utilities in accordance with Act 53 of the Public Act of 1974 and comply with each of the requirements of that act.
- G. This permit does not convey property rights in either real estate or material, nor does it authorize any injury to private property or invasion of public or private rights, nor does it waive the necessity of seeking federal assent, all local permits or complying with other state statutes.
- H. This permit does not prejudice or limit the right of a riparian owner or other person to institute proceedings in any circuit court of this state when necessary to protect his rights.
- I. Permittee shall notify the MDEQ within one week after the completion of the activity authorized by this permit, by completing and forwarding the attached, preaddressed post card to the office addressed thereon.
- J. This permit shall not be assigned or transferred without the written approval of the MDEQ.
- K. Failure to comply with conditions of this permit may subject the permittee to revocation of permit and criminal and/or civil action as cited by the specific State Act, Federal Act and/or Rule under which this permit is granted.
- L. Work to be done under authority of this permit is further subject to the following special instructions and specifications:

1. All work shall be completed in accordance with the attached plans and the terms and conditions of this permit.
2. Prior to the initiation of any permitted construction activities, a siltation barrier shall be constructed immediately downgradient of the construction site. Siltation barriers shall be specifically designed to handle the sediment type, load, water depth, and flow conditions of each construction site throughout the anticipated time of construction and unstable site conditions. The siltation barrier shall be maintained in good working order throughout the duration of the project. Upon project completion, the accumulated materials shall be removed and disposed of at an upland (non-wetland, non-floodplain) site. The siltation barrier shall then be removed in its entirety and the area restored to its original configuration and cover.
3. All raw areas resulting from the permitted construction activity shall be promptly and effectively stabilized with sod and/or seed and mulch (or other technology specified by this permit or project plans) in a sufficient quantity and manner so as to prevent erosion and any potential siltation to surface waters or wetlands.
4. All raw earth within 100 feet of a lake, stream, or wetland that is not brought to final stabilization by the end of the active growing season shall be temporarily stabilized with mulch blankets in accordance with the following dates: September 20th for the Upper Peninsula, October 1st for the Lower Peninsula north of US-10, and October 10th for the Lower Peninsula south of US-10.
5. Authority granted by this permit does not waive permit requirements under Part 91, Soil Erosion and Sedimentation Control, of the NREPA, or the need to acquire applicable permits from the County Enforcing Agent (CEA). To locate the Soil Erosion Program Administrator for your county visit www.deq.state.mi.us/sesca/.
6. No fill, excess soil, or other material shall be placed in any wetland or surface water area not specifically authorized by this permit, its plans, and specifications.
7. Prior to the start of construction, all non-work wetland areas shall be bounded by properly trenched filter fabric fence and orange construction fencing to prevent sediment from entering the wetland and to prohibit construction personnel from entering or performing work in these areas. Fence shall be maintained daily throughout the construction process. Upon project completion, the accumulated materials shall be removed and disposed of at an upland site. The erosion barrier shall then be removed in its entirety and the area restored to its original configuration and cover.
8. The permittee is cautioned that grade changes resulting in increased runoff onto adjacent property is subject to civil damage litigation.
9. In issuing this permit, the MDEQ has relied on the information and data which the permittee has provided in connection with the permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete, or inaccurate, the MDEQ may modify, revoke, or suspend the permit, in whole or in part, in accordance with the new information.
10. The authority to conduct the activity as authorized by this permit is granted solely under the provisions of the governing act as identified above. This permit does not convey, provide, or otherwise imply approval of any other governing act, ordinance, or regulation, nor does it waive the permittee's obligation to acquire any local, county, state or federal approval, or authorizations necessary to conduct the activity.
11. The permittee shall indemnify and hold harmless the State of Michigan and its departments, agencies, officials, employees, agents and representatives for any and all claims or causes of action arising from acts or omissions of the permittee, or employees, agents, or representatives of the permittee, undertaken in connection with this permit. This permit shall not be construed as an indemnity by the State of Michigan for the benefit of the permittee or any other person.

12. Noncompliance with these terms and conditions, and/or the initiation of other regulated activities not specifically authorized by this permit shall be cause for the modification, suspension, or revocation of this permit, in whole or in part. Further, the MDEQ may initiate criminal and/or civil proceedings as may be deemed necessary to correct project deficiencies, protect natural resource values, and secure compliance with statutes.
13. This permit is being issued for the maximum time allowed under Part 301, Inland Lakes and Streams and Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, PA 451 of 1994, as amended, including all permit extensions allowed under the administrative rules R 281.813 and R 281.923. Therefore, no extensions of this permit will be granted. Initiation of the construction work authorized by this permit indicates the permittee's acceptance of this condition. The permit, when signed by the DEQ, will be for a five-year period beginning at the date of issuance.

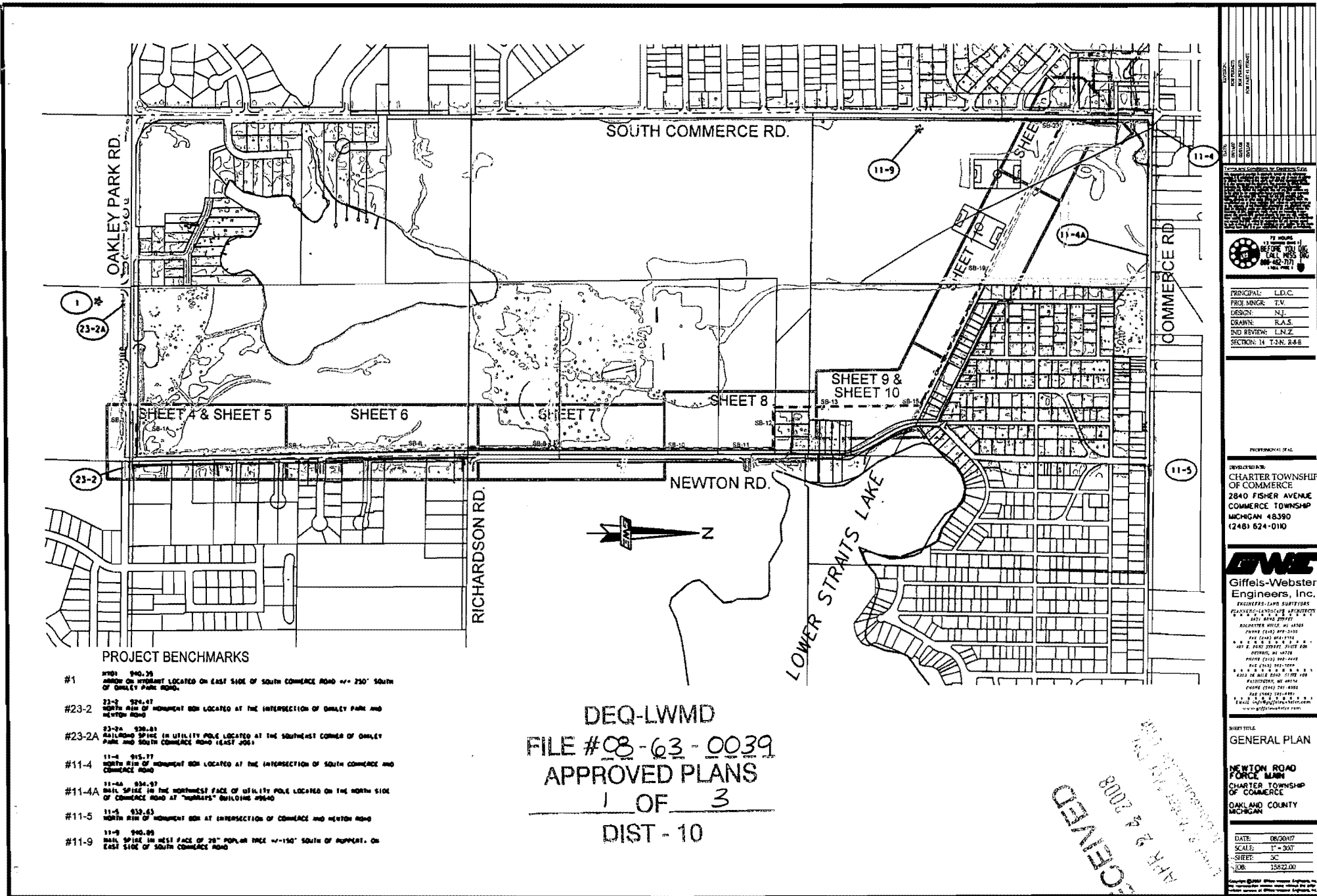
Steven E. Chester, Director
Department of Environmental Quality

By Melanie J. Foose
Melanie J. Foose
District Representative
Land and Water Management Division

cc: Oakland CEA
Commerce Township Clerk
Ms. Nikki Jeffries, Giffels-Webster Engineers

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF PERMITS AND COMPLIANCE

JUL 11 2008



DESIGNER	
DATE	
SCALE	
TITLE	

PROFESSIONAL SEAL	
REGISTERED PROFESSIONAL ENGINEER	
STATE OF MICHIGAN	
NO. 0000000000	
EXPIRES 12/31/10	
PROJECT NO. 08-63-0039	
DRAWN BY: E.A.S.	
CHECKED BY: L.A.Z.	
SECTION: 11 T-2N, R-6E	

DEVELOPER:
CHARTER TOWNSHIP OF COMMERCE
 2840 FISHER AVENUE
 COMMERCE TOWNSHIP
 MICHIGAN 48390
 (248) 624-0110

GWE
Giffels-Webster
 Engineers, Inc.
 ENGINEERS: LAND SURVEYORS
 PLANNERS: LANDSCAPE ARCHITECTS
 2011 ROAD STREET
 BOSTON, MA 02111
 PHONE (617) 267-2100
 FAX (617) 267-1100
 WWW.GWE-INC.COM
 2007-2008 PROFESSIONAL SEAL
 STATE OF MASSACHUSETTS
 REG. NO. 15222
 EXPIRES 12/31/10
 PROJECT NO. 08-63-0039
 DRAWN BY: E.A.S.
 CHECKED BY: L.A.Z.
 www.giffelswebster.com

- PROJECT BENCHMARKS**
- #1 1101 940.39
IRON ROD MONUMENT LOCATED ON EAST SIDE OF SOUTH COMMERCE ROAD ~ 250' SOUTH OF OAKLEY PARK RD.
 - #23-2 23-2 924.67
NORTH END OF MONUMENT SIGN LOCATED AT THE INTERSECTION OF OAKLEY PARK AND NEWTON RD.
 - #23-2A 23-2A 928.61
RAILROAD SPIKE IN UTILITY POLE LOCATED AT THE SOUTHWEST CORNER OF OAKLEY PARK AND SOUTH COMMERCE ROAD (EAST JOB)
 - #11-4 11-4 915.77
NORTH END OF MONUMENT SIGN LOCATED AT THE INTERSECTION OF SOUTH COMMERCE AND COMMERCE ROAD
 - #11-4A 11-4A 934.97
RAIL SPIKE IN THE NORTHWEST FACE OF UTILITY POLE LOCATED ON THE NORTH SIDE OF COMMERCE ROAD AT "HARRIS" BUILDING #9640
 - #11-5 11-5 932.63
NORTH END OF MONUMENT SIGN AT INTERSECTION OF COMMERCE AND NEWTON ROAD
 - #11-9 11-9 940.89
RAIL SPIKE IN WEST FACE OF 20" POPLAR TREE ~ 150' SOUTH OF SUPPORT. ON EAST SIDE OF SOUTH COMMERCE ROAD

DEQ-LWMD
 FILE #08-63-0039
 APPROVED PLANS
 1 OF 3
 DIST - 10

RECEIVED
 APR 24 2008
 DISTRICT ENGINEERING DIVISION
 DISTRICT 10

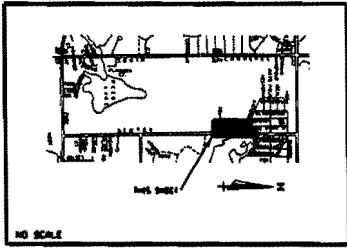
SHEET TITLE
GENERAL PLAN
 NEWTON ROAD
 FORCE MAIN
 CHARTER TOWNSHIP OF
 COMMERCE
 OAKLAND COUNTY
 MICHIGAN

DATE	06/30/07
SCALE	1" = 300'
SHEET	
JOB	15222.00

DODGE PARK NO. 5

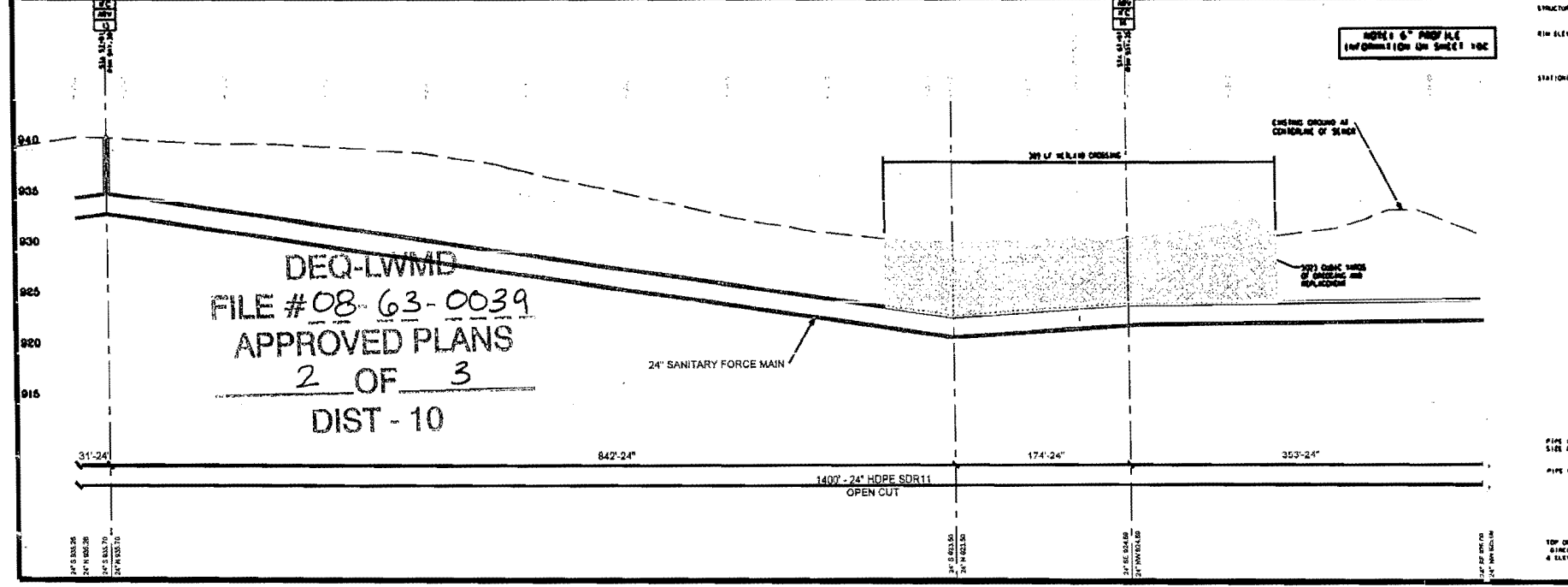
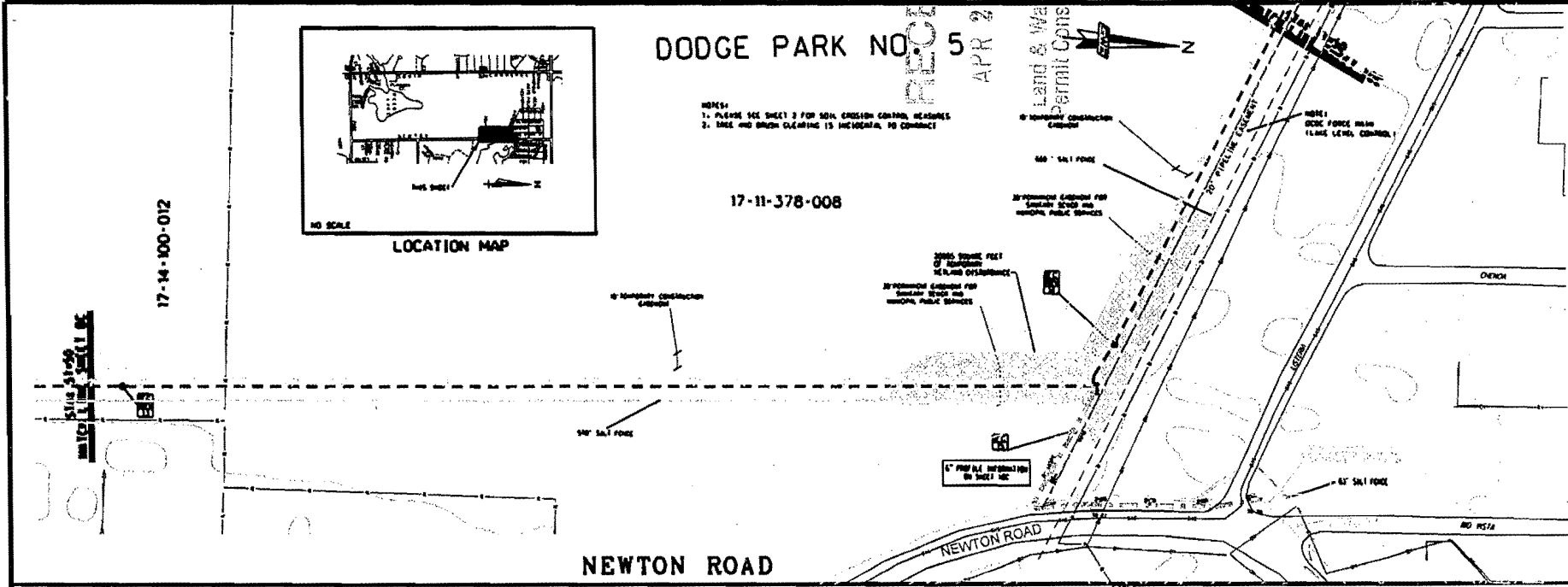
NOTES:
 1. PLEASE SEE SHEET 2 FOR S&L CROSSING CENTER, HEADINGS
 2. S&L AND S&M CLEARING IS NECESSARY TO COMPLETE

17-11-378-008



LOCATION MAP

RECEIVED
 APR 24 2008
 Land & Water Mgt. Div.
 Permit Consultation Unit



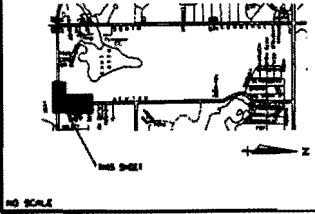
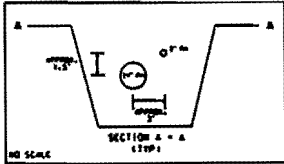
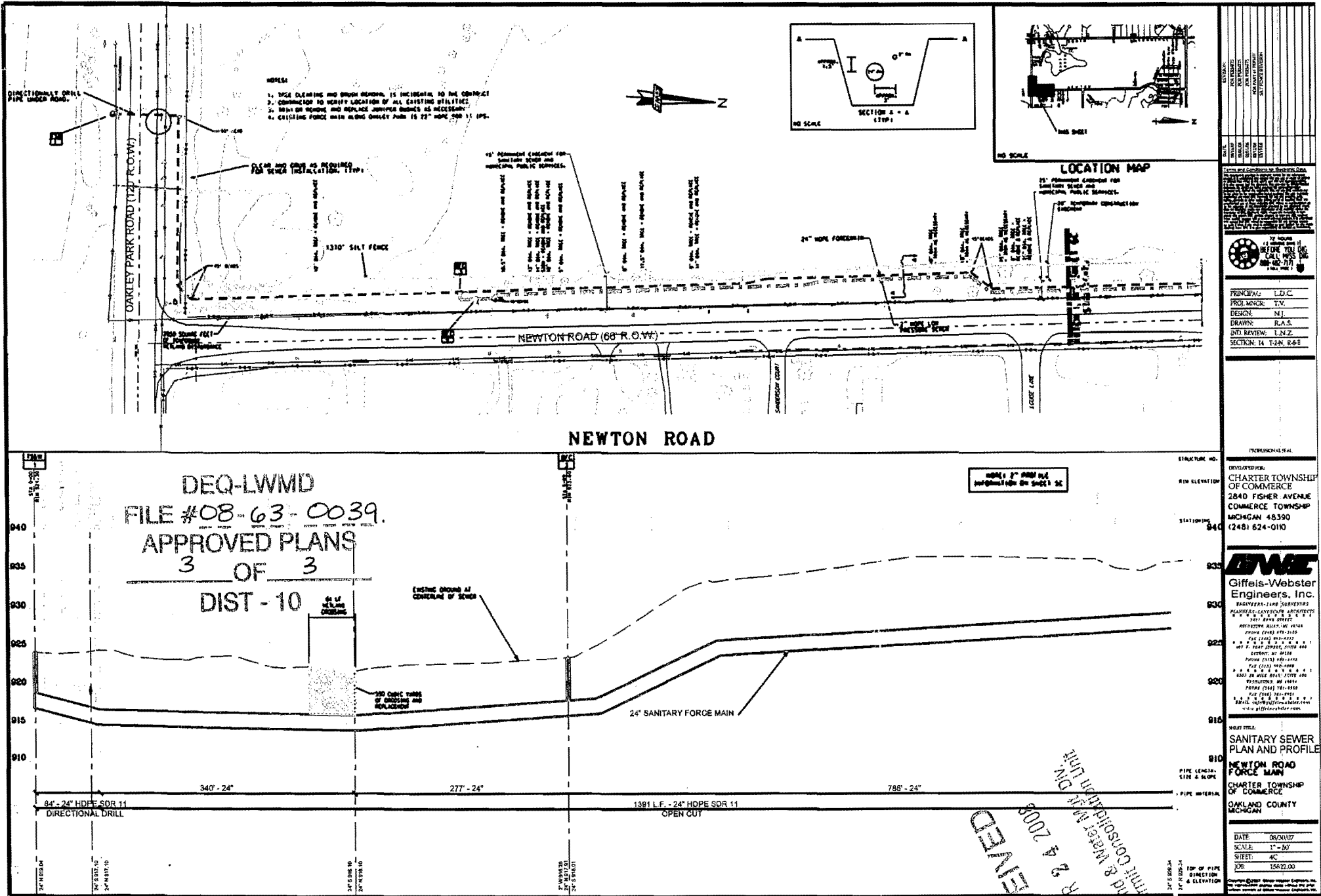
DEQ-LWMD
 FILE #08-63-0039
 APPROVED PLANS
 2 OF 3
 DIST - 10

DATE	06/30/07
SCALE	1" = 50'
SHEET	9C
JOB	15622.00

DATE: 06/30/07
 SCALE: 1" = 50'
 SHEET: 9C
 JOB: 15622.00

DATE: 06/30/07
 SCALE: 1" = 50'
 SHEET: 9C
 JOB: 15622.00

DATE: 06/30/07
 SCALE: 1" = 50'
 SHEET: 9C
 JOB: 15622.00



- NOTES:
1. PIPE CLEANING AND BRUSH REMOVAL IS INCORPORATED TO THE CONTRACT
 2. COMMENCEMENT TO BEAT'S LOCATION OF ALL EXISTING UTILITIES
 3. SOILS ON RECORD AND REPLACE ANY/ALL GUBS AS NECESSARY
 4. EXISTING FORCE MAIN ALONG OAKLEY PARK IS 24\"/>

CLEAR AND GRASS AS REQUIRED FOR SETBACK INSTALLATION TIME

12\"/>

1330' SILT FENCE

NEWTON ROAD (68' R.O.W.)

