Merced Integrated Regional Water Management Implementation Grant Proposal

Appendix 3-7

Preliminary Engineering Report for the Water System Rehabilitation & Conservation Project (October 2012)

PRELIMINARY ENGINEERING REPORT

FOR THE

WATER SYSTEM REHABILITATION & CONSERVATION PROJECT

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SECTION 1. GENERAL

The purpose of this Preliminary Engineering Report (PER) is to provide technical data and calculations to act as an informational basis for future improvements to the Planada Community Services District (CSD) domestic water system. A PER is required as part of the application process for funding from the United States Department of Agriculture (USDA) Rural Utilities Service (RUS). Such a report includes a description of the existing system, a summary of the problems being addressed, an evaluation of project alternatives, a basic cost analysis, a description of the project based on the chosen alternative and its anticipated benefits and design.

SECTION 2. PROJECT PLANNING AREA

A. Location

The Planada Community Services District is located in Merced County near Highway 140 about seven miles east of the City of Merced.

B. Environmental Resources Present

There are no significant environmental resources that will be affected by this project. The installation of meter boxes and meters will only disturb the top few feet of existing ground. Upgrading the existing water mains will not disturb anything that wasn't already disturbed when initially installed. The new generator will replace an existing generator.

C. Growth Areas and Population Trends

The United States Census Bureau records the community's population as 3,531 in 1990, 4,369 in 2000 and 4,584 in 2010. These numbers were then put into the following equation to calculate the annual growth rate over the last 20 years:

$$i = \sqrt[N]{\frac{Y_2}{Y_1}} - 1$$

Where:
i = annual growth rate
N = number of years
Y_1 = initial population
Y_2 = final population

Using the populations from 1990 to 2010, the annual growth rate was calculated to be 1.31%. This annual growth rate was then used in the following equation to project the population over the next 20 years:

$$Y_2 = Y_1 (1 + i)^N$$

The projected population in 2030 was found to be approximately 5,951 people.

SECTION 3. EXISTING FACILITIES

A. Location Map

A Map of existing water facilities can be found in Appendix A.

B. History

The Planada Community Services District was formed as a water and sewer District in 1967. Prior to that, the water and sewer facilities were operated by two different entities. The District currently owns six wells, but only five are in operation. Well #1 has been disconnected from the system for a couple of years now due to high Nitrate levels. Well #4 is a variable-speed-drive well and the others are constant speed. Each of the well sites includes a hydropneumatic tank. As of September 2012, the Planada CSD serves 1,123 water customers. Below is a breakdown of the customers:

Table 1. Existing Water Customers as of September 2012

Type of Customer	Quantity
Residential	1,081
Clinics	1
Commercial	28
Apartments	1
Schools	6
Churches	4
Parks	2
Total	***1,123***

Over the years and as the budget permits, the District has been adding water meters to the system. There are currently 593 touch-read meters and 113 manual-read meters installed. This leaves over 400 connections unmetered. The District has recently decided to implement radio-read technology to their current metering system and has ordered 200 radio-read registers. The District will switch out the existing touch-read registers on the compatible meters with the new radio-read registers. The goal is to ultimately have all radio-read meters on all water connections.

C. Condition of Facilities

1. Water Supply

The Planada CSD draws its water from the San Joaquin Valley Groundwater Basin (Merced Subbasin). The Merced Subbasin is non-adjudicated and there are no limits on the amount of water that can be pumped.

The following table contains information about each of the wells and their respective pumping characteristics.

Table 2. Well & Pump Data

Well	Flow (gpm)	Gauge Pressure		Pumping Water Level (ft)	Pumping Head (ft)
		(psi)	(ft)		
3	375	58	134	104	238
4	500	56	129	NA	NA
5	410	55	127	144	274
6	600	60	139	134	273
7	500	65	150	122	272

It should also be noted that the back-up generator at Well 5 is very old, emits smoke and does not meet air quality standards. In order to comply with air quality standards, the generator should be replaced.

The California Waterworks Standards (CWS) (California Code of Regulations, Title 22) outline methods for calculating Maximum Day Demand (MDD) and Peak Hour Demand (PHD) for water systems. The calculations performed in this report were completed pursuant to the methods found in Section 64554 of the CWS.

