cityofnovi.org

CITY of NOVI CITY COUNCIL

Agenda Item 2
November 26, 2012

SUBJECT: Approval to award an engineering services agreement with Orchard, Hiltz & McCliment for design engineering services related to the Water System Master Plan, Water Distribution Storage Facility, and Supervisory Control and Data Acquisition (SCADA) for the City's water distribution system in the amount of $172,300.

SUBMITTING DEPARTMENT: Department of Public Services, Engineering Division

CITY MANAGER APPROVAL:

EXPENDITURE REQUIRED	**$ 23,800 (Water Master Plan)** **$ 41,500 (Water SCADA)** **$107,000 (Water Storage Tank Design)** **$172,300 TOTAL**
AMOUNT INCLUDED IN CIP	**$ 40,000 (Water Master Plan)** **$303,200 (Water SCADA)** **$106,350 (Water Storage Tank Design)** **$449,550 TOTAL**
LINE ITEM NUMBER	**592-592.00-805.021 (Water Master Plan)** **592-592.00-158.050 (Water SCADA)** **592-592.00-158.290 (Water Storage Tank Design)**

BACKGROUND INFORMATION:

This project includes the completion of an update to the water distribution system master plan, development of the scope and bidding documents for the second phase of the Supervisory Control and Data Acquisition (SCADA) system for the water distribution system, and the design phase engineering for a new one million gallon elevated water storage facility. A water storage tank was proposed as part of the last water system master plan, completed in 2008. The elevated storage facility was further studied in late 2011 and the design concept was refined. The enclosed report (prepared by Orchard, Hiltz & McCliment in October 2011) provides additional details regarding the effect that water storage will have on the system to reduce Novi's wholesale water rate. The construction of a water storage facility would allow Novi to become a maximum day customer (rather than a peak hour customer, as is the case in our current contract) resulting in a cost saving in Detroit Water and Sewerage Department (DWSD) rates of approximately $1.7 million per year. The report concludes that given the $5.3 million estimated capital cost of the water storage facility and appurtenances, the payback period is estimated to be 3.2 years.

The report investigated shared storage scenarios with Commerce Township and with the City of Farmington Hills. However, both communities were concerned either with the creation of a water authority, as would be required by DWSD, or with the amount of time that it would take to implement the authority and design the system improvements to make the use of a shared tank feasible.

A water distribution system master plan update is required from each municipality/water authority every five years under Public Act 399 of 1976. The completion of the water system master plan update at this time fits well with the timing of the proposed water storage facility, so that the proposed changes to the water system can be modeled to ensure that adequate flow and pressure are provided in the most efficient and effective ways. The revised model will be required to confirm the operational and design parameters of the water storage facility.

The first phase of the SCADA system for the sanitary sewer system was implemented in 2008 with the intention of eventually expanding the system for use on the water distribution system. The addition of a water storage facility to the system adds some complexity to the system. Staff recommends that SCADA for the water distribution system be incorporated into the project to allow staff better monitoring and management of the system once the storage tank and additional system controls are constructed.

The Agreement for Professional Engineering Services for Public Projects does not contain a fee category for this type of project, so proposals were requested from the City's three pre-qualified engineering firms. City staff reviewed the proposals and recommends that design engineering for this project be awarded to OHM. OHM's proposal and a summary of the review scoring are attached.

The water system master plan update, implementation of SCADA for the water distribution system, and the design of the water storage facility were included in the Capital Improvement Program for FY2012-13. It is anticipated that funding for the water storage facility would be requested through the CIP process for FY2013-14 for construction in 2014.

RECOMMENDED ACTION: Approval to award an engineering services agreement with Orchard, Hiltz & McCliment for design engineering services related to the Water System Master Plan, Water Distribution Storage Facility, and Supervisory Control and Data Acquisition (SCADA) for the City's water distribution system in the amount of $172,300.

	1	2	Y	N
Mayor Gatt				
Mayor Pro Tem Staudt				
Council Member Casey				
Council Member Fischer				

	1	2	Y	N
Council Member Margolis				
Council Member Mutch				
Council Member Wrobel				

Project Description: Water Study/SCADA/Water Storage Tank Design

RANK 1= LOW, x= BEST (x = number of firms reponding)

Item weight:	*15*	*15*	*40*	*10*	*20*	*100*	
SCORES	**1**	**2**	**3**	**4**	**5**	Totals	*Rank*
Orchard Hiltz & McCliment	12	13	14	10	14	**1315**	1
Spalding DeDecker	5	7	9.5	9	7	**790**	3
URS	13	10	6.5	11	9	**895**	2
TOTALS	30	30	30	30	30		

SCORING CRITERIA

1. Engineering Fee
2. Evaluation of proposed staff
3. Evaluation of Approach, Statement of Understanding of Project, and proposed staff
4. Analysis of subjective statements applicable to the project as required on the RFP (Value added items)
5. Evaluation of experience on similar projects

Example of an elevated water storage facility

City of Novi
Storage Tank Feasibility Study

Summary and Conclusions

The City of Novi Water System Master Plan was completed by Stantec in 2008. One recommendation from the study included the construction of an 8 million gallon ground storage tank with an 18.6 million gallon per day pump station on City-owned property near West Park Drive and West Road. The City decided to explore alternatives in more detail and retained Orchard, Hiltz and McCliment, Inc. (OHM) to provide a financial/feasibility study of the available options to provide water storage and/or decreased water supply costs from DWSD. The results from this study are expected to be used in the City's capital improvement plan and in planning for upcoming water rates.

Recent water usage data was analyzed to determine storage volume requirements. The addition of storage and appropriate ancillary facilities would enable the City to maintain a steady flow from DWSD on a hot, high usage day, commonly referred to as a maximum day. Essentially, this allows the City to maintain a peak hour flow rate that is no greater than the average flow on the maximum day. This will result in significant cost savings based on the existing DWSD rate methodology. Using the City of Novi maximum day, which was July 21, 2011, the required storage volume to provide maximum day equalization was 0.8 million gallons (mg). Allowing for imperfections in control system strategies, a standard tank size of 1 mg was utilized as the base storage amount.

The recent water usage pattern was significantly affected by the City's Demand Management Program. The Demand Management Program requires automatic sprinkling systems to be run between 11 PM and 5 AM and to run no more often than every other day on an odd/even basis. This has resulted in significant decreases in the metered maximum day and peak hour flows. To determine the effect of the Demand Management Program on sizing of a water storage tank, data from 2007, which preceded the Novi Demand Management Program, was analyzed to determine a required storage volume. The calculations indicate the need for 2.2 mg of storage, which would result in a 2.5 mg standard size tank. This demonstrates the effectiveness of the demand management program and also illustrates the importance of continuing to pursue this program into the future.

When a storage tank is provided, it is important to consider other potential uses in addition to maximum day equalization. Typical other uses include fire flow storage and reliability for unusual problems, such as power outage. It is important to recognize that DWSD currently has a 10 million gallon ground storage facility at Haggerty Road, near 14 Mile Road, with a 70 million gallon per day pump station. Although the back-up power supply did not function as expected in 2003, DWSD has assured the communities the facilities and operational plans have been improved since then and should be available in the event of power failure. Although a significant event has not occurred to test the facilities, it is apparent DWSD has evaluated the facilities and is comfortable that appropriate actions have been taken. Therefore, additional storage to duplicate the existing DWSD facility was not considered necessary as part of this evaluation.

Several sites and types of storage tanks were evaluated as part of this study. Elevated storage is more expensive to construct, but has significantly lower energy, operation and maintenance expenses, which result in a lower life-cycle cost. Elevated storage also provides greater reliability, since the water in storage does not depend upon pumping for utilization. Ground storage with a pump station is generally more cost-effective when a very large amount of storage is required. It is easier to blend into the landscape, so it is generally considered more aesthetically pleasing. Commerce Township is also considering providing storage. Novi and Commerce are fed from the same DWSD transmission main, so this simplifies the technical ability to share storage. Therefore, alternatives were also considered for providing a joint facility with Commerce Township.

If Novi chooses to build a storage tank on its own, a 1 mg elevated storage tank in Section 17 appears to be the most cost-effective solution. This location is in the City's intermediate pressure district which can utilize existing pressure reducing valves (PRVs) to control flows. Some upgrades to the PRVs would be needed and it is expected the storage tank would also provide an opportunity to simplify operations in this district. The capital cost is estimated to be $5.3 million and the cost savings in DWSD rates is expected to be $1.7 million/year, based on the existing rate methodology. Considering the increased operation and maintenance costs, the pay-back period is estimated to be 3.2 years.

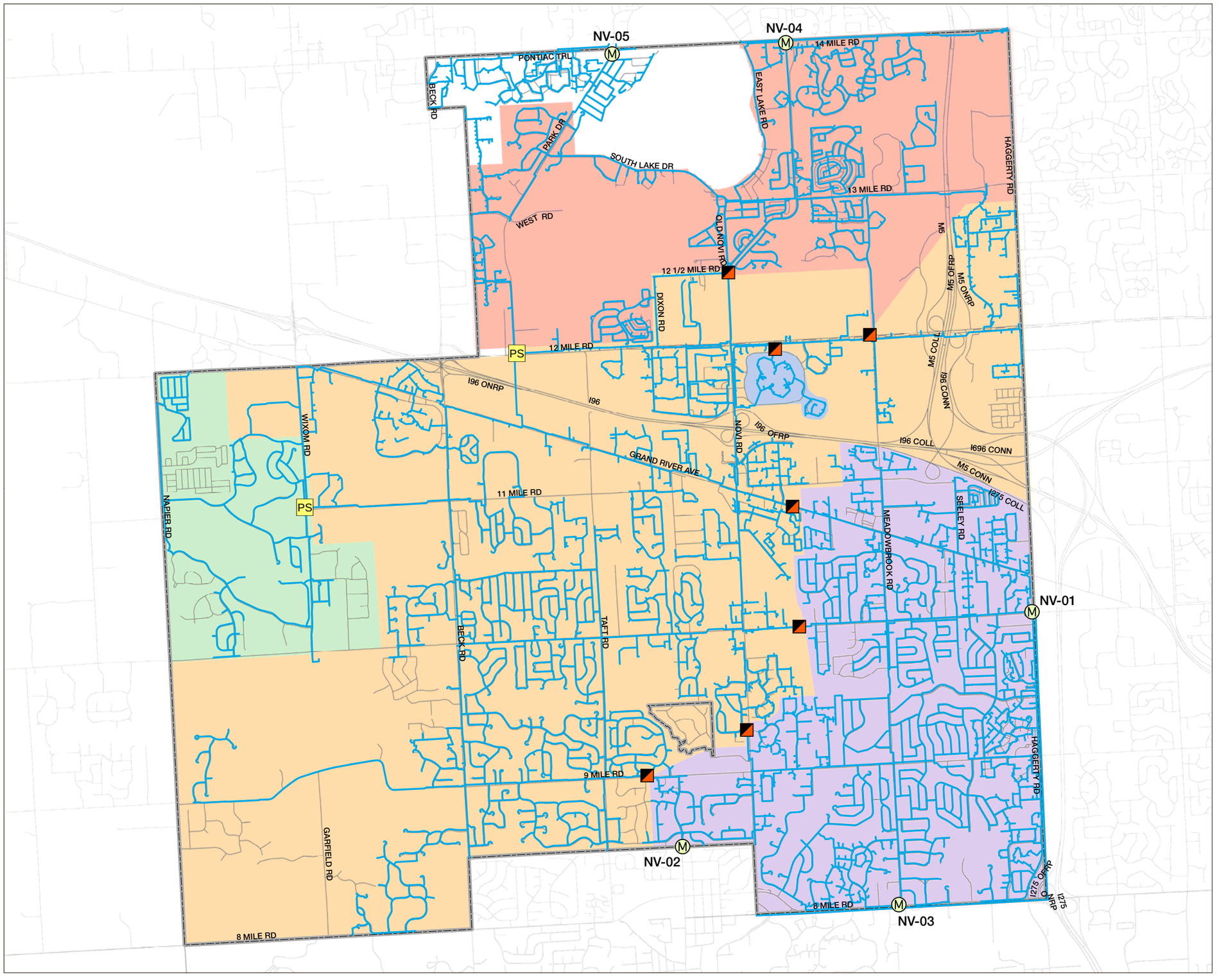
A joint storage tank by Novi and Commerce was estimated at a 3 mg size, 1 mg for Novi and 2 mg for Commerce. Both communities are initially leaning towards elevated storage. Initial technical discussions with Commerce indicates they are considering several sites, but seem to prefer a site near Sinai Hospital, to provide greater reliability to this critical location. It is also anticipated the communities would join as a water authority to simplify operation of the tank and minimize the need for physical connection from the tank to the Novi water distribution system. Creation of authorities is allowed by the DWSD contract. The role of the authority would likely include construction and operation of the storage facility, and interaction with DWSD. The Oakland County Water Resource Commission operates the Commerce Township water system, and could be considered to implement and operate the facility on behalf of the authority. The Novi share of the capital cost for a joint tank is estimated to be $4.2 million and the cost savings in DWSD rates is expected to be $1.7 million/year, based on the existing rate methodology. Considering the increased operation and maintenance costs shared in the same proportion, the pay-back period is estimated to be 2.4 years. Commerce Township does not want to form a separate entity. Therefore, it appears that this option may not be feasible, although discussions are continuing.

The City of Novi also reached out to the City of Farmington Hills to look into sharing storage. Due to the difference in hydraulic grade lines required by neighboring districts in Farmington Hills and Novi, shared storage would be difficult to accommodate.

Both neighboring communities appear to be favoring implementation of individual community storage alternatives. Therefore, it is recommended that the City of Novi pursue construction a 1.0 million gallon elevated storage tank in the intermediate district.

FIGURE 1
Water System

Water System Feasibility Study
City of Novi



PRV

Meter

PS Pump Station

Water Main

Pressure Districts

- HIGH
- INTERMEDIATE
- ISLAND LAKE
- LOWER
- TWELVE OAKS

0 2,000 4,000 6,000 8,000 Feet

Source: Data provided by Oakland County and the City of Novi. Orchard, Hiltz and McCliment does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: Michigan South NAD 1983 State Plane International Feet

Map Published: October 5, 2011

OHM
888.522.6711 | ohm-advisors.com

City of Novi
Storage Tank Feasibility Study

List of Appendices

Appendix A
Diurnal Pattern

Water Demands

In order to size the facilities, the water system demands for City of Novi over the past five years were reviewed and summarized in Table 1.

Table 1: City of Novi Water Demands

Year	Average Flow		Maximum Flow		Peak Hour Flow	
	MGD	gpm	MGD	gpm	MGD	gpm
2007*	6.64	4,611	15.26	10,597	29.92	20,778
2008	6.58	4,569	13.32	9,250	26.11	18,132
2009	5.98	4,153	12.72	8,833	18.99	13,188
2010	5.48	3,806	12.79	8,880	17.91	12,439
2011	5.94	4,125	15.32	10,639	24.81	17,229

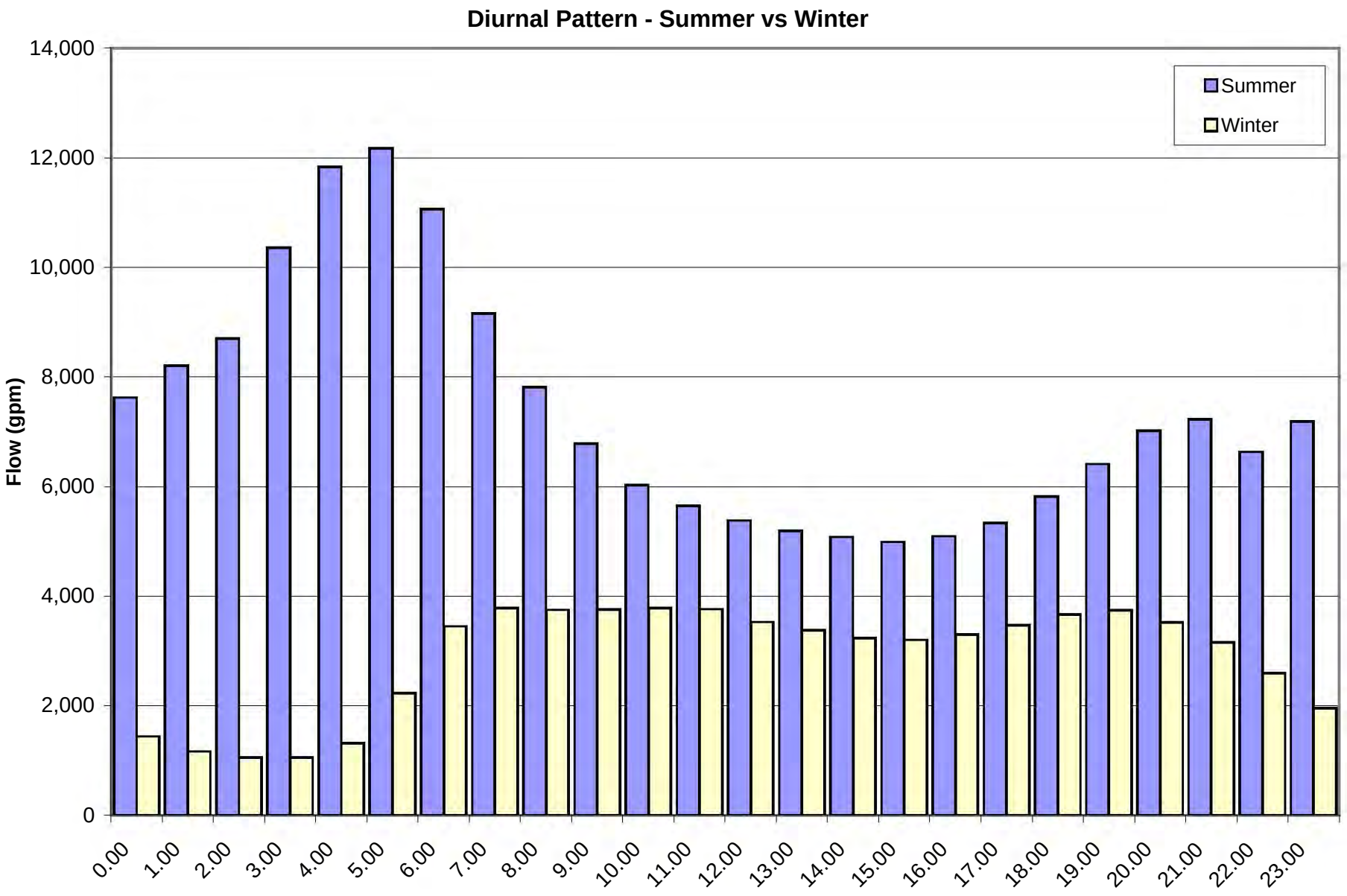
*Pre-demand management program

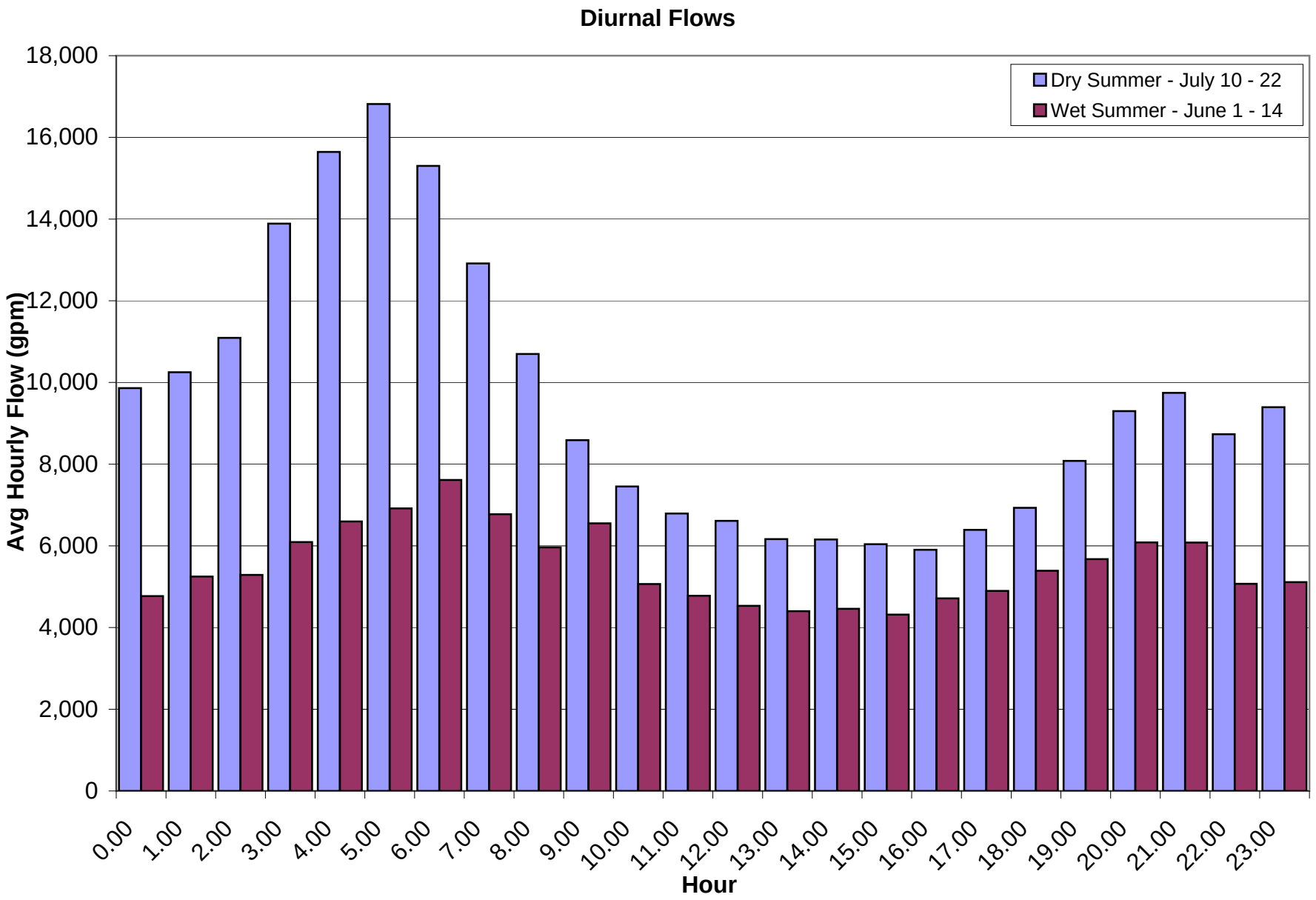
As part of the DWSD rate methodology communities have been defining contract capacitates that are needed to adequately serve their customers. For City of Novi, this results in an average daily flow of 5.9 MGD, maximum daily flow of 17.3 MGD, and a peak hour flow of 25.5 MGD for the rate calculations. A comparison of the City's summer usage and their winter usage indicates that a large amount of the City's summer usage can be attributed to irrigation. The increased summer demand, particularly during morning hours, can usually be attributed to grass watering. The City also has a large increase in water usage between dry summer conditions and wet summer conditions (see attached).