NEWTON ROAD

DEQ-LWMD
FILE #08-63-0039.
APPROVED PLANS
3 OF 3
DIST - 10

NOTE: 2\"/>

STRUCTURE NO.
RIM ELEVATION
STATIONING
940
935
930
925
920
915
910

PROFESSIONAL SEAL
DEVELOPER/OWNER
CHARTER TOWNSHIP OF COMMERCE
2840 FISHER AVENUE
COMMERCE TOWNSHIP
MICHIGAN 48390
(248) 624-0100

PROJECT TITLE
SANITARY SEWER PLAN AND PROFILE
NEWTON ROAD FORCE MAIN
CHARTER TOWNSHIP OF COMMERCE
OAKLAND COUNTY MICHIGAN

DATE 06/01/07
SCALE 1" = 50'
SHEET 4C
JOB 15622.00

RECEIVED
APR 2 2008
Land & Water Mfg. Div.
Permit Consideration Unit

APPENDIX E –
COST ESTIMATES
PRESENT WORTH ANALYSIS
USER COSTS



PROJECT NAME
Newton Road Sanitary Force Main

GWE PROJ. NO.: 15822.11
DATE: May 1, 2012

PRELIMINARY CONSTRUCTION COST ESTIMATE

ELIGIBLE WORK ITEMS

Project involves the installation of approximately 9,050 LF of 19" (inside Dia.) HDPE force main along Newton Road by directional drilling.

ITEM WORK ACTIVITY	QUANTITY	UNIT	UNIT PRICE	TOTAL	COMMENTS
SOIL EROSION SEDIMENT CONTROL					
Misc. erosion control	1	LS	\$10,000.00	\$10,000.00	
SUBTOTAL - EROSION CONTROL				\$10,000	
TRAFFIC CONTROL AND STRIPING					
Traffic Control	1	LS	\$4,000.00	\$4,000.00	
SUBTOTAL TRAFFIC CONTROL AND STRIPING				\$4,000	
LANDSCAPING					
Landscape Restoration	1	LS	\$10,000.00	\$10,000.00	
SUBTOTAL - LANDSCAPING				\$10,000	
MISCELLANEOUS ITEMS					
Permit Fees	1	LS	\$7,000.00	\$7,000.00	
SUBTOTAL MISCELLANEOUS ITEMS				\$7,000	
DIRECTIONAL DRILLING / STRUCTURES					
19" (inside dia.) HDPE SDR 11	9050	LF	\$200.00	\$1,810,000.00	
16" DI PIPE	135	LF	\$150.00	\$20,250.00	
STRUCTURES w/ VALVING	5	EA	\$25,000.00	\$125,000.00	
Connection to Existing	2	EA	\$5,500.00	\$11,000.00	
HDPE to DIP Transition	1	EA	\$1,200.00	\$1,200.00	
SUBTOTAL - DIRECTION DRILLING / STRUCTURES				\$1,967,450.00	
SUBTOTAL CONSTRUCTION COSTS				\$1,998,450.00	
CONSTRUCTION CONTINGENCY			15%	\$299,767.50	
CONSULTANT / SOFT COSTS					
CONSULTANT ENGINEER					
Engineering				\$281,250.00	
SUBTOTAL - CONSULTANT				\$281,250.00	
SUB CONSULTANT					
Geotechnical / Soil borings				\$10,000.00	
Material Testing				\$5,000.00	
SUBTOTAL - SUB CONSULTANT				\$15,000.00	
SUBTOTAL - CONSULTANT / SOFT COSTS				\$296,250.00	
TOTAL ESTIMATED COST				\$2,594,467.50	

INELIGIBLE WORK ITEMS

Project involves the installation of approximately 2,285 LF of 2" HDPE Low Pressure main along Newton Road by directional drilling.

ENGINEERING DESIGN				\$93,750.00
STRUCTURES w/ VALVING	5	EA	\$15,000.00	\$75,000.00
2" HDPE SDR 11	2285	LF	\$17.00	\$38,845.00
4" DI PIPE	100	LF	\$70.00	\$7,000.00
SUBTOTAL - INELIGIBLE				\$214,595.00

Specific work items that ARE NOT included in this estimate include:

1. Wetland mitigation
2. Easement acquisition and exhibit preparation costs
3. Survey topography
4. Structure pilings

It should be pointed out that since we have no control over the Contractor's method of determining prices, competitive bidding or market conditions, our opinion of the probable construction cost as provided for herein is made on the basis of experience and represents our best judgment as design professionals. We cannot guarantee that the final construction cost will not vary from this estimate.

Respectfully,
GIFFELS-WEBSTER ENGINEERS, INC.

Estimate Prepared By: Joseph Anderson, PE, RLA
Date: May 1, 2012

Estimate Checked By: Jason Mayer, P.E.
Date: May 1, 2012

1025 East Maple Road, Suite 100 Birmingham, MI 48009 (248) 852-3100 Fax: (248) 852-6372	28 West Adams, Suite 1200 Detroit, MI 48226 (313) 962-4442 Fax: (313) 962-5068	6303 26 Mile Road, Suite 100 Washington Twp, MI 48094-3819 (586) 781-8950 Fax: (586) 781-8951
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PROJECT NAME
Commerce Road Sanitary Force Main (Alternate Route)

GWE PROJ. NO.: 15822.11
DATE: May 1, 2012

PRELIMINARY CONSTRUCTION COST ESTIMATE

ELIGIBLE WORK ITEMS

Project involves the installation of approximately 8,950 LF of 19" (inside Dia.) HDPE force main along Commerce Road and Oakley Park Road by directional drilling.

ITEM	WORK ACTIVITY	QUANTITY	UNIT	UNIT PRICE	TOTAL	COMMENTS
SOIL EROSION SEDIMENT CONTROL						
	Misc. erosion control	1	LS	\$10,000.00	\$10,000.00	
SUBTOTAL - EROSION CONTROL					\$10,000	
TRAFFIC CONTROL AND STRIPING						
	Traffic Control	1	LS	\$4,000.00	\$4,000.00	
SUBTOTAL TRAFFIC CONTROL AND STRIPING					\$4,000	
LANDSCAPING						
	Landscape Restoration	1	LS	\$10,000.00	\$10,000.00	
SUBTOTAL - LANDSCAPING					\$10,000	
MISCELLANEOUS ITEMS						
	Permit Fees	1	LS	\$7,000.00	\$7,000.00	
SUBTOTAL MISCELLANEOUS ITEMS					\$7,000	
DIRECTIONAL DRILLING / STRUCTURES						
	19" (inside dia.) HDPE SDR 11	8950	LF	\$225.00	\$2,013,750.00	
	16" DI PIPE	110	LF	\$150.00	\$16,500.00	
	STRUCTURES w/ VALVING	4	EA	\$25,000.00	\$100,000.00	
	Connection to Existing	2	EA	\$5,500.00	\$11,000.00	
	HDPE to DIP Transition	1	EA	\$1,200.00	\$1,200.00	
SUBTOTAL - DIRECTION DRILLING / STRUCTURES					\$2,142,450.00	
SUBTOTAL CONSTRUCTION COSTS					\$2,173,450.00	
CONSTRUCTION CONTINGENCY					15%	\$326,017.50
CONSULTANT / SOFT COSTS						
CONSULTANT ENGINEER						
	Engineering				\$281,250.00	
SUBTOTAL - CONSULTANT					\$281,250.00	
SUB CONSULTANT						
	Geotechnical / Soil borings				\$150,000.00	
	Material Testing				\$5,000.00	
SUBTOTAL - SUB CONSULTANT					\$155,000.00	
SUBTOTAL - CONSULTANT / SOFT COSTS					\$436,250.00	
TOTAL ESTIMATED COST					\$2,935,717.50	

Specific work items that ARE NOT included in this estimate include:

1. Wetland mitigation
2. Easement acquisition and exhibit preparation costs
3. Survey topography
4. Structure pilings

It should be pointed out that since we have no control over the Contractor's method of determining prices, competitive bidding or market conditions, our opinion of the probable construction cost as provided for herein is made on the basis of experience and represents our best judgment as design professionals. We cannot guarantee that the final construction cost will not vary from this estimate.

Respectfully,
GIFFELS-WEBSTER ENGINEERS, INC.

Estimate Prepared By: Joseph Anderson, PE, RLA
Date: May 1, 2012

Estimate Checked By: Jason Mayer, P.E.
Date: May 1, 2012

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Commerce Township: Project Plan for State Revolving Funds
Appendix E-2: Present Worth Analysis of Principal Alternatives (Force Main)

May 8, 2012; Job No. 18217.12

Design life of project 50 years
 Planning Period 20 years
 Discount Rate 4.375%
 PV is assumed to be at the end
 of construction 0

Description			Proposed Alternative (Newton Rd)		South Commerce Rd. Route	
			Cost	Present Worth	Cost	Present Worth
A.	Present Worth of Construction Costs & Operations and Maintenance Cost					
	1	Estimated Construction Cost	\$2,595,000	-\$2,595,000	\$2,935,000	-\$2,935,000
	2	Annual Operations, Maintenance, & Repair Costs	\$5,000	-\$65,750	\$5,000	-\$65,750
	3	Energy Cost: Both alternatives are the same				
	4	Sub-total		-\$2,660,750		-\$3,000,750
B.	Salvage Value after Planning Period					
	1	Straight lined depreciated value after Design Period	-\$1,557,000	\$661,240	-\$1,761,000	\$747,876
C.	Capitalize Interest and Revenue Generated from Project		\$0	\$0	\$0	\$0
D.	Total Present Worth			-\$1,999,510		-\$2,252,874

DATE CREATED: MAY 1, 2009
 DATE MODIFIED: MAY 1, 2009

J.A. LOMBARDO & ASSOCIATES, INC.
 CONSULTING ENGINEERS
 445 SOUTH LIVERNOIS, SUITE 202
 ROCHESTER HILLS, MI 48307
 (248) 656-9650

GEOHERMAL ENERGY RECOVERY SYSTEM
 COMMERCE WWTP

L&A 0428-13

BY: JA LOMBARDO

ITEM NO.	DESCRIPTION	QTY	UNIT	MAT'L COST	TOTAL MAT'L	LABOR COST	TOTAL LABOR	TOTAL COST
1.0	HEAT PUMPS							
1.1.1	HEAT PUMP	7	EA	\$20,000	\$140,000	\$6,240	\$43,680	\$183,680
1.1.2	PRE-HEAT COIL	3	EA	\$2,000	\$6,000	\$1,000	\$3,000	\$9,000
2.0	PUMPS							
2.1.1	PEW PUMP	1	EA	\$11,000.00	\$11,000	\$3,120	\$3,120	\$14,120
2.1.2	HEAT TRANSFER PUMP	1	EA	\$7,000.00	\$7,000	\$2,080	\$2,080	\$9,080
2.1.3	CHECK VALVE	2	EA	\$860.00	\$1,720	\$200	\$400	\$2,120
2.1.4	ISOLATION VALVE	4	EA	\$1,500.00	\$6,000	\$350	\$1,400	\$7,400
3.0	PIPING							
3.1.1	6" DI PIPE	310	LF	\$30.00	\$9,300	\$10	\$3,100	\$12,400
3.1.2	6" INSULATION	310	LF	\$3.00	\$930	\$6	\$1,705	\$2,635
3.1.3	4" DI PIPE	200	LF	\$28.00	\$5,600	\$8	\$1,600	\$7,200
3.1.4	4" INSULATION	200	LF	\$2.50	\$500	\$5	\$1,000	\$1,500
3.1.5	3" GS PIPE	40	LF	\$20.00	\$800	\$17	\$680	\$1,480
3.1.6	3" INSULATION	40	LF	\$1.75	\$70	\$4	\$140	\$210
3.1.7	2.5" GS PIPE	40	LF	\$16.00	\$640	\$15	\$600	\$1,240
3.1.8	2.5" INSULATION	40	LF	\$2.00	\$80	\$4	\$140	\$220
3.1.9	2" GS PIPE	410	LF	\$25.00	\$10,250	\$10	\$4,100	\$14,350
3.1.10	2" INSULATION	410	LF	\$1.50	\$615	\$3	\$1,230	\$1,845
3.1.11	4" VALVE	2	EA	\$750.00	\$1,500	\$250	\$500	\$2,000
3.1.12	3" VALVE	2	EA	\$550.00	\$1,100	\$175	\$350	\$1,450
3.1.13	2.5" VALVE	2	EA	\$500.00	\$1,000	\$150	\$300	\$1,300
3.1.14	2" VALVE	14	EA	\$250.00	\$3,500	\$50	\$700	\$4,200
SUBTOTAL								\$277,430
SALES TAX		0%						\$0
SUBTOTAL								\$277,430
CONTINGENCY		15%						\$41,615
SUBTOTAL								\$319,045
ENGINEERING		15%						\$47,857
TOTAL								\$366,901

DATE CREATED: MAY 3, 2009
 DATE MODIFIED: MAY 3, 2009

J.A. LOMBARDO & ASSOCIATES, INC.
 CONSULTING ENGINEERS
 445 SOUTH LIVERNOIS, SUITE 202
 ROCHESTER HILLS, MI 48307
 (248) 656-9650

GEOHERMAL ENERGY RECOVERY SYSTEM
 COMMERCE WWTP

L&A 0428-13

BY: JA LOMBARDO

ENERGY RECOVERY WITH AIR-TO-AIR HEAT EXCHANGER

ITEM NO.	DESCRIPTION	QTY	UNIT	MAT'L COST	TOTAL MAT'L	LABOR COST	TOTAL LABOR	TOTAL COST
1.0	HEAT EXCHANGER							
1.1.1	HT EXCHGR 6700 CFM	1	EA	\$10,000	\$10,000	\$3,000	\$3,000	\$13,000
1.1.2	HT EXCHGR 10000 CFM	1	EA	\$15,000	\$15,000	\$3,500	\$3,500	\$18,500
1.1.3	HT EXCHGR 24000 CFM	1	EA	\$25,000	\$25,000	\$5,000	\$5,000	\$30,000
2.0	MAKE-UP AIR UNITS							
2.1.1	MODIFY MAU-2	1	EA	\$5,000.00	\$5,000	\$8,000	\$8,000	\$13,000
2.1.2	MODIFY MAU-3	1	EA	\$6,000.00	\$6,000	\$12,000	\$12,000	\$18,000
2.1.3	MODIFY MAU-4	1	EA	\$7,500.00	\$7,500	\$16,000	\$16,000	\$23,500
3.0	DUCTWORK							
3.1.1	42x20 GALV STEEL	1501	LB	\$8.00	\$12,008	\$10	\$15,010	\$27,017
3.1.2	42x20 DAMPER	2	EA	\$1,500.00	\$3,000	\$500	\$1,000	\$4,000
3.1.3	FAN 6700 CFM	2	EA	\$5,000.00	\$10,000	\$2,000	\$4,000	\$14,000
3.1.4	1" 42x20 DUCT INSUL	517	SF	\$6.00		\$3		
3.1.5	ROOF PENETRATION	1	EA	\$500.00		\$1,000		
3.1.6	36x26 GALV STEEL	3002	LB	\$8.00	\$24,015	\$10	\$30,019	\$54,035
3.1.7	36x26 DAMPER	2	EA	\$1,750.00	\$3,500	\$500	\$1,000	\$4,500
3.1.8	FAN 10000 CFM	2	EA	\$7,500.00	\$15,000	\$3,000	\$6,000	\$21,000
3.1.9	1" 36x26 DUCT INSUL	1033	SF	\$6.00		\$3		
3.1.10	WALL PENETRATION	1	EA	\$1,000.00		\$2,000		
3.1.11	54x36 GALV STEEL	4358	LB	\$8.00	\$34,861	\$10	\$43,576	\$78,437
3.1.12	54x36 DAMPER	2	EA	\$2,000.00	\$4,000	\$750	\$1,500	\$5,500
3.1.13	FAN 24000 CFM	2	EA	\$15,000.00	\$30,000	\$5,000	\$10,000	\$40,000
3.1.14	1" 54x36 DUCT INSUL	1500	SF	\$6.00	\$9,000	\$3	\$4,500	\$13,500
3.1.15	WALL PENETRATION	1	EA	\$1,500.00	\$1,500	\$3,000	\$3,000	\$4,500
SUBTOTAL								\$363,989
SALES TAX		0%						\$0
SUBTOTAL								\$363,989
CONTINGENCY		15%						\$54,598
SUBTOTAL								\$418,587
ENGINEERING		15%						\$62,788
TOTAL								\$481,376

Commerce Township: Project Plan for State Revolving Funds
Appendix E-4: Present Worth Analysis of Principal Alternatives (Heat Recovery)

May 8, 2012; Job No. 18217.12

Design life of project 25 years
 Planning Period 20 years
 Discount Rate 4.375%
 PV is assumed to be at the end
 of construction 0

Description			Treated Effluent Heat Recovery for Buildings 105 & 106		Air to Air Heat Exchanger for Buildings 105 & 106	
			Cost	Present Worth	Cost	Present Worth
A.	Present Worth of Construction Costs & Operations and Maintenance Cost					
	1	Estimated Construction Cost	\$366,706	-\$366,706	\$481,376	-\$481,376
	2	Annual Operations, Maintenance, & Repair Costs	\$23,685	-\$311,457	\$9,124	-\$119,980
	3	Energy Cost: Natural Gas Energy Savings	-\$57,662	\$758,254	-\$55,769	\$733,361
	4	Sub-total		\$80,091		\$132,005
B.	Salvage Value after Planning Period					
	1	Straight lined depreciated value after Design Period	-\$73,341	\$31,147	-\$96,275	\$40,887
C.	Capitalize Interest and Revenue Generated from Project		\$0	\$0	\$0	\$0
D.	Total Present Worth			\$111,238		\$172,892

**Commerce Township SCADA System Cost Estimate
Using Existing Fiber Optic Network**

Site Name	Site Location/Community	PLC, Radio, Off site Labor	On Site Installation	Electrical and Controls Replacement	Total Site Cost
Welch Rd	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Haggerty Rd	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Oakley Park	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Richardson Rd	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Hayes Creek	Commerce Twp	\$16,000	\$4,400	\$0	\$20,400
Commerce Towne	Commerce Twp	\$11,100	\$4,400	\$60,500	\$76,000
Crystal Shores	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Sherwood Lake	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Huron Hills S.A.D.	Commerce Twp	\$11,100	\$4,400	\$60,500	\$76,000
Starwood	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Commerce Lk Woods	Commerce Twp	\$11,100	\$4,400	\$60,500	\$76,000
The Preserves	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Campbell Creek	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Union Lake	Commerce Twp	\$16,000	\$4,400	\$0	\$20,400
Eldora	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Golf Lane	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
McCoy	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Best Drive	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Birkdale	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Maple Pointe	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
M-5 (Haggerty Road Corridor)	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Summit (Central West)	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Loon Lake	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Wixom/Charms	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Hills of Bogie Lake	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Maple Road	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Alorington Court	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Martin Parkway	Commerce Twp	\$16,000	\$4,400	\$0	\$20,400
Total Site Cost		\$325,500	\$123,200	\$181,500	\$630,200

Total Direct Cost	\$630,200
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**Commerce Township SCADA System Cost Estimate
Using New Radios**

Site Name	Site Location/Community	PLC, Radio, Off site Labor	On Site Installation	Electrical and Controls Replacement	Total Site Cost
Welch Rd	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Haggerty Rd	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Oakley Park	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Richardson Rd	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Hayes Creek	Commerce Twp	\$16,000	\$4,400	\$0	\$20,400
Commerce Towne	Commerce Twp	\$11,100	\$4,400	\$60,500	\$76,000
Crystal Shores	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Sherwood Lake	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Huron Hills S.A.D.	Commerce Twp	\$11,100	\$4,400	\$60,500	\$76,000
Starwood	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Commerce Lk Woods	Commerce Twp	\$11,100	\$4,400	\$60,500	\$76,000
The Preserves	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Campbell Creek	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Union Lake	Commerce Twp	\$16,000	\$4,400	\$0	\$20,400
Eldora	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Golf Lane	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
McCoy	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Best Drive	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Birkdale	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Maple Pointe	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
M-5 (Haggerty Road Corridor)	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Summit (Central West)	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Loon Lake	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Wixom/Charms	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Hills of Bogie Lake	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Maple Road	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Alorington Court	Commerce Twp	\$11,100	\$4,400	\$0	\$15,500
Martin Parkway	Commerce Twp	\$16,000	\$4,400	\$0	\$20,400
Total Site Cost		\$325,500	\$123,200	\$181,500	\$630,200

Total Direct Cost	\$630,200
Radio Cost Allocation (10%)	\$100,000
Total Cost	\$730,200

Commerce Township: Project Plan for State Revolving Funds
Appendix E-6: Present Worth Analysis of Principal Alternatives (SCADA Systems)

May 8, 2012; Job No. 18217.12

Design life of project 20 years
 Planning Period 20 years
 Discount Rate 4.375%
 PV is assumed to be at the end
 of construction 0

Description			SCADA		SCADA	
			Utilizing Existing Fiber Optic		Utilizing New Radios	
			Cost	Present Worth	Cost	Present Worth
A.	Present Worth of Construction Costs & Operations and Maintenance Cost					
	1	Estimated Construction Cost	\$630,200	-\$630,200	\$730,200	-\$730,200
	2	Annual Operations, Maintenance, & Repair Costs	\$15,000	-\$197,250	\$15,000	-\$197,250
	3	Energy Cost: Included in OM&R Costs		\$0		\$0
	4	Sub-total		-\$827,450		-\$927,450
B.	Salvage Value after Planning Period					
	1	Straight lined depreciated value after Design Period	\$0	\$0	\$0	\$0
C.	Capitalize Interest and Revenue Generated from Project		\$0	\$0	\$0	\$0
D.	Total Present Worth			-\$827,450		-\$927,450

**Commerce Township Project Plan
for Energy Cost Reduction and Sewer Overflow Risk Reduction in
the Commerce Township Waste Water Treatment System**

Project User Costs

May 8, 2012, GWE Job No. 18217.13

Newton Road Force Main						
Item	Description	Capital Costs	Annual Payments	Residential Equivalent Units	Annual User Cost	Monthly User Cost
1	Construction Cost & SRF Loan Amount	\$2,809,062				
2	Annual Loan Payment		\$213,617			
3	Annualized Operations & Maintenance Costs		\$6,000			
4	Annualized Energy Savings					
5	Total Annual Cost of Project		\$219,617			
6	Existing REU's			10,400		
7	Annual User Cost				\$21.12	
8	Monthly User Cost					\$1.76
Heat Recovery System						
9	Construction Cost & SRF Loan Amount	\$366,706				
10	Annual Loan Payment		\$27,886			
11	Annualized Operations & Maintenance Costs		\$23,685			
12	Annualized Energy Savings		-\$57,662			
13	Total Annual Cost of Project		-\$6,091			
14	Existing REU's			10,400		
15	Annual User Cost				-\$0.59	
16	Monthly User Cost					-\$0.05

SCADA System						
Item	Description	Capital Costs	Annual Payments	Residential Equivalent Units	Annual User Cost	Monthly User Cost
17	Construction Cost & SRF Loan Amount	\$630,200				
18	Annual Loan Payment		\$47,924			
19	Annualized Operations & Maintenance Costs		\$15,000			
20	Savings to customers through more accurate meter billings		-\$23,086			
21	Savings from Remote Connection/Disconnect		-\$7,500			
22	Reduction in emergency dispatch		-\$5,000			
23	Annualized Operations & Maintenance Cost Savings as Compared to Existing System		-\$24,750			
24	Total Annual Cost of Project		\$2,588			
25	Existing REU's			10,400		
26	Annual User Cost				\$0.25	
27	Monthly User Cost					\$0.02
	Total Annual User Cost				\$20.78	
	Total Monthly User Cost					\$1.73

**APPENDIX F –
SCADA SYSTEM
DESIGN CRITERIA**

8. System Design Criteria

The design criteria for the Oakland County Supervisory Control and Data Acquisition System (SCADA) are detailed below.

