

Oakland Township Oakland Hunt & Southeast Water System Storage & Treatment

May 21, 2014

Introduction

This memorandum provides the cost opinions for design and construction of the interconnection of the two water systems, the water treatment (iron removal) and storage improvements for the Oakland Hunt & Southeast Water System in Oakland Township. Three different system conditions were reviewed for phasing the construction (existing, 20-year and ultimate development). The existing condition is derived from the 2012 billing data and the peaking factors for the maximum day in July. The 20-year condition was determined as part of the Water Reliability Study, January 2014. This 20-year population and demand are for the existing water service boundary. The ultimate design condition considers expanding the service area to allow for future development. These cost opinions are being provided for use in determining anticipated annual bond payments.

System Sizing

The 2012 billing data and peaking factors were used to determine the existing average day and maximum day demand. These values were used to calculate the size of the storage tank which is approximately equal to one average day volume in the combined Oakland Hunt and Southeast Service Areas. The required treatment capacity is equal to the maximum day demand because storage will be provided to service the system during peak hour and fire protection. See Table 1 and 2 for a summary of water treatment and storage requirements under each system condition.

Table 1: Water System Treatment Requirements

Condition	Population	REUs	Demand				Treatment	
			Average Day		Maximum Day		(gpm)	(MGD)
			(gpm)	(MGD)	(gpm)	(MGD)		
Existing	2,203	700	272	0.39	1,026	1.5	1,200	1.7
20 Year	3,355	1,073	464	0.67	1,774	2.6	1,800	2.6
Ultimate	4,505	1,437	683	0.98	2,635	3.8	2,650	3.8



Table 2: Water System Storage Requirements

Oakland Hunt & Southeast Water System								
Condition	Population	REUs	Demand		Storage			
			Average Day		Required (gallons)	Existing (gallons)	Required New (gallons)	Standard Size Waterspheriod (gallons)
			(gpm)	(MGD)				
Existing	2,203	700	272	0.39	392,188	284,322	107,866	150,000
20 Year	3,355	1,073	464	0.67	668,834		384,512	400,000
Ultimate	4,505	1,437	683	0.98	983,945		699,623	750,000

The Oakland Hunt & Southeast Water System’s maximum day peaking factor is greater than other comparable communities. This has a large impact on the cost of treatment. A graph of the data used to develop the peaking factor is provided in Figure 1. This graph shows that the high usage was seen for several days and is therefore not an overly conservative estimate. The high maximum day peaking factor is attributed to lawn watering.