Water usage data from July 8, 2011 shows that a total of 3,059,400 gallons were pumped from the five wells. This amount is 75% higher than the average daily water usage during that month. Telephone conversations with Stan Rodriguez (Planada CSD maintenance supervisor) on October 17, 2011 conclude that there were no low pressure complaints on or around that date. Historical weather data for that date also does not justify the extreme water usage. For these reasons, it will be assumed that the daily readings may have been faulty or may have included more than a 24 hour period. Even though daily water usage data is available, the monthly water usage data will be used as per CWS Section 64554(b)(2).

a. Maximum Day Demand (MDD):

August 2010 Water Usage: 60,050,600 gallons

Per CWS Section 64554 (b)(2)(C)

MDD = 1.5 x Daily Usage during maximum month

$$\text{MDD (2010)} = \frac{1.5 \text{ x } 60{,}050{,}600 \text{gallons}}{31 \text{days}} = 2.91 \text{ MGD} = 2{,}018 \text{ gpm}$$

Since 2010, the Planada Village Migrant Center has been closed and abandoned and the new Felix Torres Migrant Center has been constructed. The old labor camp had a MDD of 70 gpm and the new Felix Torres center has a MDD of 167 gpm. This additional demand of 97 gpm shall be added to the 2010 MDD to get a current MDD of the entire system.

MDD (Current) = 2,018 gpm + 97 gpm = 2,115 gpm

b. Peak Hour Demand (PHD):

Per CWS Section 64554 (b)(2)(D)

PHD = 1.5 x MDD = 1.5 x 2,115 gpm = 3,173 gpm

c. Fire Flow

A Fire Flow of 1,000 gpm shall be simulated at various locations throughout the community during maximum day demand conditions.

d. Large Users

Schools:

Average Day Demand (ADD) = 15 gpd/student for Elementary School
= 25 gpd/student for Middle/High Schools

Per CWS Section 64554(b)(3)(C)

MDD = 2.25 x ADD

Assume a student population growth factor of 1.25

$$\text{MDD} = \frac{2.25 \text{ x } 1.25 \text{ x ADD}}{7 \text{ hrs/day x } 60 \text{ min/hr}}$$

Average daily attendances used in the following calculations were provided by the individual schools.

$$\text{Elementary School MDD} = \frac{2.25 \text{ x } 1.25 \text{ x } 475 \text{ students x } 15 \text{ gpd/student}}{7 \text{ hrs/day x } 60 \text{ min/hr}}$$
$$= 48 \text{ gpm}$$

$$\text{Middle School MDD} = \frac{2.25 \text{ x } 1.25 \text{ x } 275 \text{ students x } 25 \text{ gpd/student}}{7 \text{ hrs/day x } 60 \text{ min/hr}}$$
$$= 46 \text{ gpm}$$

$$\text{Granada High School MDD} = \frac{2.25 \text{ x } 1.25 \text{ x } 50 \text{ students x } 25 \text{ gpd/student}}{7 \text{ hrs/day x } 60 \text{ min/hr}}$$
$$= 8 \text{ gpm}$$

Table 3. Significant Demands

User	MDD (gpm)	Location
Mill	35*	J-43
Casa Del Sol (55 apartments)	70*	J-167
Felix Torres Migrant Center (52 units)	167**	J-177
Bear Creek Housing (65 units)	85***	J-174
Planada Elementary School	48	J-106
Cesaer Chavez Middle School	46	J-30
Granada High School	8	J-173
Total	***459***	

* From May 1999 Water System Study
** From Felix Torres Project
*** Based on a rate of 1.31 gpm per connection from Self-Help Enterprises (SHE) agreement, provided by Paul Boyer at SHE.

e. Unit Flow Rate

$$\text{MDD/connection} = \frac{\text{Actual MDD less usage of existing large users}}{\text{Total connections less number of large user connections}}$$

$$\text{MDD/connection} = \frac{2{,}115\,\text{gpm} - 459\,\text{gpm}}{1{,}123\,\text{connections} - 7\,\text{connections}} = 1.48\ \text{gpm/connection}$$

2. Treatment

Other than standard chlorination at each well site, the District does not have any treatment facilities in operation.