Major SCADA components covered by this document include:

- Lift Pump Stations
- Wastewater Treatment Plants (WWTPs)
- Water Treatment Plants (WTPs)
- Retention Basins (RT)/Retention Treatment Basins (RTBs)
- Sewer/Level Monitoring Stations

Criteria provided include the following:

- Introduction & Overview
- Terminology and acronym definitions.
- Standards and codes list.
- Physical design criteria.
- Network and other communications requirements.
- Functional requirements.
- Applications programming requirements.
- Documentation requirements.
- Testing requirements.
- Support requirements.
- Pump station specific criteria.
- SCADA wireless specific criteria.

8.1 Introduction & Overview

This section defines general SCADA system design criteria. Typical designs will include detailed design drawings as well as specification sections following the below recommended criteria. The below recommended criteria are intended to be system guidelines and will be bolstered with detailed project specifications during the design phase.

Tetra Tech presents the below described design criteria as indication of our commitment to detail and will follow these guidelines throughout the design process. These design guidelines are to be utilized in conjunction with the project standard design drawing set developed by Tetra Tech during the course of this project. The design criteria below is intended to be a summary of design details that will be incorporated into the overall SCADA design project and is not intended to be a comprehensive list such as will be developed during the design process.

8.2 Terminology

Terminology and acronyms used in this document are shown below:

County – Oakland County Michigan
OCIT – Oakland County Information Technology
OCWRC – Oakland County Water Resources Commissioner
CMMS – Computerized Maintenance Management System
Client – Workstation class computer (typically running Windows 7)
DMZ – Demilitarized Zone
HMI – Human Machine Interface
I/O – Input/output
IP – Internet Protocol
TCP – Transmission Control Protocol
ISP – Internet Service Provider
KVM – Keyboard, Video & Mouse
LAN – Local Area Network
WAN – Wide Area Network
Mbps – Million Bits per Second
PLC – Programmable Logic Controller
RTU – Remote Terminal Unit
SCADA – Supervisor Control and Data Acquisition
Server – Server class computer (typically running Windows Server 2008 R2)
UPS – Uninterruptable Power Supply
WTP – Water Treatment Plant
WWTP – Wastewater Treatment Plant
RB – Retention Basin
RTB – Retention Treatment Basin
LS – Lift Station
CAMS – Oakland Counties “Computer Aided Maintenance System”

8.3 Standards and Codes

The following organizations have generated standards that are to be used as guides in assuring quality and reliability of components and systems; govern nomenclature; define parameters of configuration and construction in addition to specific details outlined in this document.

- ISA, Instrumentation, Systems and Automation Society
- UL, Underwriters Laboratories
- AWWA, American Water Works Association
- NEMA, National Electrical Manufactures Association
- OSHA, Occupational Safety and Health Administration
- ANSI, American National Standards Institute
- NFPA, National Fire Protection Association
- NIST, National Institute of Standards and Technology
- IEEE, Institute of Electrical and Electronic Engineers
- NEC, National Electrical Code(ANSI/NFPA-70)

8.4 Naming Conventions

During software design a PLC and HMI tag naming convention will be developed to standardize tag naming. Items such as facility names (codes), process areas, point numbers, etc. will be standardized. This will also help standardize alarm process area and notification standards. These standards are intended to be followed throughout the life cycle of the SCADA system and will be applied to each and every County SCADA installation site.

8.5 General System Requirements

Single Point of Failure

In general, single points of failure are to be avoided. This does not mean that all control and equipment has to be duplicated, but there are specific components for which redundancy is required for safety or continued operation. Redundancy is required for the following components:

- SCADA Servers
- SCADA Data Servers “Communication Servers”
- SCADA Workstations
- SCADA Radio Concentrator Site Communications (Optional)

Components for which redundancy is not required include the following:

- PLC’s
- PLC I/O modules
- Radio communications links (i.e. Lift Station to Concentrator Site)
- Instruments

Color Coding of Warning Devices

Unless noted otherwise, use the following color code for lenses of indicating lights.

- On or Open Green
- Off or Closed Red
- Alarms/Warning Amber
- Automatic or Remote White
- Manual or Local Blue

Nameplates

All individual panels, instruments, and panel mounted devices shall be provided with nameplates. Identification plates shall be laminated phenolic with white letters engraved on a black background and mounted with screws or double-back adhesive foam tape. Individual control switches and pushbuttons shall have customized legend plates which indicate function. Equipment identification nameplates shall contain ENGINEER’s item designation and, for indicators and transmitters, design range and units of device shown. All components inside panel shall have identification plates. This includes instruments, relays, switches, circuit boards in plug-in racks, etc. Identification plates shall include engineering symbols (FBQ-1, SW-3, FIC-4, CR-1, etc.). Switches and circuit breakers inside panel shall have names (Horn, Audio Tone, Panel Power, etc.) on identification plates as well as engineering symbol. Identification plates shall be located on or adjacent to device they are identifying and shall be readable without looking around, under, or on top of device to find identification plate.

Accessibility and Mounting

All control equipment shall be mounted in an easily accessible location. Equipment or piping shall not have to be removed to access controls. All controls shall be mounted no higher than four feet of finished floor. All NEC clearance requirements shall be met for the appropriate voltage level. All equipment and instrument tubing shall be rigidly installed.

8.6 Field Mounted Instrumentation

General

When possible use single source manufacturer for each instrument type. Use the same manufacturer for different instrument types whenever possible. Provide instrumentation of rugged construction designed for site conditions. Provide only new, standard, first-grade materials throughout, conforming to standards established by Underwriter's Laboratories (UL), Inc., and so marked or labeled, together with manufacturer's brand or trademark. Instrument enclosures shall be NEMA rated for the environment. In hazardous areas, meet the NEC Class, Group, and Division as shown or specified. Submergence rated enclosures shall be provided in areas subject to flooding. Provide instrument transmitters that produce isolated 4-20 mA analog signals. Use linear, direct reading indicators unless otherwise specified. Analyzers must be removable from the process lines without disrupting the process.

Installation

Unless readily accessible for viewing and calibration from floor elevation, do not install electrical transmitters on process piping. Mount equipment on instrument racks, stands or in enclosures near the sensor at a level that permits viewing from floor elevation. Install instrumentation and auxiliary devices to be accessible for maintenance. Provide space between instruments, equipment, and piping for ease of removal and servicing. Include panel layouts to include ergonomic factors associated with maintaining the equipment. In general, install instrumentation to be accessible from floor level or grade.

Maintenance and Troubleshooting

The continued, useful operation of a control system depends on effective maintenance and calibration. The availability of complete system documentation and the installation of proper test connections greatly assist in maintenance and calibration. During the design of the system, every effort will be made to make the system as easy to maintain and troubleshoot as possible. For example the system design standard drawings include a depiction of a wetwell vented tray that allows much easier maintenance than prior design methods.

Pressure Measurement

Pressure and Differential Pressure Transmitter

Diaphragm type pressure transmitters will be used for gauge, differential pressure and absolute pressure measurement applications. Endress+Hauser pressure transmitters are a preferred manufacture (Model #: FMX21-66J0/0).

Pressure Gauges

For pressure gauges, solid-front, glycerin-filled units will be used. Diaphragm or bellows type elements will be used for low pressure ranges. Dial size is to be 4 1/2 inches minimum. Accuracy shall be two percent of span or better. Scale range shall be such that normal operating pressure lies between 50 and 80 percent of scale range. Dresser/Ashcroft and Ametek U.S. Gauge are the preferred manufacturers.

Pressure Diaphragm Seals

Diaphragm seals will be used to protect pressure instruments from corrosion and to keep solids out of instruments when they are connected to pipelines. Typical manufacturers are Dresser/Ashcroft and Ametek. Isolation valves and calibration ports will be provided for pressure instruments.

Pressure Switches

Mechanical Pressure Switches with Dial

Acceptable manufacturers are Murphy OPLH series.

Flow Measurement

Electromagnetic Flow Element and Transmitters

Magnetic flow meters will be used for sludge service. A minimum flow velocity of 5 fps through the flowmeter will be maintained for primary sludge and 3 fps for secondary sludge. Magnetic flow tubes require a minimum of five diameters of straight pipe upstream and two diameters of straight pipe downstream. Forward and Reverse flow options shall be considered. All meters shall include HART option. Endress+Hauser are a preferred manufacture (ProMag 50 series with HART). Other acceptable manufacturers are ABB, Yokagawa and Rosemount.

Flow Element and Transmitter, Thermal Mass Flow

Airflow measurement for air applications will utilize thermal dispersion technology for flow measurement. Venturi tubes or orifice plates are not acceptable. The flow element must be installed through a hot tap assembly to facilitate cleaning flow elements without isolating the pipe line. A dirt/moisture separator should be installed upstream of the flow element. The straight approach must be at least 10 diameters upstream and 10 diameters downstream from the flow element. Transmitter will be remote (nonintegral) from the meter, and shall be NEMA 4X rated. Transmitter shall include local LCD display of both the instantaneous flowrate and totalized flow. Acceptable manufacturers are Fluid Components (FCI) or Kurz Instruments.

Level Measurement

Unless otherwise noted lift stations will utilize submersible pressure type level sensors and transmitters will be used for level measurement. Transmitter enclosures shall be NEMA 4X rated. Ultrasonic transmitters shall be used in a very limited basis to measure flume or other types of non-control elements. The ultrasonic units will be Siemens/ Milltronics, Endress & Hauser, or STI. Large facility or critical system level measurements will be taken with a Bubbler system. The Bubbler system shall consist of the following equipment: differential pressure transmitter, air compressor, air release valve, and a normally closed solenoid valve located just outside the hazardous area boundary. Chart recorders are not required. Float and displacer type level switches will be used in sump pump applications and for

high level alarms. Floats shall be watertight and shall have a diameter of at least 4 inches. Floats shall be internally weighted and mechanically switched. Floats containing mercury shall not be used. Acceptable manufacturers are Siemens or Anchor Scientific. Submersible level unit shall be Endress+Hauser FMX21-66J0/0. Bubbler differential pressure transmitter shall be Endress+Hauser PMC51-DPF0/101.

Variable Frequency Drives

Unless otherwise noted all Variable frequency drives (VFD's) shall be Allen-Bradley Powerflex 753 series with Ethernet and/or DeviceNet connectivity. Drives shall include conformal coating. Other VFD manufactures to be considered are Square-D Altivar 61 series.

8.7 Control Panels

General

Control Panels located indoors shall be painted steel or fiberglass, NEMA 12, as manufactured by Hoffman or equal. Enclosures shall be provided with corrosion inhibitors. Control Panels outdoors will be 316 stainless steel, NEMA 4X, and painted white on the inside and outside. Provide outdoor enclosures with sunshields, thermostatically controlled space heaters, and corrosion inhibitors. Control Panels Indoors in hose-down or corrosive areas should be NEMA 4X, fiberglass or stainless steel. Provide louvers, forced ventilation, or air conditioners as required to prevent temperature build-up within the enclosure and maintain equipment within equipment temperature ratings as required.

Signal Isolation and I/O

Unless otherwise indicated or required for a specific application, all PLC I/O shall meet the following: For lift stations, provide 24-VDC discrete inputs. Provide discrete output modules with dry contact relay outputs rated at 24-VDC. Provide isolated 4-20 mA analog inputs. Except for 4-wire transmitter loops, provide power supplies for all 4-20 mA signals from the control panel. Provide isolated 4-20 mA analog outputs.

Distribute I/O between Modules

To comply with general philosophy of no single point of failure, terminate I/O for related equipment on different I/O modules, where practical. For example, if there are four high service pumps; terminate digital inputs for two pumps onto one I/O module, and digital inputs for the other two pumps on a separate I/O module. When multiple racks are provided, the I/O modules should be in separate racks with separate power supplies.

Panel Power Distribution, I/O, and Loop Powering Practices

Provide individual fuses for each 4-20 mA signal loop. Provide individual fuses for each group of discrete inputs for a common piece of equipment.

Termination of Wiring

All PLC I/O wiring shall be terminated on removable terminal strips on the individual PLC modules that permit removing I/O modules without disconnecting the wiring. Tag and mark all terminal blocks and individual wiring. All wiring from the field shall terminate on separate numbered terminal blocks. Separate groups of terminal blocks shall be provided for the following:

- Discrete inputs
- Discrete outputs
- Analog inputs
- Analog outputs
- Each different voltage level
- Each different voltage source within the panel
- All outside voltage sources of a like voltage level should be grouped together, and shall also be labeled and provided with individual disconnects.

8.8 Lightning Surge Protection and Backup Power Requirements

Grounding Requirements

Provide ground conductors and ground rods adequately sized and in close enough proximity to grounded equipment, including surge protectors, to produce impedance between the connected equipment and ground. For alternating current loads, provide ground and neutral conductors that are no smaller than phase conductors.

UPS Requirements

In general provide either a UPS or battery power back up for all control panels, PLCs, components, computers, and communications equipment. Provide true on-line type UPS that and provides power conditioning to the load and shall automatically revert to line power after batteries are discharged without requiring manual reset for all critical server and control hardware. As a minimum UPSs provided for the "IT SCADA Data Center" will have the capacity for maintaining operation for one hour. For the local PLC monitoring and control, provide battery backup power capable of maintaining the PLC and communications interface in operator for two hours. UPS receptacles to be color coded and identified as for UPS supplied equipment only. Where generators are provided, the UPS shall be powered by the emergency generator bus such that in the event of a power failure the UPS is functional for the duration the emergency generator is operating. Provide UPS power to all communications equipment. It is not intended that printers, copiers, or individual instruments be required to be connected to the UPS system. It is not required that auxiliary control panel components such as space heaters, receptacles, fans, etc. be connected to UPS power. For facilities with several loads requiring UPS power, a single large facility UPS with power distribution to loads is preferred over individual UPS located in panels or equipment enclosures. For UPSs with distribution panels, provide automatic bypass switches and isolation breakers so that the UPS can be isolated and taken out of service for maintenance without disturbing the loads it powers. Where specified, UPSs shall provide auxiliary contact outputs connected to the PLCs for UPS alarms.

Discrete Signal Line Protection

Surge protection is not required.

Analog Signal Line Surge Protection

4-20 mA signal circuits with any portion of the circuit traveling outside a building shall be provided with a surge protective device at each end of the circuit. 4-20ma to fiber convertors shall be used for critical areas where signals emanate from outside to inside a building.

8.9 Cabling and Media Requirements

General

Except for designated direct-burial installations, install all cabling [copper and fiber optic] in conduit. Separate copper and fiber optic cabling. Install fiber optic cable inside inner-duct in conduit. Individual conduit runs shall be kept to a minimum and control cabling may be combined in common conduits and routed to centralized terminal boxes to the greatest extent possible. Wherever combined control cables are split out of a common conduit, provide a terminal box. Note that different control voltages shall not be combined. To minimize the effects of lightning and surges, underground control and communication cabling routed outside the building confines shall meet the following requirements:

- Use fiber optic cable where practical for underground or outdoor communication between PLC components including 4-20ma signal runs.
- Where individual control or monitoring signals must be routed outside, minimize the routing lengths. Evaluate cost effectiveness of installing a separate remote I/O cabinet near the monitored equipment.

Conductor Labeling

Wire labels shall be provided for each individual conductor and multi-conductor cable at all termination points including termination/junction boxes. Handwritten labels are not acceptable. All labels shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or type written onto adhesive labels. Text shall be of a color contrasting with the label such that it is easily read.

Fiber Optic Cable

Install all fiber optic cable with at least 50 percent spare fibers and a minimum of four spare fibers. Provide optical fiber with a core diameter of 50um and a cladding diameter of 125um for all multi-mode installations and core diameter of 9um and a cladding diameter of 125um for single mode fiber optic cable as required. Selection between single mode and multi-mode fiber optic cable will be based on data rate and distance. Terminate all fiber optic cable (including spares) in fiber optic patch panels and satisfy test criteria outlined in specifications. When any fibers in a cable are terminated in a patch panel, terminate all fibers in that cable. All fiber optic cabling and patch panels shall be manufactured by Corning Cable Systems or equivalent.

Instrument Cabling

Provide shielded pair cabling for all analog signal circuits. Instrument Cable: 600-volt minimum insulated shielded cable with two or more twisted No. 16 or No. 18AWG stranded copper conductors; PVC, nylon, or polyethylene outer jacket; and 100% foil shielding. All instrument cabling shall be Belden Model 1118A or 1120A or equivalent.

Fiber Optic Cabling Field Quality Control

Testing shall be done by CONTRACTOR with at least 5 years of experience in testing fiber-optic cabling systems. CONTRACTOR shall test each fiber strand. OWNER reserves the right to have representation present during all or a portion of the testing process. CONTRACTOR must notify OWNER 5 days prior to commencement of testing. If OWNER elects to be present during testing, test results will only be acceptable when conducted in the presence of OWNER. Any fiber-optic cable left non-terminated at the

discretion of OWNER, shall be tested using an adequate light source to determine that all installed strands are not damaged.

Local Area Network and Components

All Local Area Network [LAN] and components shall be listed and rated as “Category 6” and satisfy test criteria specified in specifications. Route cabling to minimize proximity to alternating current (AC) wiring, transformers and lighting ballast. Cabling shall satisfy test criteria for operation at 100 Mbps or better as specified in project specifications.

8.10 Network and Server Rack Requirements

Locate network and computer racks in a physically secure location with access limited to those responsible for operation and maintenance of the components and applications housed in the racks. Provide both adequate, reliable temperature and humidity control and reliable, quality electric power. Also, provide UPS capacity for maintaining operation for a minimum of one hour. Provide a minimum 3 feet of clearance both directly in front and behind the rack. Provide racks with both front and back access for computer and network equipment as required.

Layout

In general, install heavy equipment near or at the bottom of the rack. For racks that require ventilation, install fans or cooling system at the top and bottom. Provide horizontal cable management above patch panels and switches with a minimum of 1 rack-mount unit of cable management for every 2 units of switches and patch panels. Provide vertical cable management along both sides of the rack. Add power strips as necessary to ease access and power cable management. Provide shelves for any equipment that is not rack-mountable. Use shelves that are deeper than the equipment it is supporting. For heavy equipment, include drawer glides.

Power Supply

Provide one or more, as required, dedicated 120V power circuit for each rack. Locate the power distribution panel sourcing the power circuits inside the physically secure space housing the racks served. An automatic power transfer from UPS to line power shall be included.

Security Requirements

Security enhancing features, policies and requirements are discussed below. The scope of the discussion covers equipment, features, and functions that play a role in remote site alarm detection, telemetry, head-end SCADA functionality, alarm processing and notification, SCADA networks, and remote access to SCADA functions.

The ultimate goal of system security is system reliability. The concept of security applied to SCADA system components relates to the imperviousness of system components to unauthorized access and resultant compromise of system reliability and control. It also encompasses the ability to detect and subsequently respond to instances of unauthorized access and system disturbance in order to prevent compromise of system reliability and control. Discussions of SCADA system security invariably lead to discussions of system reliability and visa-versa. Some of the items discussed below may appear to be reliability issues but they also affect overall system security.

Physical Security

Coordinate with Oakland County Maintenance to establish physical security requirements for lift stations and other facilities. For SCADA servers locate all computers in a locked temperature controlled room with reliable conditioned power. Limit access to the IT SCADA Data Center to the staff performing maintenance on the system. All outdoor mounted control panels are required to be pad-lockable and have door switches to indicate intrusion. Control panels at lift station locations are to include a control panel intrusion alarms sent back via SCADA. Video monitoring, when required, is expected to be included for larger view/control type sites that incorporate high speed communication links. When necessary, design video systems to include local digital video recorders with the following capabilities:

1. System to utilize Pelco 8100 Series DVR to match existing Oakland County standards.

Design lighting systems to provide adequate illumination for proper camera operation.

Access control shall include the following:

1. Access Control shall be compatible with existing County AMAG access control system.

Intrusion detection and alarming features:

- Intrusion, motion, fire, and smoke detection devices and logic should be designed into the SCADA system at many sites. These features and related response policies increase the security and reliability of the SCADA system. It is good practice to standardize these functions across similar sites.

Physical security of remote site SCADA components:

- Physical security measures contribute to the overall security of the SCADA system. Potential breaches can result in damage to components resulting in loss of system function as well as unauthorized network access from remote sites with network connectivity. Devin will discuss physical security in detail.

Password Policies and Administration:

- Password protect all PLCs
- Verify and ensure secure login and password administration policy for SCADA network, computers, applications, and remote access.
- Provide multiple levels of user privileges for various SCADA user groups. Limit user group access and functionality to the needs of group members.
- Ensure that a robust and rigorously administered password strength and rotation policy is followed.
 - Minimum password complexity requirements
 - Rotate passwords on a schedule.
 - Change passwords when key personnel leave the organization.

- Business Domain membership and administration of SCADA computers from the Business Domain is not always recommended.

SECURE SCADA Operations Control Center (SOCC) Equipment:

- Locate SCADA workstation displays so they cannot be viewed by unauthorized people or the general public.
- Configure automatic inactivity logout of SCADA view applications. Automatically log out administrator, supervisor, and operator level SCADA users and login a default view only user after a specified period of inactivity.
- Automatically switch SCADA computers to locked screen saver display after a period of inactivity and require an authorized Windows user to unlock the computer to bring the display up. If this is not acceptable to Operations staff, then switch to locked screen saver after hours.
- Configure SCADA "server" and WIN911 auto dialer software for redundant automatic backup. This increases the reliability of remote site intrusion notification as well as overall system function.
- Locate core SCADA and telemetry hardware components in a physically secure location. Provide "client" workstation computers in operations, engineering, and management work areas as needed. Core components include SCADA "server" computers, Historical data server computers, SCADA network equipment, remote access equipment, and head-end telemetry equipment.
- Provide uninterruptible power systems for head-end SCADA and telemetry equipment. This enhances the reliability of security functions as well as overall system function.
- Verify that antivirus software virus definitions are up to date on SCADA computers. Disable automatic updates. Implement manual update policy.
- Disable internet connection for all SCADA computers unless proper security measures have been implemented.
- Disable remote management and control functions on all SCADA computers.
- Disable automatic update functions on all SCADA computers. Implement manual update policy. Verify that SCADA computer operating systems are kept up to date with the most current security updates, patches, and service packs that are supported by the SCADA software manufacturer by first testing them on a test environment computer before deploying on the live system.

Network and Computer Security

Provide SCADA network and computer security in compliance with industry standards. Network and computer security includes access control, virus protection, and intrusion detection and prevention. Access controls include controls provided by network appliances such as routers and firewalls, user authentication and role-based access limitations, as well as appliance and operating system configuration to disable unnecessary or high risk services, limit access, and establish secure user names and passwords. Design to coordinate with OCIT to establish secure networks and computer systems.

SCADA Network Security

- Separate the SCADA network from the County enterprise network with an appropriately configured firewall and/or router.

- Firewall all SCADA system remote access methods. Comply with IT department security standards.
- Do not use PC Anywhere or similar for remote access to SCADA computers.