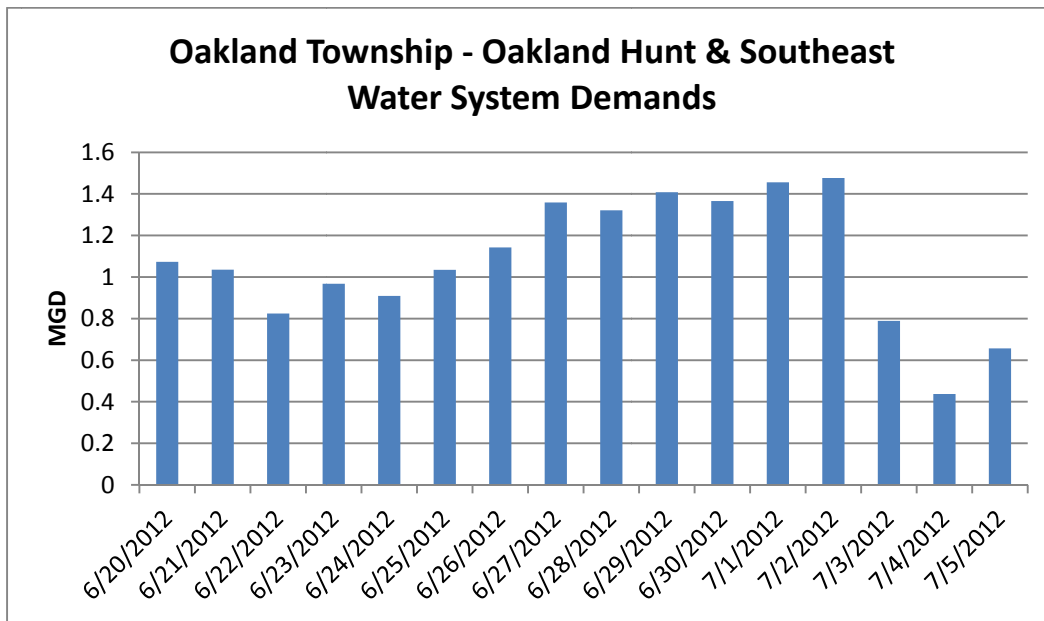


Figure 1



The average day demand for the year 2012 based on billing records is 0.39 MGD. OHM reviewed daily demand for 16 days in 2012 in order to determine the maximum day peaking factor. Table 3 summarizes the observed data. As shown in Table 3 six days had a maximum day peaking factor greater than 3.0. The highest was 3.76 seen on July 2, 2012. The peaking factor for Oakland Hunt is 3.92. The peaking factors for each system were used to project the 20-year demand. The average of 3.86 was used to project the Ultimate demand for the new service area.

Table 3: Maximum Day Peaking Factors

Date	Daily Use		Peaking Factor
	(gpm)	(MGD)	
6/20/2012	745	1.07	2.74
6/21/2012	719	1.04	2.64
6/22/2012	572	0.82	2.10
6/23/2012	672	0.97	2.47
6/24/2012	631	0.91	2.32
6/25/2012	718	1.03	2.64
6/26/2012	794	1.14	2.91
6/27/2012	944	1.36	3.47
6/28/2012	917	1.32	3.37
6/29/2012	978	1.41	3.59
6/30/2012	948	1.37	3.48
7/1/2012	1011	1.46	3.71
7/2/2012	1025	1.48	3.76
7/3/2012	548	0.79	2.01
7/4/2012	303	0.44	1.11
7/5/2012	456	0.66	1.68

Costs and Growth Assumptions

The construction cost opinions were prepared to allow for possible phasing of improvements. The existing design condition provides treatment and storage for only existing residences in Oakland Hunt and Southeast water system service areas. The cost opinions were prepared for use in rate assessments.

The 20-year design condition assumed 100% of Oakland Hunt current phases and 20% of the future phases of Oakland Hunt. It also assumes 100% build-out of existing Southeast subdivisions, 50% of the approved condominium sites and 25% of undeveloped parcels in the existing system boundary. This growth equates to the SEMCOG 20-year population projections. The Oakland Hunt development is actively building new homes and the remaining phases are currently in the planning



stages. The existing Oakland Hunt water treatment facility was originally built by the Oakland Hunt development to serve the all of its phases.

The ultimate build out condition assumes 100% build-out of the future district and 10% of existing residences on wells will connect. There is a noticeable increase in demand when the water system boundaries are expanded to allow for future development in this area. Table 4 is a summary of the Southeast Water System improvement costs.

Table 4: Southwest Water System Improvement Costs

Condition	REUs	Storage and System Connection	Southeast PRV	Treatment	Total Annual Bond Payment	Annual Bond Payment / REU
Existing	700	\$4,925,000	\$107,000	\$4,066,000	\$595,249	\$854
20 Year	1,073	\$5,907,000	\$107,000	\$5,077,000	\$726,132	\$679
Ultimate	1,437	\$6,802,000	\$107,000	\$6,581,000	\$883,679	\$617



Appendix A

Water Treatment Cost Opinions



Project Summary Engineer's Opinion of Probable Project Costs

Owner: Oakland County Water Resources Commissioner's Office
Project: **Oakland Hunt & Southeast Water System Water Treatment**
Work: Existing Conditions - 800 GPM Well Addition (Well Capacity, firm - 1200 gpm)
 1,200 gpm (1.7 MGD) Iron Removal Treatment Plant (Add 450 gpm Capacity to existing)
 Reuse existing 1400 gpm HS Pumps to pump to Water Tower

Date: 5/17/2014
Project No. 0105-13-0091
Prepared By: S. Wright
Reviewer: V. Putala
Current ENR: 9796