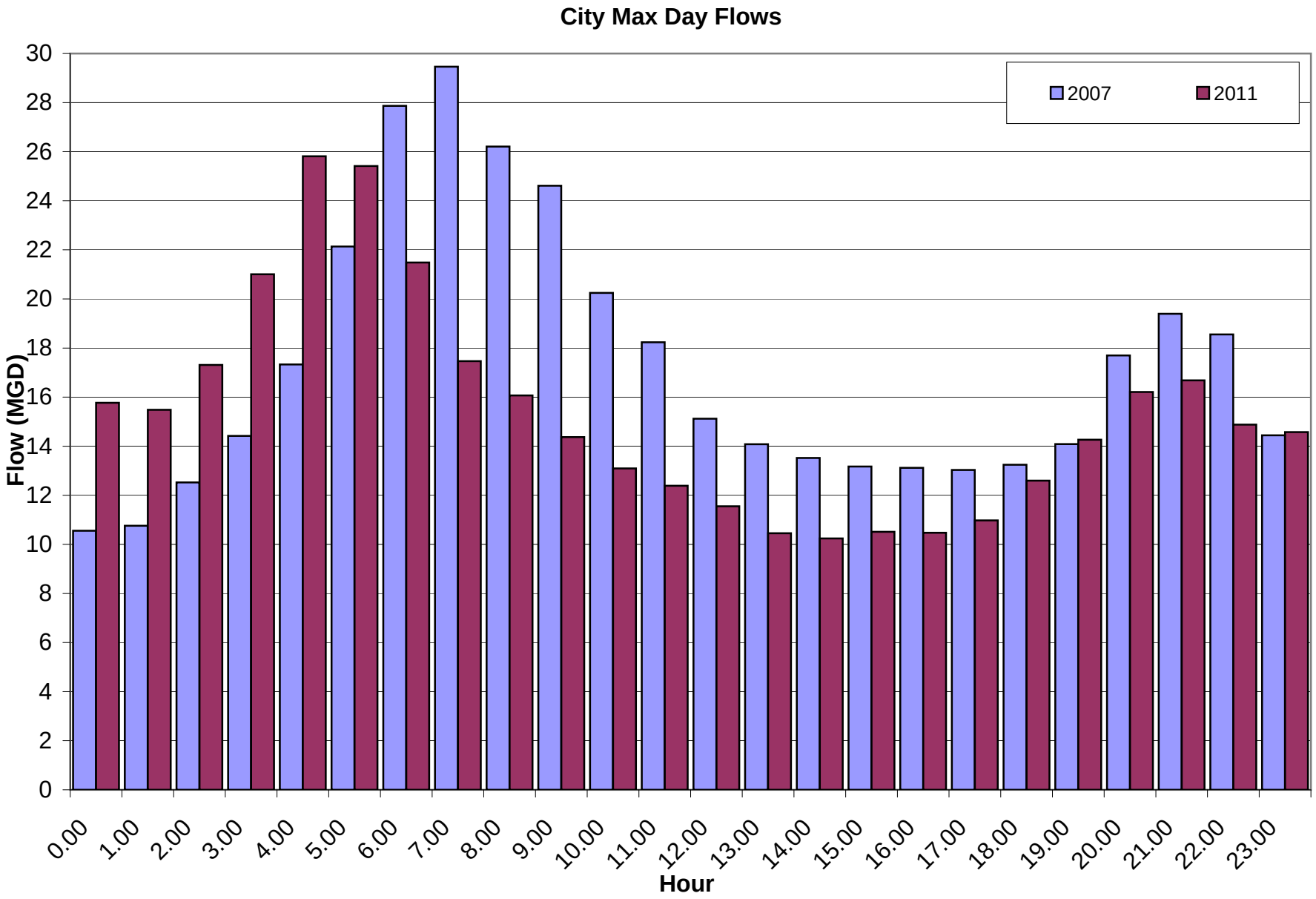
Demand Management

In an effort to reduce their peak water usage the City of Novi created a marketing plan. As part of this marketing plan, the City implemented an aggressive public education plan. This aggressive education plan along with the economic downturn resulted in drastically reduced peak water rates. Some of this reduction may be due to weather conditions or the economic downturn, however, part of the change is the timing of automatic sprinkler systems. Typically set at 6 a.m or 7 a.m. previously, now being asked to set them at 4 a.m. The shifting of the peak from 6-10 a.m. to earlier in the morning is evidence that the communities' actions are making a difference in water usage. This can be seen in the City's flow profile and a comparison of 2007 (pre demand management) and 2011 (post demand management) maximum day diurnal patters (see Attached).

This shift in usage has allowed the City to decrease its DWSD contract capacities to save money. The City desires to continue its demand management practices and is interested in further decreasing peak usage in the future. The City has set aggressive goals in the DWSD contract (see attached Table) and Staff is poised to put forth the effort needed to meet these goals.


Diurnal Pattern - Summer vs Winter
Flow (gpm)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Summer
Winter
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
17.00
18.00
19.00
20.00
21.00
22.00
23.00


Diurnal Flows
Dry Summer - July 10 - 22
Wet Summer - June 1 - 14
Avg Hourly Flow (gpm)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
17.00
18.00
19.00
20.00
21.00
22.00
23.00
Hour

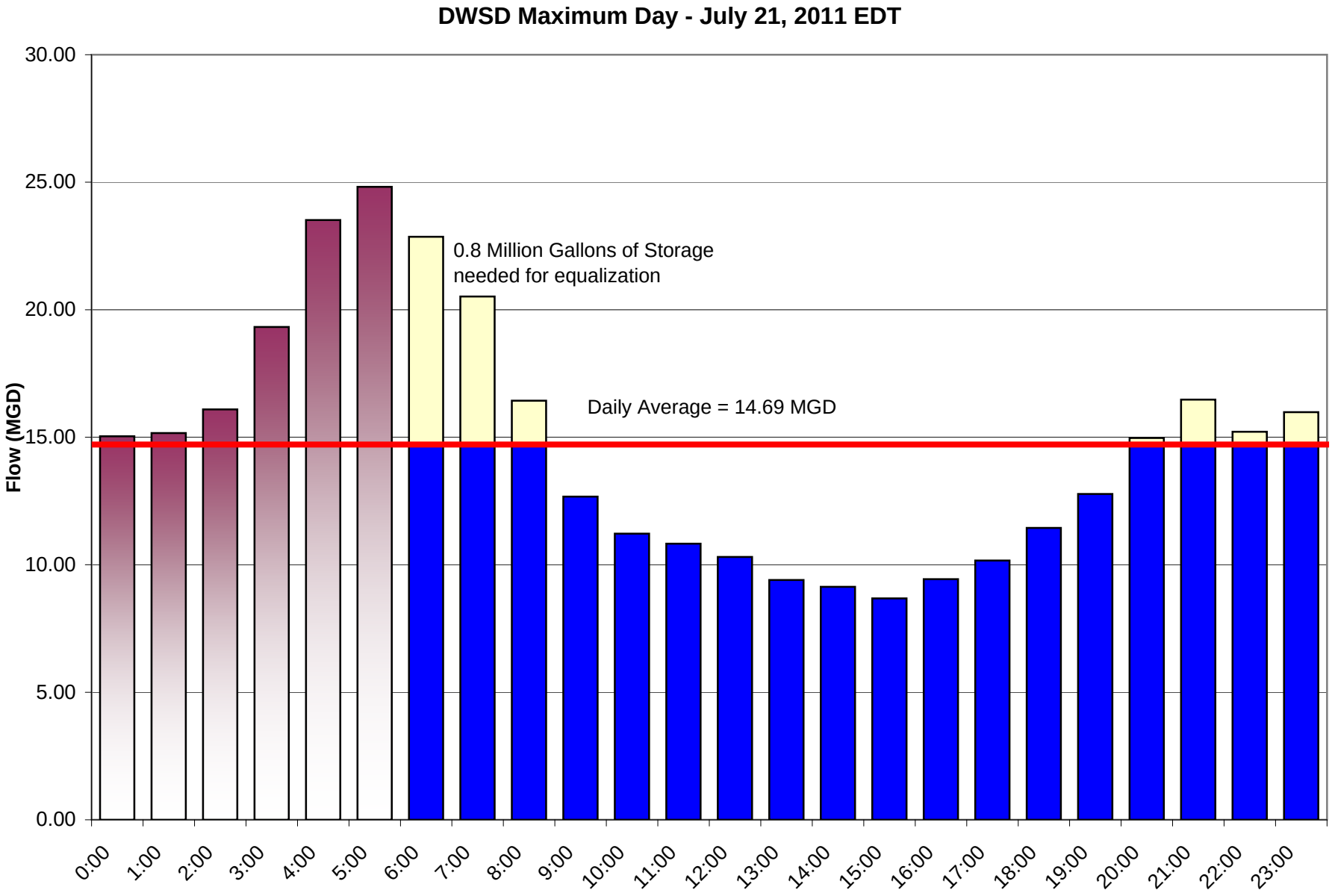

City Max Day Flows
2007
2011
Flow (MGD)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
17.00
18.00
19.00
20.00
21.00
22.00
23.00
Hour

CITY OF NOVI

Projected Contract Values

YEAR	Average (MCF)	Average Day (MGD)	Mx Day (MGD)	Pk Hr (MGD)
2011	281,800	5.78	17.30	25.50
2012	281,800	5.78	16.80	24.50
2013	281,800	5.78	16.30	23.50
2014	285,050	5.84	16.49	23.77
2015	288,300	5.91	16.68	24.04
2016	291,551	5.98	16.86	24.31
2017	294,801	6.04	17.05	24.58
2018	298,051	6.11	17.24	24.86
2019	301,301	6.18	17.43	25.13
2020	304,551	6.24	17.62	25.40
2021	307,802	6.31	17.80	25.67
2022	311,052	6.38	17.99	25.94
2023	314,302	6.44	18.18	26.21
2024	317,552	6.51	18.37	26.48
2025	320,803	6.58	18.56	26.75
2026	324,053	6.64	18.74	27.02
2027	327,303	6.71	18.93	27.29
2028	330,553	6.77	19.12	27.57
2029	333,803	6.84	19.31	27.84
2030	337,054	6.91	19.50	28.11
2031	340,304	6.97	19.68	28.38
2032	343,554	7.04	19.87	28.65
2033	346,804	7.11	20.06	28.92
2034	350,054	7.17	20.25	29.19
2035	353,305	7.24	20.44	29.46
2036	356,555	7.31	20.62	29.73
2037	359,805	7.37	20.81	30.01
2038	363,055	7.44	21.00	30.30

Appendix D
Storage Sizing


DWSD Maximum Day - July 21, 2011 EDT
Flow (MGD)
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.8 Million Gallons of Storage
needed for equalization
Daily Average = 14.69 MGD
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
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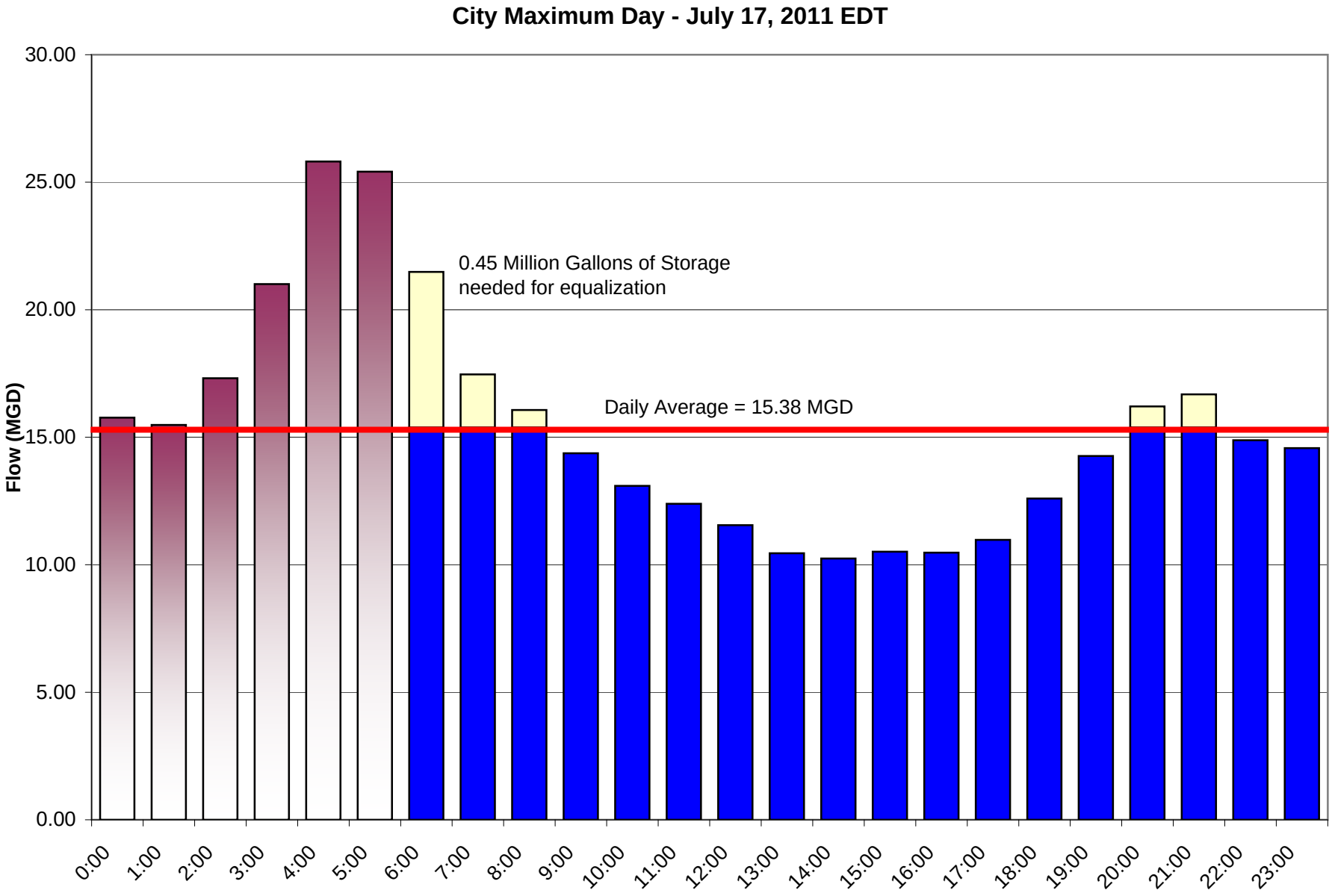
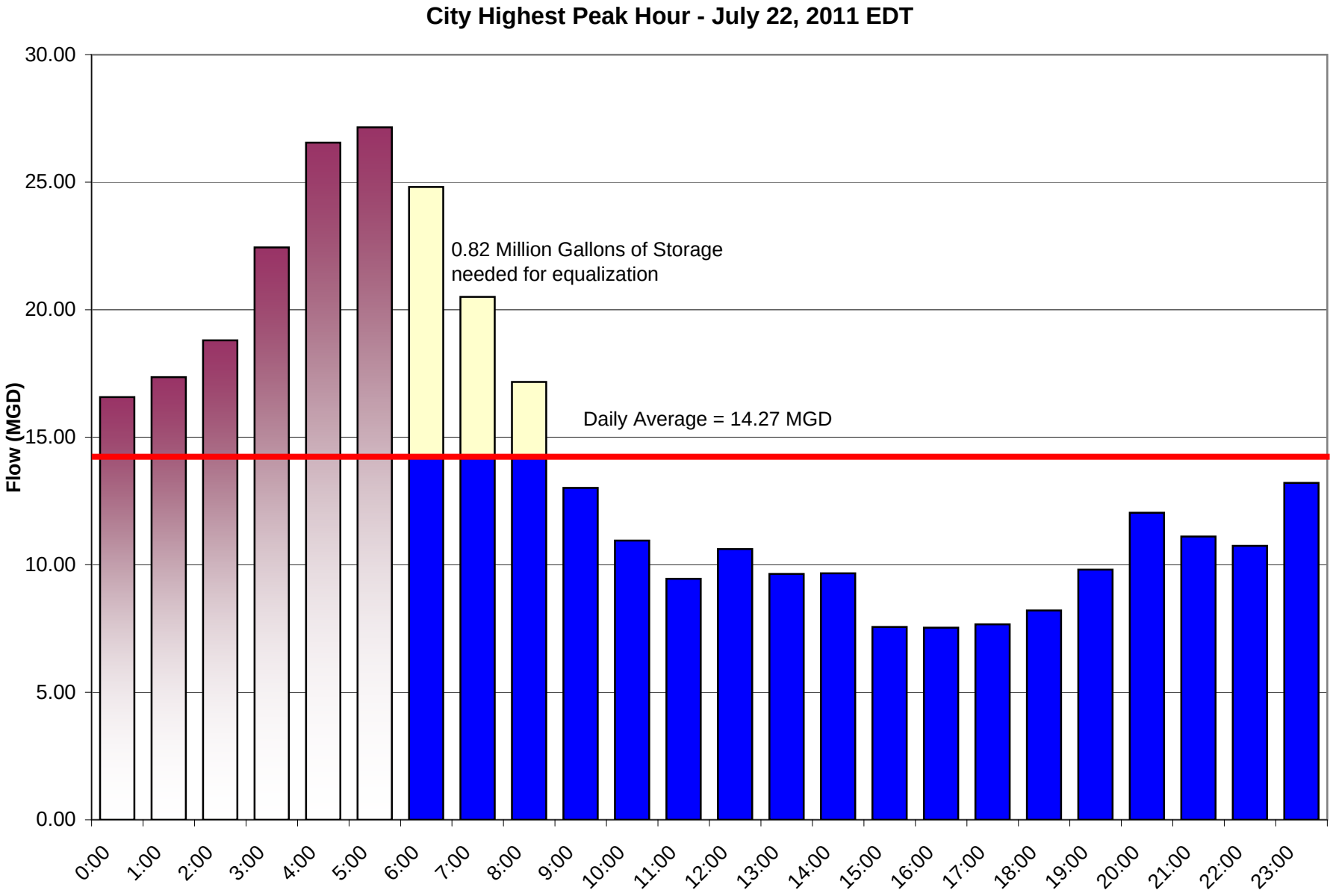
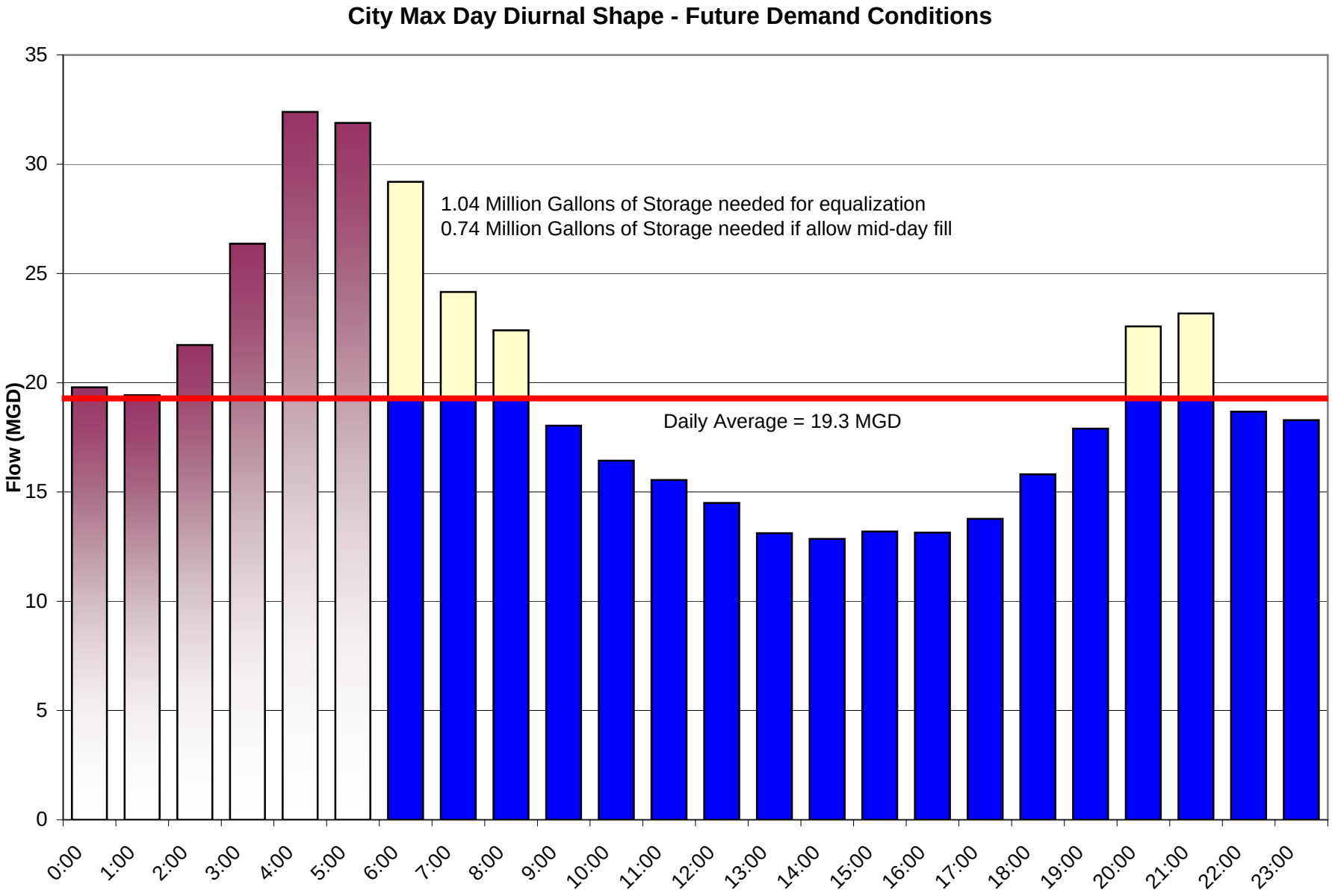
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00


City Maximum Day - July 17, 2011 EDT
Flow (MGD)
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.45 Million Gallons of Storage
needed for equalization
Daily Average = 15.38 MGD
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00


City Highest Peak Hour - July 22, 2011 EDT
Flow (MGD)
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.82 Million Gallons of Storage
needed for equalization
Daily Average = 14.27 MGD
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00


City Max Day Diurnal Shape - Future Demand Conditions
Flow (MGD)
35
30
25
20
15
10
5
0
1.04 Million Gallons of Storage needed for equalization
0.74 Million Gallons of Storage needed if allow mid-day fill
Daily Average = 19.3 MGD
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00

Appendix C
Storage Alternatives

Storage Facility

The addition of storage and appropriate ancillary facilities to the City of Novi water system would enable the City to maintain a steady flow from DWSD by putting the flow into storage during low usage periods and draining from the storage tank during high usage. Essentially this allows the City to maintain a peak hour flow rate approximately equal to the maximum day flow rate. Utilizing the maximum day demand curve, it is estimated that a minimum of 0.8 million gallons storage would be required. Allowing for a typical safety factors a 1.0 million gallon storage facility is recommended. It is assumed that the 10% of growth projected in the master plan will maintain the same diurnal patter and the City could develop a mid day fill over time such that additional storage would not be needed in the future.

There are several alternatives for storage facilities within the City of Novi. Five (5) storage alternatives are addressed below.

Alternative 1A: 1.0 Million Gallon Ground Storage Tank $4,500,000

This alternative involves a million gallon ground storage tank and 10.5 MGD booster pumping station located near West Park and 12 Mile Roads in quarter section 9SE. This storage tank is the equivalent to that sized in the 2008 master plan. The reduction in size is due to the City's demand management plan, elimination of some conservative assumptions and additional information from DWSD's automated water meter read (WAMR) website. The storage tank will be designed to fill at night between midnight and six in the morning in accordance with DWSD's exclusionary period. The station will pump from the storage facility during peak usage periods in order to limit the peak flow from the City.

Advantages of this alternative include low upfront costs, easy system control and the City owns the property at the proposed location. Long term concerns are the increased operation and maintenance cost associated with a pump station. Due to the high operational costs this alternative has a Total Present Worth for a 20 year projection of over $7 million.

Alternative 1b: 3.0 Million Gallon Ground Storage Tank $3,220,000

This alternative involves a three million gallon ground storage tank and 20 MGD booster pumping station located near West Park and 12 Mile Roads in quarter section 9SE. One million gallons will be allocated to the City of Novi and 2.0 million gallons allocated to Commerce Township. The storage tank will be designed to fill at night between midnight and six in the morning in accordance with DWSD's exclusionary period. The station will pump from the storage facility during peak usage periods in order to limit the peak flow from the City.

Advantages of this alternative include low upfront costs shared between two communities, easy system control, the City owns the property at the proposed location, and operations and maintenance costs will be shared between two communities. Long term concerns are the increased operation and maintenance cost associated with a pump station but this is mitigated between the two communities. There is also additional costs and maintenance associated with the interconnection between the two communities and potentially with the authority. Due to the high operational costs this alternative has a Total Present Worth for a 20 year projection of over $13 million. The City of Novi's share of the storage costs is $4.34 million.

Alternative 2: 1.0 Million Gallon Elevated Storage Tank Intermediate District $5,320,000

This alternative involves a million gallon elevated storage tank located on the northwest portion of the City's Intermediate Pressure District (section 17). The storage tank will be controlled by the West Park Booster Pump Station and the three pressure reducing valves located between the High Pressure District and the Intermediate Pressure District. The desired long term goal for this district is to maintain a hydraulic gradeline (HGL) of 1,091 ft. Therefore, the storage tank will be 145 ft to top capacity line (TCL). The storage tank will be designed to fill at night between midnight and six in the morning in accordance with DWSD's exclusionary period. The station will drain by gravity from the storage facility during peak usage periods in order to limit the peak flow from the City.

Advantages of this alternative low operational (energy) costs and the potential to locate the storage facility on City owned property or negotiate with neighboring land owners for land acquisition. The controls for this storage facility may be complicated as the filling and draining will be controlled by four different devices. If this alternative is chosen, the City could look into the possibility of eliminating one or more of these connections as part of the Storage Tank Basis of Design. Another disadvantage of this alternative is the relatively high upfront costs compared to the ground storage tank and those options with costs shared with Commerce Township. This alternative has a Total Present Worth for a 20 year projection of $4.57 million.