SCADA Computer Security

- Install the two redundant SCADA machines in physically separate locations with separate power source and network data connections.
- Redundant service, media, and equipment for WIN911 would enhance reliability of alarm notification functions. An alternate dial-out channel such as a cell modem could provide a back-up call out communications channel.
- Deploy network security scanning software to enhance network security. Network security scanning software could be installed to enhance security of the network and provide intruder alerts. This software provides network scanning, intrusion detection and alarming, which will detect unauthorized users on the network and provide alarms to the responsible IT organization. Network security scanning software can analyze the operating systems and applications running on the network to identify possible security holes and alert administrators to the detected vulnerabilities. The software can scan the entire network, IP by IP, and provide information such as service pack levels, missing security patches, wireless access points, USB devices, open shares, open ports, services and applications that are active, key registry entries, and weak passwords, users and groups. Network security scanning software can provide filter and reporting tools to aid administrators in proactively securing a network. It can provide patch management functions that can be used to manually or automatically acquire and deploy detected missing patches, service packs, etc. An example software is [GFi Language](#).
- Deploy network change auditing software to enhance the security of network device configurations. Network change auditing software can be used to further secure networks. Change auditing software can provide change auditing across multiple vendor servers, desktops, directory servers and network devices. Change auditing software can independently detect both automated and manual changes, reconcile detected changes with authorized and intended changes, and graphically report on desired and undesired change status. The software can assess system damage after an attack or an unintended change, report files and configurations that need to be repaired, and rank violations by relative severity. Change auditing software can provide notification of all undesired changes, according to severity, and can show who made the change, what change was made, and when and how the change was made. The software can provide change-auditing security for files, directories, registry settings, directory server objects, and configuration files on servers, desktops, and network devices. It can provide quasi real time notification (e-mail, etc.) to alert administrators of intrusion into critical files. An example software is [Tripwire Enterprise](#).
- Deploy change management for automation systems software to enhance the security of the SCADA system configuration files. Software products are available that can reduce the vulnerability of automation system program and configuration files to unauthorized change or corruption. Change management software can provide change auditing and disaster recovery for automation systems through security, version control, audit trails, central storage, and automated backup and recovery. Change management software can provide protection for software configurations on SCADA systems and PLCs. Change management software can detect

and prevent unauthorized changes and access requests. An Example is G.E. Proficy Change Manager or Rockwell FactoryTalk Asset Manager.

- Consider adding a dedicated security application server machine to the network environment as security tools are added.

8.11 Network and Other Communication Requirements

Overview

The following three types of networks are anticipated:

1. Local area networks (LANs) at IT for interconnecting the SCADA server components, the WRC Offices for interconnecting HMI SCADA client and terminal client components, at WRC Maintenance for interconnecting the HMI terminal client computers, at view/control sites for interconnecting card access, video DVR and SCADA wireless access point and at the Radio Concentrator sites for interconnecting the control PLC's and Ethernet radio equipment.
2. Wide area network (WAN) consisting of a mixture of fiber optic and digital T1 speed communication media to interconnect the radio concentrator sites to OAKNet.
3. A digital cellular wireless network (optional) to provide a backup connection method from the radio concentrator sites back to OCIT.

Local Area Networks

Provide LANs that offer 100 Mbps full duplex speed in all areas. For LAN components installed outside temperature controlled environments, use industrially hardened appliances. For lift stations provide a single industrially hardened switch supporting necessary protocols and suitable for installation in the lift station environment. There may also be site applications where a wireless LAN (WLAN) alternative is adequate and cost effective. Switch manufactures shall be Cisco, Rockwell or Hirschmann.

Wide Area Network

Provide a WAN supporting IP protocol. Work with Oakland County IT and data communications network providers to select a product that satisfies SCADA needs including providing adequate capacity, ability to handle internet protocol (IP) traffic, acceptable reliability and reasonable cost.

SCADA Data Server Center (SDSC)

The initial planned data rate requirement is 55.0 Mbps or faster.

WRC Maintenance

The initial planned data rate requirement is 10.0 Mbps or faster.

SCADA Operations Control Center (SOCC)

The initial planned data rate requirement is 55.0 Mbps or faster.

Radio Concentrator Sites (RCS)

The initial planned data rate is 1.5 million bits per second (Mbps) using a service such as T1. Advantages of this interface include scalability flexibility, and life-cycle cost effectiveness.

Digital Cellular Network

Provide Verizon Cellular data connection for temporary backup communication links between the SDSC and each of the RCS sites. Typical average user throughput speeds for 3G cellular data connections are approximately 1.4 Mbps download and 800 Kbps upload. Products such as Cisco Routers with third generation (3G) high-speed interface card (3G HWIC or equivalent) provide IPsec and GRE tunneling to ensure that data is secure from unauthorized access.

Deployment considerations are as follows:

- Verify received signal strengths are greater than -80 dB at Radio Concentrator sites.
- Deploy as a secondary WAN connection (Primary is T1)
- Implement Verizon Wireless Private Network capability with fixed-end connectivity solution (FECS) that provides several application management alternatives including:
 - Traffic segregation with FECS helps reduce the risk that exists on unprotected public networks and access through public gateways.
 - Implement additional security measures by using VPN and IPsec.

Investigate the possibility of on-demand service level agreements that may lower cost based on total usage (low) or other method of reoccurring charges. Router could be portable and deployed only when the primary communication interface is down.

8.12 Functional Requirements

General Requirements

Requirements for environmental, physical security, reliability and redundancy apply equally to all computers, communications and network equipment. Requirements for pump stations and PLC equipment located in electrical rooms and process areas differ and are addressed individually.

Local Autonomous Control

At local equipment control panels or motor control centers, provide stand-alone, local autonomous equipment control such that the equipment is not dependent on communications links or operator intervention. It is intended that all automatic control and equipment sequencing be accomplished through the PLC controllers. It is intended that all equipment sequencing for motor restart after a power outage be programmed into the PLC.

Hard-Wired Backup Control

Hard-wired backup controls are not required for most equipment, but need to be evaluated on a site by site basis. Specifically, pressure switches or float backup on the pump systems to provide hard-wired logic to maintain pump station operation in the event of a PLC malfunction.

Local Manual Control

The local control panel or motor control center operator interface will provide for local manual equipment control that will override PLC control. It is intended that local manual control will be used primarily for maintenance functions and/or emergency situations and not operation. Hardwired safety interlocks such as HIGH motor temperature or high vibration will prevent manual equipment operation.

Equipment Protection and Safety

In general hardwire protective devices which are required for electrical protection and personnel safety directly into individual equipment controllers or starters to eliminate reliance on PLCs controllers.

Maintained Versus Momentary Controls

It is intended that all discrete outputs from the PLCs controllers to individual equipment controllers be maintained contact outputs such that seal in contacts are not required in the control circuit.

PLC Monitoring of Equipment Status

As a minimum, each equipment controller shall provide maintained contacts to the PLC to monitor each of the following:

- Equipment Running
- Equipment in Auto
- Equipment Fail
- Equipment Open/Closed

Control of Variable Speed Drives

Use smart Fieldbus interfaces such as Ethernet or DeviceNet to variable speed drives for speed monitoring and control, status monitoring, and drive control, as well as for monitoring other useful information such as motor current and drive diagnostics. In general, provide local manual control at the drive. However, some critical applications may require local manual start/stop or even speed control at the located at the equipment.

Local Operator Interface

In general, local operator interface requirements shall be evaluated on a case-by-case basis. However, for large pump stations or small plant process applications provide local operator interfaces that, as a minimum, include the following indicators and controls:

- a) Failure Alarms
- b) Motor Elapsed Runtimes
- c) Pump Running
- d) Motor Current Indication
- e) Wetwell Level Indication
- f) Wetwell HIGH and LOW float alarms
- g) Station Pressure (suction & discharge if applicable)
- h) Station Flow

Remote Operator Interface

Remote operator interface requirements include provisions for HAND/OFF/AUTO (HOA) selectors for remote manual override control and duplication of the indicators and controls of the local operator interface. Also provide any additional monitoring and control displays and pop-ups required to support automated sequencing and analog control. Implement operator interface units that allow standard HMI software to be deployed. Custom one off units shall not be used.

8.14 System Alarming

Alarm Conditioning

Alarm conditioning in addition to that provided by each PLC will be required to account for conditions external to the facility and to further reduce nuisance alarms and improve alarm response. For example, suppress FAIL alarms for equipment for which the power has failed. Provide supervisor adjustable delays to reduce nuisance alarms for analog variables. Develop specific alarm conditioning rules during design and finalize them during construction. The goal is that any critical alarm requires immediate attention and that other alarms require timely action. Log events or low priority alarms that aren't annunciated for which a response can be scheduled.

Logical Alarm Summary Displays

A logical alarm summary presentation on alarm summary displays is required to ease the decision process during emergencies.

Alarm Prioritization

Alarms prioritization is required with only critical and important alarms presented on alarm summaries. Log other, lower priority, alarms and place them in categories such as facility location, Plant Capacity, etc. to ease performance analysis and maintenance scheduling.

8.15 Trending and Reporting

Historical Trending

Easy access and flexible graphical presentation of historical trend data over the last four years is required to support operational analysis and maintenance planning. To prevent loss of data provide an automated easy to use process for periodically archiving historical trend data to removable media.

Historical Data

Provide dual, redundant historical data collectors on two of the SCADA server nodes to be located at OCIT. Data collectors will collect plant historical data even if the historical data server is not running (down) and will store then forward the data upon restoration of the Historical data server.

Database Interface

The historical database is expected to be off the shelf standard manufactures data Historian product with a proprietary interface exclusive of that manufacture. The data Historian will then be customized with procedures to import existing data historical, import sewer metering data, import DWSD Whammer

data, etc. Data will first need to be normalized and reviewed before import. Data normalization and review procedures will need to be developed during the software design phase.

CMMS (CAMS) Interface

It is possible that a computerized maintenance management system (CMMS) or other information management system interface will be required for the historical data servers to support preventative maintenance scheduling. Interface solutions to the existing CAMS system will be studied during the software design phase. We already know that the selected HMI software from Rockwell automation has a direct to ESRI database connector tool that will allow data exchange between the SCADA Historian and the CAMS system.

Reporting Application

Provide a single reporting application for producing reports from the SCADA data Historian.

Operation Reports

Work with County staff to determine operational reporting needs and develop an automated system for producing reports using the SCADA historian. Determine which report variables are measurements and which must be manually entered, for lab analysis for example. Configure the historian to provide forms for manual data entry and for maintaining the manual entries in the historical data records.

Reporting

Work with Oakland County staff to determine regulatory reporting needs and develop an automated system for producing reports using the SCADA historian. For the sewage collection systems regulatory reports are generally required for overflow type and chemical usage events, etc. Internal management reports are needed that summarize periodic collection system performance.

8.16 Access for Operators and Maintenance Staff

Notification of Critical Alarms

Mobile operators and maintenance staff need to receive notification of appropriate critical alarms.

Critical Alarm Delivery Method

A flexible system that is capable of being operator configured (or reconfigured) is required for forwarding appropriate critical alarms to appropriate County staff. Initially, the most likely method of delivery will be text messaging or email to cell phones "Smart Phones".

Critical Alarm Assignment Method

An easy to use configuration tool is needed for selecting critical alarms for mobile delivery and assigning those alarms to one or more County staff.

Mobile Laptops

Provide maintenance staff with mobile laptop computers and digital cellular wireless cards linking the cards to the private digital cellular network for use in monitoring & control of the system as well as monitoring and adjusting system performance. These laptops will use terminal server client access to

the SCADA terminal server to display graphics displays, view process trends, and review alarm summaries.

8.17 SCADA System Service, Support, Upgrade and Migration

System, Service, Support, Upgrade and Migration Schedule

Provide a projected schedule of recurring expenses for system service, support, upgrade and migration to the County for use in preparing annual budgets. Provide a schedule that can be easily updated by staff on an annual basis to make adjustments as necessary expenses and expense costs vary. Prepare a draft schedule early in design so that the County can consider these costs when making technology and equipment selections. Update the schedule routinely throughout design and construction of the SCADA system. Include all of the items listed below, as well as any others that are being considered for the SCADA system. Work with providers and manufacturers to determine the appropriate service/support product suites for the County and in developing service agreements covering services provided, performance parameters, and emergency response times.

Service

Service fees include monthly fees for items such as out-sourced communications links, as well as annual hardware and software service agreements.

Support

Support is needed for repair, upgrade and routine maintenance of specialty SCADA hardware and software such as computers, PLCs and HMI software installed at County facilities. Support is routinely delivered by technicians and engineers that actually visit the site to perform physical inspection, maintenance, repair and upgrade. Tetra Tech recommends that most of these items be handled by Oakland County maintenance staff. Some support services, such as software service patch installation, may be delivered by remote software professionals under County supervision using secure communications links from our remote offices in Ann Arbor.

Upgrade

Periodic upgrades are needed to keep hardware and software current. Upgrades are less frequent, more expensive and better scheduled than system support work. Upgrades usually require outages and configuration adjustments. To reduce disruption typically one of several workstations or redundant servers is upgraded and put back on line before others are upgraded. Utilizing virtualization (VMware) on critical server computers will allow the fastest turn-around time of any major hardware upgrade or repair.

Migration

Migration is needed to allow moving from one application, platform, service, topology or media to a replacement application, platform, service, topology or media. Migration needs usually are driven by technological advancement, market conditions or evolving end user needs. Again the planned usage of virtualization will minimize down-time and be less costly to maintain over the equipment life-cycle.

8.18 Application Programming Requirements

General Requirements

Develop detailed control descriptions in accordance with these design criteria.

- PLC application programming
- HMI application programming
- Historian programming
- Web/Reporting programming

NEED TO ENHANCE THIS SECTION BASED ON SOFTWARE SELECTION

8.19 Drawings and Control Strategy

General

Provide design and construction documentation conforming to the following standards. Inclusion of detailed PLC panel drawings in the Contract Documents is intended to clarify requirements for bidders providing more competitive bids. Tetra Tech prides itself on providing some of the most detailed electrical & Instrumentation design drawings in the industry.

Drawings

Loop Diagrams

Detailed loop diagrams shall be provided for all control loops. At a minimum, the following information will be included on the loop diagrams.

- Specific location of each device, such as area, panel location, racks number, etc.
- Instrumentation, equipment, and component descriptions, manufacturers, and model numbers.
- Signal ranges and calibration information.
- PLC related items such as Input/Output (I/O) type and address, PLC rack number, PLC slot number, PLC point number, PLC name/number, and PLC equipment manufacturer and part numbers.

Ladder Logic Diagrams

Electrical ladder diagrams will not be included as part the detailed design drawings, instead full ladder logic documentation will be part of the programming standards manual, software operations manual and finalized PLC ladder logic printouts.

Interconnection Wiring Diagrams

Interconnection wiring diagrams for control panels and PLC enclosures shall be provided. The interconnection wiring diagrams are to show the control panel internal wiring and the associated interconnections with field elements and equipment. "Typical" diagrams or "typical" wire lists may not be used; show each circuit individually. The diagrams will depict the complete interconnection wiring.

As a minimum, the interconnection wiring diagrams will show the following.

- Panel instrumentation and control components' tag number, description, terminals, and scale range.
- Internal terminal strip number and terminal number assignments
- Internal wire number assignments
- General location of devices such as field or panel
- All point-to-point interconnections with identifying numbers of electrical cable or wire
- Field element tag number, description, terminals, location (e.g. "FIELD", enclosure, MCC number), and signal range and calibration information (such as set-points)
- Circuit name or field wire numbers for wires entering or leaving a panel
- PLC related items such as Input/output (I/O) type and address, PLC rack number, PLC slot number, PLC point number, PLC location, and PLC component part numbers.
- Overall panel power wiring showing primary source of panel power, voltages, branch circuits, and power connections to panel and field devices.
- Energy sources of devices (field, panel, or otherwise) such as electrical power. Identify voltage and other applicable requirements. For electrical sources, identify circuit or disconnect numbers.

Panel Layout and Schedules

Detailed drawings of the construction and layout of all control panels and PLC enclosures will be provided.

The drawings will show the following.

- Scale Drawings: Show dimensions and location of panel mounted devices, doors, louvers, and subpanels, internal and external.
- Construction Details showing panel NEMA rating, enclosure dimensions, panel configuration (e.g. type of mounting), panel material, internal backplate dimensions, and other construction details.
- Instrumentation and control components schedule include item number, tag designations, nameplate inscriptions, instrument scale, and any other special information and remarks required for clarity.
- Some drawings may include Bill of materials indicating item identifier, tag number, description, manufacturer, model number, and quantity.
- Construction Notes: Panel wire color schemes, wire and terminal block numbering and labeling scheme.

Cable Routing

Drawings will provide sufficient documentation to illustrate data cable routing and installation conformance to cable, PLC, communication hardware manufacturer installation specifications and requirements.

Typical Mounting and Installation Details

Typical mounting and installation details shall be developed for all instruments and control system components. To maintain quality and consistency, these details will be used whenever possible.

Provide enough detailed information to avoid confusion and prevent field instruments and panels from being improperly mounted, installed, and used.

Floor Plans

Develop floor plans for all new and modified control rooms.

Location Plans

Develop location plans which show locations of instruments, panels, and equipment.

Control Strategies / Loop Descriptions

During software development Tetra Tech will develop control narratives documenting each individual process as controlled from the PLC. The narrative will be a concise, easy-to-follow description of the control sequence, algorithm, and interfaces with other strategies and equipment. Narrative descriptions may be supplemented by logic diagrams when appropriate.

8.20 Testing Procedures

General

Factory Tests will be incorporated into all work. All tests performed may be witnessed by a representative of the County staff. Submittal requirements for each set of tests include draft test procedures, final procedures reflecting County review comments and completed test documentation including the initials of the person completing the tests and the signature of the witness.

Pre-Qualification

Implement component/contractor pre-qualification. This step will help ensure the compatibility of system components. Component functionality, record of performance and distribution and support network will be the major factors considered.

The following items may undergo pre-qualification:

- Programmable Logic Controllers (PLC's)
- Human-Machine Interface Software (HMI)
- Computers/Peripherals
- System Panel Builders
- Primary Elements

Factory Test (FT)

Test fabricated panels, enclosures, and systems at their assembly location. Hardware testing to verify system wiring, layout, workmanship, and appearance of completed control panels. Demonstrate correct function of inputs and outputs using a hardware or software "mimic board." Perform a PLC load test to verify that outputs can be driven at full load simultaneously. Communications tests to verify inter-processor messaging via network links. Control logic tests begin with loading ENGINEER-developed ladder logic software. Control logic and sequences will be tested and verified using a "mimic board."

Operator interface integration test builds upon previously completed phases by exercising entire system from the data management computer.

8.21 Operations and Maintenance Manuals

Provide Operations and Maintenance Manuals in electronic form for all work. Provide manuals with enough detail to allow operation, removal, installation, adjustment, calibration, maintenance and procurement of spare parts for each component.

8.22 Training

Training plans for County employees will be developed during the design phase. It is anticipated to include the following manufactures and engineer conducted training.

Manufacturer’s training classes:

- Basic level application programming training on manufactures specific software. Training classes will be more generic in nature and allow County staff to learn specific skill sets to maintain system applications.

Training conducted at Tetra Tech Training facility or on the County’s live system:

- Maintenance and applications programming training for PLC and HMI software specific to County’s system. This includes training of the HMI graphical user interface and PLC systems already developed and operational. Provides application specific training in the use of the graphics development environment, report production, trending, historical data collection and storage, and other custom software and programming associated with this implementation. May include on/off-site training for up to 15 of the County’s staff.

8.23 Spare Parts and Maintenance Agreements

Spare parts and maintenance support requirements will be determined during design.

8.24 SCADA Test Environment

The ideal environment to assess the SCADA is a safe (non-production) configuration. However, it is also desirable to have all connecting components and functionality available in order to confidently assess full system interoperability. This includes everything from the data historian & SCADA servers all the way down to the data collectors and RTU’s. An RTU is used in SCADA systems at a remote location to collect and transmit data back to the control room, as well as receive and implement operator commands from the control center. Ideally, these components are configured with actual signals for the assessment, although emulators and simulators will most likely be necessary. The ability to establish a typical SCADA installation allows the assessment team to more accurately test and make recommendations on the configuration and deployment of a representative production system. Understanding the system configuration is key when deciding where the biggest risks in the system may reside and, therefore, which potential vulnerabilities are top priority. The assessment team must know where and how a SCADA system element typically connects to such things as the Internet, third-party

networks such as T1, radio and cellular, and end-point RTUs. Any of these elements being accessed from outside the SCADA network, such as the Historian database or other reporting sub-systems, should be tested based on its position in the network. Firewall and intrusion detection system configurations should be duplicated in order to test the effectiveness of the perimeter security they provide. Intrusion detection systems can be tested to determine if they detect intrusions into the SCADA system. In general, the firewall(s) implemented within a system enforce the security policy for the SCADA system. Accepted and normal operating procedures need to be known in order to assess the likelihood of an attack being successful. The goal of many attacks is to alter information and/or commands coming into or going out of the SCADA system. A completely functional system, or reasonable representation, provides a realistic assessment environment since complete determination of the results or consequences of an attack is dependent upon all of the interconnected functionalities within the system. For example, assessing a system without a redundant backup system with automatic failover doesn't show how a system which is usually implemented with redundancy responds to an attack.

During the past several years the use of virtual machine software such as VMware or Microsoft Hyper-V have greatly simplified system vulnerability testing by allowing whole subsystems to be testing within one piece of physical hardware.

Vulnerability Testing

Vulnerability tests should be conducted from a computer that is not part of the SCADA system. This replicates a typical attack scenario where the attacker must penetrate the system from a remote computer. Dedicated assessment equipment is also necessary for the assessment to be conducted without interruption. An attack machine with all the tools needed to perform the vulnerability assessment should be available for this work. In addition, a reliable Internet connection for research in the test area makes work more efficient.

The following steps should be implemented:

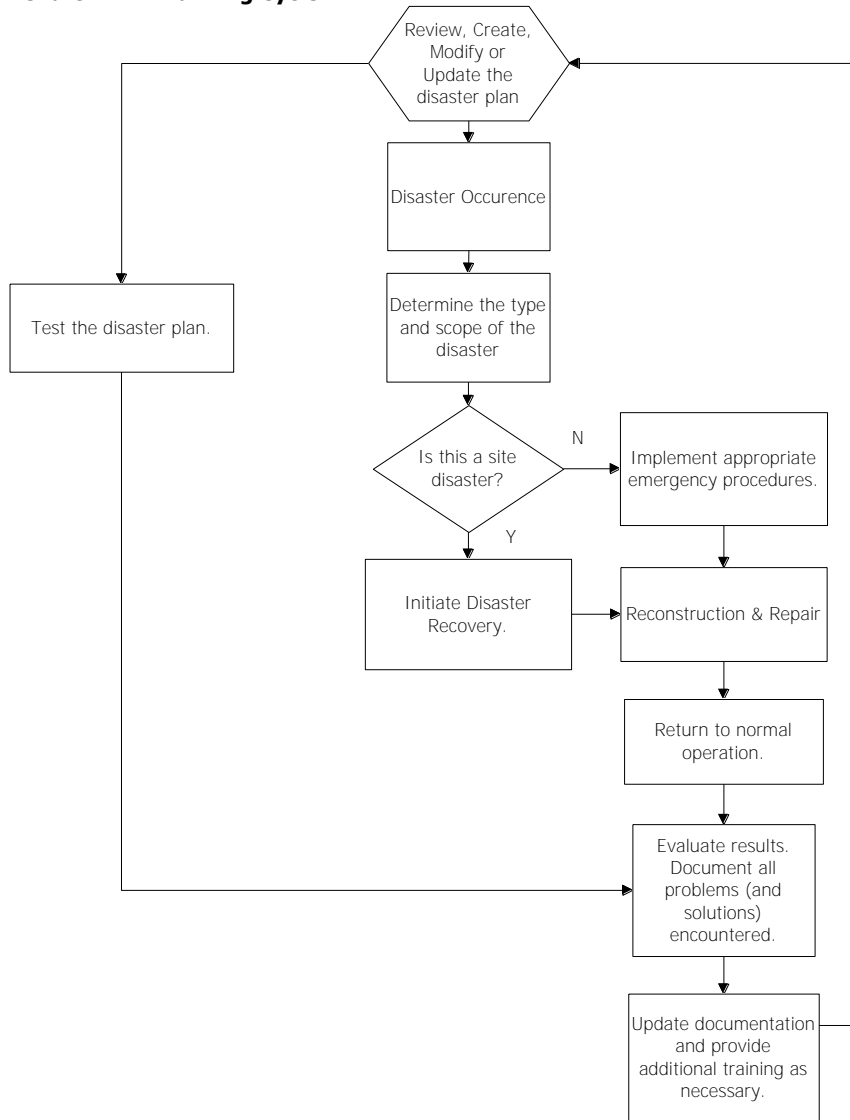
1. Define an assessment plan that includes open port scanning.
2. Dedicate a work area to conduct testing.
3. Contact the software manufacture or vendor to discuss possible system vulnerabilities.
4. Utilize common open source or commercial tools that are useful for assessing SCADA systems.
 - a. Tools: Nessus security scanner, Ethereal protocol analyzer, and Stat Scanner.