3. Storage

Other than the hydropenuematic tank at each well site, the District does not have any water storage facilities.

4. Distribution System

The District's water distribution system is pressurized by the hydropneumatic tanks at each of the well sites. There is no central pumping facility or booster station within the community.

There are various water lines in the system that are too small to meet the minimum pressure requirements of the CWS. In addition, the pipe material is thin-walled, does not meet the requirements of the CWS, and according to the maintenance supervisor, is easily broken with a shovel.

As mentioned above, not all water connections are metered. Therefore; there is currently no way to estimate the water loss of the system.

a. Water Model

The modeling software used to simulate the existing water system is WaterCAD V8i by Bentley. The District has an existing water system model from a recent capacity study; however, it was created to simulate the effects of future development on the existing system. That model was used as a basis for this report but was revised to reflect the existing system as it is today. Some of the data used in this report originates from the previous capacity study.

b. Reservoirs

The reservoirs in the model simulate the groundwater. The elevation of each reservoir shall be set at the static groundwater surface elevation. The following table provides the actual ground elevation, depth to static water level and the calculated static water level elevation for each well.

Table 4. Static Groundwater & Reservoir Data

Well	Ground Elevation (ft)	Static Water Level (ft)	Reservoir Elevation (ft)
3	227	62	165
4	224	61	163
5	224	99	125
6	223	80	143
7	225	35	190

c. Pumps

Each of the pumps is modeled using actual well data and pump curves. The following table contains the field data obtained during a field visit in 2011:

Table 5. Pumping Data

Well	Flow (gpm)	Gauge Pressure		Pumping Water Level (ft)	Pumping Head (ft)
		(psi)	(ft)		
3	375	58	134	104	238
4	500	56	129	NA	NA
5	410	55	127	144	274
6	600	60	139	134	273
7	500	65	150	122	272

d. Hydropneumatic Tanks

WaterCAD does not have a direct way of modeling hydropneumatic tanks, so they are modeled using an equivalent constant cross section area tank. According to the WaterCAD manual, "When using the Constant Area Approximation method, you will need to know the effective volume of the tank (usually between 30 and 50% of the total volume), and the hydraulic grade line elevation corresponding to the maximum and minimum water volumes." The effective cross sectional area of an equivalent tank is given by the following equation:

$$\text{Area} = \frac{\text{Effective Volume (ft}^3\text{)}}{\text{HGL}_{\text{off}}\text{ (ft)} - \text{HGL}_{\text{on}}\text{ (ft)}}$$

For purposes of the model, the On/Off pressures for each well will be set to 40 psi/60 psi, respectively. This range of pressure is optimum for maintaining minimum pressure requirements and minimizing the number of pump On/Off cycles. The actual On/Off pressures that the District is using can be found in the site visit notes in Appendix B.

Assumed available storage for each tank = 1500 gallons = 200 ft^3

The following table shows the calculated On/Off water levels as well as the cross sectional area for each of the tanks:

Table 6. Hydropneumatic Tank Data

Tank	Tank Base Elevation (ft)	Status	On/Off Pressure		Water Surface Elevation (ft)	Tank Average Area (ft^2)
			(psi)	(ft)		
3	227	ON	40	92	319	4.26
		OFF	60	139	366	
4	224	ON	40	92	316	4.26
		OFF	60	139	363	
5	224	ON	40	92	316	4.26
		OFF	60	139	363	
6	223	ON	40	92	315	4.26
		OFF	60	139	362	
7	225	ON	40	92	317	4.26
		OFF	60	139	364	

e. Demands

As mentioned above, since the last water model was created, the old Migrant Center has been abandoned and the new Felix Torres facility has become fully

operational. The demands related to these changes have been adjusted in the new model to match the MDD and PHD calculated in Section 3.C.1. above.

f. Water Availability

Prior to running the model for the various scenarios, a crude water in/water out comparison was made. 40 psi was chosen as the target pressure due to it being the OFF pressure of the wells. The adjusted pump curves were then used to determine the anticipated flow from each well at the target pressure. The table below shows the available water from each of the wells at 40 psi.