Alternative 3A: 1.0 Million Gallon Elevated Storage Tank High Pressure District $6,910,000

This alternative involves a million gallon elevated storage tank located west of M-5 at an elevation of 1,000 feet in the High Pressure District within section 1. Two control valves will need to be added at the DWSD connection NV-04 and NV-05. The storage tank will be designed to maintain an HGL between 1,103 and 1,143 ft, which is a 140 ft to TCL. The storage tank will be designed to fill at night between midnight and six in the morning in accordance with DWSD's exclusionary period. The station will drain by gravity from the storage facility during peak usage periods in order to limit the peak flow from the City.

The advantage of this alternative is the low operational (energy) costs. The controls for this storage facility is less complicated than the storage alternative located in the Intermediate District but still involves two control valves at the DWSD connections. A disadvantage of this alternative is the relatively high upfront costs compared to the other alternatives. This alternative has a Total Present Worth for a 20 year projection of $5.91 million.

Alternative 3B: 3.0 Million Gallon Elevated Storage Tank High Pressure District $4,175,000

This alternative involves a three million gallon elevated storage tank located west of M-5 at an elevation of 1,000 feet in the High Pressure District (section 17). Two control valves will need to be added at the DWSD connection NV-04 and NV-05 in addition to the meter pit and control valve between Commerce Township and the City of Novi. The storage tank will be designed to maintain an HGL between 1,103 and 1,143 ft, which is a 140 ft to TCL. The storage tank will be designed to fill at night between midnight and six in the morning in accordance with DWSD's exclusionary period. The station will drain by gravity from the storage facility during peak usage periods in order to limit the peak flow from the City.

The advantage of this alternative is the low operational (energy) costs and the lowest total present worth calculation of all of the alternatives. The controls for this storage facility is less complicated than the storage alternative located in the Intermediate District but still involves two control valves at the DWSD connections and the connection to Commerce Township, which is not at the same hydraulic grade line at the City. Disadvantages include potential land acquisition and coordination with Commerce Township. This alternative has a Total Present Worth for a 20 year projection of $3.43 million.

Alternative 4: Old Expo Center Elevated Storage Tank $650,000

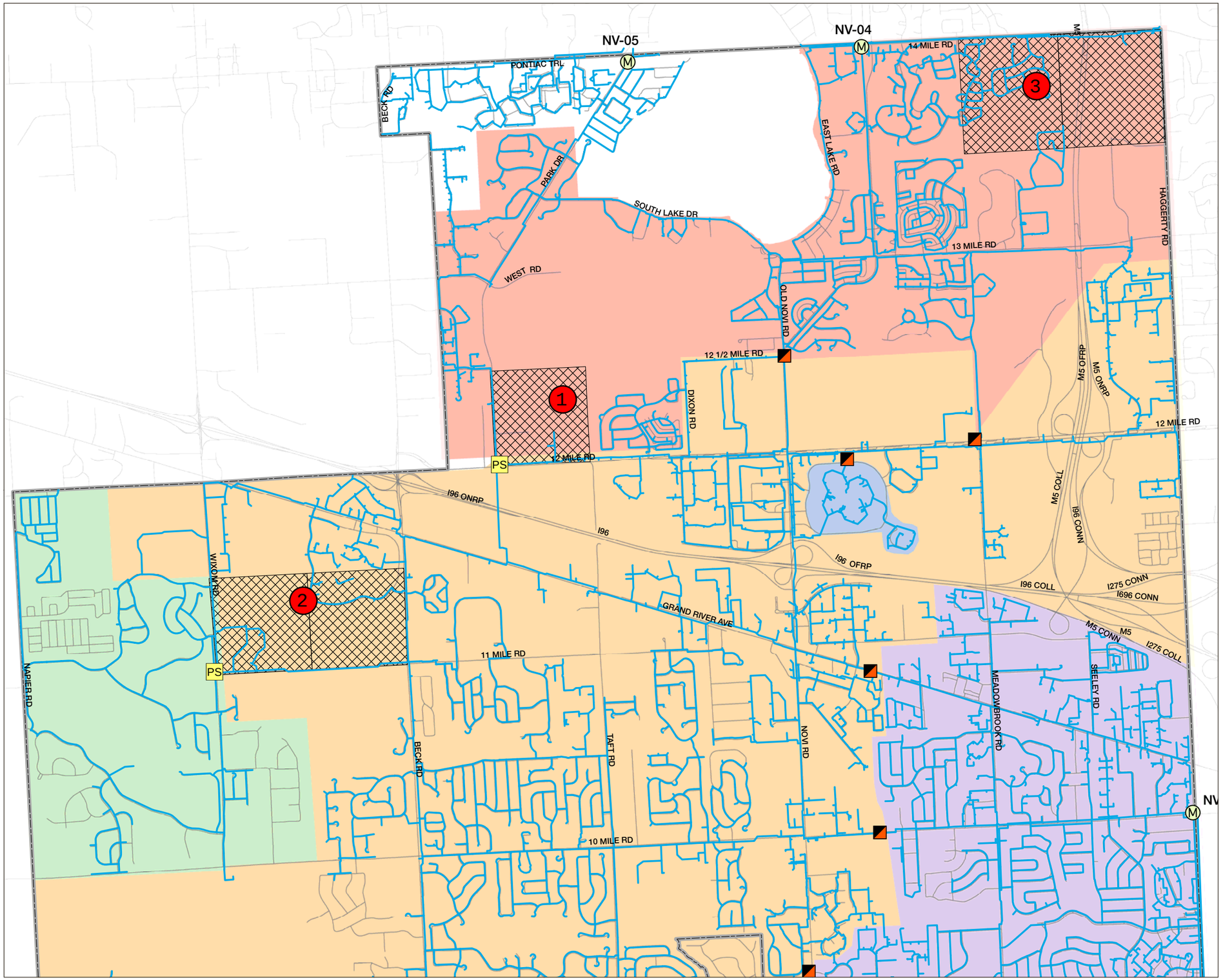
This alternative involves utilizing the existing Expo Design Center elevated storage tank located in the Intermediate district. The City is not aware of the size or elevation of the storage facility. The storage tank will be controlled by the West Park Booster Pump Station and the three pressure reducing valves located between the High Pressure District and the Intermediate Pressure District.

There are still too many unknown factors associated with this facility to know if it is a viable option. Assuming that the storage tank's elevation is sufficient for operation in the Intermediate Pressure District, there may be several advantages and disadvantages to this alternative. The advantages of this alternative are the low upfront costs and it utilizes an existing facility. Disadvantages include that the controls for this storage facility may be complicated and the storage facility may not be large enough to make the City of Novi a

maximum day customer. Another disadvantage is that while the storage facility may be obtained at minimal cost there are still significant costs associated with adding the control to the booster pump station, existing facility and the three pressure reducing valves. This alternative has a Total Present Worth for a 20 year projection of $1.96 million assuming that there is no salvage value for the existing storage tank after an additional 20 years.

FIGURE C1
Site Locations

Water System Feasibility Study
City of Novi



PRV
Meter
Pump Station
Water Main
SDE.Novi_QtrSectionLine

Pressure Districts

HIGH
INTERMEDIATE
ISLAND LAKE
LOWER
TWELVE OAKS

0 2,000 4,000 6,000 8,000 Feet

Source: Data provided by Oakland County and the City of Novi. Orchard, Hiltz and McCliment does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: Michigan South NAD 1983 State Plane International Feet

Map Published: October 5, 2011

OHM
888.522.6711 | ohm-advisors.com

Appendix D
Water Rate Calculations

Water Rates

The City's DWSD required revenue for fiscal year 2011-2012 is $7.88 million or an equivalent rate of $27.96 per 1,000 cubic feet (Mcf). This rate is based on an annual usage of 281,800 Mcf, a maximum day usage of 17.3 MGD and a peak hour usage of 25.5 MGD. Several scenarios were evaluated to determine potential cost savings associated with the implementation of the storage project.

A conservative scenario was developed by assuming that the DWSD estimate of 18.6 MGD for maximum day flow is reasonable and the peak hour flow would be equal to that of the maximum day. This peak usage reduction will be achievable with 1.0 million gallons in storage. The new revenue requirement for the City of Novi associated with the reduction in peak usage will be $6.14 million or an equivalent rate of $21.80 / Mcf. Based on the City's yearly usage for 2010-2011, the savings from this rate reduction would be $1,735,000 annually.

Other scenarios were developed based on varying levels of conservative estimate of maximum day usage and more aggressive control of the flows through demand management. See Table below for the various flow scenarios.

Table 1: Revenue Requirements

Scenario	Revenue Requirements	Savings	% Reductions
FY 2011-2012	$ 7,878,754		
Max Day 18.6	$ 6,143,068	$1,735,686	22%
Max Day 17.3	$ 5,788,659	$2,090,095	27%
Max Day 16.8	$ 5,666,817	$2,211,937	28%

The three scenarios evaluated primarily differ in the choice of the maximum day flow rate. The maximum daily flow rate is usually influenced quite a bit by irrigation practices. Continued diligence and enforcement of the City's mandatory grass watering ordinance controls is an important part of the above assumptions.

Appendix E
Cost Estimates

City of Novi, Michigan
Storage Tank Feasibility Cost Analysis

	1.0 MG ground West Park & 12 **Alt 1A**	3.0 MG Ground 12 and West Park **Alt 1B**	1.0 MG Elevated Providence **Alt 2**	1.0 MG Elevated M-5 **Alt. 3A**	3.0 MG Elevated M-5 **Alt 3B**
Storage Tank (See Note 1)	$755,000	$1,560,000	$2,040,000	$2,050,000	$5,100,000
Land Acquisition	$0	$0	$0	$330,000	$330,000
Site Improvements for Storage Tank	$100,000	$100,000	$75,000	$100,000	$100,000
Blasting and Painting Containment			$120,000	$120,000	$0
System Controls			$75,000	$75,000	$75,000
Altitude Valve	$75,000	$75,000	$75,000	$75,000	$75,000
Cathodic Protection	$20,000	$20,000	$20,000	$20,000	$20,000
Booster Station	$1,830,000	$3,650,000	$0	$0	$0
Distribution/Transmission Improvements	$220,000	$1,030,000	$840,000	$220,000	$1,030,000
Control Valves					
NV-04 - New Vault and Control Valves	$0	$0	$0	$810,000	$810,000
NV-05 - New Vault and Control Valves	$0	$0	$0	$810,000	$810,000
PRV - 9	$0	$0	$100,000	$0	$0
PRV - 7 & 11	$0	$0	$100,000	$0	$0
PRV - 16 & 17	$0	$0	$100,000	$0	$0
Subtotal Construction Costs	$3,000,000	$6,435,000	$3,545,000	$4,610,000	$8,350,000
Contingency (20%)	$600,000	$1,287,000	$709,000	$922,000	$1,670,000
Total Construction Cost	$3,600,000	$7,722,000	$4,254,000	$5,532,000	$10,020,000
Engineering and Legal Costs (25%)	$900,000	$1,930,500	$1,063,500	$1,383,000	$2,505,000
Total Project Cost	$4,500,000	$9,652,500	$5,317,500	$6,915,000	$12,525,000
Novi Project Share	**$4,500,000**	**$3,217,500**	**$5,317,500**	**$6,915,000**	**$4,175,000**

Notes:
1.) Assumes that suitable soil bearing pressure (5000-6000 psf) is available.

CIty of Novi, Michigan
Storage Tank Feasibility Cost Analysis

	1.0 MG ground West Park & 12	3.0 MG Ground 12 and West Park	1.0 MG elev Providence	1.0 MG M-5	3.0 MG Elevated M-5	Expo M-5
INPUTS	**Alt 1A**	**Alt 1B**	**Alt 2**	**Alt. 3A**	**Alt 3B**	**Alt 3B**
Design and Construction Costs	$4,500,000	$9,652,500	$5,317,500	$6,915,000	$12,525,000	$675,000
EPA Discount Rate (i) - less than 4% use 4%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%
Life Expectancy (lexp)	50	50	50	50	50	50
Cost Recovery Period - Years (n):	20	20	20	20	20	20
SALVAGE VALUE (Straight Line Depreciation)						
Constant Yearly Depreciation (Dx) (Design & Const Costs/lexp):	$90,000.00	$193,050.00	$106,350.00	$138,300.00	$250,500.00	$13,500.00
Value Remaining After 20 years (Vn = Dx*(lexp-n))	$2,700,000.00	$5,791,500.00	$3,190,500.00	$4,149,000.00	$7,515,000.00	$405,000.00
Present Worth Factor of Remaining Value: PWf = (1+i)^-n	0.4564	0.4564	0.4564	0.4564	0.4564	0.4564
Present Worth of Salvage Value (PWsalv=PWf * Vn):	***$1,232,244.75***	***$2,643,165.00***	***$1,456,102.55***	***$1,893,549.44***	***$3,429,747.90***	***$184,836.71***
OPERATION, MAINTENANCE and REPLACEMENT (OM&R)						
Present Worth Factor for uniform series of payments PWf = ((1+i)^n*-1) / (i * (1+i)^n)	13.59	13.59	13.59	13.59	13.59	13.59
Annual OM&R Costs						
Annual Operations Cost	$79,500.00	$79,500.00	$24,000.00	$24,000.00	$28,000.00	$0.00
Pump Station Replacement Cost ($/year)	$60,000.00	$80,000.00				
Storage Tank Maintenance Cost ($/year)	$20,000.00	$79,500.00	$22,000.00	$22,000.00	$25,000.00	$0.00
Valve Maintenance Cost ($/year)	$0.00	$9,100.00	$4,500.00	$18,200.00	$36,400.00	$0.00
Annual Power Consumption	$117,000.00	$194,000.00	$1,800.00	$1,200.00	$1,800.00	$1,200.00
Projected Annual OM&R Costs (Aomr) - Total	**$277,000.00**	**$442,000.00**	**$52,000.00**	**$65,400.00**	**$91,000.00**	**$52,000.00**
Projected Annual OM&R Costs (Aomr) - Novi Share	**$277,000.00**	**$147,000.00**	**$52,000.00**	**$65,400.00**	**$30,000.00**	**$52,000.00**
Present Worth for OM&R: Pwomr = Aomr * PWf	***$3,764,520.40***	***$1,997,777.97***	***$706,696.97***	***$888,807.34***	***$407,709.79***	***$706,696.97***
TOTAL PRESENT WORTH						
Total Present Worth (Pwtot) = Design & Construction Cost + Pwomr - Pwsalv	***$7,032,276***	***$13,016,259***	***$4,568,094***	***$5,910,258***	***$10,331,972***	***$1,196,860***
Total Present Worth (Pwtot) - NOVI Share	***$7,032,276***	***$4,338,753***	***$4,568,094***	***$5,910,258***	***$3,443,991***	***$1,196,860***

City of Novi, Michigan
Storage Tank Feasibility Cost Analysis

Flow Scenario 1 (Q = 18.6 MGD) $1,735,686

Alternative 1 - 1.0 Ground Storage Tank

Year	Investment (T=0)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost	-$5,055,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000	-$285,000
DWSD Rate Savings		$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686
Cumulative		-$3,604,314	-$2,153,628	-$702,942	$747,744	$2,198,430	$3,649,116	$5,099,802	$6,550,488	$8,001,174	$9,451,860	$10,902,546	$12,353,232	$13,803,918	$15,254,604	$16,705,290	$18,155,976	$19,606,662	$21,057,348	$22,508,034	$23,958,720
Net Cash Inflow	-$5,055,000	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686	$1,450,686

NPV	**$14,096,439**
Rate	4.0%
Payback	3.5 years

Alternative 1b - 3.0 Ground Storage Tank

Year	Initial Investment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost	-$3,077,500	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000	$147,000
DWSD Rate Savings		$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686
Cumulative		-$1,194,814	$687,872	$2,570,558	$4,453,244	$6,335,930	$8,218,616	$10,101,302	$11,983,988	$13,866,674	$15,749,360	$17,632,046	$19,514,732	$21,397,418	$23,280,104	$25,162,790	$27,045,476	$28,928,162	$30,810,848	$32,693,534	$34,576,220
Net Cash Flow	-$3,077,500	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686	$1,882,686

NPV	**$21,643,093**
Rate	4.0%
Payback	1.6 years

Alternative 2 - 1.0 Elevated Storage - Providence

Year	Initial Investment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost	-$5,317,500	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000	-$52,000
DWSD Rate Savings		$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686
Cumulative		-$3,633,814	-$1,950,128	-$266,442	$1,417,244	$3,100,930	$4,784,616	$6,468,302	$8,151,988	$9,835,674	$11,519,360	$13,203,046	$14,886,732	$16,570,418	$18,254,104	$19,937,790	$21,621,476	$23,305,162	$24,988,848	$26,672,534	$28,356,220
Net Cash Flow	-$5,317,500	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686	$1,683,686

NPV	**$16,888,791**
Rate	4.0%
Payback	3.2 years

Alternative 3 - 1.0 Elevated Storage - 14 Mile

Year	Initial Investment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost	-$6,915,000	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400	-$65,400
DWSD Rate Savings		$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686
Cumulative		-$5,244,714	-$3,574,428	-$1,904,142	-$233,856	$1,436,430	$3,106,716	$4,777,002	$6,447,288	$8,117,574	$9,787,860	$11,458,146	$13,128,432	$14,798,718	$16,469,004	$18,139,290	$19,809,576	$21,479,862	$23,150,148	$24,820,434	$26,490,720
Net Cash Flow	-$6,915,000	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286	$1,670,286

NPV	**$15,177,627**
Rate	4.0%
Payback	4.1 years

Alternative 3b - 3.0 Elevated Storage - 14 Mile

Year	Initial Investment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost	-$4,175,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000
DWSD Rate Savings		$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686	$1,735,686
Cumulative		-$2,409,314	-$643,628	$1,122,058	$2,887,744	$4,653,430	$6,419,116	$8,184,802	$9,950,488	$11,716,174	$13,481,860	$15,247,546	$17,013,232	$18,778,918	$20,544,604	$22,310,290	$24,075,976	$25,841,662	$27,607,348	$29,373,034	$31,138,720
Net Cash Flow	-$4,175,000	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686	$1,765,686

NPV	**$19,058,893**
Rate	4.0%
Payback	2.4 years

CB&I Inc.
14105 S. Route 59
Plainfield, IL 60544-8984
USA
Tel: 815-439-3112
Fax: 815-439-3130
mallison@cbi .com

September 29, 2011

To: Carrie Ricker Cox, P.E.
OHM
34000 Plymouth Road
Livonia, MI 48150

RE: **Elevated Budgetary Estimates for Novi, MI** (Rev 1)

Dear Carrie:

Per your request, I have revised our budget pricing for the elevated water storage tank opportunity in Novi, Michigan as follows:

1000 MG x 140' TCL Waterspheroid - $2,050,000 (40' Headrange)
1000 MG x 140' TCL Composite - $2,040,000 (40' Headrange)
1000 MG x 145' TCL Waterspheroid - $2,075,000
1000 MG x 145' TCL Composite - $2,060,000
3000 MG x 145' TCL Composite - $5,075,000 (50' Headrange)

Budget Pricing Includes

- ☑ AWWA D100-05 Tank w/ Overflow Height as specified above
- ☑ Seismic Design - Zone 1, also compliance with IBC 2000
- ☑ Shop priming
- ☑ Epoxy/ Urethane Paint
- ☑ Spread Footing Foundation
- ☑ Basic Electrical
- ☑ Anchor Bolts (If Required)
- ☑ Ladders w/ safety climb
- ☑ SS Inlet (CS for WSO)
- ☑ SS Overflow to Grade (CS for WSO)
- ☑ Prevailing Wages

Alt. Site/Project Specific Items not Included

- ☐ Cathodic Protection
- ☐ Telemetry
- ☐ Piping Outside the Foundation
- ☐ Altitude Valves
- ☐ Valve Vault
- ☐ Site Work
- ☐ Tank Signage / Logo's
- ☐ Pile / Pier Foundation (< 4000 psf soil)
- ☐ Containment for Blasting and Painting

The global steel market is experiencing unprecedented price increases. The current market conditions make predicting material prices highly uncertain. The budget estimate offered herein is based on present day pricing and availability of materials, and may be subject to change outside of CB&I control.

Please be sure to add for any alternate site or project specific items that I have excluded above. If you should have any questions please contact me at (815) 439-3112. Thank you once again for your continued interest in CB&I.

Very Truly Yours,
CB&I

Mike Allison

Michael S. Allison
Business Development Manager

Appendix F
Joint Storage with Commerce Township or Farmington Hills

Shared Storage

Shared storage was a viable option for the City of Novi. It provides not only initial savings in capital costs but also ongoing savings in operations and maintenance costs. The City of Novi worked with both Commerce Township and the City of Farmington Hills to look into the option of shared storage. Both communities have similar hydraulic grade line needs and the combined storage needs were such that a combined elevated storage tank would work for shared storage with either community (see below storage calculations). However, the DWSD requirements for forming an authority and the timing for working out details of the authority made the shared storage alternative less desirable. Both neighboring communities decided to implement individual community storage alternatives. Since shared storage is no longer an alternative for the City of Novi, it is recommended that the City pursue constructing a 1.0 million gallon elevated storage tank in the intermediate district.