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	800 gpm Production Well	1	LS	\$225,000.00	\$225,000.00
2	Masonry Block Building	880	SF	\$200.00	\$176,000.00
3	Foundation	55	CY	\$600.00	\$33,000.00
6	Vertical Pressure Filters (4 units @ 8 ft dia, 150 gpm)	4	EA	\$175,000.00	\$700,000.00
7	Backwash Water Tank Modifications	1	LS	\$150,000.00	\$150,000.00
8	Effluent Metering	1	LS	\$15,000.00	\$15,000.00
9	High Service Pump Piping Modifications	1	EA	\$10,000.00	\$10,000.00
10	High Service Pump VFD's	2	EA	\$17,500.00	\$35,000.00
11	Chemical Feed Facilities	1	LS	\$125,000.00	\$125,000.00
12	Process Piping	1	LS	\$200,000.00	\$200,000.00
13	Valves	18	EA	\$6,500.00	\$117,000.00
14	Mechanical Systems (5%)	1	LS	\$68,000.00	\$68,000.00
15	Dehumidification System	1	EA	\$50,000.00	\$50,000.00
16	Electrical Systems (10%)	1	LS	\$142,000.00	\$142,000.00
17	Instrumentation (5%)	1	LS	\$81,000.00	\$81,000.00
18	Site Work (10%)	1	LS	\$190,000.00	\$190,000.00
				TRADES SUBTOTAL	\$2,317,000.00
CONTRACTUAL REQUIREMENTS					
	General Conditions	10%			\$231,700.00
	General Requirements	5%			\$115,850.00
	Contingencies	20%			\$463,400.00
				TOTAL CONSTRUCTION COST:	\$3,127,950.00
PROJECT COSTS					
	Engineering	25%			\$781,990.00
	Finance and Legal	5%			\$156,400.00
				ENGINEER'S OPINION OF PROJECT COST	\$4,066,000.00



Project Summary Engineer's Opinion of Probable Project Costs

Owner: Oakland County Water Resources Commissioner's Office
Project: Oakland Hunt & Southeast Water System Water Treatment
Work: 20-year Condition - 800 GPM Well Addition (Firm Capacity - 1200 gpm) w/
1,800 gpm (2.6 MGD) Iron Removal Treatment Plant (Add 1,050 gpm Capacity to existing)

Date: 5/17/2014
Project No.: 0105-13-0091
Prepared By: S. Wright
Reviewer: V. Putala
Current ENR: 9796

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	800 gpm Production Well	1	LS	\$225,000.00	\$225,000.00
2	600 gpm Production Well and Aquifer Development	1	LS	\$350,000.00	\$350,000.00
3	Masonry Block Building Extension (12 x 52)	625	SF	\$200.00	\$125,000.00
4	Foundation	45	CY	\$600.00	\$27,000.00
5	Decorative Brick for Filter Screening	45	LF	\$225.00	\$10,125.00
6	Demolish Hydropneumatic Tank and Detention Tank	1	EA	\$60,000.00	\$60,000.00
7	Add High Service Pump (end-suction)	1	EA	\$55,000.00	\$55,000.00
8	Variable Speed Drive for High Service Pump	1	EA	\$17,500.00	\$17,500.00
9	Add VFD's to existing pumps	2	EA	\$17,500.00	\$35,000.00
9	High Service Pump Piping Modifications	1	EA	\$40,000.00	\$40,000.00
10	Horizontal Pressure Filters (10 ft dia x 35' Long 1050 gpm)	2	EA	\$350,000.00	\$700,000.00
11	Backwash Water Tank	1	LS	\$200,000.00	\$200,000.00
12	Effluent Metering	1	LS	\$15,000.00	\$15,000.00
13	Chemical Feed Facilities	1	LS	\$125,000.00	\$125,000.00
14	Process Piping	1	LS	\$150,000.00	\$150,000.00
15	Valves	15	EA	\$6,500.00	\$97,500.00
16	Replace Generator	1	EA	\$100,000.00	\$100,000.00
17	Generator Louver Modification	1	LS	\$25,000.00	\$25,000.00
18	Mechanical Systems (5%)	1	LS	\$72,000.00	\$72,000.00
19	Electrical Systems (10%)	1	LS	\$163,000.00	\$163,000.00
20	Instrumentation (5%)	1	LS	\$90,000.00	\$90,000.00
21	Site Work (10%)	1	LS	\$211,000.00	\$211,000.00
TRADES SUBTOTAL					\$2,893,125.00
CONTRACTUAL REQUIREMENTS					
	General Conditions	10%			\$289,310.00
	General Requirements	5%			\$144,660.00
	Contingencies	20%			\$578,630.00
TOTAL CONSTRUCTION COST:					\$3,905,725.00
PROJECT COSTS					
	Engineering	25%			\$976,430.00
	Finance and Legal	5%			\$195,290.00
ENGINEER'S OPINION OF PROJECT COST					\$5,077,000.00