Table 7. Available Water at 40 psi

Well	Flow at 40 psi (gpm)
3	630
4	650
5	550
6	770
7	700
Total	***3,300***

The total available flow (at 40 psi) of 3,300 gpm is greater than the demands for all three scenarios mentioned in Section 3.C.1. above. With the largest source offline, there is 2,530 (3,300 – 770 = 2,530) gpm available which still meets the MDD. Ignoring pipe losses, there would be no problem meeting the minimum pressure requirement of 20 psi. However, the District is aware of an area in the north-east part of the community (near Haskell Avenue, Merced Street and Cody Avenue) that exhibits low pressures during certain times of the year, when water usage is high. This is assumed to be due to the undersized water mains (3”- 4”) in the area.

g. Pressure

The model of the existing system was run for various demand scenarios and the minimum pressure was located. Table 8 shows the minimum pressure found during these scenarios.

Table 8. Model Results for Existing System

Scenario	**Minimum Pressure**	**at Junction**
Max Day Demand	43 psi	J-130
Peak Hour Demand	41 psi	J-130
MDD & FF @ J-12	43 psi	J-130
MDD & FF @ J-130	-75 psi	J-130
MDD & FF @ J-157	32 psi	J-157

MDD & FF @ J-167	35 psi	J-167
MDD & FF @ J-177	43 psi	J-130
MDD & FF @ J-186	27 psi	J-186
MDD & FF @ J-191	39 psi	J-191
MDD & FF @ J-206	43 psi	J-130
MDD w/ Well 3 Offline	42 psi	J-130
MDD w/ Well 4 Offline	42 psi	J-130
MDD w/ Well 5 Offline	43 psi	J-130
MDD w/ Well 6 Offline	43 psi	J-130
MDD w/ Well 7 Offline	42 psi	J-130

As seen in Table 8, the existing system meets minimum pressure requirements for all scenarios except for a fire flow at Junction J-130. It should also be noted that the minimum pressure for many of the scenarios occurs at J-130 which is located in the problem area discussed above, correlating with what has been observed in the actual system.

In order to reduce the pressure losses in this area, it is recommended that the existing 3” and 4” mains in this area be replaced with 8” diameter pipes. See the table below for the model results of the existing system after the pipes have been upgraded in this area.

Table 9. Model Results for Existing System with Upgrades

Scenario	**Minimum Pressure**	**at Junction**
Max Day Demand	44 psi	J-130
Peak Hour Demand	42 psi	J-130
MDD & FF @ J-12	43 psi	J-130
MDD & FF @ J-130	31 psi	J-130
MDD & FF @ J-157	33 psi	J-157
MDD & FF @ J-167	35 psi	J-167
MDD & FF @ J-177	43 psi	J-130
MDD & FF @ J-186	28 psi	J-186
MDD & FF @ J-191	39 psi	J-191
MDD & FF @ J-206	44 psi	J-130
MDD w/ Well 3 Offline	42 psi	J-130
MDD w/ Well 4 Offline	43 psi	J-130
MDD w/ Well 5 Offline	43 psi	J-130
MDD w/ Well 6 Offline	43 psi	J-130
MDD w/ Well 7 Offline	42 psi	J-130

With the suggested upgrades, a fire-flow at J-130 now results in a pressure of approximately 31 psi, thus meeting all pressure requirements in the entire system for all demand scenarios. See Appendix B for printout of WaterCAD model and Appendix C for a map that shows the water lines to be replaced.

D. Financial Status of Existing Facilities

1. Rate Schedule

As mentioned above, not all connections are currently metered. For this reason the District charges a flat rate based on the connection type/size. See Table 10 for the current water rate schedule.

Table 10. Current Water Rate Schedule

Connection Type/Size	Monthly Charge
Single Residence	
3/4" to 1"	$33.00
1-1/2"	$44.00
2"	$70.00
Multi-Family Residence	Single Residence rate plus $16.00/each additional unit
Business/Commercial	
3/4"-1"	$42.00
1-1/2"	$50.00
2"	$73.00
4"	$230.00
4" Fire Protection	$95.00
8" Fire Protection	$384.00

2. Annual O&M Costs

The following data represents the Operation and Maintenance costs for the District's water system in 2010-2011.