8.25 Disaster Recovery Plan

A full disaster recovery plan will be created during the programming phase and thorough testing of the plan will be completed during the final phases of software startup. The final document will outline the disaster recovery plan for the Oakland County SCADA system. The plan will be a set of structured and formalized activities, system procedures and action plans that will be implemented in the event of any

adverse incident that prohibits the normal operation of the SCADA applications. The following chart depicts the disaster recovery planning cycle.

Chart 1: DR Planning Cycle



Disaster Recovery Plan Objectives

The disaster recovery document will outline the disaster recovery plan for the Oakland County SCADA system. The plan will be a set of formalized and structured activities, systems procedure and action plans that will be implemented in the event of any adverse incident that prohibits the use of the SCADA applications.

Expectations

The disaster plan would be implemented in the event that the SCADA system servers and related computer equipment is not operational or severely impaired.

Disaster Recovery Testing

A disaster recovery plan that has not been tested is not a plan. Unless tests are performed to determine the viability of the actions and strategy, the plan will usually not work at the time of the disaster. Plan deficiencies will usually occur despite careful planning. A complete test will include the verification of restored data and the functionality of the application.

Disaster Recovery in Virtualized Environments

Virtualized fault tolerant solutions can ease the disaster recovery planning, implementation and recovery of complex systems. Tetra Tech will work with Oakland County IT's existing procedures to develop a complete disaster recovery plan.

8.26 Drawing Standards

Electrical and Instrumentation details were created for OCWRC and included as part of this study. The purpose of the details is to establish uniformity and consistency with respect to the County's electrical, instrumentation, and SCADA systems. In addition, many consultants do work for the County, so these standards can serve as a basis on what is to be provided so that as new systems are installed, they are compatible and fully integrated into the County's new system.

Below is a listing of the sample electrical drawings:

- E-100 Legend, Notes
- E-101 Panelboard and Sample Details
- E-102 Sample Details
- E-103 Sample Details
- E-104 Pump Control Panel Wiring Diagram
- E-105 One Line Diagram
- E-106 Wiring Diagrams
- E-107 Elevated Storage Tank Plans, Details
- E-108 Wiring Diagrams, One Line Diagrams
- E-109 Low Voltage Power Distribution
- E-110 Pump Station One Line Diagram
- E-111 Motor Control Center Wiring Diagrams
- E-112 Sample Background Plans, Details
- E-113 Power Distribution Plan, Motor Control Center
- E-114 Overall Power Distribution Diagram
- E-115 Power Distribution Plan
- E-116 Variable Frequency Drive Wiring Diagrams

- E-117 One-Line Diagrams-6 pumps Variable Speed
- E-118 One Line Diagrams- Secondary Service
- E-119 Details

Included in the above electrical drawings are examples for power distribution, motor control from constant speed or variable speed operation, equipment wiring diagrams, and construction details. These are applicable to small, medium, and large water or wastewater pumping systems, elevated storage tanks, well houses, and booster pumping stations. These systems can range in size from 2HP up to 350HP.

Below is a listing of the sample Instrumentation drawings:

- I-100 Legend, Notes
- I-101 Pump Control Panel Wiring Diagram
- I-102 System Configuration Drawing, Flow Diagram
- I-103 Pump Station Control Panel Wiring
- I-104 Wireless I/O Diagram
- I-105 Sample P&ID Flow Diagram
- I-106 System Configuration Plans
- I-107 Well Pump Processor Panel Wiring Diagram
- I-108 Well Pump Processor Panel Wiring Diagram
- I-109 Sample Details
- I-110 Sample Details
- I-111 System Configuration Drawing
- I-112 Process Flow Diagram
- I-113 Process Panel Wiring Diagram
- I-114 Process Panel Wiring Diagram
- I-115 Process Panel Wiring Diagram
- I-116 Process Panel Wiring Diagram
- I-117 Process Flow Diagram

Included in the above instrumentation drawings are examples for process flow diagrams (P&ID's), control panel wiring diagrams, system configuration drawing and construction details. These details are equipment specific and indicate the type of SCADA hardware that is to be provided.

These details will be revised and updated as we progress thru the design phase of the current SCADA improvements project.

APPENDIX G –
NOTICE OF PUBLIC HEARING
ADVERTISEMENT

NEWSPAPER CLASSIFIEDS

Client:	1683598	Giffels-Webster Engineers	Phone:	(248) 852-3100
Address:	1025 E. Maple Suite 100		Birmingham, MI 48009	
Ad #	1834730	Requested By:	NIKKI JEFFRIES	Fax:
Sales Rep.:	CC75	Deborah Phillips	Phone:	(248) 745-4523
		deborah.phillips@newspaperclassi-	Fax:	(248) 332-1988
Class.:	1050	Legal Notices		
Start Date:	05/07/2012	End Date:	05/07/2012	Nb. of Inserts: 2
PO #:				Printed By: DPHILL
Publications:	Daily Oakland Press, Daily OP- Internet			
Paid Amount:	\$0.00	Balance:	\$630.24	
Total Price:	\$630.24			Page 1 of 1

NOTICE OF PUBLIC HEARING

The Charter Township of Commerce will hold a public hearing regarding the proposed Project Plan for Energy Cost Reduction and Sewer Overflow Risk Reduction in the Commerce Township Sanitary Sewer System for the purpose of receiving comments from interested persons.

The hearing will be held at 7 p.m. on June 7, 2012, at the Commerce Township Hall, 2009 Township Drive, Commerce, MI 48390.

The purpose of the proposed project is: 1) to reduce the risk and severity of future sanitary sewer overflows; and 2) to reduce energy use in the sewer transportation and treatment system.

Project construction will involve:

1) Newton Road Force Main: Installation of 9,200 lineal feet of 19" inside diameter polyethylene pipe in easements along the west side of Newton Road from Oakley Park Road to the north property line of Multi Lakes Conservation Association, and in easements across Commerce Township Dodge Park No. 5, between Newton Road and South Commerce Road. An additional 2,300 lineal feet of 2" diameter pressure sewer will be placed along Newton Road.

2) Treated Effluent Heat Recovery System at Commerce WWTP: The proposed system will use heat in the treated effluent to heat the buildings at the WWTP.

3) SCADA System: Installation of Supervisory Control and Data Acquisition system to monitor and control 28 existing sewer pump stations.

Impacts of proposed project primarily include temporary construction related impacts along Newton Road and in Dodge Park No. 5.

The estimated cost to users of the proposed project is estimated to be \$1.75/month

Copies of the plan detailing the proposed projects are available for inspection at the following locations:

- * Commerce Township Hall, 2009 Township Drive, Commerce, MI 48390
- * Commerce Township Library, 2869 North Pontiac Trail, Commerce, MI 48390
- * Commerce Township website:
www.commercetwp.com

Copies of the plan detailing the proposed projects may also be available for inspection at the following locations:

- * West Bloomfield Township Hall, library,
- * White Lake Township Hall, library, and
- * Wolverine Lake Village Offices and web site
- * Novi City Hall Clerk's Office, library, and website

Written comments received before the hearing record is closed on June 7, 2012 will receive responses in the final project plan. Written comments should be sent to Commerce Township Clerk, 2009 Township Drive, Commerce, MI 48390. Questions/comments can also be addressed by calling the Clerk at the Commerce Township offices at 248-624-0110.

Publish May 7, 2012

**APPENDIX H –
SEMCOG POPULATION PROFILES**



Community Profiles

Charter Township Of Commerce

2009 Township Dr
 Commerce Township, MI 48390-1666
<http://www.commercetwp.com>



Census 2010 Population: 35,874
 Area: 28.2 square miles

[People](#) | [Economy & Jobs](#) | [Housing](#) | [Transportation](#) | [Land Use](#) | [Reference Map](#)

Interactive Census 2010 Maps: [Population](#) | [Youth Population](#) | [Senior Population](#)

Population Forecast

Source: U.S. Census Bureau and SEMCOG 2035 Forecast produced in 2007-08.
 ↑ - Move cursor over chart to view population numbers

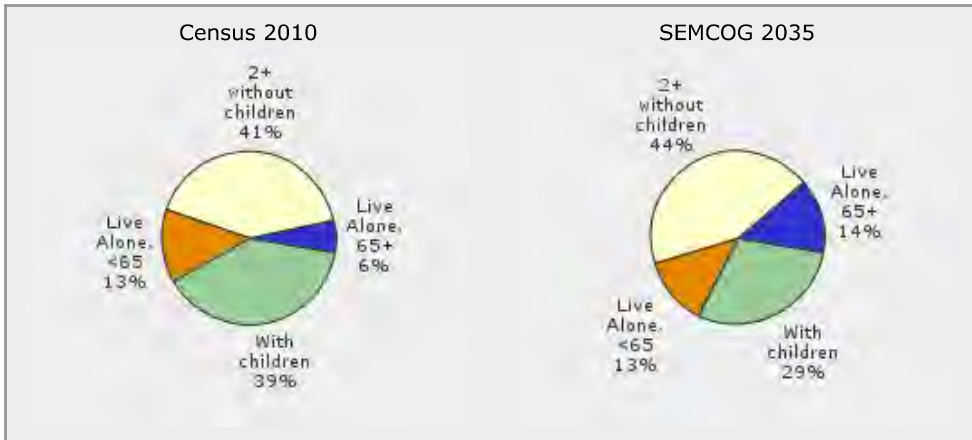
Population and Households	Census 2000	Census 2010	Change 2000-2010	Pct Change 2000-2010	SEMCOG Dec 2011
Total Population	30,349	35,874	5,525	18.2%	36,010
Group Quarters Population	23	70	47	204.3%	70
Household Population	30,326	35,804	5,478	18.1%	35,940
Housing Units	11,191	13,967	2,776	24.8%	14,072
Households (Occupied Units)	10,708	13,220	2,512	23.5%	13,374
Residential Vacancy Rate	4.3%	5.3%	1.0%	-	5.0%
Average Household Size	2.83	2.71	-0.12	-	2.69

Components of Population Change	Annual Average	
	Census 1990-1999	SEMCOG 2000-2009
Natural Increase (Births - Deaths)	243	204
Births	359	357
Deaths	116	153
Net Migration (Movement In - Movement Out)	576	361
Population Change (Natural Increase + Net Migration)	819	565

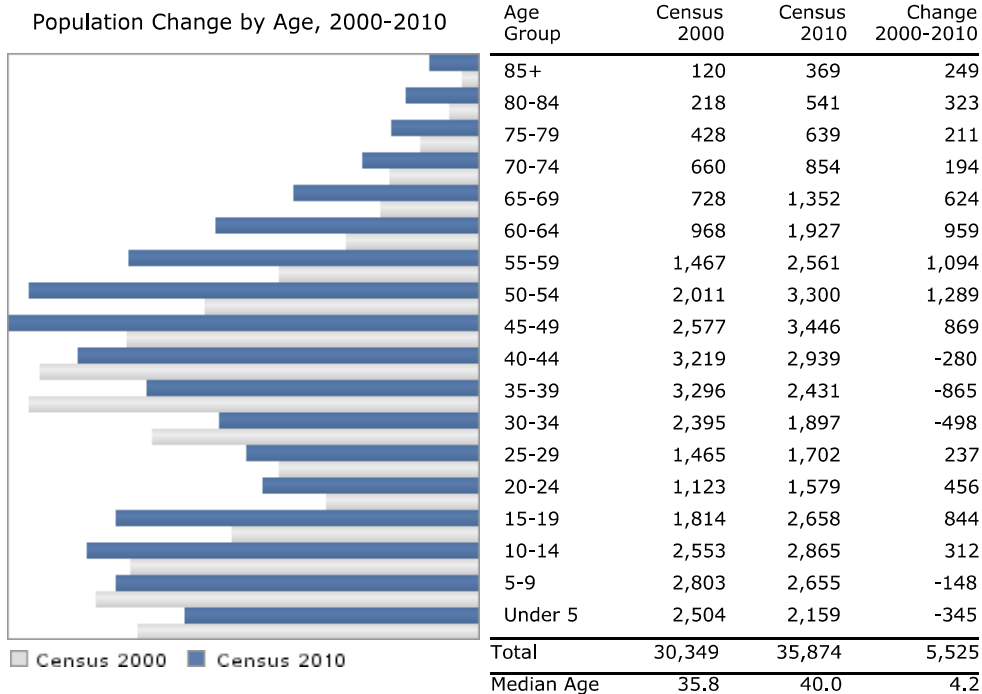
Source: Michigan Department of Community Health Vital Statistics, U.S. Census Bureau, and SEMCOG.

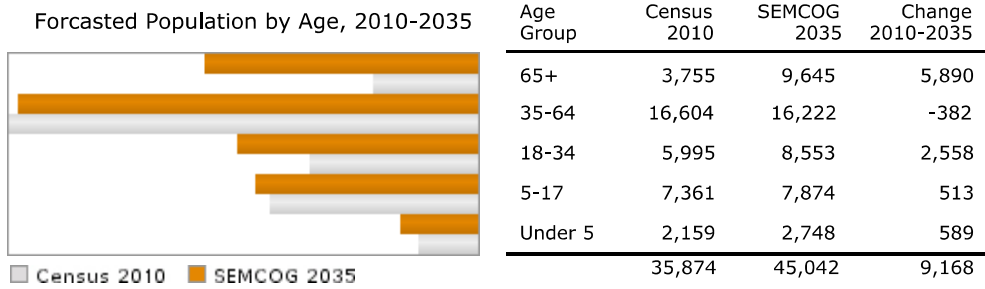
Demographics

Household Types



Household Types	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
With seniors 65+	1,555	2,671	71.8%	6,709	151.2%
Without seniors	9,153	10,549	15.3%	11,802	11.9%
Two or more persons without children	4,102	5,477	33.5%	8,059	47.1%
Live alone, 65+	443	822	85.6%	2,562	211.7%
Live alone, under 65	1,323	1,784	34.8%	2,441	36.8%
With children	4,840	5,137	6.1%	5,449	6.1%
Total Households	10,708	13,220	23.5%	18,511	40.0%

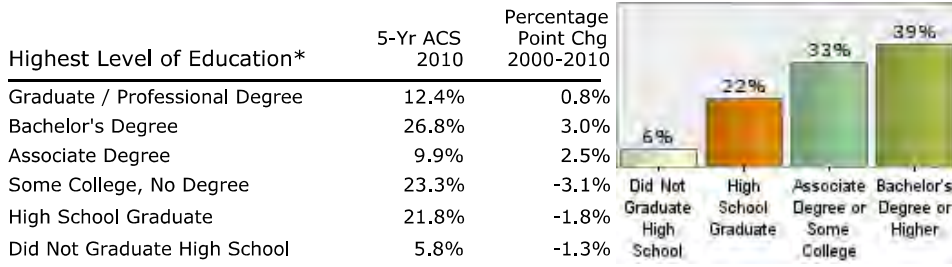




Senior and Youth Population	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
65 and over	2,154	3,755	74.3%	9,645	156.9%
Under 18	9,118	9,520	4.4%	10,622	11.6%
5 to 17	6,614	7,361	11.3%	7,874	7.0%
Under 5	2,504	2,159	-1.1%	2,748	27.3%

Note: Population by age changes over time because of the aging of people into older age groups, the movement of people, and the occurrence of births and deaths.

Race and Hispanic Origin	Census 2000		Census 2010		Percentage Point Chg 2000-2010
Non-Hispanic	29,991	98.8%	34,937	97.4%	-1.4%
White	29,059	95.7%	32,775	91.4%	-4.4%
Black	155	0.5%	608	1.7%	1.2%
Asian	426	1.4%	930	2.6%	1.2%
Multi-Racial	265	0.9%	516	1.4%	0.6%
Other	86	0.3%	108	0.3%	0.0%
Hispanic	358	1.2%	937	2.6%	1.4%
Total Population	30,349	100.0%	35,874	100.0%	0.0%



* Population age 25 and over

Source Data

- [SEMCOG - Detailed Data](#)
- [Michigan Department of Community Health - Vital Statistics](#)
- [U.S. Census Bureau - American FactFinder](#)



Community Profiles

Charter Township Of West Bloomfield

4550 Walnut Lake Rd
 West Bloomfield, MI 48323-2556
<http://www.twp.west-bloomfield.mi.us/>



Census 2010 Population: 64,690
 Area: 31.3 square miles

[People](#) | [Economy & Jobs](#) | [Housing](#) | [Transportation](#) | [Land Use](#) | [Reference Map](#)

Interactive Census 2010 Maps: [Population](#) | [Youth Population](#) | [Senior Population](#)

Population Forecast

Source: U.S. Census Bureau and SEMCOG 2035 Forecast produced in 2007-08.
 ↑ - Move cursor over chart to view population numbers

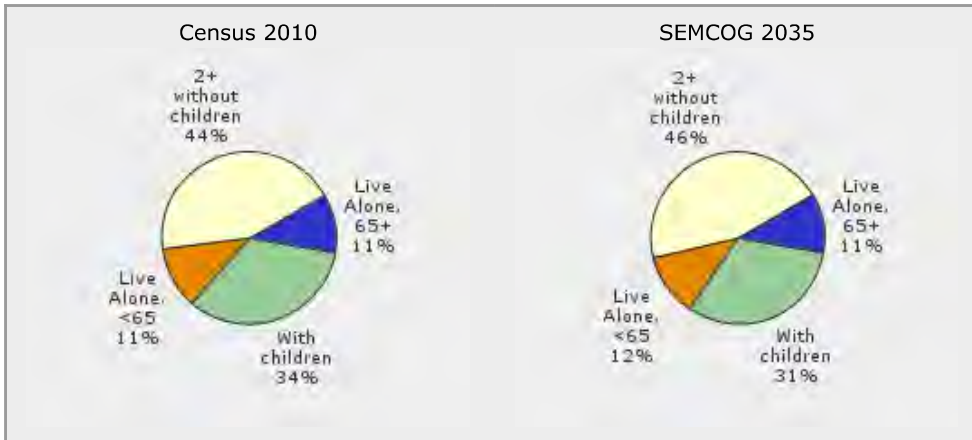
Population and Households	Census 2000	Census 2010	Change 2000-2010	Pct Change 2000-2010	SEMCOG Dec 2011
Total Population	64,860	64,690	-170	-0.3%	64,661
Group Quarters Population	779	610	-169	-21.7%	610
Household Population	64,081	64,080	-1	-0.0%	64,051
Housing Units	24,410	25,813	1,403	5.7%	25,827
Households (Occupied Units)	23,414	24,111	697	3.0%	24,224
Residential Vacancy Rate	4.1%	6.6%	2.5%	-	6.2%
Average Household Size	2.74	2.66	-0.08	-	2.64

Components of Population Change	Annual Average	
	Census 1990-1999	SEMCOG 2000-2009
Natural Increase (Births - Deaths)	358	156
Births	721	644
Deaths	363	488
Net Migration (Movement In - Movement Out)	677	28
Population Change (Natural Increase + Net Migration)	1,034	184

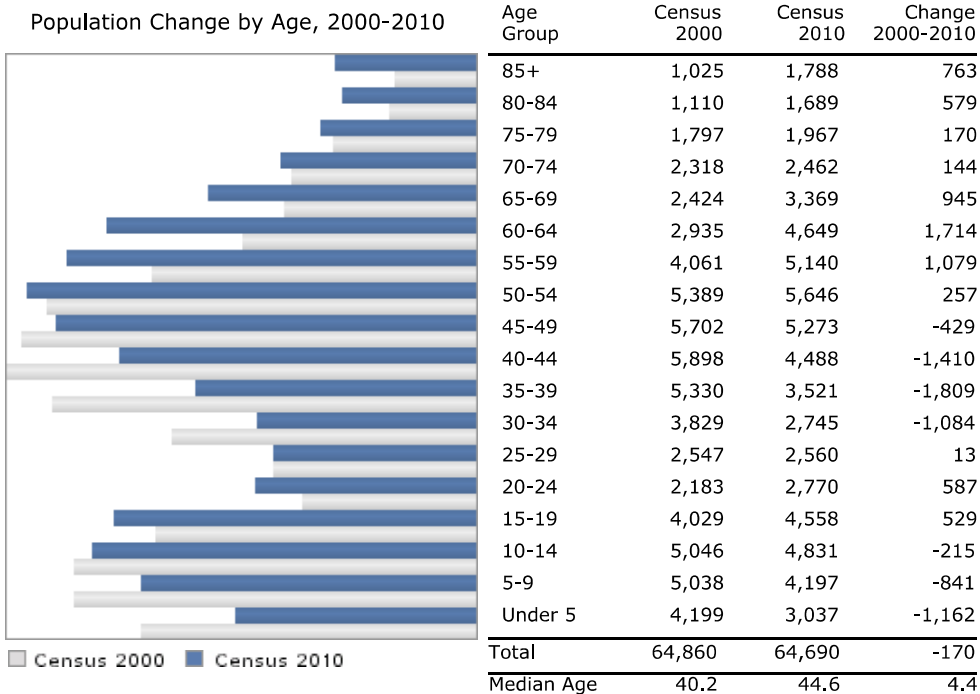
Source: Michigan Department of Community Health Vital Statistics, U.S. Census Bureau, and SEMCOG.