Project Summary Engineer's Opinion of Probable Project Costs

Owner: Oakland County Water Resources Commissioner's Office
Project: Oakland Hunt & Southeast Water System Water Treatment
Work: Ultimate Condition - 800 GPM Well Addition (Firm Capacity - 1200 gpm) w/
2,650 gpm (3.8 MGD) Iron Removal Treatment Plant (Add 1,900 gpm Capacity)

Date: 5/17/2014
Project No.: 0105-13-0091
Prepared By: S. Wright
Reviewer: V. Putala
Current ENR: 9796

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	800 gpm Production Well	1	LS	\$225,000.00	\$225,000.00
2	600 gpm Production Well and Aquifer Development	1	LS	\$350,000.00	\$350,000.00
3	Masonry Block Building Extension (12 x 52)	625	SF	\$200.00	\$125,000.00
4	Foundation	45	CY	\$600.00	\$27,000.00
5	Decorative Brick for Filter Screening	45	LF	\$225.00	\$10,125.00
6	Demolish Hydropneumatic Tank and Detention Tank	1	EA	\$60,000.00	\$60,000.00
7	Add High Service Pump (end-suction)	2	EA	\$75,000.00	\$150,000.00
8	Variable Speed Drive for High Service Pump	4	EA	\$17,500.00	\$70,000.00
9	Add VFD's to existing pumps	2	EA	\$17,500.00	\$35,000.00
10	High Service Pump Piping Modifications	1	EA	\$50,000.00	\$50,000.00
11	Horizontal Pressure Filters (10 ft dia x 35' Long 1050 gpm)	3	EA	\$350,000.00	\$1,050,000.00
12	Backwash Water Tank	1	LS	\$200,000.00	\$200,000.00
13	Effluent Metering	1	LS	\$15,000.00	\$15,000.00
14	Chemical Feed Facilities	1	LS	\$150,000.00	\$150,000.00
15	Process Piping	1	LS	\$200,000.00	\$200,000.00
16	Valves	22	EA	\$6,500.00	\$143,000.00
17	Replace Generator	1	EA	\$115,000.00	\$115,000.00
18	Generator Louver Modification	1	LS	\$25,000.00	\$25,000.00
19	Mechanical Systems (5%)	1	LS	\$103,000.00	\$103,000.00
20	Electrical Systems (10%)	1	LS	\$231,000.00	\$231,000.00
21	Instrumentation (5%)	1	LS	\$127,000.00	\$127,000.00
22	Site Work (10%)	1	LS	\$289,000.00	\$289,000.00
TRADES SUBTOTAL					\$3,750,125.00
CONTRACTUAL REQUIREMENTS					
	General Conditions	10%			\$375,010.00
	General Requirements	5%			\$187,510.00
	Contingencies	20%			\$750,030.00
TOTAL CONSTRUCTION COST:					\$5,062,675.00
PROJECT COSTS					
	Engineering	25%			\$1,265,670.00
	Finance and Legal	5%			\$253,130.00
ENGINEER'S OPINION OF PROJECT COST					\$6,581,000.00



Appendix B
Water Storage Cost Opinions



Project Summary Engineer's Opinion of Probable Project Costs

Owner: Oakland County Water Resources Commissioner's Office
Project: Oakland Hunt & Southeast Water System Connection and Storage
Work: Existing Design Condition - 150,000 gallons of Elevated Water Storage
will be provided behind Township Offices
16-inch water main extension to connect Oakland Hunt and Southeast Water Systems

Date: 5/21/2014
Project No.: 0105-13-0091
Prepared By: J. Patterson
Reviewer: V. Putala
Current ENR: 9749.51