Table 11. O&M Costs for 2010-2011

Salaries & Wages	$153,216
Employee Benefits	$54,739
Depreciation	$91,391
Insurance	$31,900
Gas and Oil	$7,466
Lab Fees	$21,278
Office Equipment	$5,617

Office Expense	$5,950
Operating Supplies	$19,840
Contractual Services	$7,000
Professional Services	$9,789
Repairs	$8,013
Maintenance	$15,104
Permits & Dues	$14,206
Retirement Plan Expense	$14,605
Property Taxes	$1,823
Printing & Publication	$281
Utilities	$131,239
Miscellaneous	$2,650
Uniforms	$4,263
Rents	$2,357

Total Operations and Maintenance costs for 2010-2011 were $602,727.

3. Annual Revenue

The District's water system revenue was $495,004 for the 2010/2011 operating year (ending June 30, 2011).

The District has no water debts or loans at this time.

SECTION 4. NEED FOR PROJECT

A. Health, Sanitation and Security

1. Water Metering Requirements of Assembly Bill (AB) 2572

AB 2572 was signed in 2004 and requires that all water suppliers install water meters on all customer connections by January 1, 2025. However, the District received a grant from the Department of Water Resources which requires all services to be metered and read by the year 2020. As mentioned above, the District currently has meters installed on 706 connections. In order to meet the State requirement of metering all water connections, the District needs to install approximately 417 more meters before year 2020. This project includes 300 new meters.

2. Minimum Pressure Requirements of the California Waterworks Standards

The CWS (CCR Title 22) require minimum pressures to be maintained in the water system during various water demand scenarios. These requirements are found in Table 12.

Table 12. Minimum Pressure Requirements for Existing & Future Development

Scenario	Existing System	New Improvements
Max Day Demand (MDD)	20 psi	40 psi*
Peak Hour Demand (PHD)	20 psi	40 psi*
MDD w/ Fire Flow (FF) of 1,000 gpm for 2 Hrs	20 psi	20 psi*
MDD with One Well Offline	20 psi	40 psi*

* California Waterworks Standards (CWS) requires 40 psi for each new addition to the distribution system that expands the existing system service connections by more than 20%. This project does not include any additional connections, so the minimum pressure required is 20 psi.

As mentioned above, in Section 3.C.4.g., the existing system experiences pressures below the State threshold of 20 psi during a Fire Flow scenario. This project will improve the water distribution system to allow all pressure requirements to be met.

3. San Joaquin Valley Air Quality Standards

The emissions from the back-up generator at Well 5 do not meet the air quality standards of the San Joaquin Valley Air Pollution Control District. This project will include the purchase of a new generator that complies with all air quality standards.

B. System O & M

Standard operation and maintenance costs are approximately $602,727 per year.

The District hopes to save money by replacing the old manual-read meters and installing radio-read registers on their compatible touch-read meters. This will reduce the amount of time spent each month reading, recording and calculating water usage. Another issue the District has encountered is the excessive use of water by some customers. The District anticipates a reduction in water usage once meters have been installed on all connections.

The District is not able to monitor water loss in the system due to the lack of meters on all connections. This makes it difficult for the District to determine the status of their water mains and if certain pipelines need to be replaced or not. The new pipelines associated with this project will reduce some of the overall O & M costs related to breakages.

Replacing the old generator at Well 5 will provide a reliable back-up power source, allowing the system to operate more effectively during power outages, thus reducing O & M costs.

C. Growth

The current needs of the District are to satisfy existing problems only. The District is not requesting funds to accommodate any future connections or growth.

SECTION 5. ALTERNATIVES CONSIDERED

Section 4 clearly illustrates the District's need to comply with both Title 22 and AB 2572. This section will look at various project alternatives that will bring the existing water system into compliance with these regulations.

A. Water Main Material

As discussed above, this project requires upgrades to some existing water mains in order to meet State minimum pressure requirements. There are various piping materials available including, Polyvinyl Chloride (PVC), Fiberglass, Steel, Ductile Iron and others. CCR Title 22, Article 4, Section 64570 lists all of the available piping materials and their respective American Water Works Association (AWWA) standards for materials and installation. Obviously, the materials have different characteristics, costs, and design requirements.