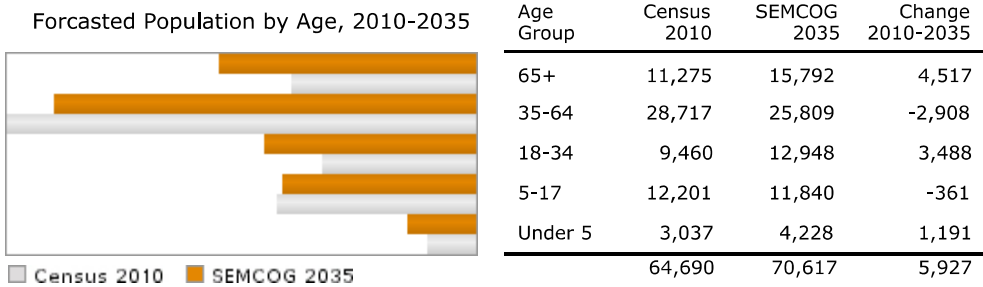
Demographics

Household Types



Household Types	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
With seniors 65+	5,730	7,770	35.6%	9,326	20.0%
Without seniors	17,684	16,341	-7.6%	18,412	12.7%
Two or more persons without children	9,938	10,666	7.3%	12,646	18.6%
Live alone, 65+	1,763	2,625	48.9%	3,097	18.0%
Live alone, under 65	2,776	2,737	-1.4%	3,274	19.6%
With children	8,937	8,083	-9.6%	8,721	7.9%
Total Households	23,414	24,111	3.0%	27,738	15.0%



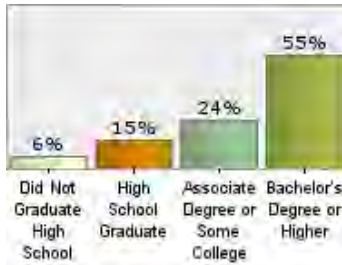


Senior and Youth Population	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
65 and over	8,674	11,275	30.0%	15,792	40.1%
Under 18	17,093	15,238	-10.9%	16,068	5.4%
5 to 17	12,894	12,201	-5.4%	11,840	-3.0%
Under 5	4,199	3,037	-1.8%	4,228	39.2%

Note: Population by age changes over time because of the aging of people into older age groups, the movement of people, and the occurrence of births and deaths.

Race and Hispanic Origin	Census 2000		Census 2010		Percentage Point Chg 2000-2010
Non-Hispanic	63,955	98.6%	63,648	98.4%	-0.2%
White	53,958	83.2%	49,474	76.5%	-6.7%
Black	3,327	5.1%	7,338	11.3%	6.2%
Asian	5,050	7.8%	5,412	8.4%	0.6%
Multi-Racial	1,413	2.2%	1,226	1.9%	-0.3%
Other	207	0.3%	198	0.3%	-0.0%
Hispanic	905	1.4%	1,042	1.6%	0.2%
Total Population	64,860	100.0%	64,690	100.0%	0.0%

Highest Level of Education*	5-Yr ACS 2010	Percentage Point Chg 2000-2010
Graduate / Professional Degree	25.6%	-0.8%
Bachelor's Degree	29.5%	0.7%
Associate Degree	6.4%	1.0%
Some College, No Degree	17.6%	-0.9%
High School Graduate	14.7%	0.6%
Did Not Graduate High School	6.1%	-0.6%



* Population age 25 and over

Source Data

- [SEMCOG - Detailed Data](#)
- [Michigan Department of Community Health - Vital Statistics](#)
- [U.S. Census Bureau - American FactFinder](#)



Community Profiles

White Lake Charter Township

7525 Highland Rd
 White Lake, MI 48383-2938
<http://www.whitelaketwp.com/>



Census 2010 Population: 30,019
 Area: 37.1 square miles

[People](#) | [Economy & Jobs](#) | [Housing](#) | [Transportation](#) | [Land Use](#) | [Reference Map](#)

Interactive Census 2010 Maps: [Population](#) | [Youth Population](#) | [Senior Population](#)

Population Forecast

Source: U.S. Census Bureau and SEMCOG 2035 Forecast produced in 2007-08.
 ↑ - Move cursor over chart to view population numbers

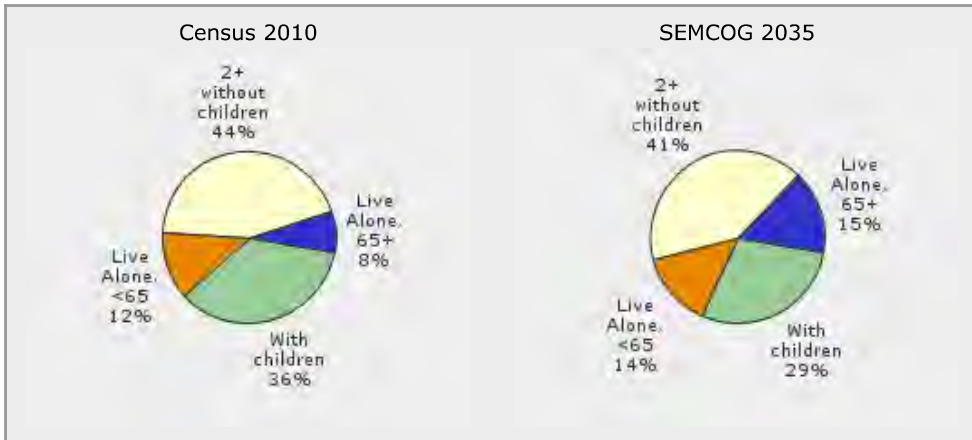
Population and Households	Census 2000	Census 2010	Change 2000-2010	Pct Change 2000-2010	SEMCOG Dec 2011
Total Population	28,219	30,019	1,800	6.4%	30,033
Group Quarters Population	283	76	-207	-73.1%	76
Household Population	27,936	29,943	2,007	7.2%	29,957
Housing Units	10,616	12,214	1,598	15.1%	12,255
Households (Occupied Units)	10,092	11,262	1,170	11.6%	11,347
Residential Vacancy Rate	4.9%	7.8%	2.9%	-	7.4%
Average Household Size	2.77	2.66	-0.11	-	2.64

Components of Population Change	Annual Average	
	Census 1990-1999	SEMCOG 2000-2009
Natural Increase (Births - Deaths)	228	147
Births	365	337
Deaths	138	191
Net Migration (Movement In - Movement Out)	327	-40
Population Change (Natural Increase + Net Migration)	554	107

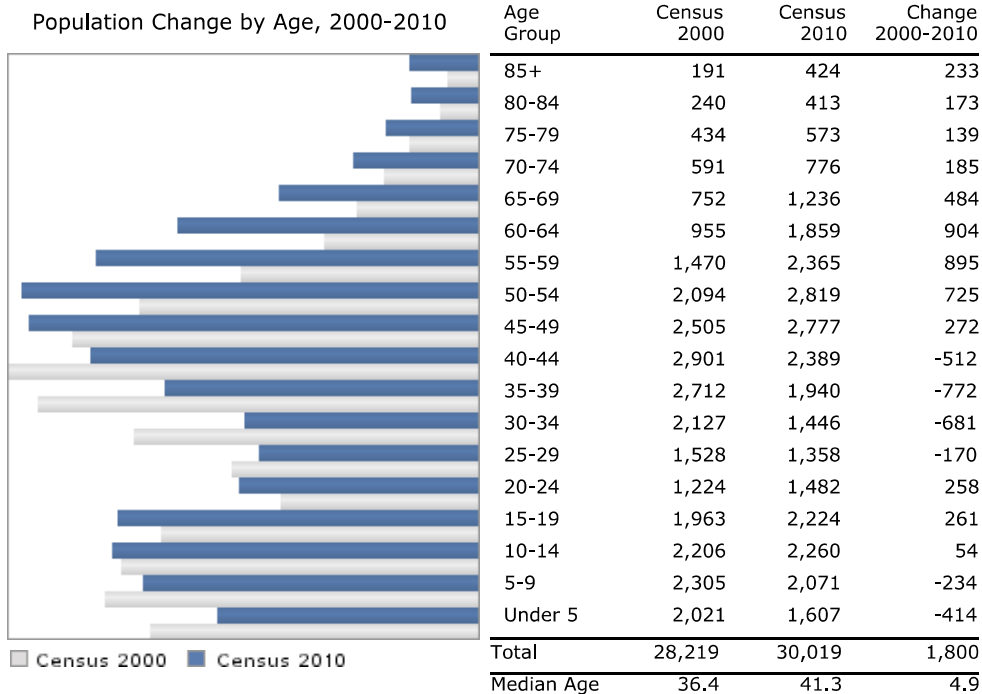
Source: Michigan Department of Community Health Vital Statistics, U.S. Census Bureau, and SEMCOG.

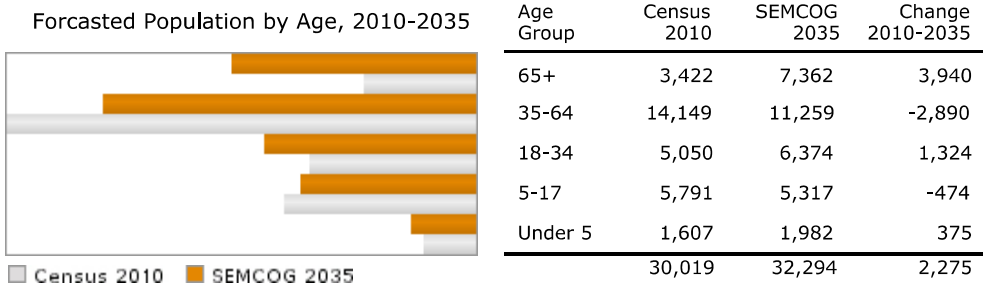
Demographics

Household Types



Household Types	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
With seniors 65+	1,524	2,520	65.4%	4,682	85.8%
Without seniors	8,568	8,742	2.0%	8,530	-2.4%
Two or more persons without children	4,133	4,965	20.1%	5,457	9.9%
Live alone, 65+	450	882	96.0%	2,042	131.5%
Live alone, under 65	1,329	1,406	5.8%	1,859	32.2%
With children	4,180	4,009	-4.1%	3,854	-3.9%
Total Households	10,092	11,262	11.6%	13,212	17.3%

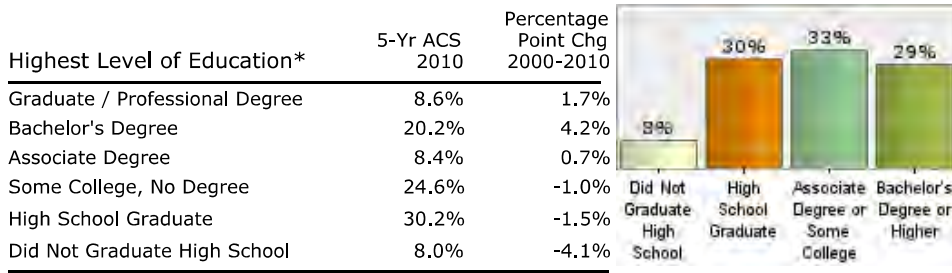




Senior and Youth Population	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
65 and over	2,208	3,422	55.0%	7,362	115.1%
Under 18	7,807	7,398	-5.2%	7,299	-1.3%
5 to 17	5,786	5,791	0.1%	5,317	-8.2%
Under 5	2,021	1,607	-1.5%	1,982	23.3%

Note: Population by age changes over time because of the aging of people into older age groups, the movement of people, and the occurrence of births and deaths.

Race and Hispanic Origin	Census 2000		Census 2010		Percentage Point Chg 2000-2010
Non-Hispanic	27,709	98.2%	29,120	97.0%	-1.2%
White	26,907	95.4%	28,000	93.3%	-2.1%
Black	212	0.8%	321	1.1%	0.3%
Asian	166	0.6%	271	0.9%	0.3%
Multi-Racial	290	1.0%	398	1.3%	0.3%
Other	134	0.5%	130	0.4%	-0.0%
Hispanic	510	1.8%	899	3.0%	1.2%
Total Population	28,219	100.0%	30,019	100.0%	0.0%



* Population age 25 and over

Source Data

- [SEMCOG - Detailed Data](#)
- [Michigan Department of Community Health - Vital Statistics](#)
- [U.S. Census Bureau - American FactFinder](#)



Community Profiles

Village of Wolverine Lake

425 Glengary Rd Ste 2
 Wolverine Lake, MI 48390-1404
<https://mylocalgov.com/WolverineLakeMI>



Census 2010 Population: 4,312
 Area: 1.7 square miles

People
Economy & Jobs
Housing
Transportation
Land Use
Reference Map

Interactive Census 2010 Maps: [Population](#) | [Youth Population](#) | [Senior Population](#)

Population Forecast

Year	Population
1960	2,415
1970	4,415
1980	4,915
1990	4,715
2000	4,415
2010	4,312
2020	4,112
2030	4,112
2035	4,285

Note for Wolverine Lake: Incorporated as of the 1960 Census from part of Commerce Township.
 Source: U.S. Census Bureau and SEMCOG 2035 Forecast produced in 2007-08. ↑ - Move cursor over chart to view population numbers

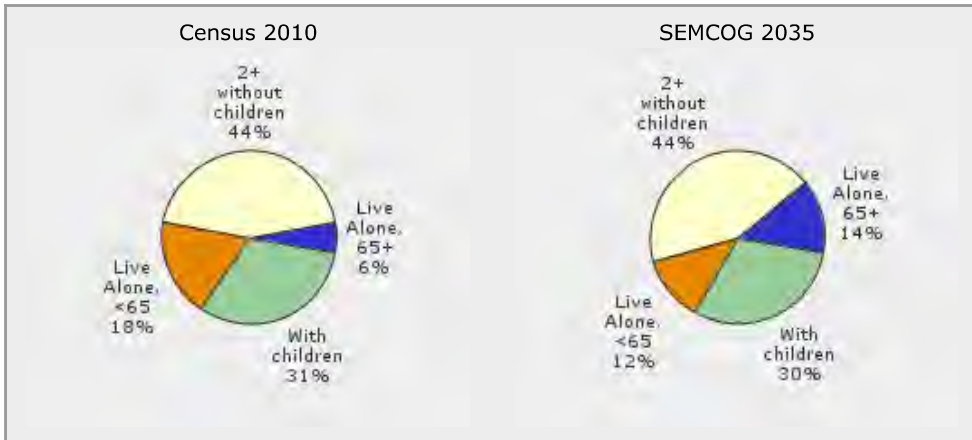
Population and Households	Census 2000	Census 2010	Change 2000-2010	Pct Change 2000-2010	SEMCOG Dec 2011
Total Population	4,415	4,312	-103	-2.3%	4,285
Group Quarters Population	0	0	0	-%	0
Household Population	4,415	4,312	-103	-2.3%	4,285
Housing Units	1,733	1,840	107	6.2%	1,840
Households (Occupied Units)	1,671	1,733	62	3.7%	1,740
Residential Vacancy Rate	3.6%	5.8%	2.2%	-	5.4%
Average Household Size	2.64	2.49	-0.15	-	2.46

Components of Population Change	Annual Average	
	Census 1990-1999	SEMCOG 2000-2009
Natural Increase (Births - Deaths)	22	12
Births	36	31
Deaths	14	19
Net Migration (Movement In - Movement Out)	-53	-33
Population Change (Natural Increase + Net Migration)	-31	-21

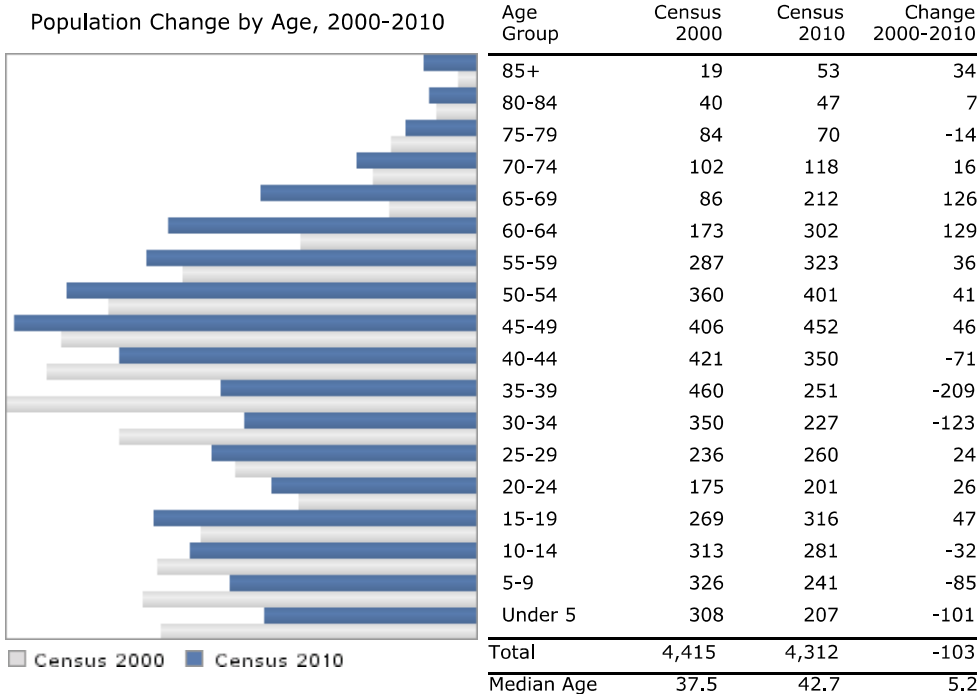
Source: Michigan Department of Community Health Vital Statistics, U.S. Census Bureau, and SEMCOG.

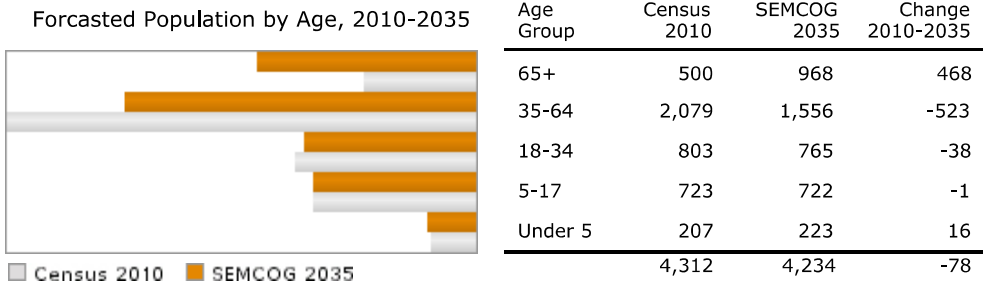
Demographics

Household Types



Household Types	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
With seniors 65+	246	363	47.6%	621	71.1%
Without seniors	1,425	1,370	-3.9%	1,147	-16.3%
Two or more persons without children	697	770	10.5%	771	0.1%
Live alone, 65+	87	98	12.6%	243	148.0%
Live alone, under 65	247	320	29.6%	215	-32.8%
With children	640	545	-14.8%	539	-1.1%
Total Households	1,671	1,733	3.7%	1,768	2.0%

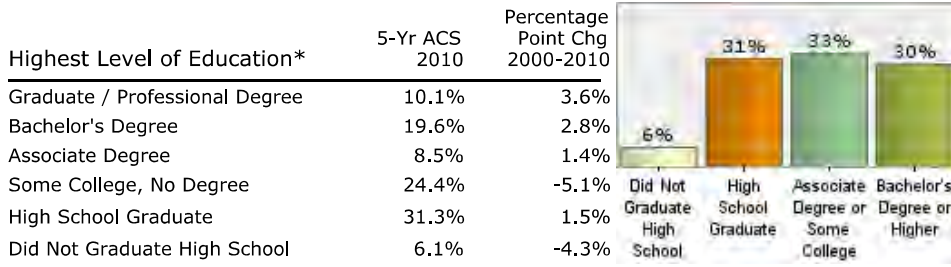




Senior and Youth Population	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
65 and over	331	500	51.1%	968	93.6%
Under 18	1,125	930	-17.3%	945	1.6%
5 to 17	817	723	-11.5%	722	-0.1%
Under 5	308	207	-2.3%	223	7.7%

Note: Population by age changes over time because of the aging of people into older age groups, the movement of people, and the occurrence of births and deaths.

Race and Hispanic Origin	Census 2000		Census 2010		Percentage Point Chg 2000-2010
Non-Hispanic	4,369	99.0%	4,207	97.6%	-1.4%
White	4,284	97.0%	4,062	94.2%	-2.8%
Black	18	0.4%	29	0.7%	0.3%
Asian	22	0.5%	52	1.2%	0.7%
Multi-Racial	34	0.8%	52	1.2%	0.4%
Other	11	0.2%	12	0.3%	0.0%
Hispanic	46	1.0%	105	2.4%	1.4%
Total Population	4,415	100.0%	4,312	100.0%	0.0%



* Population age 25 and over

Source Data

[SEMCOG - Detailed Data](#)

[Michigan Department of Community Health - Vital Statistics](#)

[U.S. Census Bureau - American FactFinder](#)



Community Profiles

City of Novi

45175 W 10 Mile Rd
Novi, MI 48375-3024
<http://www.cityofnovi.org>



Census 2010 Population: 55,374
Area: 31.2 square miles

People
Economy & Jobs
Housing
Transportation
Land Use
Reference Map

Interactive Census 2010 Maps: [Population](#) | [Youth Population](#) | [Senior Population](#)

Population Forecast

Year	Population
1960	~5,000
1970	~10,000
1980	~22,000
1990	~32,000
2000	~45,000
2010	~52,000
2020	~55,000
2030	~65,000
2035	~68,000

Note for Novi: Incorporated as of the 1970 Census from Village of Novi. Population numbers prior to 1970 are of the village. The Village of Novi was incorporated in 1958 from the majority of Novi Township. Population numbers not available before 1960 as area was part of Novi Township.
Source: U.S. Census Bureau and SEMCOG 2035 Forecast produced in 2007-08. ☞ - Move cursor over chart to view population numbers

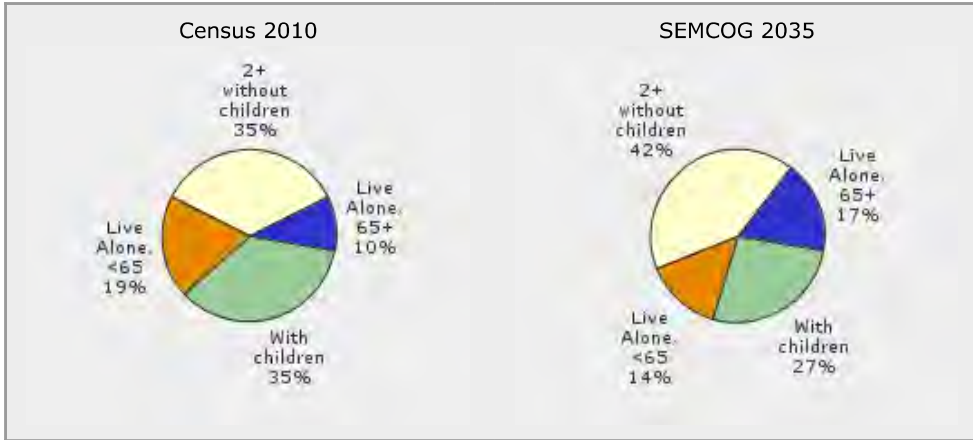
	Census 2000	Census 2010	Change 2000-2010	Pct Change 2000-2010	SEMCOG Dec 2011
Population and Households					
Total Population	47,579	55,374	7,795	16.4%	56,062
Group Quarters Population	267	360	93	34.8%	360
Household Population	47,312	54,864	7,552	16.0%	55,702
Housing Units	19,717	24,286	4,569	23.2%	24,579
Households (Occupied Units)	18,792	22,317	3,525	18.8%	22,680
Residential Vacancy Rate	4.7%	8.1%	3.4%	-	7.7%
Average Household Size	2.52	2.46	-0.06	-	2.46

Components of Population Change	Annual Average	
	Census 1990-1999	SEMCOG 2000-2009
Natural Increase (Births - Deaths)	375	303
Births	581	587
Deaths	206	284
Net Migration (Movement In - Movement Out)	1,069	23
Population Change (Natural Increase + Net Migration)	1,443	326

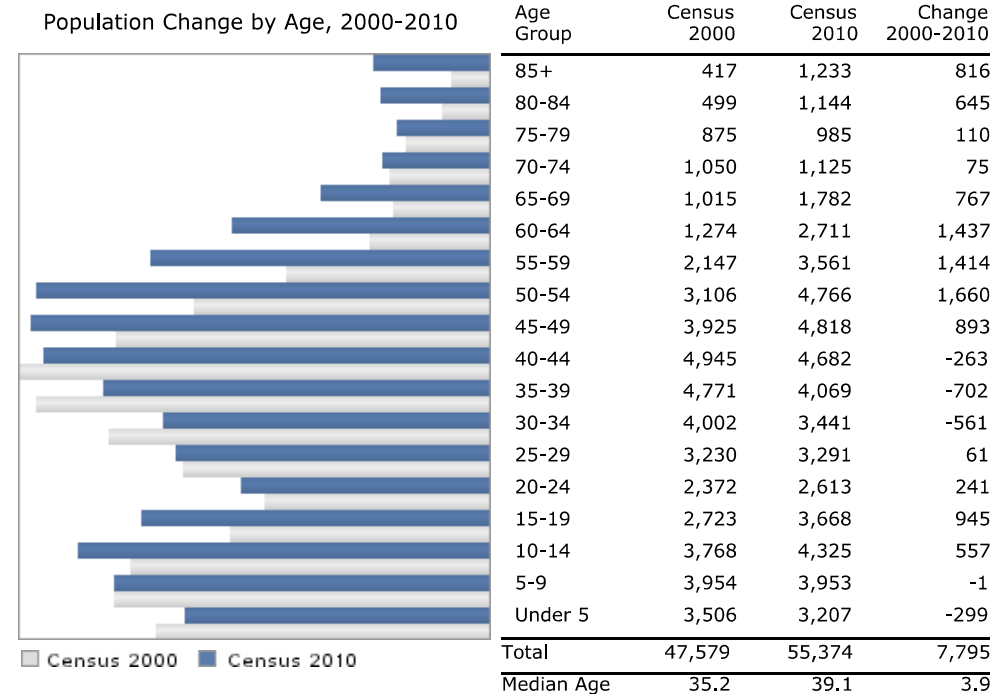
Source: Michigan Department of Community Health Vital Statistics, U.S. Census Bureau, and SEMCOG.