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
Storage					
1	150,000 Gallon Waterspheroid Elevated Storage Tank (standard foundation)	1	EA	\$750,000.00	\$750,000.00
2	Cathodic Protection	1	EA	\$30,000.00	\$30,000.00
3	Tank Logo	1	EA	\$50,000.00	\$50,000.00
4	Altitude Valve	1	EA	\$75,000.00	\$75,000.00
5	Site Improvements	1	LS	\$100,000.00	\$100,000.00
6	Electrical Improvements	1	LS	\$250,000.00	\$250,000.00
7	System Controls	1	LS	\$150,000.00	\$150,000.00
Connecting Water Systems					
8	Clearing and Grubbing (Heavy Woods)	2	AC	\$5,000.00	\$10,000.00
9	16-inch Water Transmission Main	4,700	LF	\$250.00	\$1,175,000.00
10	16" Isolation Valve	11	EA	\$6,000.00	\$66,000.00
11	Site Restoration	1	LS	\$150,000.00	\$150,000.00
TRADES SUBTOTAL					\$2,806,000.00
CONTRACTUAL REQUIREMENTS					
	General Conditions	10%			\$280,600.00
	General Requirements	5%			\$140,300.00
	Contingencies	20%			\$561,200.00
TOTAL CONSTRUCTION COST:					\$3,788,100.00
PROJECT COSTS					
	Engineering	25%			\$947,030.00
	Finance and Legal	5%			\$189,410.00
ENGINEER'S OPINION OF PROJECT COST					\$4,925,000.00



Project Summary Engineer's Opinion of Probable Project Costs

Owner: Oakland County Water Resources Commissioner's Office
Project: **Oakland Hunt & Southeast Water System Connection and Storage**
Work: 20-Year Design Condition - 400,000 gallons of Elevated Water Storage
will be provided behind Township Offices
16-inch water main extention to connect Oakland Hunt and Southeast Water Systems

Date: 5/21/2014
Project No.: 0105-13-0091
Prepared By: J. Patterson
Reviewer: V. Putala
Current ENR: 9749.51

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
Storage					
1	400,000 Gallon Waterspheroid Elevated Storage Tank	1	EA	\$1,300,000.00	\$1,300,000.00
2	Cathodic Protection	1	EA	\$30,000.00	\$30,000.00
3	Tank Logo	1	EA	\$60,000.00	\$60,000.00
4	Altitude Valve	1	EA	\$75,000.00	\$75,000.00
5	Site Improvements	1	LS	\$100,000.00	\$100,000.00
6	Electrical Improvements	1	LS	\$250,000.00	\$250,000.00
7	System Controls	1	LS	\$150,000.00	\$150,000.00
Connecting Water Systems					
8	Clearing and Grubbing (Heavy Woods)	2	AC	\$5,000.00	\$10,000.00
9	16-inch Water Transmission Main	4,700	LF	\$250.00	\$1,175,000.00
10	16" Isolation Valve	11	EA	\$6,000.00	\$66,000.00
11	Site Restoration	1	LS	\$150,000.00	\$150,000.00
TRADES SUBTOTAL					\$3,366,000.00
CONTRACTUAL REQUIREMENTS					
	General Conditions	10%			\$336,600.00
	General Requirements	5%			\$168,300.00
	Contingencies	20%			\$673,200.00
TOTAL CONSTRUCTION COST:					\$4,544,100.00
PROJECT COSTS					
	Engineering	25%			\$1,136,030.00
	Finance and Legal	5%			\$227,210.00
ENGINEER'S OPINION OF PROJECT COST					\$5,907,000.00



Project Summary Engineer's Opinion of Probable Project Costs

Owner: Oakland County Water Resources Commissioner's Office
Project: Oakland Hunt & Southeast Water System Connection and Storage
Work: Ultimate Design Condition - 750,000 gallons of elevated water storage
will be provided behind Township Offices
16-inch water main extension to connect Oakland Hunt and Southeast Water Systems

Date: 5/21/2014
Project No.: 0105-13-0091
Prepared By: J. Patterson
Reviewer: V. Putala
Current ENR: 9749.51

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
Storage					
1	750,000 Gallon Waterspheroid Elevated Storage Tank	1	EA	\$1,800,000.00	\$1,800,000.00
2	Cathodic Protection	1	EA	\$30,000.00	\$30,000.00
3	Tank Logo	1	EA	\$70,000.00	\$70,000.00
4	Altitude Valve	1	EA	\$75,000.00	\$75,000.00
5	Site Improvements	1	LS	\$100,000.00	\$100,000.00
6	Electrical Improvements	1	LS	\$250,000.00	\$250,000.00
7	System Controls	1	LS	\$150,000.00	\$150,000.00
Connecting Water Systems					
8	Clearing and Grubbing (Heavy Woods)	2	AC	\$5,000.00	\$10,000.00
9	16-inch Water Transmission Main	4,700	LF	\$250.00	\$1,175,000.00
10	16" Isolation Valve	11	EA	\$6,000.00	\$66,000.00
11	Site Restoration	1	LS	\$150,000.00	\$150,000.00
				TRADES SUBTOTAL	\$3,876,000.00
CONTRACTUAL REQUIREMENTS					
	General Conditions	10%			\$387,600.00
	General Requirements	5%			\$193,800.00
	Contingencies	20%			\$775,200.00
				TOTAL CONSTRUCTION COST:	\$5,232,600.00
PROJECT COSTS					
	Engineering	25%			\$1,308,150.00
	Finance and Legal	5%			\$261,630.00
				ENGINEER'S OPINION OF PROJECT COST	\$6,802,000.00