The District's standards for construction of new water main require the use of either PVC pipe or Ductile Iron pipe.

PVC is commonly selected and used in many water systems for its ease of construction, cost and material properties. PVC is inert with water so it won't oxide or leave trace elements in the water. Also, PVC can be made to have a smooth interior surface that minimizes pressure loss due to friction.

Ductile Iron is also commonly used but usually in situations that require a higher strength material like when minimal cover is available. Due to the higher strength, ductile iron pipe is known to be significantly more expensive than PVC.

B. Water Meters

Water meter manufacturers typically offer three different meter reading options. In order of cheapest to most expensive, they are manual-read, touch-read and radio-read. While the radio-read is the most expensive option, it offers the convenience of simple drive-by readings as well as leak-detection which can help to reduce water wasting.

For the reasons mentioned here and in Section 3.B. above, the District has decided to implement radio-read meters into their water system. They are currently upgrading some of their existing meters to radio-read and intend to convert them all as their budget allows.

C. Project Alternatives

Based on the discussion above, two different project alternatives will be considered. Both alternatives involve the use of radio-read meters, with the only difference being the type of material used for the pipe upgrades. Alternative 1 consists of new ductile-iron pipe upgrades and Alternative 2 consists of new PVC pipe upgrades.

1. Alternative 1 – Ductile Iron Pipe Upgrades with Radio-Read Meters

a. Description

This alternative includes the installation of new 8" ductile-iron water main and new radio-read meters and equipment. It also includes the construction of new water services to those lots affected by the water main upgrade.

b. Design Criteria

All calculations, estimates, projections, and methods used to evaluate water capacities, demands and this alternative are in compliance with the CWS and RUS design policies.

c. Map

See Appendix C for map of area to be upgraded.

d. Environmental Impacts

No significant environmental impacts are associated with this alternative.

e. Land Requirements

No additional land is required by this alternative.

f. Construction Problems

There are no extraordinary construction concerns associated with this alternative.

g. Cost Estimates

1) Construction Costs – $658,550
2) Non- Construction Costs – $165,600
3) Annual Operations & Maintenance - $575,000

h. Advantages/Disadvantages

The only difference between this alternative and the other is that it uses ductile iron pipe. The advantage here is that it could be installed with less coverage if

needed to cross over existing utilities. A disadvantage is ductile-iron pipe will corrode over time. The labor costs would be the same for installing either type of pipeline, but the material costs are known to be higher for ductile-iron.

2. Alternative 2 – PVC Pipe Upgrades with Radio-Read Meters

a. Description

This alternative includes the installation of new 8" PVC water main and new radio-read meters and equipment. It also includes the construction of new water services to those lots affected by the water main upgrade.

b. Design Criteria

All calculations, estimates, projections, and methods used to evaluate water capacities, demands and this alternative are in compliance with the CWS and RUS design policies.

c. Map

See Appendix C for map of area to be upgraded.

d. Environmental Impacts

No significant environmental impacts are associated with this alternative.

e. Land Requirements

No additional land is required by this alternative.

f. Construction Problems

There are no extraordinary construction concerns associated with this alternative.

g. Cost Estimates

1) Construction Costs – $613,700
2) Non- Construction Costs – $165,600
3) Annual Operations & Maintenance - $575,000

h. Advantages/Disadvantages

The PVC water main is the cheaper alternative and will serve its purpose just as well as the ductile-iron. An advantage of the PVC is it does not have corrosion issues like ductile-iron. If there are any conflicts with existing utilities, the PVC pipe will simply require a deeper trench to pass under them.

SECTION 6. SELECTION OF AN ALTERNATIVE

A. Present Worth Cost Analysis

Below is a table that contains the various costs for each of the alternatives:

Table 13. Cost Comparison

Alternative	***Capital***	***O&M & Personnel Over 20yr period***	***Present Worth of Project Over 20yr Period***
Alt 1	$890,005	$11,500,000	$9,575,209
Alt 2	$840,670	$11,500,000	$9,520,005

B. Matrix Rating System

Cost alone will not determine which alternative shall be implemented. There are various other important aspects to consider, such as the alternative's ability to serve its purpose, and reliability. Table 14 illustrates the matrix rating system used to select an alternative. Each of the above characteristics was assigned a weight, 1 through 5, based on the importance of that characteristic. Each alternative was then given a rating (1=poor, 3=average, 5=good) with respect to each of the characteristics. The products of the weights and the scores are then summed up for each alternative providing an overall rating.