MAX DAY

Date	Novi Total	Commerce Total	Authority	Combined Rank	Novi Rank	Commerce Rank
7/17/2011	15.32	5.59	20.92	1	1	2
7/10/2011	15.17	5.72	20.89	2	2	1
7/16/2011	14.91	5.24	20.15	3	3	5
7/9/2011	14.80	5.29	20.10	4	4	3
7/21/2011	14.75	5.21	19.96	5	5	6
7/8/2011	14.67	5.25	19.92	6	6	4
7/26/2011	14.42	5.17	19.59	7	9	7
7/25/2011	14.53	5.05	19.57	8	7	
7/20/2011	14.45	5.09	19.53	9	8	10
7/15/2011	13.99	4.98	18.97	10		

PEAK HOUR - System

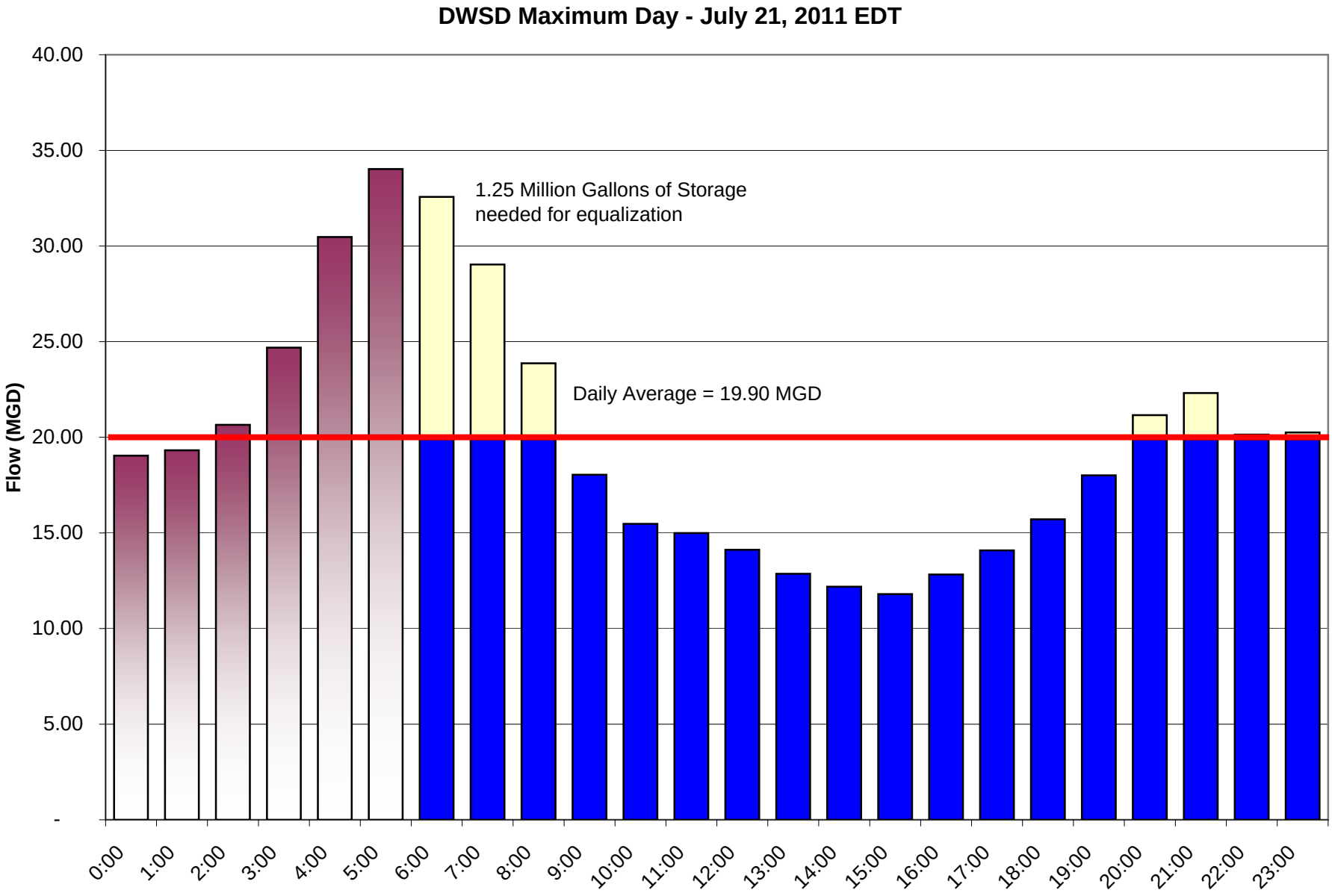
Date	Novi Total	Commerce Total	Authority	Combined Rank
7/22/2011 5:00	27.15	9.81	36.97	1
7/18/2011 5:00	26.61	9.81	36.42	2
7/15/2011 5:00	26.07	9.71	35.79	3
7/25/2011 5:00	26.06	9.41	35.47	4
7/11/2011 5:00	25.48	9.80	35.28	5
7/26/2011 5:00	25.86	9.35	35.21	6
7/17/2011 5:00	25.41	9.76	35.18	7
7/16/2011 3:00	27.06	8.06	35.12	8
7/22/2011 6:00	24.81	9.91	34.72	9
7/27/2011 5:00	25.19	9.38	34.56	10

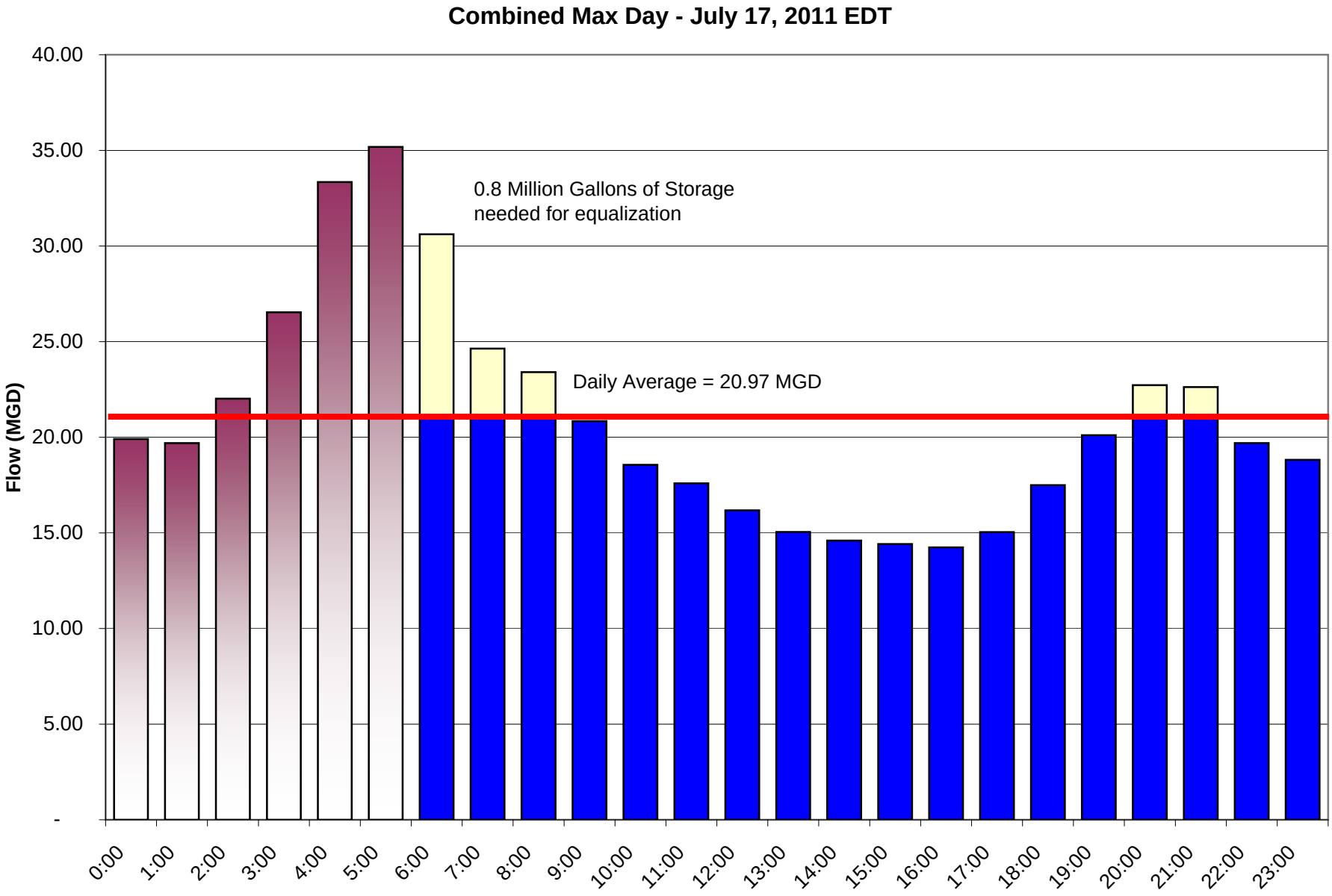
PEAK HOUR - Non Exclusionary

Date	Novi Total	Commerce Total	Authority	Combined Rank
7/22/2011 6:00	24.81	9.91	34.72	1
7/27/2011 6:00	24.46	10.03	34.49	2
7/11/2011 6:00	24.30	10.06	34.35	3
7/18/2011 6:00	24.24	9.78	34.02	4
7/15/2011 6:00	23.65	9.52	33.17	5
7/25/2011 6:00	23.34	9.69	33.03	6
7/20/2011 6:00	23.17	9.83	33.00	7
7/26/2011 6:00	22.93	9.64	32.57	8
7/21/2011 6:00	22.86	9.71	32.57	9
7/8/2011 6:00	22.66	9.30	31.96	10

	Actual 2011	10%	Novi Contract	Commerce Contract*	Combined
Maximum Day	20.92	23.01	16.3	7.09	23.39
Peak Hour	34.72	38.20	23.5	12.78	36.28

*From DWSD 2003-2010 Flow Profile


DWSD Maximum Day - July 21, 2011 EDT
Flow (MGD)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
-
1.25 Million Gallons of Storage needed for equalization
Daily Average = 19.90 MGD
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00


Combined Max Day - July 17, 2011 EDT
Flow (MGD)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
-
0.8 Million Gallons of Storage
needed for equalization
Daily Average = 20.97 MGD
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
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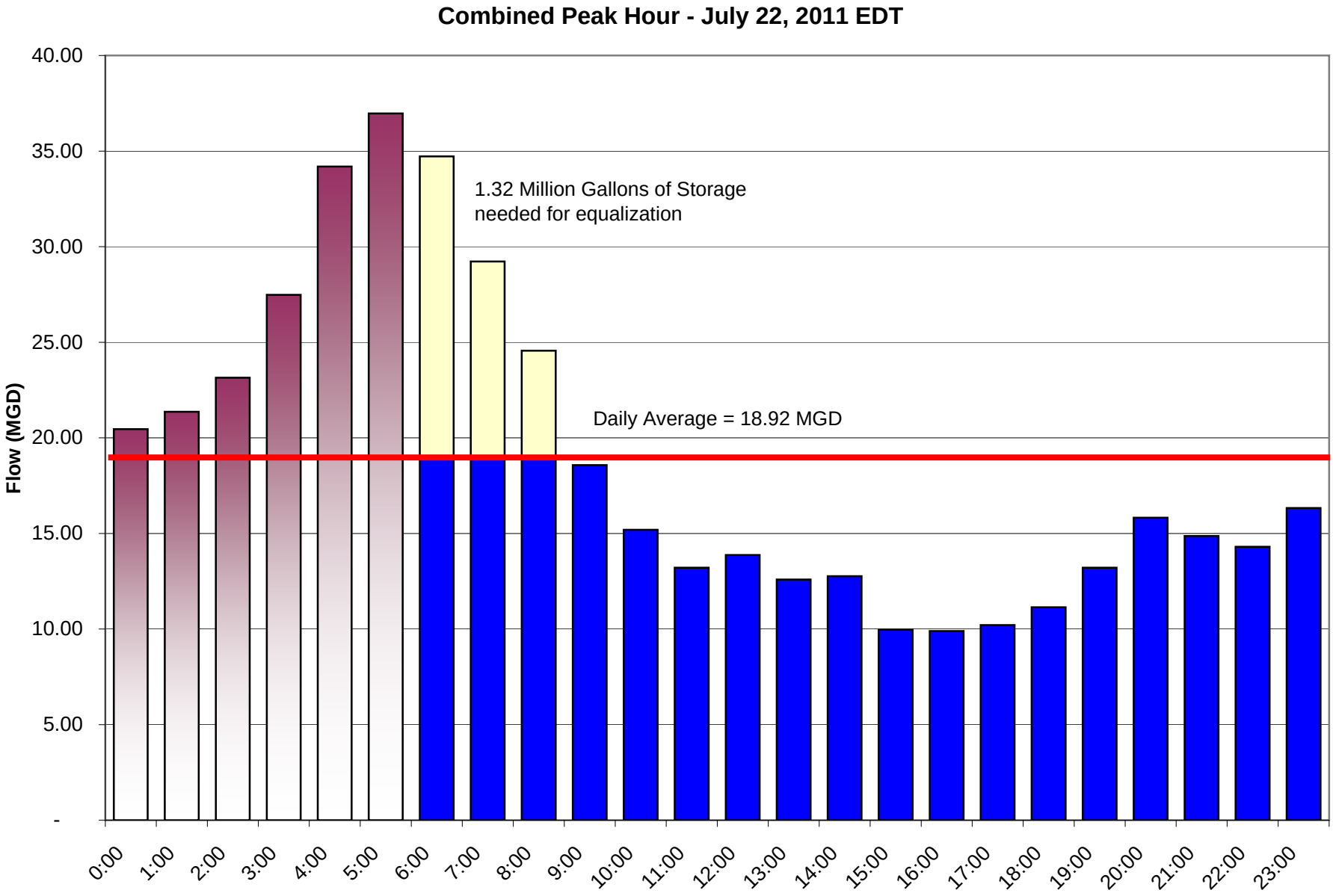
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00


Combined Peak Hour - July 22, 2011 EDT
Flow (MGD)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
-
1.32 Million Gallons of Storage
needed for equalization
Daily Average = 18.92 MGD
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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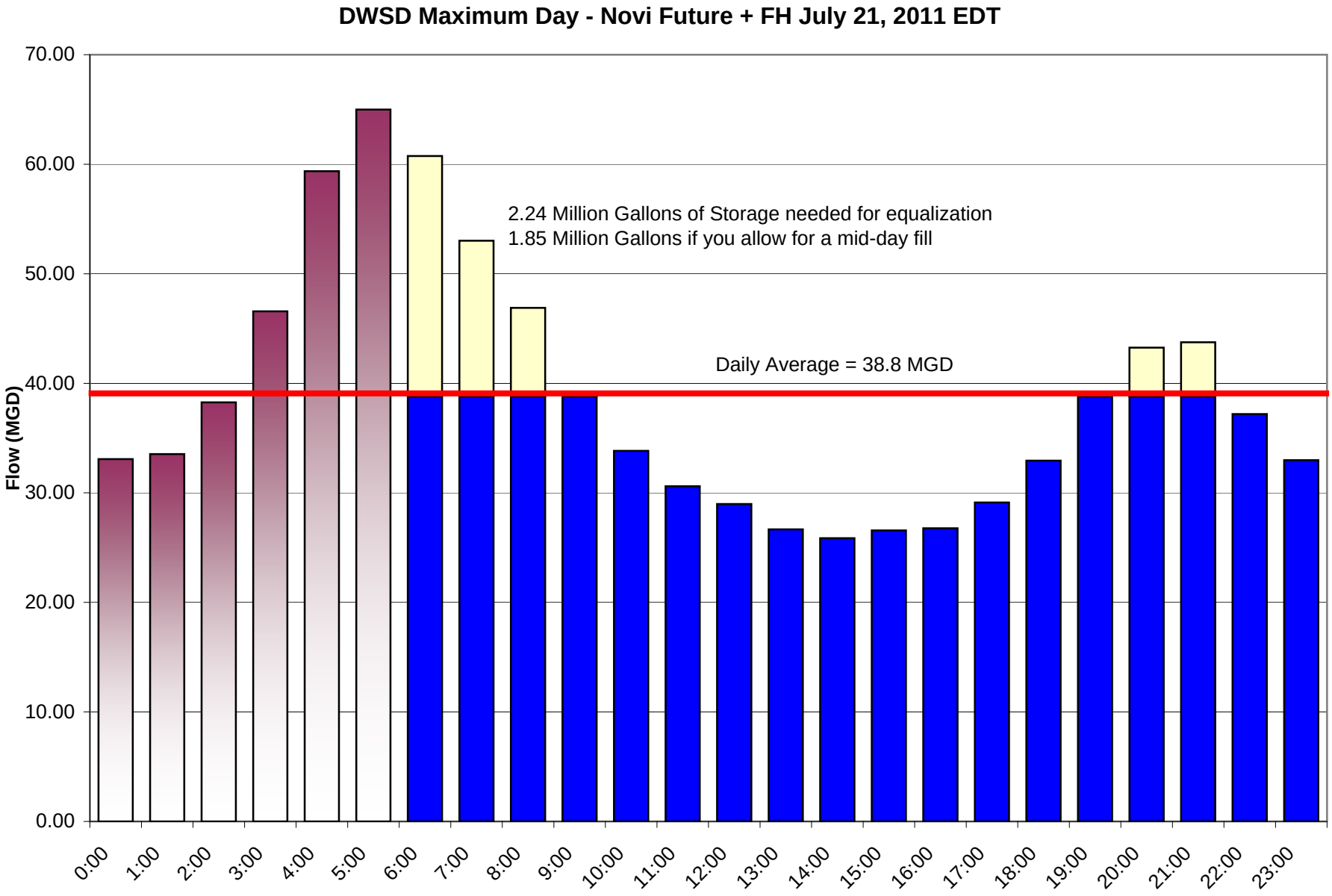
18:00
19:00
20:00
21:00
22:00
23:00


DWSD Maximum Day - Novi Future + FH July 21, 2011 EDT
Flow (MGD)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
2.24 Million Gallons of Storage needed for equalization
1.85 Million Gallons if you allow for a mid-day fill
Daily Average = 38.8 MGD
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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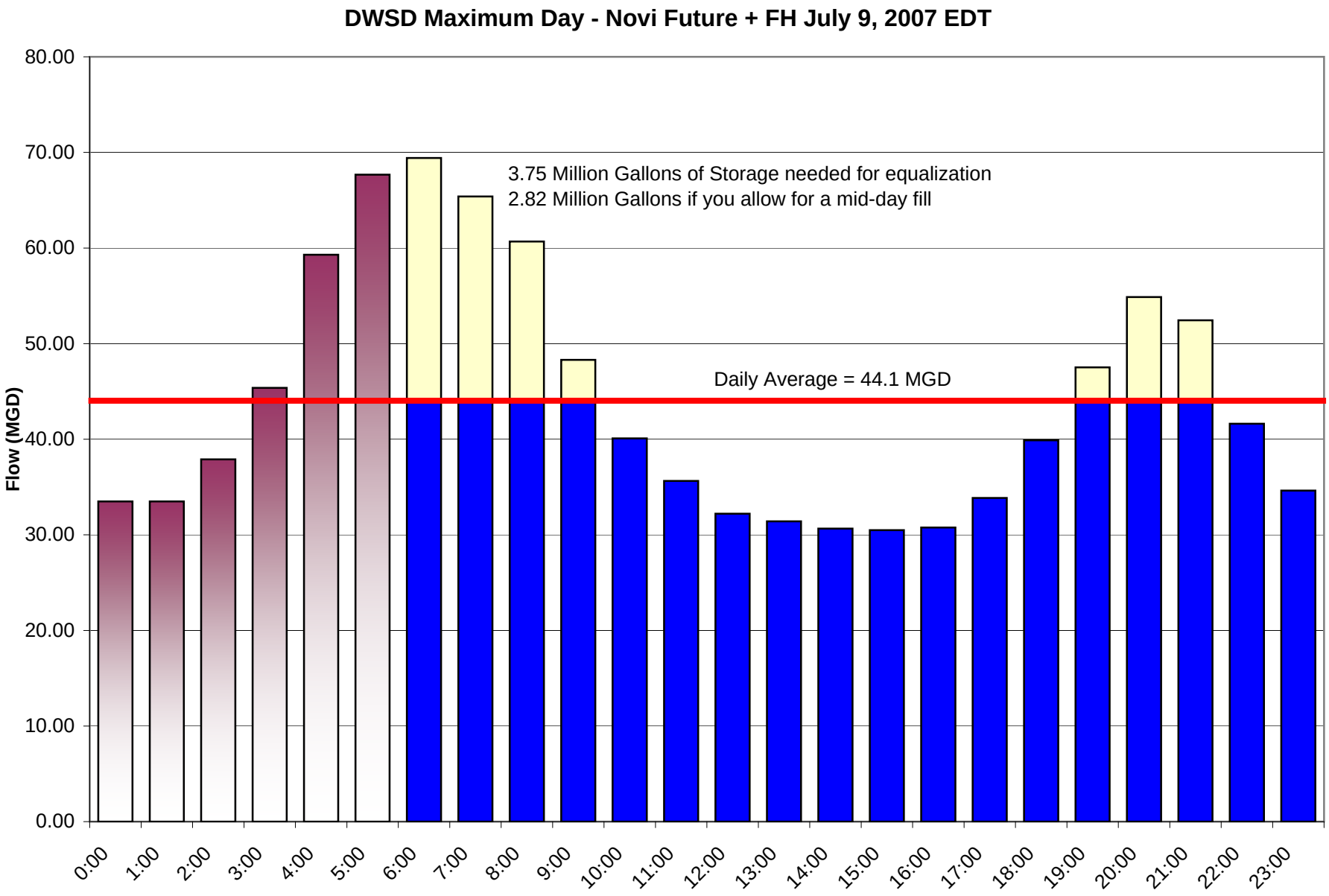
23:00


DWSD Maximum Day - Novi Future + FH July 9, 2007 EDT
3.75 Million Gallons of Storage needed for equalization
2.82 Million Gallons if you allow for a mid-day fill
Daily Average = 44.1 MGD
Flow (MGD)
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
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22:00
23:00

SUPPLEMENTAL PROFESSIONAL ENGINEERING SERVICES AGREEMENT

WATER SYSTEM MASTER PLAN, WATER DISTRIBUTION STORAGE FACILITY. AND WATER SCADA ENGINEERING SERVICES

This Agreement shall be considered as made and entered into as of the date of the last signature hereon, and is between the City of Novi, 45175 W. Ten Mile Road, Novi, MI 48375-3024, hereafter, "City," and Orchard, Hiltz & McCliment, Inc. whose address is 34000 Plymouth Road, Livonia, MI 48150, hereafter, "Consultant."

R E C I T A L S:

This Agreement shall be supplemental to, and hereby incorporates the terms and conditions of the AGREEMENT FOR PROFESSIONAL ENGINEERING SERVICES FOR PUBLIC PROJECTS, and attached exhibits, entered into between the City and the Consultant on September 24, 2009.

This project includes the completion of an update to the water distribution system master plan, development of the scope and bidding documents for the second phase of the Supervisory Control and Data Acquisition (SCADA) system for the water distribution system, and the design phase engineering for a new one million gallon elevated water storage facility.

NOW, THEREFORE, in consideration of the foregoing, the City and Consultant agree as follows:

Section 1. **Professional Engineering Services**.

For and in consideration of payment by the City as provided under the "Payment for Engineering Services" section of this Agreement, Consultant shall perform the work described in the manner provided or required by the following Scope of Services, which is attached to and made a part of this Agreement as Exhibit A, all of said services to be done in a competent, efficient, timely, good and workmanlike manner and in compliance with all terms and conditions of this Agreement.

Exhibit A Scope of Services

Section 2. Payment for Professional Engineering Services.

1. Basic Fee.

   a. Design Phase Services:
      i. Water System Master Plan Update: The Consultant shall complete the engineering services related to the water system master plan update as described herein for a lump sum fee of $23,800.
      ii. Supervisory Control and Data Acquisition (SCADA) for Water: The Consultant shall complete design and bidding phase services related to the implementation of SCADA for the water distribution system as described herein for a lump sum fee of $41,500.

iii. Water Distribution Storage Facility: The Consultant shall complete the design and bidding phase services related to the construction of a water distribution storage facility as described herein for a lump sum fee of $107,000.

b. Construction Phase Services will be awarded at the time of construction award, should it occur.

2. Payment Schedule for Professional Engineering Services Fee.

Consultant shall submit monthly statements for professional engineering services rendered. The statements shall be based on Consultant's estimate of the proportion of the total services actually completed for each task as set forth in Exhibit A at the time of billing. The City shall confirm the correctness of such estimates, and may use the City's own engineer for such purposes. The monthly statements should be accompanied by such properly completed reporting forms and such other evidence of progress as may be required by the City. Upon such confirmation, the City shall pay the amount owed within 30 days.

Final billing under this agreement shall be submitted in a timely manner but not later than three (3) months after completion of the services. Billings for work submitted later than three (3) months after completion of services will not be paid. Final payment will be made upon completion of audit by the City.

3. Payment Schedule for Expenses.

All expenses required to complete the scope of services described herein, including but not limited to costs related to mileage, vehicles, reproduction, computer use, etc., shall be included in the basic fee and shall not be paid separately. However, as compensation for expenses that are not included in the standard scope of services, when incurred in direct connection with the project, and approved by the City, the City shall pay the Consultant its actual cost times a factor of 1.15.

Section 4. Ownership of Plans and Documents; Records.

1. Upon completion or termination of this agreement, all documents prepared by the Consultant, including tracings, drawings, estimates, specifications, field notes, investigations, studies, etc., as instruments of service shall become the property of the City.

2. The City shall make copies, for the use of the Consultant, of all of its maps, records, laboratory tests, or other data pertinent to the work to be performed by the Consultant under this Agreement, and also make available any other maps, records, or other materials available to the City from any other public agency or body.

3. The Consultant shall furnish to the City, copies of all maps, records, field notes, and soil tests that were developed in the course of work for the City and for which compensation has been received by the Consultant.

Section 5. Termination.

1. This Agreement may be terminated by either party upon 7- days' prior written notice to the other party in the event of substantial failure by the other party to fulfill its obligations under this agreement through no fault of the terminating party.

2. This Agreement may be terminated by the City for its convenience upon 90 days' prior written notice to the Consultant.

3. In the event of termination, as provided in this Article, the Consultant shall be paid as compensation in full for services performed to the date of that termination, an amount calculated in accordance with Section 2 of this Agreement. Such amount shall be paid by the City upon the Consultant's delivering or otherwise making available to the City, all data, drawings, specifications, reports, estimates, summaries, and that other information and materials as may have been accumulated by the Consultant in performing the services included in this Agreement, whether completed or in progress.

Section 6. Disclosure.

The Consultant affirms that it has not made or agreed to make any valuable gift whether in the form of service, loan, thing, or promise to any person or any of the person's immediate family, having the duty to recommend, the right to vote upon, or any other direct influence on the selection of consultants to provide professional engineering services to the City within the two years preceding the execution of this Agreement. A campaign contribution, as defined by Michigan law shall not be considered as a valuable gift for the purposes of this Agreement.

Section 7. Insurance Requirements.

1. The Consultant shall maintain at its expense during the term of this Agreement, the following insurance:

A. Worker's Compensation insurance relative to all Personnel engaged in performing services pursuant to this Agreement, with coverage not less than that required by applicable law.

B. Comprehensive General Liability insurance with maximum bodily injury limits of $1,000,000 (One Million Dollars) each occurrence and/or aggregate and minimum Property Damage limits of $1,000,000 (One Million Dollars) each occurrence and/or aggregate.

C. Automotive Liability insurance covering all owned, hired, and non-owned vehicles with Personal Protection insurance to comply with the provisions of the Michigan No Fault Insurance Law including Residual Liability insurance with minimum bodily injury limits of $1,000,000 (One Million Dollars) each occurrence and/or aggregate minimum property damage limits of $1,000,000 (One Million Dollars) each occurrence and/or aggregate.