Appendix C

PRV Cost Opinions



Project Summary Engineer's Opinion of Probable Project Costs

Owner: Oakland County Water Resources Commissioner's Office
Project: Oakland Hunt & Southeast Water System PRV for South Pressure District
Work: All Design Conditions - Pressure Reducing Valves
Located in Existing Knorrwood Pines Well House

Date: 5/21/2014
Project No.: 0105-13-0091
Prepared By: J. Patterson
Reviewer: V. Putala
Current ENR: 9749.51

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Demolition existing piping	1	LS	\$5,000.00	\$5,000.00
2	Process piping	1	LS	\$25,000.00	\$25,000.00
3	8 " PRV	1	EA	\$5,000.00	\$5,000.00
4	8" Gate Valve	3	EA	\$4,500.00	\$13,500.00
5	2" PRV	1	EA	\$5,000.00	\$5,000.00
6	2 " Ball Valve	2	EA	\$200.00	\$400.00
7	Electrical Improvements	1	LS	\$4,000.00	\$4,000.00
8	System Controls	1	LS	\$3,000.00	\$3,000.00
TRADES SUBTOTAL					\$60,900.00
CONTRACTUAL REQUIREMENTS					
	General Conditions	10%			\$6,090.00
	General Requirements	5%			\$3,050.00
	Contingencies	20%			\$12,180.00
TOTAL CONSTRUCTION COST:					\$82,220.00
PROJECT COSTS					
	Engineering	25%			\$20,560.00
	Finance and Legal	5%			\$4,110.00
ENGINEER'S OPINION OF PROJECT COST					\$107,000.00



Appendix D

Annual Bond Payment

WCWRC - Oakland Hunt & Southeast District Water System User Costs

April 21th, 2014

Interest Rate (%)	2.75%
Loan Duration (years)	20

User Cost Determination

Project No.	(P) Amount Financed (\$)	i (%)	n (years)	(1+i)^n	A i*(1+i)^n	B (1+i)^n-1	A/B	P*(A/B) Annual Debt (\$/yr)	Number of REUs	Annual Bond Payment per REU (\$/REU)	Total Annual Bond Payment per REU (\$/REU)
Existing Demand											
Water Treatment	\$4,066,000	2.75%	20	1.72043	0.04731	0.72043	0.06567	\$267,021	700	\$381.46	
Water Storage/System Connection	\$4,925,000	2.75%	20	1.72043	0.04731	0.72043	0.06567	\$323,433	700	\$462.05	
South Pressure District PRV	\$107,000	2.75%	20	1.72043	0.04731	0.72043	0.06567	\$7,027	700	\$10.04	\$853.54
Total	\$9,098,000							\$597,481			
20- Year Demand											
Water Treatment	\$5,077,000	2.75%	20	1.72043	0.04731	0.72043	0.06567	\$333,415	1,073	\$310.73	
Water Storage/System Connection	\$5,907,000	2.75%	20	1.72043	0.04731	0.72043	0.06567	\$387,923	1,073	\$361.53	
South Pressure District PRV	\$107,000	2.75%	20	1.72043	0.04731	0.72043	0.06567	\$7,027	1,073	\$6.55	\$678.81
Total	\$11,091,000							\$728,365			
Ultimate Demand											
Water Treatment	\$6,581,000	2.75%	20	1.72043	0.04731	0.72043	0.06567	\$432,186	1,437	\$300.76	
Water Storage/System Connection	\$6,802,000	2.75%	20	1.72043	0.04731	0.72043	0.06567	\$446,699	1,437	\$310.86	
South Pressure District PRV	\$107,000	2.75%	20	1.72043	0.04731	0.72043	0.06567	\$7,027	1,437	\$4.89	\$616.50
Total	\$13,490,000							\$885,912			