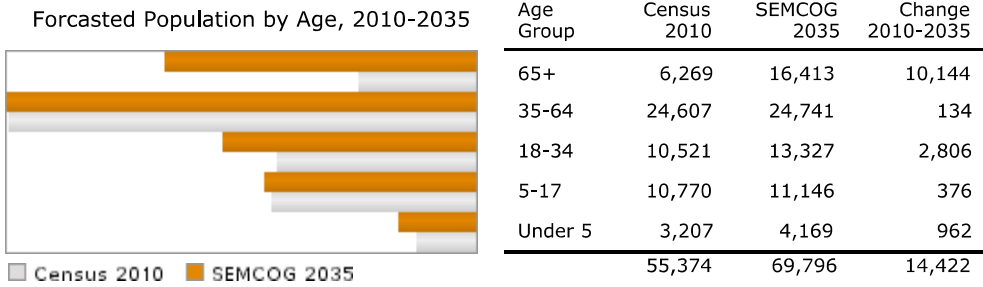
Demographics

Household Types



Household Types	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
With seniors 65+	2,693	4,615	71.4%	11,544	150.1%
Without seniors	16,033	17,702	10.4%	17,908	1.2%
Two or more persons without children	6,450	7,898	22.4%	12,316	55.9%
Live alone, 65+	1,110	2,217	99.7%	5,041	127.4%
Live alone, under 65	4,157	4,350	4.6%	4,154	-4.5%
With children	7,009	7,852	12.0%	7,941	1.1%
Total Households	18,726	22,317	19.2%	29,452	32.0%



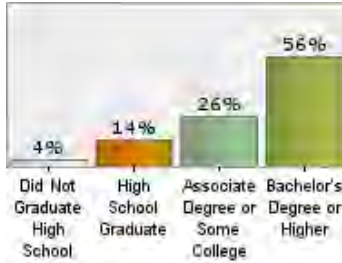


Senior and Youth Population	Census 2000	Census 2010	Pct Change 2000-2010	SEMCOG 2035	Pct Change 2010-2035
65 and over	3,856	6,269	62.6%	16,413	161.8%
Under 18	13,127	13,977	6.5%	15,315	9.6%
5 to 17	9,621	10,770	11.9%	11,146	3.5%
Under 5	3,506	3,207	-0.6%	4,169	30.0%

Note: Population by age changes over time because of the aging of people into older age groups, the movement of people, and the occurrence of births and deaths.

Race and Hispanic Origin	Census 2000		Census 2010		Percentage Point Chg 2000-2010
Non-Hispanic	46,724	98.2%	53,734	97.0%	-1.2%
White	40,960	86.1%	39,367	71.1%	-15.0%
Black	899	1.9%	4,451	8.0%	6.1%
Asian	4,098	8.6%	8,761	15.8%	7.2%
Multi-Racial	640	1.3%	1,019	1.8%	0.5%
Other	127	0.3%	136	0.2%	-0.0%
Hispanic	855	1.8%	1,640	3.0%	1.2%
Total Population	47,579	100.0%	55,374	100.0%	0.0%

Highest Level of Education*	5-Yr ACS 2010	Percentage Point Chg 2000-2010
Graduate / Professional Degree	23.6%	4.5%
Bachelor's Degree	32.1%	2.0%
Associate Degree	7.2%	0.4%
Some College, No Degree	18.6%	-2.6%
High School Graduate	14.3%	-2.4%
Did Not Graduate High School	4.2%	-1.9%



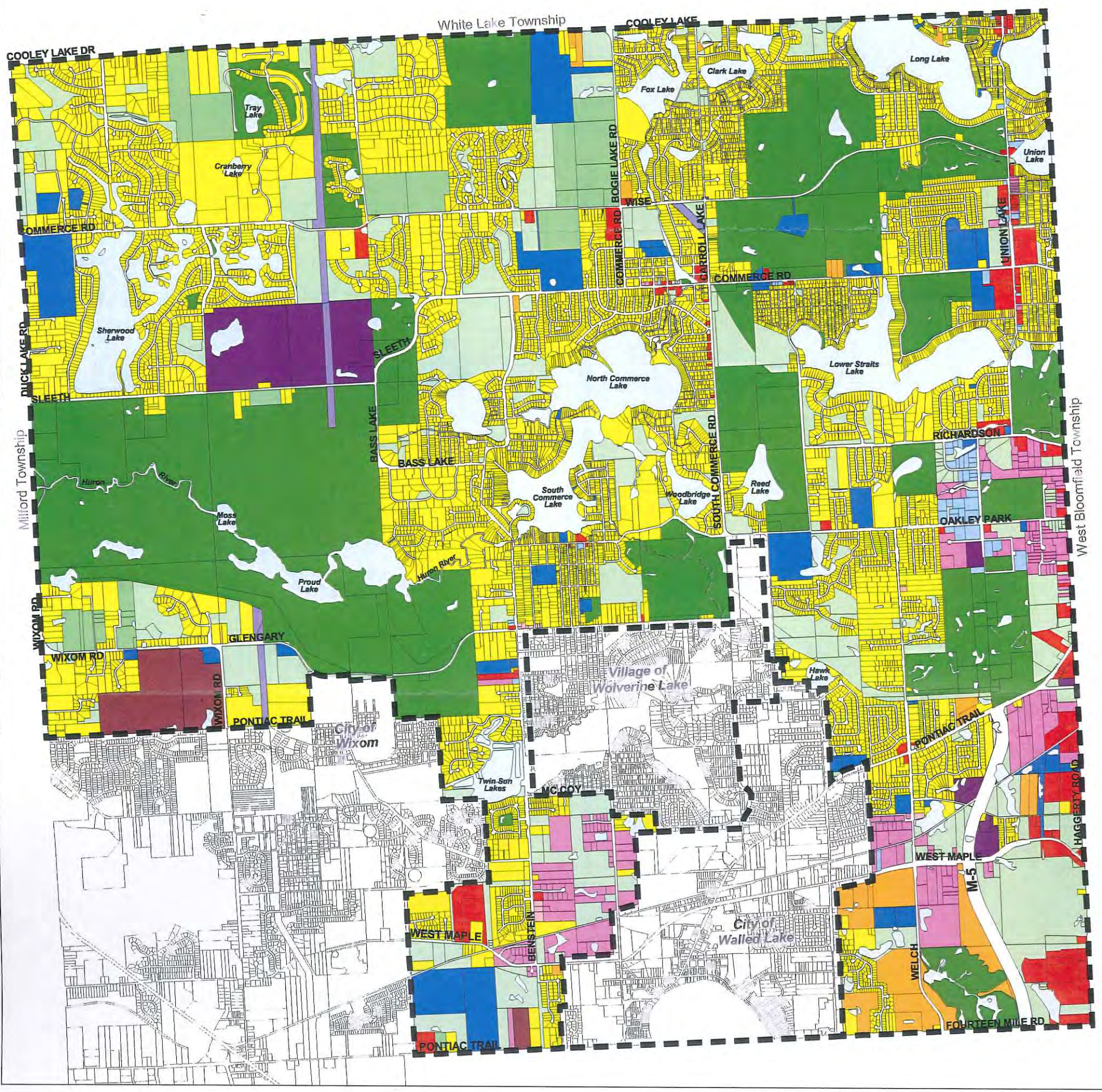
* Population age 25 and over

Source Data

- [SEMCOG - Detailed Data](#)
- [Michigan Department of Community Health - Vital Statistics](#)
- [U.S. Census Bureau - American FactFinder](#)

**APPENDIX I –
LAND USE MAPS**

Commerce Charter Township, Oakland County, Michigan



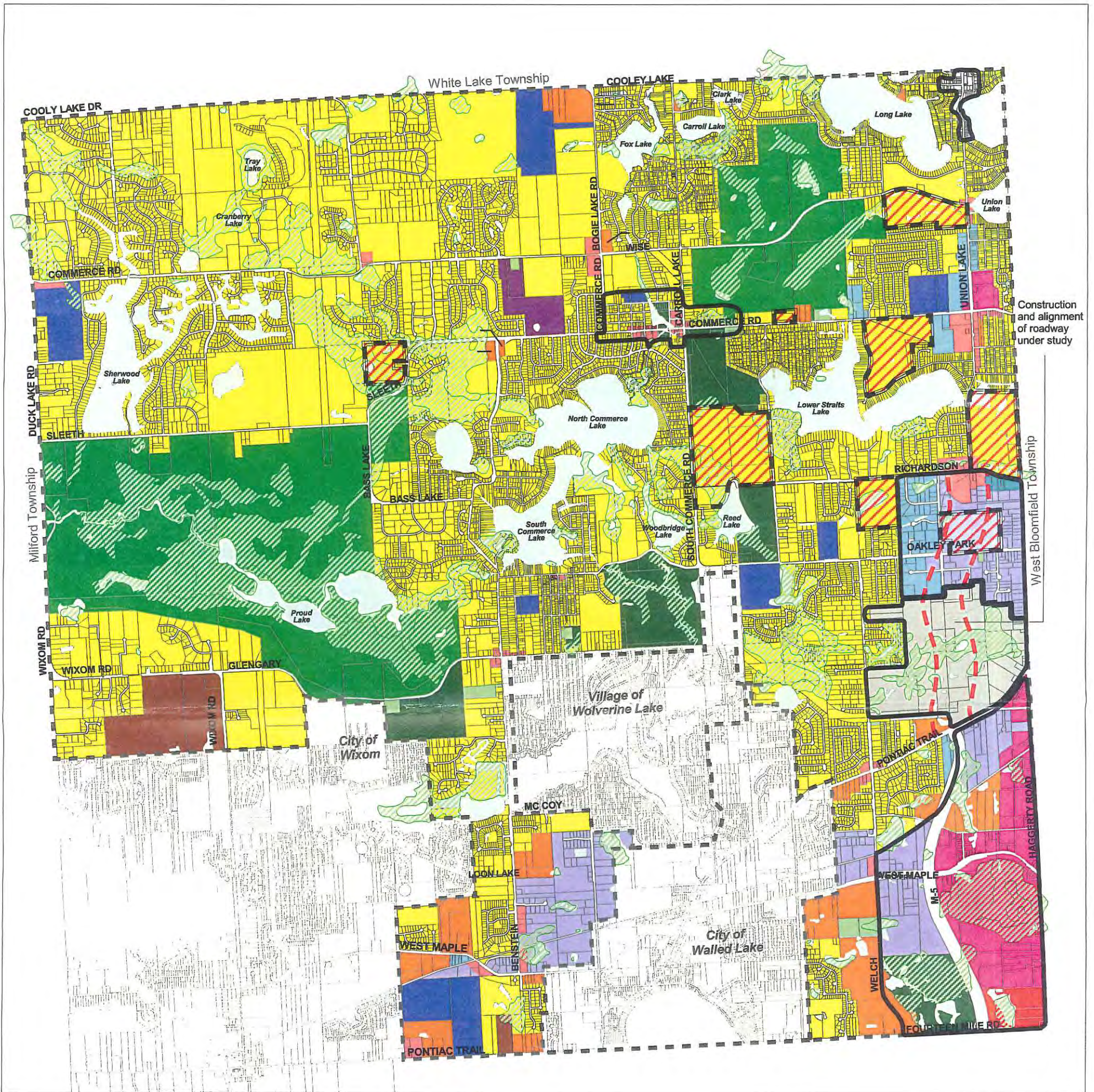
Existing Land Use Categories					
	Agricultural		Neighborhood Commercial		Public/Semi-Public
	Single Family Residential		General Commercial		Parks/Recreation
	Multiple Family Residential		Office		Utilities
	Manufactured Home Park		Light Industrial		Vacant
			Heavy Industrial		Municipal Boundaries

Map 2 Existing Land Use - 2002

Basemap Source: Oakland County GIS
Data Source: McKenna Associates Inc., 5/02

0 Ft. 3400 Ft. 1700 Ft. 12/01/2005

Commerce Charter Township, Oakland County, Michigan



Construction and alignment of roadway under study

West Bloomfield Township

Future Land Use

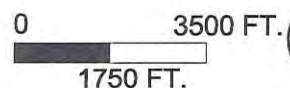
- | | | |
|-----------------------------|----------------------|-------------------------|
| Single Family Residential | Hospital | Private Recreation Area |
| Multiple Family Residential | Industrial | Special Area Plans |
| Mobile Home Park | Office | Regulated Wetlands |
| Neighborhood Commercial | Office Research | |
| Community Commercial | Four Corners Village | |
| General Commercial | Commerce Town Center | |

Public Facilities

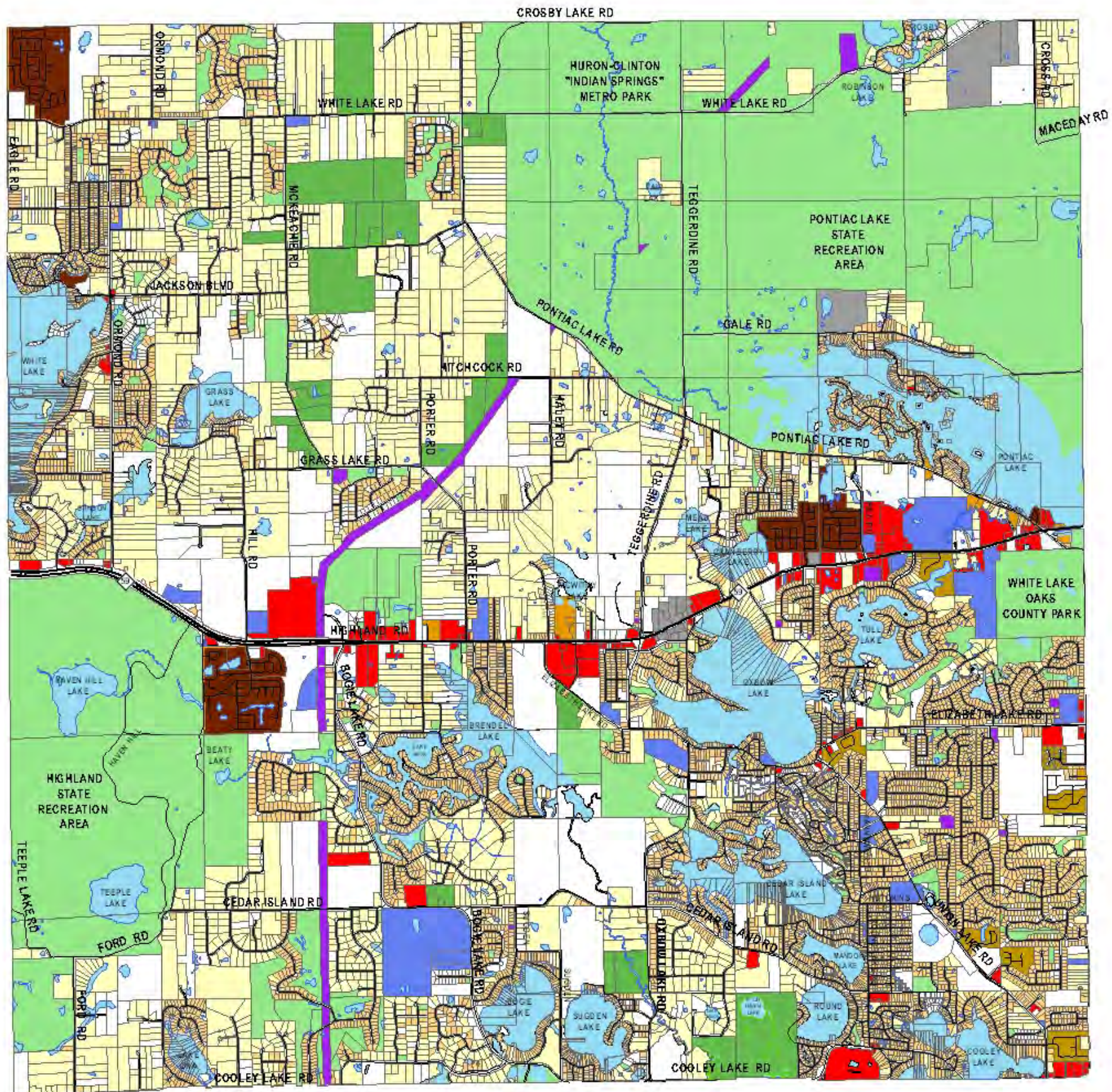
- | |
|----------------------|
| School |
| Township Park |
| State Land |
| Community Facilities |

Map 6 Future Land Use

Base Map Source: Oakland County, Michigan
Data Source: McKenna Associates, Inc. 1/03



07/23/2004



EXISTING LAND USE - 2009
WHITE LAKE TOWNSHIP
OAKLAND COUNTY, MICHIGAN
MAP 1

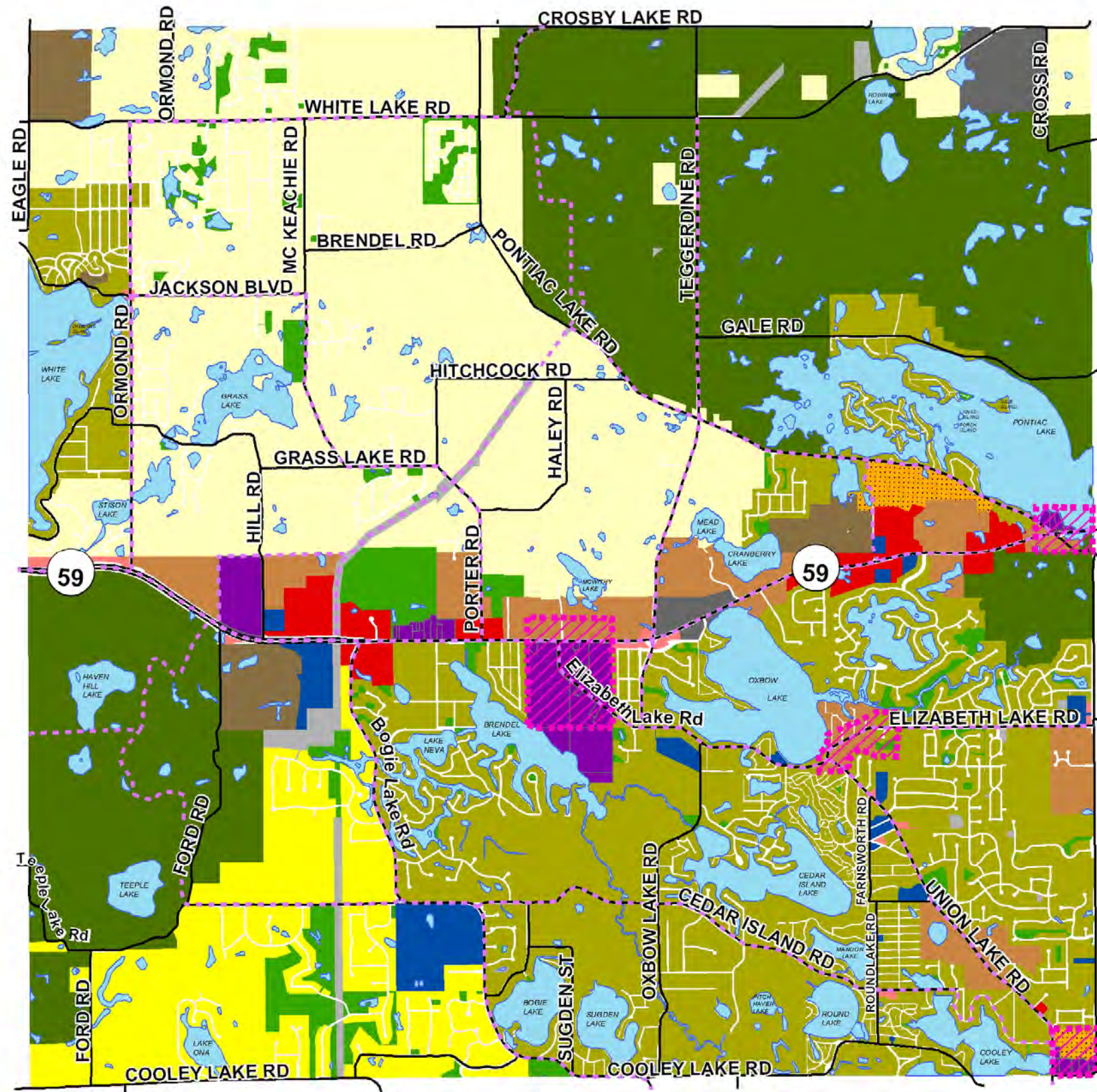
- Agricultural
- Recreation/Conservation
- Single Family, Acreage parcel
- Single Family, Small lot
- Single Family, Attached
- Multiple Family
- Mobile Home Park
- Commercial/Office
- Industrial
- Public/Institutional
- Transportation/Utility/Communication
- Vacant
- Water



Sources: Oakland County Planning and Birchler Arroyo
 October 20, 2010

LAND USE PLAN

WHITE LAKE TOWNSHIP OAKLAND COUNTY, MI



- RURAL ESTATES
- OPEN SPACE ESTATES
- RESIDENTIAL RESORT
- MOBILE HOME
- PLANNED NEIGHBORHOOD
- MULTIPLE FAMILY
- PLANNED COMMUNITY
- SATELLITE BUSINESS
- PLANNED BUSINESS
- PLANNED COMMERCE
- FOCUS AREA
- PUBLIC AND QUASI-PUBLIC
- REGIONAL PARKS AND OPEN SPACE
- LOCAL PARKS AND OPEN SPACE
- UTILITIES
- WATER
- PLANNED PATHWAYS