D. The Consultant shall provide proof of Professional Liability coverage in the amount of not less than $1,000,000 (One Million Dollars) per occurrence and/or aggregate, and Environmental Impairment coverage.

2. The Consultant shall be responsible for payment of all deductibles contained in any insurance required hereunder.

3. If during the term of this Agreement changed conditions or other pertinent factors should in the reasonable judgment of the City render inadequate insurance limits, the Consultant will furnish on demand such additional coverage as may reasonably be required under the circumstances. All such insurance shall be effected at the Consultant's expense, under valid and enforceable policies, issued by the insurers of recognized responsibility which are well-rated by national rating organizations and are acceptable to the City.

4. All policies shall name the Consultant as the insured and shall be accompanied by a commitment from the insurer that such policies shall not be canceled or reduced without at least thirty (30) days prior notice to the City.

With the exception of professional liability, all insurance policies shall name the City of Novi, its officers, agents, and employees as additional insured. Certificates of Insurance evidencing such coverage shall be submitted to Sue Morianti, Purchasing Manager, City of Novi, 45175 West Ten Mile Road, Novi, MI 48375-3024 prior to commencement of performance under this Agreement and at least fifteen (15) days prior to the expiration dates of expiring policies.

5. If any work is sublet in connection with this Agreement, the Consultant shall require each subconsultant to effect and maintain at least the same types and limits of insurance as fixed for the Consultant.

6. The provisions requiring the Consultant to carry said insurance shall not be construed in any manner as waiving or restricting the liability of the Consultant under this Agreement.

Section 8. <u>Indemnity and Hold Harmless</u>.

A. The Consultant agrees to indemnify and hold harmless the City, its elected and appointed officials and employees, from and against any and all claims, demands, suits, losses and settlements, including actual attorney fees incurred and all costs connected therewith, for any damages which may be asserted, claimed or recovered against the City by reason of personal injury, death and/or property damages which arises out of or is in any way connected or associated with the actions or inactions of the Consultant in performing or failing to perform the work.

The Consultant agrees that it is its responsibility and not the responsibility of the City to safeguard the property and materials used in performing this Agreement. Further, this Consultant agrees to hold the City harmless for any loss of such property and materials used pursuant to the Consultant's performance under this Agreement.

Section 9. Nondiscrimination.

The Consultant shall not discriminate against any employee, or applicant for employment because of race, color, sex, age or handicap, religion, ancestry, marital status, national origin, place of birth, or sexual preference. The Consultant further covenants that it will comply with the Civil Rights Act of 1973, as amended; and the Michigan Civil Rights Act of 1976 (78. Stat. 252 and 1976 PA 4563) and will require a similar covenant on the part of any consultant or subconsultant employed in the performance of this Agreement.

Section 10. Applicable Law.

This Agreement is to be governed by the laws of the State of Michigan and the City of Novi Charter and Ordinances.

Section 11. Approval; No Release.

Approval of the City shall not constitute nor be deemed release of the responsibility and liability of Consultant, its employees, associates, agents and subconsultants for the accuracy and competency of their designs, working drawings, and specifications, or other documents and services; nor shall that approval be deemed to be an assumption of that responsibility by the City for any defect in the designs, working drawings and specifications or other documents prepared by Consultant, its employees, subconsultants, and agents.

After acceptance of final plans and special provisions by the City, Consultant agrees, prior to and during the construction of this project, to perform those engineering services as may be required by City to correct errors or omissions on the original plans prepared by Consultant and to change the original design as required.

Section 12. Compliance With Laws.

This Contract and all of Consultants professional services and practices shall be subject to all applicable state, federal and local laws, rules or regulations, including without limitation, those which apply because the City is a public governmental agency or body. Consultant represents that it is in compliance with all such laws and eligible and qualified to enter into this Agreement.

Section 13. Notices.

Written notices under this Agreement shall be given to the parties at their addresses on page one by personal or registered mail delivery to the attention of the following persons:

City: Rob Hayes, P.E., Director of Public Services and Maryanne Cornelius, Clerk, with a copy to Thomas R. Schultz, City Attorney

Consultant: Vyto Kaunelis, P.E.

Section 14. Waivers.

No waiver of any term or condition of this Agreement shall be binding and effective unless in writing and signed by all parties, with any such waiver being limited to that circumstance only and not applicable to subsequent actions or events.

Section 15. Inspections, Notices, and Remedies Regarding Work.

During the performance of the professional services by Consultant, City shall have the right to inspect the services and its progress to assure that it complies with this Agreement. If such inspections reveal a defect in the work performed or other default in this Agreement, City shall provide Consultant with written notice to correct the defect or default within a specified number of days of the notice. Upon receiving such a notice, Consultant shall correct the specified defects or defaults within the time specified. Upon a failure to do so, the City may terminate this Agreement by written notice and finish the work through whatever method it deems appropriate, with the cost in doing so being a valid claim and charge against Consultant; or, the City may preserve the claims of defects or defaults without termination by written notice to Consultant.

All questions which may arise as to the quality and acceptability of work, the manner of performance and rate of progress of the work, and the interpretation of plans and specifications shall be decided by the City. All questions as to the satisfactory and acceptable fulfillment of the terms of this agreement shall be decided by the City.

Section 16. Delays.

No charges or claims for damages shall be made by the Consultant for delays or hindrances from any cause whatsoever during the progress of any portions of the services specified in this agreement, except as hereinafter provided.

In case of a substantial delay on the part of the City in providing to the Consultant either the necessary information or approval to proceed with the work, resulting, through no fault of the Consultant, in delays of such extent as to require the Consultant to perform its work under changed conditions not contemplated by the parties, the City will consider supplemental compensation limited to increased costs incurred as a direct result of such delays. Any claim for supplemental compensation must be in writing and accompanied by substantiating data.

When delays are caused by circumstances or conditions beyond the control of the Consultant as determined by the City, the Consultant shall be granted an extension of time for such reasonable period as may be mutually agreed upon between the parties, it being understood, however, that the permitting of the Consultant to proceed to complete the services, or any part of them, after the date to which the time of completion may have been extended, shall in no way operate as a waiver on the part of the City of any of its rights herein set forth.

Section 17. Assignment.

No portion of the project work, heretofore defined, shall be sublet, assigned, or otherwise disposed of except as herein provided or with the prior written consent of the City. Consent to

sublet, assign, or otherwise dispose of any portion of the services shall not be construed to relieve the Consultant of any responsibility for the fulfillment of this agreement.

Section 18. Dispute Resolution.

The parties agree to try to resolve any disputes as to professional engineering services or otherwise in good faith. In the event that the parties cannot resolve any reasonable dispute, the parties agree to seek alternative dispute resolution methods agreeable to both parties and which are legally permissive at the time of the dispute. The parties agree to use their best efforts to resolve any good faith dispute within 90 (ninety) days notice to the other party. In the event the parties cannot resolve that dispute as set forth above, they may seek such remedies as may be permitted by law.

WITNESSES ORCHARD, HILTZ & McCLIMENT, INC

_____

_____ _____

By: _____
Its: _____

The foregoing _____ was acknowledged before me this ____ day of _____, 20___, by _____ on behalf of _____.

_____
Notary Public
_____ County, Michigan
My Commission Expires: _____

WITNESSES

_____

_____

CITY OF NOVI

_____
By: Robert J. Gatt
Its: Mayor

The foregoing _____ was acknowledged before me this ____ day of _____, 20___, by _____ on behalf of the City of Novi.

_____
Notary Public
Oakland County, Michigan
My Commission Expires: _____

EXHIBIT A - SCOPE OF SERVICES

Consultant shall provide the City professional engineering services in all phases of the Project to which this Agreement applies as hereinafter provided. These services will include serving as the City's professional engineering representative for the Project, providing professional engineering consultation and advice and furnishing customary civil, structural, mechanical and electrical engineering services and customary engineering services incidental thereto, as described below.

A. **Basic Services**.

[see attached]

B. **Performance.**

1. The Consultant agrees that, immediately upon the execution of this Agreement, it will enter upon the duties prescribed in this agreement, proceed with the work continuously, and make the various submittals on or before the dates specified in the attached schedule. The City is not liable and will not pay the Consultant for any services rendered before written authorization is received by the Consultant.

2. The Consultant shall submit, and the City shall review and approve a timeline for submission of plans and/or the completion of any other work required pursuant to this Scope of Services. The Consultant shall use its best efforts to comply with the schedule approved by the City.

3. If any delay is caused to the Consultant by order of the City to change the design or plans; or by failure of the city to designate right-of-way, or to supply or cause to be supplied any data not otherwise available to the Consultant that is required in performing the work described; or by other delays due to causes entirely beyond the control of the Consultant; then, in that event, the time schedules will be adjusted equitably in writing, as mutually agreed between the City and the Consultant at the moment a cause for delay occurs.

4. Since the work of the Consultant must be coordinated with the activities of the City (including firms employed by and governmental agencies and subdivisions working with the City), the Consultant shall advise the City in advance, of all meetings and conferences between the Consultant and any party, governmental agency, political subdivision, or third party which is necessary to the performance of the work of the Consultant.

Proposal for

Water System Master Plan, SCADA for the Water System & 1 MG Elevated Water Storage Tank

November 8, 2012





City of Novi

Department of Public Services
26300 Le BeGole Drive
Novi, MI 48375

OHM is a firm of architects, engineers and planners committed to Advancing Communities. Leaders rely on OHM's proven public and private sector expertise, insightful counsel and forward thinking to create thriving places for people.

- Integrity – We stand behind our work
- Dedication – Do what it takes
- People Caring Organization
- Teamwork – Desire to be a valued member of your team

OHM est.1962

Advancing Communities℠

Table of Contents

Water System Master Plan, SCADA for the Water System & 1 MG Elevated Water Storage Tank

Water Master Plan and System Upgrades

Client Reference Information
City of Auburn Hills, MI
Ron Melchert, Director of Public Services
248.391.3777
1827 N. Squirrel Road
Auburn Hills, MI 48326

Cost
Study: $85,000 (over 5 years)
Construction: Approximately $5 million (over 7 years)

Key Personnel
Vicki Putala, Project Manager
Carrie Ricker Cox, Project Engineer
Eric Binkowski, Dixon Engineering, Inspector

The City of Auburn Hills receives water from five connections to the Detroit Water and Sewerage Department's (DWSD) water system, one of the largest water systems in the U.S. Due to an increasing number of complaints regarding high, low and fluctuating water pressures, in 2000 Auburn Hills contracted with OHM to investigate, identify potential problems and determine solutions to provide adequate current and future water service to its customers. As part of the water master plan and model, OHM recommended improvements including a new elevated storage tank and several new pressure districts.

Relevance
- Calibrated hydraulic network analysis
- Water main design and construction
- Elevated storage tank design and construction
- Pump station design and construction
- Control valve construction
- SCADA system

Between 2002 and 2008, OHM provided design and construction administration/observation services for the new 1 MG elevated storage tank and booster pump station, water main upsizing and adding valves to improve areas with excessively high or low flows. Prior to construction of the Booster Pump Station in 2002 the City did not have a SCADA system. Included in the design of the pump station was a SCADA system that incorporated several lift station and pressure reducing valves throughout the City.

OHM updated the City's water master plan in 2009 to determine system performance based on improvements made over the previous 5 years and based on the substantial growth within the community over this same time period. Part of the study included developing and successfully calibrating a hydraulic network analysis model. Short-term recommended improvements included changing the elevated storage tank operations in order to minimize DWSD rates. Other recommendations included the addition of an elevated storage tank in the Central District to provide much needed fire protection and to allow the City to become a maximum day customer. In addition, several transmission main improvements were recommended to feed potential growth areas. OHM is currently evaluating cooperation arrangements with other communities in this region to minimize future capital improvement costs.

Elevated Storage Tank and Related Water System Improvements

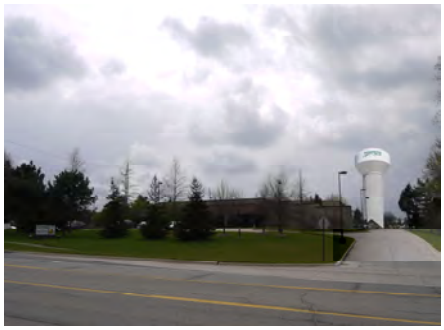
Client Reference Information
City of Farmington Hills, MI
Gary Mekjian, PE, Director of Public Services
248.871.2535
31555 W. Eleven Mile Road
Farmington Hills, MI 48336-1165

Project Cost
Design & CE: $1.25 million
Construction: $16.9 million (estimated)

Project Timeline
Design & CE: 03/2012 – 06/2012
Construction: 08/2012 – 06/2014 (expected)

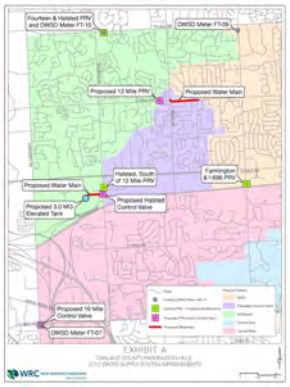
Key Personnel
Vyto Kaunelis, Principal in Charge
Vicki Putala, Project Manager
Carrie Ricker Cox, Design Engineer
Tim Kuhns, Design Engineer
Elaine Gumpper, Design Engineer
Sherri Wright, Design Engineer
Al McComb, Construction Supervisor
Eric Binkowski, Dixon Engineering, Inspection
Mike Bak, ICS, SCADA & Controls

Design for the largest composite tank in the State of Michigan



The City of Farmington Hills retained OHM to conduct a Water Sustainability Plan. The study identified several water system improvements including a 3.0 MG elevated storage tank, controls, new 20" and 30" transmission mains and replacement of 4" & 6" distribution mains with new 8" and 12" mains.

Based on an evaluation of water system peaking factors, OHM projected that the City could save approximately $3.5 million annually by reducing peak demand from DWSD by installing a 3.0 MG elevated storage tank. In order to expedite the economic benefit of reduced DWSD peak water demand fees, the City was interested in expediting the design, permitting, bidding and construction of the tank. OHM assisted in fast-track design services to make the project bid-ready within 3 months of project initiation. The tower project was bid under the engineer's estimate and construction was initiated on schedule.



Relevance
- Calibrated hydraulic network analysis
- Water main design and construction
- Control valve construction and modifications
- Elevated storage tank design and construction
- SCADA System

Design challenges were encountered due to the active use of the property. Seasonal construction limits were defined to allow City employees access to the adjacent salt dome for winter road conditions. Limited access to the north and west required temporary construction easements from the neighboring property owner.

OHM assisted the City by coordinating with private cell carriers. The existing cell tower on the property is planned to be removed and the carrier equipment moved to the new storage tank. The tower design accommodated conduit placement and exterior cell enclosure locations for future use. The tank pedestal was designed with a second floor and staircase to allow for added City storage.

OHM's services for this project will continue beyond design and will include permitting and construction-phase administration/observation.

Phase II of the project includes the design and construction of several new control valves, SCADA and necessary water main to connect the tank to the rest of the system. Phase II work began in November 2012.

Water Storage Tank Feasibility Study & Design

Client Reference Information
Charter Township of Orion, MI
C. William Ireland, Director of Public Works
248.391.0304 ext. 118
2525 Joslyn Road
Lake Orion, MI 48362

Project Cost
Feasibility Study & Preliminary Design: $25,000
Design & CE: $750,000
Construction: $5.0 million

Key Personnel
James C. Stevens, PE, Project Manager
Vicki Putala, PE, QA/QC
Sherri Wright, PE, Design Engineer
Tim Kuhns, PE, Design Engineer
Carrie Ricker Cox, PE, Hydraulics Engineer
Vyto Kaunelis, Technical Expert
Gerald Ashburn, Construction Supervisor
Eric Binkowski, Dixon Engineering, Inspection
Mike Bak, ICS, SCADA & Controls

Orion Township is served by a single 42-inch DWSD transmission main. Problems have been experienced with low pressure, particularly during peak summer usage. When the Township started to consider a new contract with DWSD, it was recognized that the DWSD rate methodology assessed significant costs based on peak hour usage. Therefore, a study was conducted to determine potential for rate savings by constructing a new storage tank. As part of this feasibility study, OHM reviewed the Township's water demands and potential site locations for storage. It was determined the Township could have an annual savings of between $620,000 and $980,000. Coordination with General Motors allowed the Township to obtain land near the existing DWSD connection for their storage tank.

Initially, the Township wanted to consider only ground storage, due to aesthetic concerns. A life cycle cost analysis was prepared, which showed a present worth savings of approximately $2.5 million by utilizing elevated storage, due to the considerable energy costs of utilizing ground storage and a pumping station. The Township elected to proceed with the construction of a 2.5 MG elevated tank.

The tower was constructed over two construction seasons starting in late fall 2010. In addition to the tower, a control valve vault was installed at the DWSD feed to the township. Completion of this vault was difficult due to a gate valve that was required to be cut-in on the single DWSD feed to the community. In order to shut down this feed, and cut-in this valve, an additional emergency connection was installed to the City of Auburn Hills. Combined with a previous emergency connection, these emergency connections and a full Orion Township Water Tower, along with an outside irrigation water ban, allowed the only feed to the community to be shut down for 24 hours while the gate valve was cut-in.

Relevance
- Calibrated hydraulic network analysis
- Water main design and construction
- Control valve construction
- Elevated storage tank design and construction
- SCADA System

The operations of this tower are very efficient. The tower is filled from the existing DWSD system pressure, and water is drained from the tower via two electrically actuated cone valves, with one at the tower and the other at the control valve vault. When DWSD pressure is high and the Township needs to drain the tank there is a flow control valve located at the DWSD connection that will limit the flow from DWSD to a desired flow rate. A SCADA system was provided to allow automated control and remote access to data and controls.

This section includes our approach for the three related projects. We have kept them separate to aid in your review. If OHM is selected to provide engineering services for both the water system master plan and storage tank design, the City will realize overall cost savings as a significant amount of "thinking" during the master plan will be incorporated in the storage tank Basis of Design and implemented in the contract documents.

1. Water System Master Plan

Project Understanding

The City of Novi obtains its water from the Detroit Water and Sewerage Department (DWSD) at five (5) locations, Ten Mile and Haggerty, North Center Street, 8 Mile and Meadowbrook, 14 Mile west of Decker and West Park Drive and North Haven Drive. The City is divided into five pressure Districts:

- The High Pressure District is served by 14 mile Road and West Park Drive feeds
- The Intermediate District, is fed through various pressure reducing valves (PRVs) and the West Park Pump Station
- The Island Lake Pressure District is fed through the Island Lake Pump Station
- Twelve Oaks Pressure District is fed through a PRV
- The Lower Pressure District is fed from the remaining three DWSD connections

Since the Water Master Plan was completed in 2008, significant changes have occurred in Novi, including the following:

- The economy took a severe downturn and the recovery is occurring slowly
- Novi has implemented an aggressive demand management public education program, which has significantly reduced the peak hour flows
- A decision has been made to change from the 8 million gallon (MG) ground storage recommendation to a 1 MG elevated tank

The City would like to update the Water Master Plan to serve as the basis for the Capital Improvement Program and for the preliminary engineering parameters of the water storage tank.

Work Plan

TASK 1.0 Demands

The City of Novi has initiated a very successful demand management program in 2009. This program has shifted the City's peak demand to the DWSD exclusionary period of 11pm to 5am (EST) and dramatically reduced the peak hour flow rate. In addition, economic conditions have changed in Southeastern Michigan and SEMCOG is projecting that population and employment will grow very slowly. The table below shows the demands used for the 2008 Master Plan and the current DWSD contractual values.

	Master Plan Flow (mgd)		DWSD Contract Flow (mgd)
	Existing	Future	Existing
Annual Average	6.8	7.45	5.8
Maximum Day	17.24	18.63	16.8
Peak Hour	32.48	37.25	24.5

The demands will be updated based on the SEMCOG population and employment projections. It is suggested that the demand distribution utilized for the 2008 Master Plan continue to be used.

TASK 2.0 Modeling

OHM will obtain the City's water GIS layer that includes water system improvements that have been implemented since 2008. We assume these improvements are clearly identified in the GIS (i.e. length, diameter, pipe material, year installed). The existing model was calibrated in 2008, and it is expected that pipe roughness would not have changed significantly since that time. Therefore, we are not proposing to recalibrate the model. We will update the model using an adjustment factor to reflect the existing demand conditions and the current future forecasts. The model will also be updated to include the proposed elevated storage tank. Model scenarios will be run for existing and future maximum day, peak hour and fire protection conditions.

TASK 3.0 Analysis

Results from the previous master plan indicate that the distribution system can maintain acceptable supply pressure and fire flows. There were improvements recommended to enhance water quality, improve fire protection, improve supply pressure, and provide redundancy. The model results will be compared to the 2008 results. The primary changes are expected to occur in the peak hour scenario with the new 1 million gallon elevated storage tank. We will determine the type of capital improvements needed to implement the tank. We will review each of the Tier 1 and 2 improvements that have not yet been implemented to determine if they are still needed or if there are additional improvements that are identified. OHM will meet with the City to discuss each of the improvements. The results of the discussions and follow-up analyses will be formalized into a Water System Capital Improvement Plan.

TASK 3.0B Optimize Pressure Districts

In past discussions with the City, it was indicated that the City may want to review its district boundaries and hydraulic grade lines within each district. The previous study recommended PRV improvements and establishment of a different hydraulic grade line at the High/Intermediate Pressure boundary and at the Intermediate/Lower Pressure boundary. If the City is comfortable with the prior work, the update can be done within the existing Master Plan framework. However, once the elevated tank elevations are set, it will limit future flexibility.

Often, the extremes of pressure and fire protection can be found at district boundaries. In some cases, modifications of these district boundaries can improve operating pressure and improve fire protection by maintain water main looping. This task will include review of the pressure district boundaries in terms of system operating pressure and available fire protection.

TASK 4.0 Update Master Plan Report

Under this task we will prepare cost estimates for the recommended improvements. We will prepare a technical memorandum depicting the existing and future conditions modeled, alternatives analysis and conclusions reached. A map depicting short term and future improvements will be created. We will meet with the City to review findings and finalize results. A brief summary report that includes the capital improvement program will be provided.

2. SCADA for the Water System

Project Understanding

During this phase of the project OHM will assist the City in implementation of a SCADA system for monitoring and /or control at eight pressure reducing valves or flow control valves, two booster pump stations and the proposed elevated storage tank. OHM and ICS have extensive experience working with local municipalities designing and implementing SCADA systems. This provides us an understanding of the needs specific to water and wastewater applications and how to implement systems that provide long term reliability at a reasonable cost. We emphasize communication throughout the design process to ensure the finished product provides operations staff with tools they need to reduce overall costs and improve response time during emergency situations.

Work Plan

TASK 1.0 Review Existing Sites and System Requirements

Initially, we will meet with your staff to discuss the functional requirements of the SCADA system from a monitoring and control standpoint. The discussions will focus on determining the short-term and long-term goals of the system. Discussions will include any preferences for specific types of control equipment, issues with the existing system, security concepts and future expansion requirements. Once we understand the requirements of the system, we will provide preliminary examples of comparable systems within local municipalities to discuss different ideas that may be pursued.

This will include listing future initiatives the City may want to pursue, including flow monitoring at each pressure reducing valve and at all DWSD connections. This will also include tower controls recommended from the tower Basis of Design.

TASK 2.0 Develop and Verify System Design Recommendations

The next step will be visiting all of the sites slated for upgrade and document the specifics of the equipment to be included in the SCADA system. We will review the existing SCADA servers and determine the available capacity for expansion. From there, we will develop preliminary design concepts based on the functional requirements and the existing site equipment.

One of the challenges with the existing system is based on the use of a cellular backbone as a communication path for the SCADA system. Not all PLC/RTU equipment is compatible with a cellular modem backbone. Cellular service providers are becoming increasingly restrictive with the types of equipment that they will allow on their networks. Great care needs to be taken in selecting the proper equipment for use in a cellular system to maintain compatibility and long term reliability. We will investigate compatibility between your existing Multitrode RTU's, the Iconics SCADA system and the PLC/RTU equipment that we recommend for expansion to the existing system. An important concept to consider in designing SCADA systems based on a cellular backbone is the long term operational costs associated with the various types of equipment. We will develop a cost versus performance analysis of multiple PLC/RTU options including the associated pros and cons of each option. This concept of long term operational costs is often overlooked in the design phase and leaves the client to deal with excessive recurring costs associated with operating the SCADA system.

An ever increasing concern with SCADA systems has focused around how to secure the control environment from the increasing level of outside threats. We will examine the necessary system architecture, operational requirements and prepare a design that incorporates "best practices" for securing the SCADA environment.

Once we have assembled preliminary design concepts, we will meet with City staff to review the concepts and select the most appropriate solution based on your needs and budget. With the feedback from these discussions, we will then develop a final design.

TASK 3.0 Design
Plans and specifications will be created for each of the sites listed above as determined necessary through our discussions with City staff in Task 1.0.

TASK 3.1 Optional Design
Despite the manufacturer's information and claims, equipment is not always compatible. Therefore, we recommend an optional testing task as follows. Upon completion of the final design we will provide testing services to verify that the existing SCADA hardware and software infrastructure will operate with the new equipment selected through the design process. Once testing is complete and it is determined that the system design meets the goals of the project, we will develop a final bid package, including drawings, specifications and a cost estimate.

3. Engineering for 1 Million Gallon Elevated Water Storage Tank

The City of Novi is interested in constructing a 1.0 MG elevated storage tank to provide peak water demand needs to the City's customers in order to reduce water rates from DWSD. The elevated storage tank will also improve the City's water reliability by having storage within the community. Based on a water system evaluation completed by OHM in October 2011, it is expected that additional water system improvements will be needed to properly integrate the storage tank into the existing water system. These improvements will likely include water main and potentially the addition of new control valves and pressure redistricting. These additional improvements will be identified through the water system master plan, and consequently, are not included in the scope of the 1.0 MG elevated storage tank.

OHM will utilize two subconsultants for the design and construction observation of the storage tank. A geotechnical firm, approved by the City, will perform soil borings during the design and material testing during the construction. Dixon Engineering, Inc will provide construction observation for the welds, blasting and primer. Our Scope of Work is as follows:

1. Water Storage Tank Preliminary Design and Permitting

a. Meet with the City to discuss the different elevated storage tank types that could be used for this project. Pros and cons and relative cost differences will be provided so the City can make an informed decision
b. Create Basis of Design document for the sizing and operation of the storage tank. Operating water elevations and proposed operations for filling and draining the tank will be included. This information will need to be submitted to DWSD and the MDEQ for permitting
c. Coordinate geotechnical investigation in accordance with the requirements of the elevated tank manufacturer
d. Perform topographical investigation related to the geotechnical work and obtain site topography at the tank location for site design
e. Prepare preliminary drawings and specifications for the City's review and comment. OHM will attend a design review meeting with the City and prepare a meeting summary of the preliminary engineering review meeting. Plan drawings are expected to include site plan, tower details, water main details and electrical/site lighting
f. Contact the local utility companies to identify the location of private utilities

g. Prepare an estimate of the probable construction cost based on the preliminary engineering design
h. Prepare easement exhibits for easement acquisition by the City
i. Prepare and submit for project required permits including Act 399 permit application for DWSD and the MDEQ, soil erosion and sedimentation control plan for the project and Federal Aviation Administration Permit
j. OHM will coordinate permitting meetings with the DWSD and the MDEQ. We anticipate up to one meeting with the MDEQ and up to two meetings with the DWSD
a. Finalize bidding documents based on City, DWSD and MDEQ comments. Prepare probable construction cost based on final engineering design
b. Assist the City in securing bids and analyzing bids received, prepare a tabulation of bids received, provide letter of recommendation of the construction contract

2. Construction Services

a. Assist the City with project award
b. Prepare executable construction contract documents including the City's standard forms for bonds and insurance. Review contract documents signed by contractor for completeness and provide to the City for legal review and contract execution
c. Notify parties of the pre-construction meeting. Conduct the pre-construction meeting, prepare and distribute meeting minutes to attendees
d. Prepare progress payments and change orders based on the observed construction progress. Review pay request items with the contractor prior to each monthly progress payment and final payment
e. Request and collect contractor's declaration, contractor's affidavit, waivers from suppliers and subcontractors, release of surety, and release from other public agencies for which permits have been obtained under this contract
f. Perform shop drawing submittal review for equipment and components installed on the project for conformance with contract documents
g. Set two benchmarks for construction staking. All other construction staking to be performed by contractor
h. Perform part-time observation during tank construction to provide documentation that the work is performed in general accordance with the Contract Documents and being performed within the construction schedule
i. Produce daily field reports for those days observation by OHM or subconsultants was performed
j. Perform specific tank observation by Dixon Engineering Inc. and perform material and soil testing by the selected geotechnical subconsultant
k. Schedule and attend progress meetings as needed to ensure communication between the City, contractor and OHM
l. Resolve items in need of clarification relating to contract specifications and requirements
m. Complete an overall evaluation of the project at substantial completion and develop a punch list for submission to the contractor
n. Once the contractor has completed punch list items, perform a final evaluation and provide the City with recommendation for final payment to the contractor
o. Compile manufacturer operation and maintenance manuals that are provided by contractor for supplied equipment
p. Prepare record drawings based on information provided by the contractor and other third parties and submit to the City. Digital copies will be provided in both AutoCAD and PDF format

Schedule

OHM is committed to working with the City to complete the projects within the City's timeline. Our recent experience working with the Cities of Auburn Hills, Farmington Hills and Orion Township demonstrate our knowledge in performing this work. We have successfully worked with DWSD in obtaining approvals for the construction of these storage tanks and understand the key concerns that could impact the schedule. For Orion and Farmington Hills, we expedited the storage tank design and construction by phasing the project thus ensuring rate savings as soon as possible. We propose to work out a schedule with the City that is feasible while meeting the community's goals.

Budget

As requested, OHM is providing a lump sum fee for the Water System Master Plan, SCADA for the Water System and Engineering for the 1 Million Gallon Elevated Water Storage Tank design and construction administration. Crew days are included for the construction observation related to the storage tank. We have not included fees for geotechnical services. We have included one optional task for testing of the SCADA equipment. Below is our proposed fee:

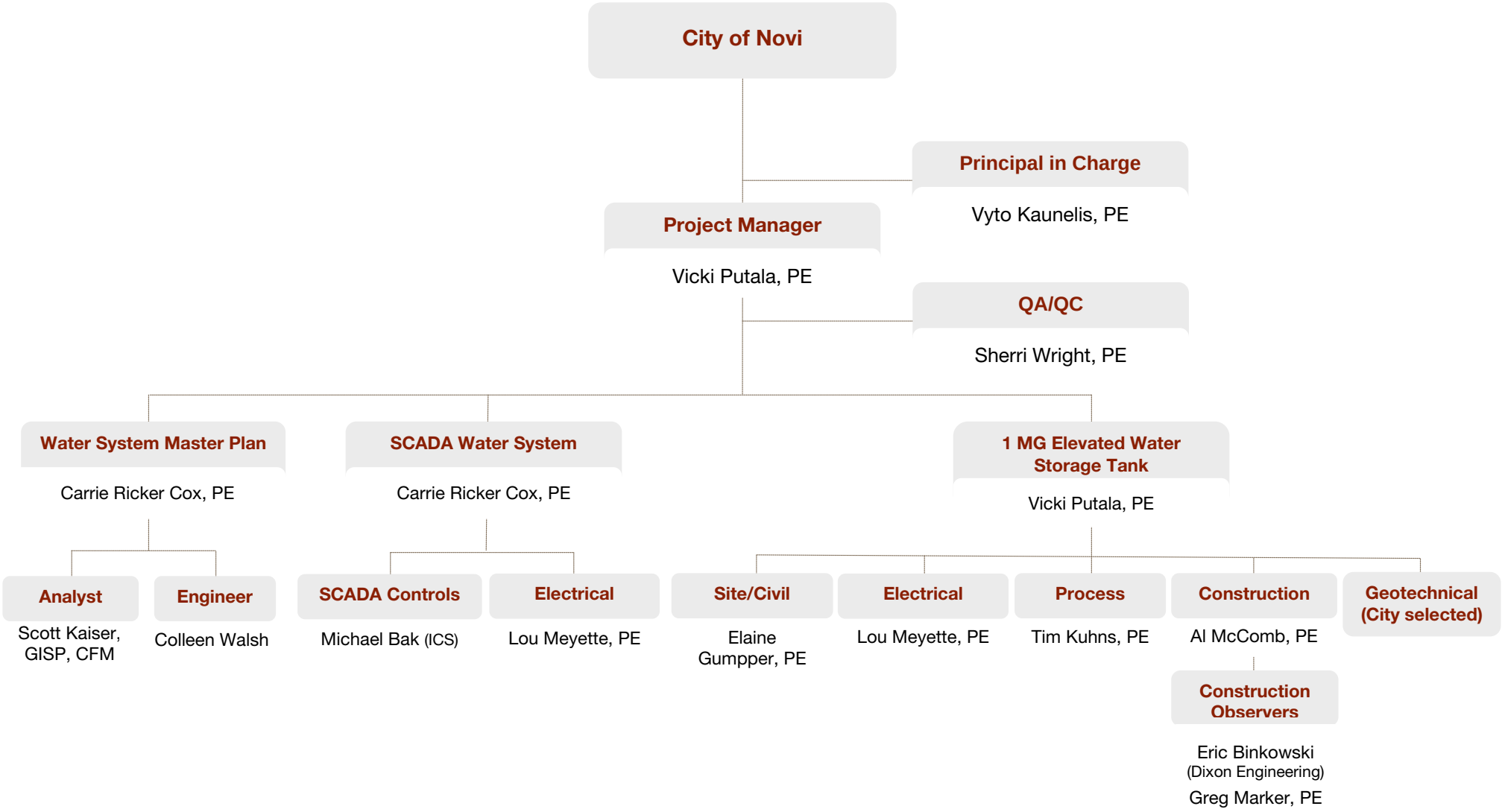
1. Water System Master Plan — Lump Sum = $23,800
2. SCADA for the Water System — Lump Sum = $41,500
3. Engineering for 1 MG Elevated Water Storage Tank Design
    a. Design Engineering — Lump Sum = $112,500
    b. Construction Administration — Lump Sum = $62,000
    c. Crew Days for Inspection — 75 days
    d. Dixon Engineering Subconsultant Fee — Lump Sum = $20,000
4. SCADA Optional Task for Testing Services — Lump Sum = $3,200

If OHM is selected for both the Water System Master Plan and the Engineering for the 1 MG Elevated Water Storage Tank Design, then the tank design fee of $112,500 will be reduced to $107,000.

Fees associated with necessary water main and/or control structures will be negotiated with the City after they are finalized through the Water System Master Plan effort.

Organizational Chart

Personnel



Vytautas (Vyto) Kaunelis, PE

Principal in Charge

Education

- Master of Science in Civil Engineering, University of Michigan, 1984
- Bachelor of Science in Civil Engineering, University of Michigan, 1976

Professional Registration

Professional Engineer, MI, 1979, #27579

Experience

36 years of experience – 10 years with Wayne County Department of Environment, 17 years with another Southeastern Michigan-based consulting engineering firm, and 9 years with OHM

Professional Affiliations

- Water Environment Federation
- American Public Works Association

Background

Vyto Kaunelis is a principal at OHM and is responsible to his clients to provide innovative, cost-effective, and quality solutions to the variety of issues facing communities today. He focuses on the big picture to create unique solutions, which often involves local communities and regional agencies collaborating to achieve greater results than they could individually. Examples of this include his involvement on the DWSD Water System Technical Advisory Committee (TAC) activities, the Wayne County NHV/RV sanitary system wet weather plan to meet MDEQ requirements, and the Oakland County Water Resources Commissioner's implementation of a unique monitoring and billing system for the Clinton-Oakland Sanitary Disposal System.

In several positions with Wayne County, including several years as the appointed Drain Commissioner, he dealt with numerous projects. Initiation and completion of all projects achieved the desired results and generally resulted in a high level of satisfaction for the customer. This was particularly important for Wayne County due to a low level of trust from factors pre-dating the administration for which he worked. This experience has provided a public sector perspective on implementation of successful projects.

Relevant Experience

Elevated Storage Tank and Related Water System Improvements, City of Farmington Hills – Ongoing

Principal in Charge responsible for the design of a 3 MG elevated composite storage tank, pressure reducing valves and water main.

Water System Sustainability Study, City of Farmington Hills – Ongoing

Principal in Charge responsible for a water system study to evaluate needed system improvements. The study included building a water model from the City's water GIS system, analysis of present and future demands and identifications of improvements including redistricting the various pressure districts to provide better service to the City's customers, new water main, storage and system controls.

Oak Park DWSD Contract Negotiations, System Improvements, and Utility Authority Exploration – 2008-2011

Technical Expert for work on reducing the DWSD wholesale water rate to the City of Oak Pak. Initially this involved review of the City's flow and operational data to identify current conditions, potential operational revisions, and expected rate savings. Worked with the City to implement the revisions and demonstrate to DWSD that the proposed contract flow rates were achievable. Improvements to the SCADA system were coordinated with the City's contractor to achieve the projected results. Since the City has more storage than they need, exploration has begun for the potential of forming a utility authority with another customer.

City of Farmington DWSD Contract Negotiation and System Improvements – 2007-2011
Technical Expert for assisting the City of Farmington in negotiating a new water contract with DWSD and developing system improvements to minimize the DWSD rate. Initially, DWSD was operating a Booster Pumping Station and Reservoir for the City of Farmington. A study was performed to show that the storage could be operated more effectively by adding a new control valve. During contract negotiations, DWSD decided that it should turn over operation and maintenance of the facilities to Farmington. Despite significant challenges with the elevation of the storage tank and the equipment in the pumping station, modifications were made to the operational scheme that resulted in significant reductions to the peak hour flows. This achieved significant rate savings. Since Farmington has three pressure districts, only one of which is served by the storage directly, additional control improvements are being implemented to further reduce the peak hour flow rate.

Orion Township Water Storage Tank Feasibility Study and Basis of Design – 2007-2009
Technical Expert for initial studies to determine the feasibility of utilizing storage to become a maximum day customer of DWSD. Study determined that 2.5 mg elevated storage was the best solution for the Township. Also served as Technical Expert for developing the Basis of Design for the elevated tank to determine the control scheme and finalize the technical details.

Water System Master Plan, Brownstown Township, MI – 2007
Principal in Charge for the development and analysis of a water distribution system model in accordance with the MDEQ's water reliability requirements. Project included reviewing DWSD SCADA to determine needed improvements to improve water pressure throughout the Township's system.

Water System Master Plan, City of Dearborn, MI – 2007
Principal in Charge for this project to assess the existing water system to identify future projects for the operation, maintenance, and upgrades of the existing water system. This was particularly important to ensure that the reinvestments that the City is annually making in the water system are providing an optimal level of benefits. The Dearborn water system is unique amongst DWSD wholesale water customers in that they are the only customer without flow meters and pressure monitors at the connection points. The intent of the Dearborn Water Master Plan was to provide the City with a study which answers the questions raised about the water system and provides the tools to proactively manage the water system into the future.

Water Operations Study, City of Northville, MI – 2005
Project Manager responsible for reviewing the City's current water operations and providing alternatives for how the City can reduce their peak flow and better utilize their existing storage. Calculated existing maximum day and peak hour demands. Worked with suppliers and existing water operators to determine strategies to minimize peak hour flow rates seen by their water supplier while utilizing the existing system components and minimizing cost.

Vicki Putala, PE
Project Manager

Education
Bachelor of Science in Environmental Engineering, Michigan Technological University, 1988

Professional Registration
Professional Engineer, MI, 1994, #40097

Experience
23 years, 18 with OHM

Professional Affiliations
- American Water Works Association
- Michigan Water Environment Association

Professional Development
- Principal's Boot Camp, 2008
- Project Manager's Boot Camp, 2005
- ACEC Environmental Quality, 2003
- LeaderEase Management Training Program, 2002
- Source Water Protection Seminar, 2002
- Funding for Watershed and Stormwater Projects, 2001
- Developing a Watershed Management Plan for Water Quality, 2000
- H2O Net Training, 1999
- Facilitation Skills Training, 1999
- Well Head Protection Seminar, 1998
- AWWA Fall Regional Meeting, 1998
- AWWA Annual Meeting, 1998
- Management Training Seminar, 1997
- Safe Drinking Water Act Amendments Seminar, 1997
- Ground Water Protection Seminar, 1997
- Stormwater BMP design, 1995

Background

As director of OHM's Environmental and Water Resources Group (EWRG), Vicki Putala is responsible for overall client satisfaction and quality of work for the projects performed by the group. Working with other EWRG members, she provides training and project management oversight to many projects undertaken by the EWRG.

Vicki's water resources experience includes studies and written reports regarding water, wastewater and stormwater improvement projects. Many of the projects have received federal and state funding. She also has experience with a variety of modeling applications for water and stormwater related projects.

Vicki's design experience includes water main, meter vaults, chemical feed systems for water and wastewater treatment facilities, instrumentation and controls, water booster pump stations, storage tanks, lift stations, aerated and stabilization lagoons, rapid sand filters, wastewater equalization, iron removal, sanitary sewer and engineered septic fields. She has also designed stormwater enhancements, including rain gardens, detention basins and regional storage.

Relevant Experience

Oakland Township Water System Master Plan, Oakland County Water Resources Commissioner's Office – Ongoing
Project Manager responsible for identifying options of bringing DWSD water to Oakland Township customers. The project includes water system modeling, cost effective analysis and coordination with surrounding communities and DWSD. Benefits of shared storage are also included.

Elevated Storage Tank and Related Water System Improvements, City of Farmington Hills – Ongoing
Project Manager responsible for the design of a 3 MG elevated composite storage tank, pressure reducing valves and water main. The project schedule was expedited in order to save the City $3,500,000 annually by reducing their peak draw from DWSD.

Water System Sustainability Study, City of Farmington Hills – Ongoing
Project Manager responsible for a water system study to evaluate needed system improvements. The study included building a water model from the City's water GIS system, analysis of present and future demands and identifications of improvements including redistricting the various pressure districts to provide better service to the City's customers, new water main, storage and system controls.

Water and Wastewater Various Improvements, City of Albion, MI – 2011
Project Manager responsible for the renovation of the existing WWTP laboratory replacement of sewage pumps and recommendations for improvements to the existing iron removal water treatment plant.

Livingston Community Water Authority Engineering Assistance, Livingston County, MI – Ongoing
Technical Advisor to assist the Authority in roles including water modeling, treatment assistance, permitting, operation and maintenance, engineering standards development, asset management program, system mapping and new development approvals.

Water Storage Evaluation and Design, Orion Township, MI – 2011
QA/QC Officer for the evaluation of various storage options for a 2.5 million gallon storage facility. Various site locations were considered as well as different types of storage such as stand pipe, ground storage and elevated storage.

2010 DWRF Water System Improvements, Village of Dexter, MI – 2009
Technical Advisor/QA/QC Officer for addition of a new potable water well to the system and chemical feed facilities at both the new well field and existing iron removal treatment plant.

Water System Master Plan & DWRF Project Plan, City of Livonia – 2010
Project Manager for developing a Water Distribution System Master Plan and DWRF Project Plan. The project included updating an existing water model, calibration, prioritizing recommended water system improvements and submittal of a DWRF Project Plan to the MDEQ for funding application.

Water System Master Plan and DWRF Project Plan, City of Dearborn, MI – 2008
Project Manager for this project to assess the existing water system to identify future projects for the operation, maintenance, and upgrades of the existing water system. A DWRF Project Plan was also developed to facilitate the financing of the needed system improvements.

Water System Evaluation & DWRF Project Plan, Village of Dexter, MI – 2008
Project Manager for evaluation of needed system improvements including a new well field, iron removal and water main plus development of a DWRF Project Plan.

Bridge Road Pump Station Improvement Preliminary Engineering, Ypsilanti Community Utilities Authority – 2008
Project Manager for identifying needed system improvements to this large existing pump station supplying over 50,000 customers. Specific work items included development of a Basis of Design, conceptual layout of new 24" water main and extensive coordination with DWSD.

Water System Plan and DWRF Project Plan, City of Hancock, MI – 2007
QA/QC Officer for a City-wide master plan focused on developing a redundant water source and internal water distribution system improvements. The project also involved the creation of a Project Plan that will be used for securing funding through the Drinking Water Revolving Fund program offered through the State of Michigan.

3rd Connection Booster Station, Charter Township of Superior, MI – 2006
Project Manager for the design of the proposed booster station. The station was aesthetically designed to blend in with the surrounding areas.

Papers and Presentations

Using SRF Loans for Stormwater BMP Improvements, MACDC Summer Conference 2009

"Good News in Michigan: The S2 Grant Program," *Great Lakes Reporter*, Spring 2007

Applying Stormwater Management to Enhance Economic Development, Smart Growth Conference, February 2005

Water System Vulnerability Assessment, September 2003

"Reducing Excessive Stormwater Flows in an Urban Community," *Michigan Municipal Review*, July 2003

"Clean Michigan Initiative Grant and Loan Update: A Practical Approach," *Michigan Municipal Review*, June 2000

Water Booster Pump Facility Design and Elevated Water Storage Tank, City of Auburn Hills, MI – 2002-2006
Project Manager and Engineer for this design project which included the development of plans and specifications for a booster pump facility, a 1,000,000 gallon elevated storage tank, and flow control valves and vaults.

YCUA Water Main Break Investigation, Ypsilanti Community Utilities Authority, MI – 1997
Project Manager and Project Engineer for this study. This project involved an examination of all the water main breaks from 1991 through 1997. Also pressure fluctuations in the distribution system were monitored and analyzed. Pump station and system operation improvements were recommended.

Wellhead Protection Plan, Village of Dexter, MI – 2001
Project Manager responsible for the development of a WHPP for the Village's new well field. This project involved the coordination of multiple agencies and Village personnel. Funding for this project was provided by a Wellhead Protection grant administrated through the MDEQ.

Water System Improvement, Lyon Township, MI – 1999
Project Manager for the development of a two new groundwater wells, well house, three miles of 16-inch transmission main and a 500,000 gallon elevated storage tank. Siting of the tank was complicated by erecting it on a landfill. The project also involved incorporating an existing 200,000 gallon elevated storage tank to aid in fire protection. The project was funding through the Water Quality Bond Fund.

Water Treatment Plan, Village of L'Anse, MI – 1990
Project Engineer responsible for the design of process piping and chemical feed systems for a direct filtration water treatment plant. The source water was from Lake Superior. Funding was provided by Rural Development.

Other Water Modeling and/or Water System Master Planning

- Water System Master Plan, City of Auburn Hills, MI
- Water System Master Plan, Charter Township of Scio, MI
- Water System Master Plan, YCUA, Ypsilanti, MI
- Water System Reliability Study, City of Farmington, MI
- Water System Reliability Study, City of Westland, MI
- Water System Reliability Study, Superior Township, MI
- Water System Reliability Study, Van Buren Charter Township, MI
- Water System Study for DWSD 36" Water Connection, Ypsilanti, MI
- Water System Study, Augusta Township, MI
- Water System Study, Village of Dexter, MI
- Water System Study, Lyon Township, MI
- Water System Study, Kearsarge, MI
- Water System Study, Franklin Township, MI
- Water System Study, Carp Lake Township. MI
- Water System Study, Eagle River, MI
- Water System Study, Village of L'Anse, MI
- Water System Study, Village of Baraga, MI

Sherri A. Wright, PE
QA/QC

Education
Bachelor of Science in Environmental Engineering, Michigan Technological University (Houghton, MI), 1987

Professional Registration
Professional Engineer, MI, 1992, #38293

Experience
24 years, 4 with OHM

Professional Certifications
- Certified Construction Contract Administrator, 2010 (CCCA)
- Certified Construction Specifier, 1994 (CSI)
- Construction Document Technologist, 1993 (CSI)

Professional Development
- Centrifugal Pump Webinar, Engineered Software, Inc., 2011
- Project Management Bootcamp, PSMJ Resources, Inc. 2008
- Design of Decentralized Wastewater Systems, Michigan State University, 2007
- Water Environment Federation Conference, Optimizing Clarifier Performance, 1996
- Manhattan College Summer Institute for Treatment of Municipal, Hazardous and Toxic Wastewaters, 1994
- Biological Nutrient Removal Design, 1993

Professional Affiliations
- American Water Works Association
- Water Environment Federation

Background
Ms. Wright has experience specializing in the analysis, development, design, and construction of infrastructure facilities for municipalities. She is a project manager responsible for report writing, contract document preparation and owner/agency liaison services during the design of wastewater collection/treatment facilities and water distribution/treatment facilities. Ms. Wright provides construction contract administration and contractor liaison services during construction of these projects and writes performance certifications after completion.

Relevant Experience
Elevated Storage Tank and Related Water System Improvements, City of Farmington Hills – Ongoing
QA/QC responsible for overseeing the development of bidding documents related to the design of a 3 MG elevated composite storage tank, pressure reducing valves and water main.