Sources: Oakland County Planning and Birchler Arroyo
May 25, 2011



Existing Land Use Map

City of Novi, Michigan
Updated February 24, 2004

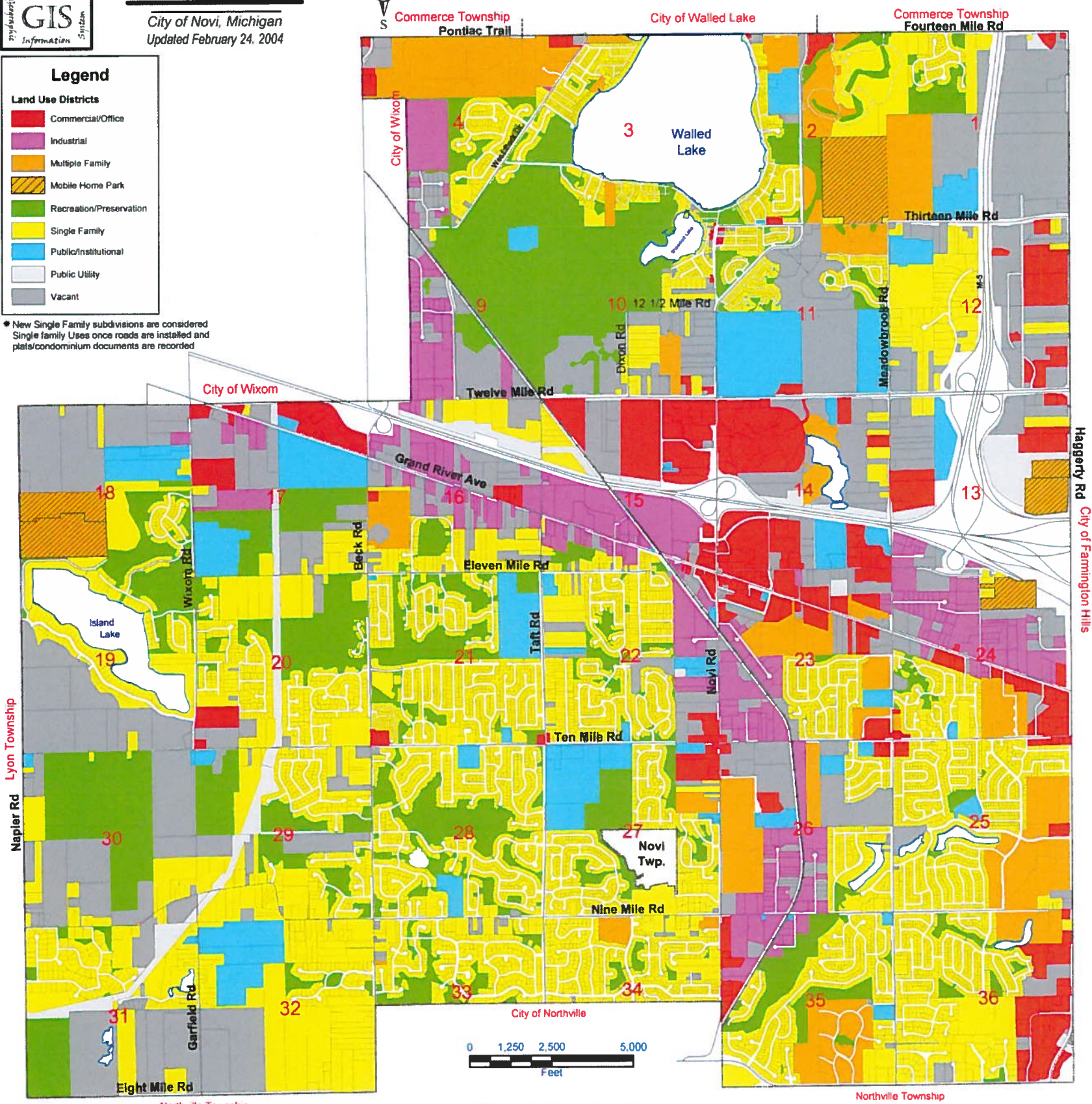


Legend

Land Use Districts

- Commercial/Office
- Industrial
- Multiple Family
- Mobile Home Park
- Recreation/Preservation
- Single Family
- Public/Institutional
- Public Utility
- Vacant

* New Single Family subdivisions are considered Single family Uses once roads are installed and plats/condominium documents are recorded



Created using the GIS Geographic Information System of the City of Novi
45175 W. Ten Mile Road
Novi, Michigan 48375

Created by:
Bill Berdelman
GIS Technician
Department of GIS/
Environmental Services

Date Initially Created:
February 10, 2004
Date of Last Revision:
February 24, 2004
Project Filename:
P:\Proj2003\ExistingLandUse
Map Name: Existing Land Use

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This map complies with the National Map Accuracy standards. The City of Novi and its Department of GIS/ Environmental Services assume no legal responsibility for the content and/or inappropriate use of this document.



Figure 13.a. Fountainwalk is a lifestyle mall built in 2002.



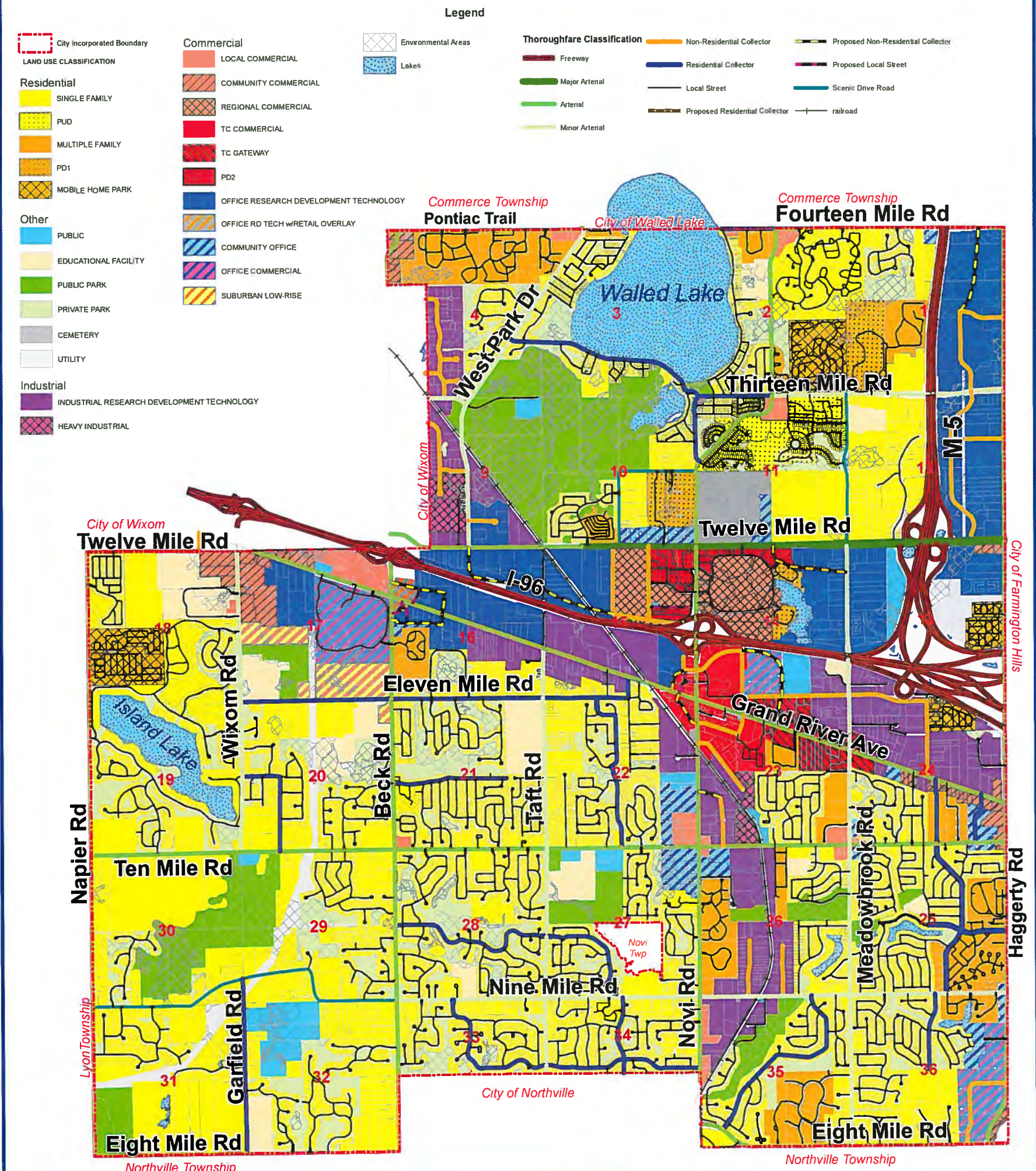
Figure 13.b. Main Street offers restaurants and specialty shops.

Figure 13. The Existing Land Use map identifies the land use patterns in the city.



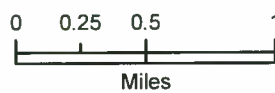
FUTURE LAND USE MAP

City of Novi, Michigan
Adopted August 25, 2010



Notes:

1. This map is intended to show generalized land use and is not intended to indicate parcel size shape or dimension. These uses reflect future land use recommendations and do not imply that short range zoning is appropriate.
2. See future land use categories section in the text of the Master Plan for a definition of each future land use category.
3. The "Environmental Areas" category includes regulated wetlands of 5 acres or more. Smaller regulated wetlands were not shown due to the scale of the map. Other natural resources are more fully described in the Master Plan text.



City of Novi Master Plan for Land Use, 2010

We hereby certify that on August 25, 2010 the City of Novi Planning Commission formally adopted this updated map and accompanying text, maps and charts, which are referred to in the document entitled "City of Novi Master Plan for Land Use, 2010" pursuant to the requirements of the Michigan Planning Enabling Act, Public Act 33 of 2008.

Mark A. Plesha Chairperson
[Signature] Secretary

CITY OF NOVI
PLANNING COMMISSION

45175 W. Ten Mile Road
 Novi, MI 48375-3024
 (248) 347-0475
 Map Cartographer:
 Mark Spencer, AICP, Planner

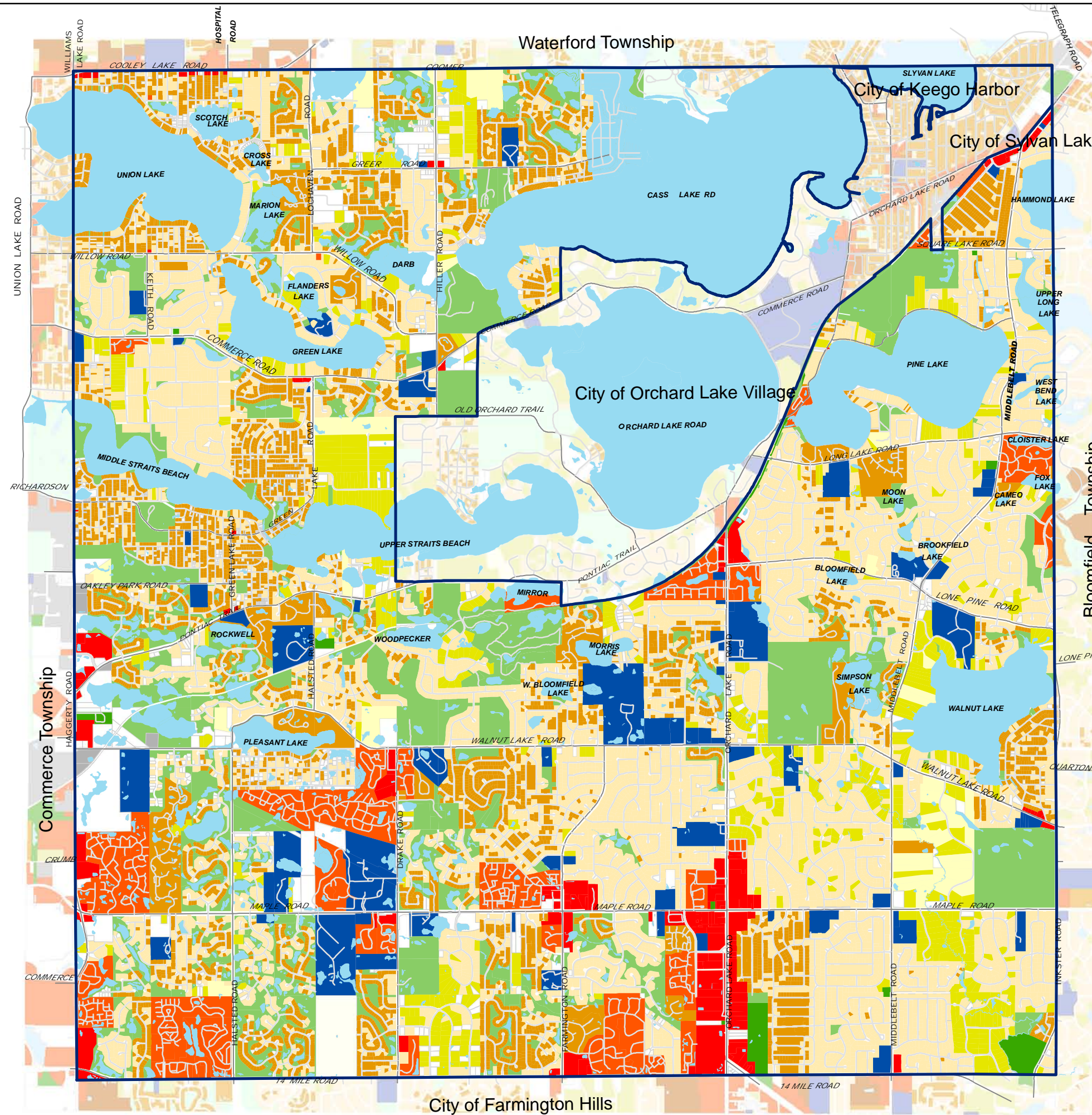


Figure 64



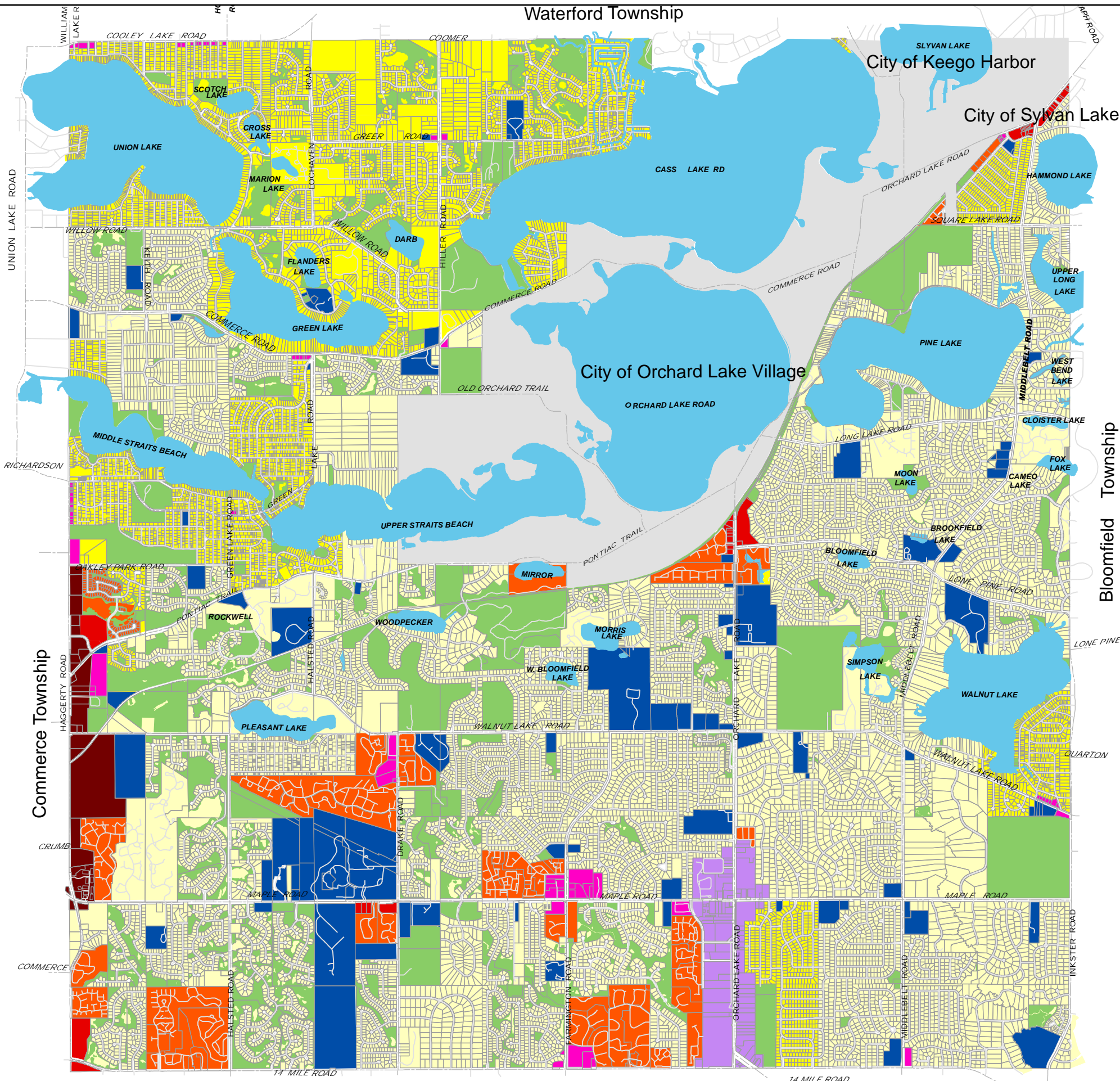
Existing Land Use Map

- Single Family, 5 acres or more
- Single Family, 1 to 4.9 acres
- Single Family, 14,000 to 43,559 sq. ft.
- Single Family, 13,999 sq ft or less
- Multiple Family
- Commercial and Office
- Industrial
- Public and Institutional
- Recreation and Conservation
- Transportation, Utility and Communication
- Vacant
- Water



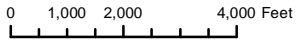
0 1,000 2,000 4,000 Feet

Source: Oakland County Planning and Economic Development and West Bloomfield Township. The map was created by Cindy Summerfield, in the IT/GIS Department. This map was adopted in September of 2010.

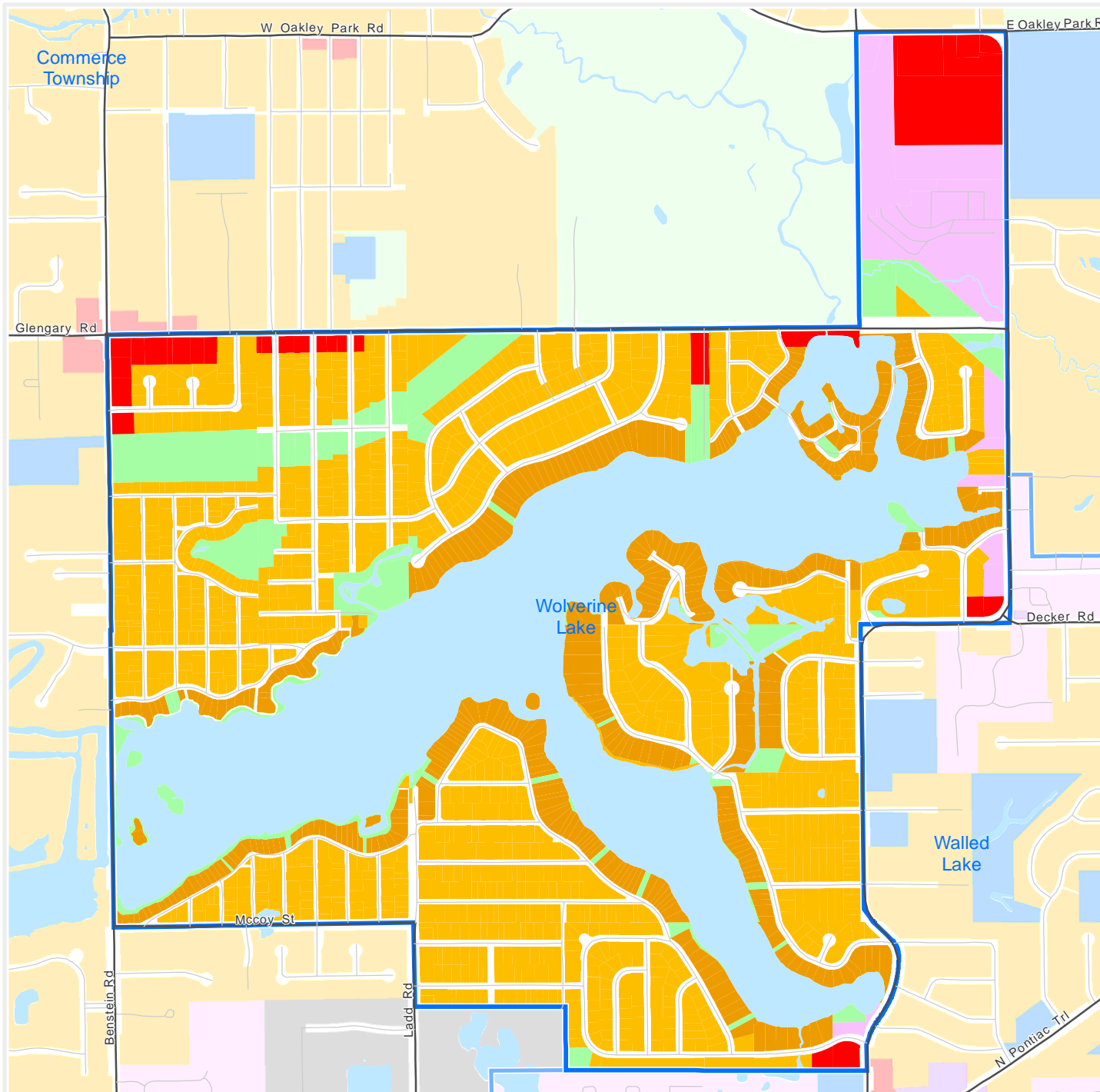


Future Land Use Map

- Low Density Single Family
- Moderate Density Single Family
- Multiple Family
- Neighborhood Business
- General Business
- Public and Institutional
- Recreation/Conservation
- Township Center Use Boundary
- Haggerty Road Mixed Use
- Railroad R-O-W
- Waterbodies



This map was created by the Geographic Information Systems Specialist- Cindy Summerfield. The map was adopted on September of 2010.



OAKLAND COUNTY MICHIGAN
 Economic Development & Community Affairs
 PLANNING & ECONOMIC DEVELOPMENT SERVICES
 Executive Office Building
 2100 Pontiac Lake Road, Bldg. 41W
 Waterford, MI 48328-0412
 248.858.0720
 www.oakgov.com/luz

Composite Master Plan

Village of Wolverine Lake

Legend

- Single Family, 10 acres or greater
- Single Family, 5 to 9.9 acres
- Single Family, 2.5 to 4.9 acres
- Single Family, 1 to 2.4 acres
- Single Family, 14,000 to 43,559 sq. ft.
- Single Family, 8,000 to 13,999 sq. ft.
- Single Family, Less than 8,000 sq. ft.
- Multiple Family Residential
- Mobile Home Park
- Commercial/Office
- Industrial
- Public/Institutional
- Recreation/Conservation
- Mixed Use
- Reclamation Plan

This map represents a generalized future land use based on each community's master plan.

1 inch = 1,313 feet
 Map created on February 16, 2012

The information provided herewith has been compiled from recorded deeds, plats, tax maps, surveys and other public records. It is not a legally recorded map or survey and is not intended to be used as one. Users should consult the information sources mentioned above when questions arise.