Booster Station Improvements, Wagner Road and Old Liberty Stations, Scio Township, MI – Ongoing
QA/QC Officer responsible for overseeing the contract document preparation associated with the addition of a 1200 gpm water booster station and the abandonment of two existing booster facilities.

Pressure Reducing Vault Modifications, City of Novi, MI – 2010
Project Manager and Lead Engineer for the hydraulic modifications to two pressure reducing vaults within the City. One vault is an entire replacement of the existing facilities, while the second structure will be abandoned and replaced.

2010 DWRF Water System Improvements, Village of Dexter, MI – 2009
Project Engineer responsible for efforts associated with the addition of a potable water well to the system, chemical feed facilities, pipe work, valves housed in a new masonry well house building with standby diesel generator power. Modifications to the existing high service pumps and filter pipework were also included in the design to meet the required system firm capacity. During construction, she assisted the Village with the chemical feed and analyzer equipment startup and calibration.

Stage 2 Disinfection Byproduct Monitoring/Sampling Plan, Orion Township, MI – 2009
Project Engineer for the coordination of the sampling efforts associated with the S2DBPR monitoring plan. The project consisted of one year of sampling and preparation of a sampling report upon completion.

Fairfield Township Water System Improvements
Project Manager and Engineer for the construction of 30,000 lf of water main along with a 150,000-gallon elevated water tank. The water supply for this project was from Madison Township where additional infrastructure was required to accommodate the project.

Water Storage Evaluation and Design, Orion Township, MI
Project manager during the evaluation of alternatives for the 2.5 MG storage facility and lead design engineer during the design and construction of the elevated composite tank and control vault. Worked with Owner, MDEQ and DWSD during the structure design to coordinate improvements amongst entities.

Madison Township M-52 Water Booster Station and Transmission Main Improvements
Project Manager and Engineer for the construction of 10,000 lf of transmission main to distribute water to Fairfield Township. Additionally, a 500 gpm above grade water booster station with bypass capabilities was constructed.

City of Petersburg Wells No. 3 and 4 and Filter Building Addition
Prepared contract documents for the addition of two 300-gpm production wells and the filter building addition.

City of Walled Lake Water Main Extension No. 1
Prepared contract documents for the construction of meter vault for connection to the Detroit Water Supply System and the extension of approximately 8,000 lf of water main.

Marion, Howell, Osceola, and Genoa (MHOG) Water Treatment Facility, Marion Township
Project Manager/Engineer for the preparation of contract documents for the construction of an 8-MGD iron removal and lime softening facility. The plant will use induced draft aeration and helical flow solids contact clarification and gravity filters to meet the treatment goals.

City of Hillsdale Board of Public Utility Water Treatment Facility
Project Engineer/Manager for the preparation of contract documents of a new 3.0-MGD iron removal WTP. Responsible for shop drawing review and contractor coordination during construction.

Frenchtown Township Water Treatment Capacity and Treatment Assessment
Project Manager for the preparation of a study to review the alternatives available to the Township for the expansion of the existing WTP. The study included an evaluation of water treatment alternatives that included conventional softening, microfiltration, and ballasted settling.

City of Brighton Challis Road Iron Removal Facility
Prepared contract documents and plant O&M manual for the 2.0 MGD facility.

Village of Brooklyn Iron Removal Facility
Prepared contract documents for the construction of a building to house two existing municipal wells and a 650 gpm iron removal treatment plant, chlorine handling system, new vertical well pumps, and high-service centrifugal pumps.

City of Novi Pontiac Trail Water Main Improvements
Project Manager and Engineer for the construction of 6,500 lf of water main installation and replacement.

Carrie Ricker Cox, PE
Project Engineer

Education
Bachelor of Science in Civil and Environmental Engineering, University of Michigan, 2001

Professional Registration
Professional Engineer, MI, 2006, #6201053216

Experience
12 years with OHM

Professional Affiliations
- AWWA, Safe Water in Ecuador Committee, Member
- AWWA Michigan Section, Young Professional Committee Chair
- AWWA, Young Professional Committee

Professional Development
- PSMJ Project Managers Boot camp, 2008
- MACP and PACP Certifications, 2007
- Vulnerability Training, 2003
- HEC-RAS Training, 2000 & 2002
- Facilitation Skills Training, 2000
- Microsoft Project Training, 2000

Papers and Presentations
- "Creating a Tight Sewer System & Proving It," WEF Collection Systems, 2008
- "Managing Peak Water Useage," ACE 2011 & AWWA MI Section Annual Conference, 2011
- "Managing Peak Water Use with Customer Incentives," Opflow, June 2012

Background
Carrie Ricker Cox represents municipal clients conducting study and design work associated with utility planning, and hydraulic and hydrologic modeling. She has experience creating and modifying telemetry systems to best utilize system operations. These operations include maximizing storage benefit, data storage, alarming and offsite corrections and modifications to the system. Carrie works with municipal clients to optimize system operations and better leverage their SCADA information for asset management and rate savings.

DWSD installed SCADA at all of the meter pits in 2002. Carrie has leveraged this data to help southeastern Michigan communities make better more cost effective decisions on their water system improvements. She played a role in helping DWSD understand the needs of the customers and the desire for a better system for obtaining this data. Over the years she has helped communities find and correct water loss, high headloss across meters, reduce pressure complaints, improve system operations and provide more accurate master planning through the use of DWSD's automated meter read system (WAMR). Through this process Carrie has learned a great deal about the DWSD system. When DWSD rolled out the new model contract Carrie helped customers understand the process and walked them through the benefits of managing their peak water usage. Using WAMR and working with DWSD staff, Carrie was able to show communities how their water system operations can affect the pressures they receive from DWSD. This enabled communities to improve water system operations, reduce their peak usage and save money on rates. She gave a presentation on this topic at the 2011 AWWA Michigan Section Annual Conference and at ACE 2011 in Washington DC. In July 2012 her paper on this topic was published in Opflow.

Relevant Experience
Water System Reliability Study
of Farmington, MI – 2012, City of Romulus, MI – 2010 City of Northville, MI – 2006, City of Auburn Hills, MI – 2008, City of Westland, MI - 2001
Project Manager for the update and analysis of a water distribution system model in accordance with the MDEQ's water reliability requirements. Project includes reviewing DWSD and community SCADA to determine system pressures and flows, storage tank and booster pump station optimization, demand management peak flow modifications, and modeling of the water distribution system to determine needed improvements to improve water pressure throughout the community's system.

Water System Master Plan
Oakland Township, MI – 2012, City of Farmington Hills, MI – 2011, Brownstown Township, MI – 2007, Augusta Township, MI – 2005, Scio Township, MI – 2001, City of Auburn Hills, MI – 2000
Project Engineer for the update and analysis of a water distribution system model in accordance with the MDEQ's water reliability requirements. Project includes the evaluation to determine cost effective options for improving each community's water system. For some communities such as Auburn Hills and Oakland Township proposed improvements were to handle future growth. In others, such at the City of Northville and Oak Park, the purpose was to minimize risk and optimize operations to save money.

Storage Tank Feasibility Study
Canton Township, MI – 2012, City of Novi, MI – 2011, Orion Township, MI – 2007
Project Engineer responsible for reviewing each community's demand patterns and peak usage over the past 5 years. Proposed size and location for storage tank facilities and provided life cycle cost analysis for multiple storage alternatives.

Pressure Reducing Valve Energy Recovery, City of Auburn Hills, MI – 2012
Project Manager responsible for determining the feasibility of replacing the City's existing pressure reducing valves at Adams Road with an in-line turbine to produce green energy. The project involved contacting local suppliers, review of SCADA, sizing the turbine, relief valve and preparing cost estimates.

Booster Pump Station Basis of Design and Preliminary Engineering
Wagner Road, Scio Township, MI – 2010, Liberty Road, Scio Township, MI – 2006, Superior Township, MI – 2006, Auburn Hills, MI – 2000
Project Engineer for modeling the communities' water systems to determine the impact of the proposed booster pump station for existing, short-term and ultimate development conditions. Prepared basis of design for booster pump stations. Modeling helped to determine facility locations, pressures, optimal pump and process piping layout, and controls.

DWSD Rate Study and Contract Negotiations, MI
City of Auburn Hills 2008 & 10, Brownstown Township 2008 & 10, City of Novi 2008 & 10, City of Northville 2008 & 10, City of Oak Park 2008 & 10, City of Farmington 2009& 11, Orion Township 2009 & 11, Romulus 2009 & 11
Project Engineer responsible for reviewing the existing facilities operations and water usage. Made recommendations for operational changes or public education that could allow the communities to reduce their peaking factors from DWSD and therefore reduce their water rates. Worked with the communities on public education and ordinances associated with water use and water conservation and assisted in contract negotiations with DWSD.

Control Valve Basis of Design and Design
Superior Township, MI – 2007, Scio Township, MI – 2007, Palace City of Auburn Hills, MI – 2005, Squirrel Road PRV City of Auburn Hills, MI – 2005, Squirrel Road Actuated Valve City of Auburn Hills, MI – 2002, Opdyke City of Auburn Hills, MI – 2002, Baldwin Commons City of Auburn Hills, MI – 2002
Project Engineer responsible for sizing the control valves. Calculated existing and future flows within the proposed service district. Modeled the effect of existing and future flows and provided a basis of design for optimal operations settings. Worked with suppliers to provide specifications for desired control valves.

Water System Operational Changes
City of Romulus – 2009, City of Farmington – 2009, City of Oak Park – 2008, City of Auburn Hills – 2008, City of Northville – 2005
Project Engineer responsible for recommending a SCADA system for the operations of each community's water and sewer system or for modifying the system to provide better system operations. Reviewed operational information and provided cost effective alternatives for how communities could reduce their peak flow and better utilize existing storage and other facilities.

Scott M. Kaiser, GISP, CFM

Analyst

Education
- Master of Science, GIS and Planning, Eastern Michigan University, 2012
- Bachelor of Science in Resource Planning, University of Michigan, 2003

Experience
11 years of experience, 7 years with OHM

Professional Certification
- Certified Floodplain Manager, Association of State Floodplain Managers, 2009
- Geographic Information Systems Professional, GIS Certification Institute, 2008

Professional Affiliation
- Improving Michigan's Access to Geographic Information Networks (IMAGIN) - Member, 2004-Present
- Association of State Floodplain Managers – Member, 2009-Present

Professional Development
- Improving Michigan's Access to Geographic Information Networks, Annual GIS User Conference, 2005, 2006, 2008 & 2009
- Michigan State Floodplain Managers Annual Conference, 2009 & 2010
- Environmental Systems Research Institute, International (ESRI) User Conference, 2005, 2006, 2007 & 2010 (presenter)

Background

Scott Kaiser specializes in the areas of Geographic Information Systems (GIS), environmental planning and assessment, hydrology, floodplain management, and modeling. With over 11 years experience in GIS and planning, his development concentrations range from data model design to spatial analysis for natural resources and public utilities. The popularity and near necessity of GIS technology within municipal government and public organizations has driven his desire to understand the spatial and attribute components to public assets such as utilities and natural features.

Due to the increased demand for spatial data accuracy and integrity, his focus has also been on the integration and usage of several leaders in GPS and mobile platforms, more specifically Trimble, Leica, and Sokkia. Incorporating GPS and GIS together creates an enterprise solution for data collection, analysis, and presentation.

Along with data platform design and development, Mr. Kaiser has also added his expertise to numerous professional and publishable award winning cartographic designs, papers, and presentations.

Relevant Experience

Water System Master Plan, Oakland Township, MI – 2012, City of Farmington Hills, MI – 2011

GIS Analyst supporting the update and **analysis** of a water distribution system model in accordance with the MDEQ's water reliability requirements. The projects included the evaluation to determine cost effective options for improving each community's water system. The improvements were to handle future growth or minimize risk and optimize operations to save money.

Water System Reliability Study, City of Farmington, MI – 2012

GIS Analyst supporting the update and analysis of a water distribution system model in accordance with the MDEQ's water reliability requirements. Updates were performed to the water distribution system model with data from the GIS to determine needed improvements for improved water pressure throughout the community's system.

Stormwater SRF Project Plan, City of Fenton, MI – 2011-2012

In the fall of 2011, OHM prepared and submitted an S2 grant application for the City to utilize that money for an SRF Project Plan. The MDEQ understood the City's need and awarded the grant to develop the Project Plan. Starting in February 2012, OHM analyzed five sites for stormwater improvements. Three locations were traditional site BMPs such as bioinfiltration and/or porous surfaces. The remaining two sites were the focus of streambank stabilization in two City parks. The entire project plan, if implemented, would bring approximately $5.4 million in stormwater improvements.

Mill Street "Green Street" Project, Village of Pinckney, MI – 2009-2010
Acting project analyst, in charge of procuring funding, site analysis and design and for what will be the first "green street" in Livingston County Michigan. In anticipation of potential ARRA funding for "green" projects, OHM approached the Village and agreed to prepare the required SRF Project Plan documents to attempt to obtain funds for the project. Ultimately, 40 percent of the total project was paid for through stimulus funds. The project includes porous pavers, infiltration trenches, perforated storm sewer and bioretention basins. This is one of only twelve stormwater projects to be funded by 2009 stimulus dollars in the entire State of Michigan.

Huron River 2010 SRF Project Plan, Washtenaw County Water Resource Commissioner – 2010
In 2010 the Water Resources Commissioner decided to pursue State Revolving Loan funding for 13 stormwater sites in the Malletts, Miller, Traver, and Swift Run Creeksheds. The proposed projects include streambank stabilization, floodplain rehabilitation, regional sediment forebays, inline detention/sediment removal, green street reconstruction, and native vegetation. Similar methods were applied to the 2010 projects that were previously utilized during the Allen Creek Project Plan and Amendment.

Huron River 2011 SRF Project Plan Amendment, Washtenaw County Water Resource Commissioner – 2011
As a follow-up to the 2010 stormwater project plan, the WCWRC and City of Ann Arbor wanted to evaluate 16 new project locations for potential stormwater improvements. OHM utilized similar analysis techniques as those employed during the previous project planning activities. Mapping and spatial analysis was the primary method of assessment. The results of the analysis became the foundation for the report. Similarly to earlier plans, the end result yielded a spatial decision making tool that was efficient to use and able to quantify the benefits that each BMP would impose on the watershed and downstream waterways.

Water Main Study, Lincoln Park, MI – 2005
Responsibilities included the creation of a geodatabase for the City's water main system. The data was collected via a GPS field survey and then integrated into the database. To further assist with the pipe placement a set of the City's water utilities atlas maps were scanned, georeferenced, and rectified to the parcels layer. Once all the features in the GIS they were then connected and attributed with the help of the scanned atlas maps and orthophoto and prepared for the water model.

As Needed GIS Data Management, Updates, and Modeling
- Charter Township of Orion
- Charter Township of Brighton
- City of Farmington
- Livingston Community Water Authority
- Village of Pinckney
- Village of Dexter
- Superior Township
- Scio Township

Papers and Presentations
- "Planning a City - An infrastructure Approach", IMAGIN Annual GIS User Conference, Dearborn, MI, 2005
- "Green Stormwater – Placing BMPs with GIS", IMAGIN Annual GIS User Conference, Lansing, MI, 2009
- "Stormwater Planning, making your GIS work for you", ESRI International User Conference, San Diego, CA, 2010
- *The Simple Method 2.0: Enhancing the Results*, Stormwater Magazine, May 2011

Awards
- Mapping Gallery winner for analytical presentation, IMAGIN, MI, 2005
- Mapping Gallery winner for analytical presentation, IMAGIN, MI, 2008

Colleen Walsh
Engineer

Education
Bachelor of Science in Civil Engineering, University of Michigan, 2011

Experience
- 2 summer internships with Muskegon County DPW
- 4 months with OHM

Professional Affiliations
American Society of Civil Engineers, 2011

Background
As a Civil Engineer, Colleen Walsh merges education and experience in hydraulic and hydrologic problem solving according to regulations to meet client needs.

Colleen has experience developing water related models for system planning, optimization, and capital improvements as well as infrastructure management planning.

She has familiarity with Geographic Information Systems as well, utilizing the capabilities of such application in modeling, capital improvement planning, and infrastructure management applications.

Colleen has also performed field work involving flow meter installation, monitoring, and removal as well as smoke testing sanitary and storm sewers to pinpoint structural deficiencies and illicit connections to the storm sewer. She has assisted in the preparation of SRF project reports and performed sanitary and stormwater analysis for billing purposes.

Relevant Experience
Water System Reliability Study, City of Farmington, MI – 2012
Engineer for the update and analysis of a water distribution system model in accordance with the MDEQ's water reliability requirements. Project includes reviewing DWSD and City SCADA to determine system pressures and flows, storage tank and booster pump station optimization, demand management peak flow modifications, and modeling of the water distribution system to determine needed improvements to improve water pressure throughout the City's system.

Water System Reliability Study, Village of Milford, MI – 2012
Engineer for the update and analysis of a water distribution system model in accordance with the MDEQ's water reliability requirements. Project required creation of a new water model based on paper maps. Project also includes review of system performance based on past improvements and determination of needed improvements throughout the Village's water system including a proposed well site.

Storage Tank Feasibility Study, Canton Township, MI – 2012
Engineer responsible for reviewing each community's demand patterns and peak usage over the past 5 years. Assisted in sizing of the storage facility and in determining the most cost-effective location.

SRF Project Plans
COSDS Project Plan – 2012
EFSDS Project Plan Amendment – 2012
Village of Milford Project Plan - 2012

Inflow and Infiltration Studies and Analyses
- City of Dearborn Inflow and Infiltration Study– 2012
- City of Urbancrest OH Inflow and Infiltration Study – 2012

ICS Integration Services LLC

35245 Schoolcraft Road
Livonia, MI 48150
Tel: (734) 306-6779
Fax: (734) 785-6025

Michael Bak
SCADA
Controls

Skills

PLC:	Allen Bradley, Bristol Babcock, General Electric, Modicon, Mitsubishi, PLC Direct, Scada Pack and Siemens
SCADA:	Bristol Babcock, Emerson, Iconics, Ignition, Intellution, Lab View, Rockwell Automation and Wonderware
Radios:	Black Box, Cal Amp, Digi, L+G, MDS, Metricomm, Motorola and Radius
Languages:	Basic, C++, Java, Python and Visual Basic

Experience

Instrumentation & Controls Manager — 2008 – Present
ICS Integration Services LLC, Livonia, MI

Senior Project Engineer
Motor City Electronic Technologies Inc, Detroit, MI — 1998-2008

Senior Automated Systems Technician
Technicolor Inc. Livonia, MI — 1994-1998

Automated Systems Technician — 1993-1994
Admore Inc, Macomb Township, MI

Education and Training

Automated Systems Technician Certificate, Macomb Community College
Associate of Applied Science Electronic Engineering Technology, Macomb Community College

Technical Training: Over 40 Factory training courses completed, including:
Allen Bradley, Devicenet, Emerson, Fieldbus, Profibus, Hart, Intellution, Metricomm, Rockwell Software & Wonderware

SCADA Project Experience

2001-2005 Detroit Water and Sewage Department Various Locations
DWSD 805/808 Suburban water billing system project: Responsibilities include design, programming review & installation for interfacing remote sites with head end locations via Utilinet 900 MHz radios. Project consisted of approximately 400 remote sites.

2004 DWSD System Control Center Detroit, MI
Project consisted of upgrading existing Intellution application to current revision of IFix. Configure and install application in a live production environment. Add in historical logging and reporting software. Tie in 3 new remote locations for monitoring and control from SCC.

2007 Oakland County Water Resource Commissioner Beverly Hills, MI
Acacia RTB upgrade and SCADA system project: Project consisted of upgrading existing Wonderware application to accommodate new automated dosing controls. Site was linked back to George W Kuhn Drain for remote monitoring and control.

2008 Oakland County Water Resource Commissioner Madison Heights, MI
Eight mile pump station SCADA project: Project consisted of designing and implementing RSView based SCADA system for remote control of station. System is linked through a cable based internet line back to George W Kuhn drain facility for central monitoring and control.

2010 Oakland County Water Resource Commissioner Waterford, MI
Elizabeth lake road pump station SCADA upgrade project: Project consisted of designing and installing RSView SCADA system for remote monitoring and control of facility.

2011 Oakland County Water Resource Commissioner Waterford, MI
Farmington Booster station controls upgrade project. Project consisted of design, installation and startup of 3 new control systems. Local SCADA designed at each site and integrated with County wide SCADA system.

2011 Harrison Township DPW Harrison Township, MI
Water tower design build project included controls and SCADA design for 3 new sites and integration with existing township SCADA system that included approximately 30 sites**.**

2012 Oakland County Water Resource Commissioner Highland, MI
EECBG controls upgrade project. Work with WRC staff to design, program and install new controls for 3 well houses and booster station. Optimize system performance and integrate new Compact Logix controls with existing SCADA system.

2012 Orion Township DPW Orion Township, MI
Water tower design build project included controls and SCADA design for 3 new sites. Controls are designed to allow Orion Township to become a max day customer for DWSD with exclusionary period fill and drain during peak usage. Provided a new SCADA system with remote access functionality.

Louis Meyette, PE
Electrical

Education
Bachelor of Science in Electrical Engineering, Michigan Technological University, 1989

Professional Registration
Professional Engineer:
- MI, 2007, #54591
- OH, 2011, #75458

Experience
23 years, 4 with OHM

Professional Associations
- ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers
- IEEE – Institute of Electrical and Electronic Engineers

Background

Mr. Meyette typically serves as a Project Manager and is responsible for electrical and mechanical systems design and specifications. He has vast experience with electrical controls, power distribution systems, and other related systems. With both Mechanical and Electrical disciplines involving energy consumption, Mr. Meyette is uniquely aware of energy costs and has experience designing for energy efficient systems.

Mr. Meyette joined OHM in 2007, contributing eighteen years of experience. During his previous employment, he designed electrical process controls and power distribution systems for the pulp and paper industry. Mr. Meyette also worked as a project manager for a general contracting firm, MJO Contracting of Houghton, Michigan. This employment experience afforded him responsibility for scope determination, estimation, design, and construction of projects supporting commercial and municipal facilities.

As a Project Manager at OHM, Mr. Meyette has worked closely with school administrators, the Michigan Department of Technology, Management & Budget, Department of Corrections, and various municipal officials. His experience with a variety of clients allows him to have a vast knowledge of different project needs and how he can help the client accomplish their goals.

Mr. Meyette believes it is important to keep open, honest, and straight-forward communication with all members of the project team throughout the duration of the project. He effectively manages the team to minimize problems and makes sure that he meets with the client regularly to ensure their needs are satisfied.

Relevant Experience

Wagner Road Booster Pump Station Design, Scio Township, MI
Electrical Engineer for booster pump station design that involved replacing an existing below ground pump station that had capacity and safety concerns. Responsible for preparing electrical plans and associated specifications. Project included relocating the existing transformer, temporary power supply, and electrical power, lighting and controls design.

Hancock Water Improvements, City of Hancock, MI
Project Manager for design and construction engineering services for water system upgrades for the City of Hancock. The project includes over $4 million in funding through USDA Rural Development. System upgrades consist of replacement of water transmission main, water main looping, replacement of various substandard water main, and upgrades to the main water storage reservoir.

Water Treatment Plant, City of Albion
Project Mechanical/Electrical Engineer for improvements at Albion's wastewater and water treatment plants. Project included evaluating pump options that will replace an outdated system and offer energy efficient and green technologies. Design drawings and specifications were provided for the renovation of the laboratory to remedy its deterioration issues, to effectively maximize storage space, and to improve workspace connections.

Farmington Hills Elevated Water Storage Tank, OCWRC
Electrical Engineer for the preparation of plans and specifications for the construction of a 3.0 MG elevated composite water storage tank for the City of Farmington Hills. Responsible for the electrical power, lighting, and controls design.

Baraga Water Treatment Facility Improvements, Village of Baraga, MI
General Contractors Project Manager for the improvements to this existing facility in Baraga, Michigan. Project included the construction of new filters and related equipment to increase capacity of the system by 50%. The construction was completed without interruption of domestic water service to the residents of the Village of Baraga.

Oakland Macomb Interceptor Drain (OMID), Oakland and Macomb Counties
Electrical Engineer for the rehabilitation of the Oakland Macomb Interceptor Drain (OMID). The interceptor had deteriorated in many sections, and several sink-holes had occurred along its length, necessitating several expensive emergency repairs. Completion of the rehabilitation required the construction of four flow control structures and two access structures to stop flow during construction and access the pipe with equipment. Responsible for the electrical power, lighting, and controls design.

Okemos/Hamilton Roads Streetscape, Meridian Township, Okemos, MI
Lighting Designer to finalize plans for the electrical power and lighting design for this downtown streetscape project using decorative LED fixtures.

Equalization Basin Improvements, Village of Dexter, MI
Mechanical Engineer for the addition of a 400,000 gallon basin, effluent pump station and influent diversion structure to minimize peak flow events to the WWTP. The equalization basin design included a flow control vault and diversion chamber to overflow excessive wet weather flows to the equalization basin and a new sanitary pump station to return the flow during normal operation. A new generator was added along with new controls and telemetry for proper operation.

Village of Dexter, Central Street Reconstruction
Lighting Designer for 650 feet of road reconstruction on Central Street within the Village of Dexter. The electrical scope included the design of the lighting for the roadway and adjacent sidewalk. A new electrical service was included for this section of the roadway.

Sludge Handling Upgrades, Village of Dexter, MI
Electrical Engineer responsible for design and construction efforts associated with upgrades to the anaerobic digester system. Improvements consist of replacement of the primary digester heating and mixing systems with improved technologies, heat exchanger and hydraulic mixing systems. Additional upgrades were new raw sludge pumps, gas handling facilities, digester covers, boilers and electrical and control systems to monitor the digester operation.

Timothy Kuhns, PE
Project Engineer

Education
- Coursework in Water Resources Engineering, Wayne State University, 2004
- Master of Science in Civil Engineering, Michigan State University, 2000
- Bachelor of Arts in Economics and International Relations, Michigan State University, 1998

Professional Registration
Professional Engineer, MI, 2004, #51854

Experience
13 years, 8 with OHM

Professional Development
- HEC-RAS 3.1 Training, 2005
- Leaderease Leadership Training, 2008

Publications
- "Does the Traditional Design Approach Lead to Overly Conservative Recommendations for Wet Weather Upgrades?", WEF Collection Systems Conference 2007
- "The Traditional Design Approach Can Lead to Overly Conservative Recommendations for Wet Weather Upgrades?", WEF Water Practice Journal, Upcoming Collection Systems Issue
- "Identifying and Correcting Rain Gauge Measurement Errors Using a Highly Accurate Hydrologic Model and Radar Reflectivity Data", WEF Collection Systems Conference 2010

Background

Tim Kuhns works primarily in the planning, design, and construction engineering of water distribution, sanitary collection, and stormwater systems. His work focuses on evaluating the capacity of these collection and distribution systems to deliver flows during high demand periods, and the design of facilities to correct bottlenecks within these systems. Tim's experience with water distribution systems includes modeling and analysis of water distribution systems for numerous communities across Southeast Michigan. He has also worked extensively in the design and construction of numerous water system capital improvement projects including elevated water storage and control vault systems in Orion Township and Farmington Hills; pressure reducing valve (PRV) improvements for the City of Novi; and well source improvements for the Village of Dexter.

In addition to the numerous water-system-related projects listed below, Tim has worked closely with the City of Novi engineering staff for the successful completion of the following projects:

- Leavenworth, Lexington Green, and Thornton Regional Basin Retrofits
- Grand River and 10 Mile Pressure Reducing Valve (PRV) Design and Construction
- Brookfarm Park Streambank Restoration
- Taft and Bishop Regional Basin Retrofits
- Novi CMOM
- Napier and Bellagio Pump Station Upgrades
- Hilton Pump Station Upgrades

Relevant Experience

City of Farmington Hills Water Storage Evaluation and Design, City of Farmington Hills, MI – 2012
Project Engineer responsible for the evaluation of alternatives of water storage alternatives. The evaluation involved a hydraulic and cost-effectiveness analysis of storage tank alternatives including stand pipe, ground storage tank, and elevated storage tank options. The evaluation concluded that a composite elevated tank is the most cost effective option. The project also included design and construction of the proposed elevated storage tank.

Grand River and 10 Mile Pressure Reducing Valve (PRV) Design and Construction, City of Novi, MI – 2009
Project Engineer responsible for the planning and design of the rehabilitation of the Grand River and 10 Mile PRVs. The project involved the field inspection, planning, design, and construction observation of the PRV station rehabilitation to ensure proper performance to handle existing and future peak flows.

Water System Master Plan, City of Livonia, MI – 2009
Project Engineer responsible for the preparation of a water system master plan and hydraulic model for the City of Livonia to analyze system pressures and develop a capital improvements program, which would address the City's aging infrastructure issues.

Orion Township Water Storage Evaluation and Design, Orion Township, MI – 2011
Project Engineer responsible for the evaluation of alternatives of water storage alternatives. The evaluation involved a hydraulic and cost-effectiveness analysis of storage tank alternatives including stand pipe, ground storage tank, and elevated storage tank options. The evaluation concluded that a composite elevated tank is the most cost effective option. The project also included design and construction of the proposed elevated storage tank.

Dexter 5th Well and WTP Improvements, Village of Dexter, MI – 2011
Project Engineer responsible for preparing hydraulic computations and design documents for the construction of an additional well house to provide additional reliability to the Dexter water system. The project also involved upgrading pumps and station piping at the WTP to improve source capacity to meet maximum day demands.

Northville Water Systems Upgrades, City of Northville, MI – 2008
Project Engineer responsible for implementation of operational improvements to the City's SCADA and Ground Storage Tank filling operations. In an effort to reduce peak flows from Detroit Water and Sewerage Department, Northville implemented SCADA and valve improvements.

Water System Master Plan & DWRF Project Plan, City of Hancock, MI – 2006
Project Engineer for a City-wide master plan focused on developing a redundant water source and internal water distribution system improvements. The project also involved the creation of a Project Plan that will be used for securing funding through the Drinking Water Revolving Fund program offered through the State of Michigan.

Water System Master Plan, City of Lincoln Park, MI – 2006
Project Engineer responsible for the preparation of a water system master plan and hydraulic model for the City of Lincoln Park to analyze system pressures and develop a capital improvements program, which would address the City's aging infrastructure issues.

Water System Master Plan, City of Dearborn, MI – 2006
Project Engineer responsible for the preparation of a water system master plan and hydraulic model for the City of Dearborn to analyze system pressures and develop a capital improvements program, which would address the City's aging infrastructure issues.

Water System Master Plan, Charter Township of Huron, MI – 2005
Project Engineer responsible for the preparation of a water system master plan and hydraulic model for Huron Township to identify transmission main routes, future service districts, and sizes of mains for serving areas of future growth.

Elaine A. Gumpper, PE
Site/Civil

Education
Bachelors of Science in Civil Engineering, Michigan State University, 1982

Professional Registration
Professional Engineer, State of Michigan, 1988, #33591

Professional Certifications
- Construction Specifications Institute – Member and Certified Construction Specifier
- Michigan Department of Natural Resources and Environment – Certified Waterworks System Operator –Class S-4
- Michigan Department of Natural Resources and Environment – Soil Erosion and Sediment Control Training Certification #09-0081

Experience
30 years, 27 with OHM

Professional Affiliations
- Construction Specifications Institute
- Michigan Water Environment Association

Background

Project Management/Design

Elaine has been the project engineer and/or project manager for various water main, sanitary sewer, pavement and drainage projects in Oakland, Wayne, Washtenaw, and Saginaw Counties in Michigan. She has served as a client representative for two Wayne County communities.

Elaine oversaw the design of a $5 million water main replacement and drainage improvement project in the City of Romulus. Approximately 6 miles of existing water main was replaced throughout an old subdivision in the historic downtown area. The roadside ditch and culvert system was upgraded to improve drainage to existing outlets. Coordination with the County was required to re-establish the drainage district lines in the neighborhood.

She is certified by the MDEQ as a Waterworks System Operator Class S-4.

Quality Assurance/Quality Control

Elaine has been responsible for quality control reviews of construction plans, specifications and contract documents produced by the Municipal and EWRG work groups. She is responsible for the standardization and updating of specifications and contract documents for use on municipal construction projects at OHM. She is actively involved in the formulation and implementation of quality assurance and quality control procedures at OHM.

Relevant Experience

Farmington Hills Elevated Water Storage Tank, OCWRC – 2012
Member of design team that prepared plans and specifications for the construction of a 3.0 MG elevated composite water storage tank for the City of Farmington Hills. Responsible for all site related design work, plan set assembly, and the preparation of the project manual for this project.

Wagner Road Booster Pump Station, Scio Township – 2010
Project engineer for the design of water main, site components, contract documents and permitting for this booster station project at Wagner and Jackson Plaza Roads. The station was built to replace an existing booster station on the site, and will be an integral part of the Scio Township water main distribution system.

River Drive Water Main Improvements, City of Lincoln Park, MI – 2009
Project Manager for the installation of a new 8-inch water main on River Dr. from Southfield Rd. to Mayflower St. by method of open-cut with the existing water main being grouted and abandoned in place. Water services were replaced with new copper from the water main to the property line, or were jumper connected to the new main.

US-12 Michigan Avenue, Water Main Replacement, MDOT - 2009
Design engineer for the replacement of three miles of existing 12" and 24" water mains within Michigan Avenue. The projected cost of the water main work was $3.3 million. OHM prepared plans to 70% completion for the re-construction of Michigan Avenue between 28th St. and I-75 in the City of Detroit. The road is under MDOT jurisdiction.

Ashley, Main and Londonderry Streets Water Main Project, City of Ann Arbor - 2008
Project Engineer for the design of replacement water main in the City of Ann Arbor. The water main installation in London and Ashley Streets was accomplished by directional drilling in the heart of downtown Ann Arbor. The project required close coordination among and permission from Washtenaw County for crossing a drain, the Ann Arbor Railroad for crossing their tracks, the MDEQ for crossing a floodplain, and the City of Ann Arbor for traffic control.

Holmes Road Phase II, Ypsilanti Community Utilities Authority, MI – 2008
Project Manager/Client Representative for this project to conduct modeling and a preliminary engineering study to determine the appropriate sizing to replace 12" water main(s) – triple water main in some places. Over one mile of CL54 DI pipe l was installed as part of this project (12-16") with 8 inch laterals connecting to the North South streets.

M-13 from Hess Avenue to Rust Avenue, MDOT – 2008
Project Engineer for the preparation of construction plans and specifications for the replacement of water main, and the separation of a combined sewer as a part of the M–13 Road Reconstruction Project. Approximately one mile of water main was replaced and a combined sewer which has been in service since the turn of the century was separated into new storm and sanitary sewers. .

Northwestern Connector (Meter and PRV Vault Relocation), Road Commission for Oakland County, MI – 2008
Project Engineer for the preparation of construction plans and specifications for the relocation of a water meter vault and PRV vault. The work was a critical part of the construction of the roundabout at 14 Mile and Farmington Roads. The Farmington Hills water system is fed by a 36" branch off of a Detroit main in 14 Mile Road. An existing DWSD meter vault and Farmington Hills PRV Vault were on this branch and in conflict with the proposed roundabout. They were reconstructed at a point beyond the roundabout. Coordination between OHM, DWSD, Oakland County, and Farmington Hills was an integral part of developing plans for the work that were acceptable to all entities.

Midway Water Main, Ypsilanti Community Utilities Authority, MI – 2007
Project Manager for preparation of construction documents for the replacement of 1200 feet of 12 inch water main in the YCUA water system. Replacement of the aged existing main improved service to the local residents.

Indianwood Road Water Main Extension, Orion Township, MI – 2006
Project Manager for the design and construction of 5,000 lineal feet of 12" water main. This project completed a main loop in the Township's system. This project involved the coordination of the local residences and school system for obtaining several easements and temporary grading permits. This project also included a portion of directional drilled water main through a difficult area.

Professional Development
- Project Innovations, LeaderEase III Training, 2006
- Michigan State University, Communication Climate and Decision Making, 2005
- PSMJ, Project Manager's Boot Camp, 2005
- Michigan State University Management Education Center, Risk Allocation in the Construction Setting, 2004
- Lorman Education Services, Effective Quality Control - Increasing Project Quality and Decreasing Costs in Michigan, 2005
- Skillpath Seminars, Fundamentals of Finance and Accounting, 2004
- Skillpath Seminars, Business Writing and Grammar Skills, 2003
- Professional Concepts Insurance Agency, Lessons in Professional Liability, 2003
- Lorman Education Services, Construction Contracting for Public Entities in Michigan, 2003
- Effective Watershed Management for a Clean Michigan Conference, 1999
- Project Innovations, Facilitation Skills Training, 1999

Alan McComb, PE

Construction Project Services Manager

Education
Bachelor of Science in Civil Engineering, University of Michigan, 1971

Professional Registrations
Professional Engineer:
- MI, 1976, #23728
- OH, 2009, #74195
- TN, 2009

Experience
40 years, 39 with OHM

5 years with the City of Ann Arbor

Alan also served as a member and Chairman of the City of Ann Arbor Building Board of Appeals from 1980 to 1994, and currently serves as Chairman on the Ypsilanti Township Construction Board of Appeals since 1993.

Professional Affiliations
- American Society of Civil Engineers, 1968-2007
- Michigan Infrastructure & Transportation Association (MITA)

Professional Development
- Project Innovations, LeaderEase Training, 2004
- Project 2000 Project Scheduling Software Seminar
- Construction Contracting for Public Entities in Michigan, 1999
- Outlook '98 Computer Software Seminar, 1999
- American Consulting Engineers Council/MI Management Training Classes, 1996
- MDOT Construction Project Record Keeping CPRKS Seminar, 1996
- MDOT Office Technician Seminar, 1987

Background

Alan, a partner in the firm, has over 35 years in the construction of infrastructure in southeast Michigan. He has been involved in the construction of major sewer, water and road projects, but also understands what it takes to build smaller projects in urban areas. He has gained vast knowledge of practical ways to approach the reconstruction of urban/suburban utility systems. Alan is a proven problem solver. Construction, especially for redevelopment and rehabilitation projects, can be messy and with the multiple parties involved misunderstandings and issues will arise. Alan has shown the ability to foresee and avoid issues but when issues do arise, he gets involved and resolves them in a timely manner. He understands that project budgets and schedules need to be maintained and that citizen complaints, along with contractor claims, must be addressed in a timely manner.

Alan's civil engineering experience has also included design and construction engineering for water and sanitary/storm sewer systems as well as major roads for municipal clients. He has been directly involved with the project administration and construction engineering of many major sewer projects including trunk sanitary and storm sewers routed directly through major residential and commercial areas. This work included construction engineering to foresee problems and promptly resolve them to minimize their impact to a project, from both cost and time perspectives. Also included are contract administration, processing pay estimates, change orders, client contact for progress status, and the adherence to all project specifications and schedules.

Relevant Experience

Elevated Storage Tank and Related Water System Improvements, City of Farmington Hills – Ongoing

Construction Manager for a 3 MG elevated composite storage tank, pressure reducing valves and water main. The project schedule was expedited in order to save the City $3,500,000 annually by reducing their peak draw from DWSD.

Oakland Macomb Interceptor Drainage District (OMID), Oakland and Macomb Counties, MI – Ongoing

Construction Project Engineer on the Contract No. 2 portion of this major rehabilitation to the OMID interceptor to maintain proper continued operation. His responsibilities included review of the daily construction inspection reports for consistency and accuracy that were prepared by the consultant team's inspectors, coordination with the contractor on his daily work schedule for the structures under construction, addressing and resolving unforeseen problems in a timely manner during the course of the project and communications with the lead consultant on major issues during the course of the project. OHM was a subconsultant to NTH for the design and construction engineering. OHM's scope included construction engineering and inspection, survey of approximately 35% of the interceptor, survey for easement document preparation, topographic mapping for two of the structures and design of the bypass pump station contained within one of the four flow control structures.

Lowell Street Paving and Water Main Improvements, Ypsilanti Community Utilities Authority, MI – 2007
Construction Manager for this project, which included replacement of approximately 2,100 lineal feet of 8-inch ductile iron water main within Lowell Street. The water main will be paid for through use of a Drinking Water Revolving Fund (DWRF), a low interest loan from the State of Michigan. OHM was also responsible for administering the contract through MDOT, performing full time construction observation and creating as-built drawings for YCUA and the City.

Bradley/Snow/I-94 WM Improvements, Ypsilanti Community Utilities Authority, MI – 2006
Construction Manager for this project. OHM worked with YCUA to determine a hybrid method of open cut and pipe bursting undersized cast iron water main. This project is part of a group of three projects that are identical in nature and will be funded with DWRF monies. This particular project consisted of approximately 18,000 ft of water main replacement (8" DIP).

Superior Township 16" Water Main Extension and 2nd Connection to City of Detroit Water and Sewerage Department (DWSD), Charter Township of Superior, MI – 2005
Construction Manager for this project. OHM designed 1,200 feet of 16-inch water main construction and a second township connection to the DWSD system through the YCUA. OHM also coordinated, reviewed, and inspected the installation of an additional 2,500 feet of 16" water main, assisted the Township by addressing residents' concerns, and coordinated with various subconsultants. OHM worked closely with YCUA, and DWSD to ensure proper connection to a critical 60-inch DWSD transmission main during construction. OHM also played a vital role in establishing the operations of both the meter pit and a pressure-reducing valve.

Ypsilanti Township/City of Ypsilanti Detroit Water and Sewerage District (DWSD) Second Connection, Ypsilanti Community Utilities Authority, MI – 2005
Construction Manager for this project to provide a redundant connection to the DWSD water supply and to significantly assure YCUA water system reliability. Approximately 4,500 lineal feet of 36-inch ductile iron water main was designed parallel to the aged DWSD transmission main through the property of General Motors Corporation. A meter vault and two pressure reducing valve vaults were also designed as part of the project.

Water System Improvements, City of Auburn Hills, MI – 2003
Construction Manager for this project to update the Auburn Hills water system with strategic installations of pressure reducing valves and electrical controlled valves in order to prepare for the addition of an elevated water storage tank.

ERIC V. BINKOWSKI

CONSTRUCTION OBSERVER

POSITION:

- Supervise Inspection Department.
- Inspector scheduling.
- Field equipment requisition and training.
- Update and prepare Inspection Manual yearly.
- Work as a Field Technician to insure the requirements of the specifications are met.
- Train new employees as Field Technicians.
- Quality control inspection services.

EXPERIENCE:

- Plural Components Experience
    - Menasha, Otsego, Michigan – Paint inspection during sludge tank repaint.
    - Grand Rapids, Michigan, Lake Michigan Filter Plant – Paint inspection during repainting of filter boxes.
    - Muskegon Heights, Michigan, Water Treatment Plant – Paint failure inspections and paint inspection during repairs.
- Joined Dixon Engineering, Inc. as a full-time inspector in 1999.
- Project management in residential construction for 7 years.

EDUCATION:

- Bachelor of Science in Business Administration with a major in Finance from Central Michigan University.

CERTIFICATIONS:

- Madison Chemical Certification for plural component paint inspection and plural component equipment.
- Completed Work Type 26, Structural Steel Painting course for Ohio Department of Transportation.
- NACE Certified Coating Inspector - Level 3 - Cert. No. 7126.
- AWS Certified Welding Inspector #04040071.
- OSHA Lead in Construction Standard 29 CFR 1926.62 training.
- OSHA Respiratory Protection 29 CFR 1910.134 training.
- Fall Protection & Competent Person training.
- Rescue from Heights training.

AFFILIATIONS:

- American Welding Society (AWS)
- National Association of Corrosion Engineers (NACE)

Gregory J. Marker, PE
Construction Observer

Education
- Bachelor of Science in Civil Engineering. Lawrence Technological University, 2004
- Bachelor of Science in Biology, Michigan State University. Lyman Briggs School, 2000

Professional Registration
Professional Engineer,
State of Michigan, 2009
6201056617

Professional Certifications
- Soil Erosion and Sediment Control Act Administrator, 2006
- Office Technician Training, Michigan Department of Transportation, 2006
- Confined Space Entry, 2006
- Waterworks System Operator Class S-3, 2006
- Waterworks System Operator Class S-4, 2006
- Michigan Public Service Institute, 2013

Professional Affiliations
- American Society of Civil Engineers – Student Chapter
- Chi Epsilon Engineering Honor Society – Student Chapter, Editor
- Laborers Union 1191 – Three Years

Experience
12 years, 8 with OHM

Background
As Field Client Representative with OHM's Construction Engineering Department, Greg is responsible for maintaining project scopes, budgets, and quality of work while fostering positive relations with the business owners and residents affected by the ongoing work. He is also responsible for correctly interpreting engineering drawings, authorizing changes from the approved plans, communicating changes to clients and regulatory agencies, and administrating the terms of the construction contracts. Greg is the project engineer from the preconstruction meeting through to final closeout.

Greg is familiar with reviewing construction materials in the field for acceptance and is qualified to ensure compliance with plans and specifications. He has recorded and reported quantities used on projects; ensured that daily inspection reports relay clear and concise information to others associated with the project; prepared daily inspection reports with detailed sketches, descriptions and records of quantities used in relationship to the project and filing these records daily as the project engineer. He has been in charge of overall budget tracking, change order and quantity disputes, contract modifications, monthly estimate production, in addition to negotiations with construction company representatives as the project engineer. Mr. Marker is experienced in all facets of a construction project from inspiration of an idea, through to final closeout.

Prior to working with OHM, Greg worked for Di Ponio and Morelli Construction. He also has a Bachelor of Science degree in Biology from Michigan State University through the Lyman Briggs Program. He spent two summers focused on environmental and ecological concerns in recreational land use areas.

Relevant Experience
Novi Federally Funded Road Improvements – Nine Mile Beck to Taft, City of Novi, MI – May 2012 to September 2012
Field Client Representative and Project engineer for one mi of pavement removal, patch curb and gutter replacement, drainage structure improvements, edge drain installation, hot mix asphalt cold milling and resurfacing, concrete sidewalk, and ADA ramps on Nine Mile Road from Taft Road easterly to Beck Road.

2012 Neighborhood Roads Improvements, City of Novi, MI – May 2012 to October 2012
Field Client Representative and Project engineer for concrete and asphalt road improvements in 13 different areas.

Nine Mile and Meadow Brook Signal Replacement, City of Novi, MI – April 2012 to September 2012
Field Client Representative and Project engineer for replacement of the signal and Controller and ADA upgrade of the sidewalks at that intersection.

Old Novi and 13 mile reconstruction, City of Novi, MI – April 2011 to October 2012
Field Client Representative and Project engineer for reconfiguration of a three way intersection to remove a signal, reconfigure the T to the majority direction, and add ADA complaint sidewalks and landscaping.

2010 PRV replacements, City of Novi, MI – October 2010 to June 2011
Field Client Representative and Project engineer for of the demolition and replacement of two (2) pressure reducing vaults (PRV) on the water distribution system. Work includes replacement of pipe and valves, and electrical improvements.

2010 Novi Capital Maintenance Program, City of Novi, MI – May 2010 to March 2011
Field Client Representative and Project engineer for Concrete Pavement patching and joint repair and HMA patching and microsurfacing including: 22,350 syd HMA, ultra thin overlay, ¾ inch, 1,425 syd pavement repair with integral curb, and 3,600 ft pavement joint and crack repair on 10 local streets in the City of Novi.

Novi Federally Funded Road Improvements, City of Novi, MI – April 2010 to March 2011
Field Client Representative and Project engineer for one mi of pavement removal, curb and gutter replacement, drainage structures, hot mix asphalt cold milling and resurfacing, concrete sidewalk, and ADA ramps on Nine Mile Road from Taft Road easterly to Novi Road. This project is funded with American Recovery and Reinvestment Funds. Greg also restored two miles of roads from the previous season and closed out those roads as part of the project.

Whittaker at Stony Creek Roundabout, YCUA, MI – May 2010 to July 2010
Field Client Representative and Project engineer for lowering of 400 feet of 12" water main. The project was performed with collaboration of storm, road, and signal improvements from the Washtenaw County Road commission as part of an MDOT local agency project.

Superior to YCUA third connection PRV upgrades, Superior Township, MI – October 2009 to June 2010
Field Client Representative and Project engineer for replacement of the existing low flow 2-inch pressure reducing valve with a 4-inch pressure reducing valve. Replacement of existing high flow pressure reducing valve actuator with a new actuator. These changes minimized pressure fluctuations under the current flow conditions in the Township.

2009 Pump Station Improvements, City of Novi, MI – May 2009 to April 2010
Field Client Representative and Project engineer for improvements at the Bellagio and Napier pump stations. Bellagio included by pass pumping and replacing of all facilities in the wet well, new control panel, new electric panel, new gas service, addition of a generator and Automatic Transfer Switch, and installation of bypass and pump and haul connections on the force main outlet. Napier station involved addition of a new generator and ATS switch.