Table 14. Matrix Rating System

Characteristic	Weight	Alternative	
		1	2
Cost	4	4	5
Reliability	4	5	5
Ability to Serve Its Purpose	3	5	5
Overall Rating		***51***	***55***

C. Conclusion

Based on the matrix rating system and cost comparison, the proposed project shall be Alternative 2 with the PVC piping and radio-read meters.

SECTION 7. PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

A. Project Design

The proposed project will include upgrading the undersized water mains in the north-east area of town with new 8" PVC water mains. All of the services connected to the existing water main in this area will be abandoned and new water services will be installed. New

radio-read water meters shall be provided and installed that are compatible with the Districts existing meters and meter reading software. The project will also include a new back-up generator for Well #5 and installation of new fire hydrants and gate valves with spacing based on District standards. See proposed improvements map in Appendix C and cost estimate in Appendix D for breakdown and quantity of proposed components.

B. Total Project Cost Estimate

Table 15. Itemized Cost Estimate for Project

Item	Subtotal	Total
Property Purchase / Lease Agreements		$0
Easement Acquisition / Right of Way / Water Rights		$0
Bond Counsel		$0
Legal Counsel		$15,000
Administrative Expenses		$10,000
Interest / Refinancing Expense		$0
Environmental Services:		
CEQA Environmental Report	$0	
NEPA Environmental Report	$0	
Environmental Mitigation	$0	
Total Environmental Services:		$0
Engineering Services		
Basic Services:		
Preliminary Engineering Report	$9,000	
Design	$42,000	
Bidding/Contract Award	$3,000	
Construction Phase Services (w/o Inspection)	$6,000	
Post-Construction Phase	$1,000	
Resident Inspection Services - $82/hr x 60 hours + $180 (mileage)	$5,100	
Additional Services		
Geotechnical Services (Soil report for generator design)	$2,000	
Materials Testing Services (Construction Phase)	$5,000	
Surveying Services (Construction Phase)	$2,500	
Environmental Mitigation Services (Construction Phase)	$0	
Operation & Maintenance Manual	$0	
Easement Acquisition / ROW Services (Construction Phase)	$0	
Hydrogeologist Services	$0	
Total Engineering Services:		$75,600
Equipment / Materials (Generator)		$65,000
Construction Cost Estimate (See Appendix D)		$613,700
Contingency (10% of Construction Cost Estimate)		$61,370
TOTAL PROJECT COST ESTIMATE		$840,670

C. Annual Operating Budget

1. Income

The District plans to keep the same rate schedule that they use now. The following table contains the District's existing rate schedule for water service that they intend to use after project completion.

Table 16. Proposed Water Rate Schedule (same as current)

Connection Type/Size	Monthly Charge
Single Residence	
3/4" to 1"	$33.00
1-1/2"	$44.00
2"	$70.00
Multi-Family Residence	Single Residence rate plus $16.00/each additional unit
Business/Commercial	
3/4"-1"	$42.00
1-1/2"	$50.00
2"	$73.00
4"	$230.00
4" Fire Protection	$95.00
8" Fire Protection	$384.00

2. O & M Costs

Estimated annual costs for O & M on the proposed water system is approximately $575,000. See the following table for breakdown of proposed O & M costs.

Table 17. Estimated O&M Costs for Proposed System

Salaries & Wages	$153,216
Employee Benefits	$54,739
Depreciation	$91,391
Insurance	$31,900
Gas and Oil	$5,000
Lab Fees	$21,278
Office Equipment	$5,617
Office Expense	$5,950
Operating Supplies	$16,000
Contractual Services	$7,000
Professional Services	$9,789

Repairs	$6,000
Maintenance	$12,000
Permits & Dues	$14,206
Retirement Plan Expense	$14,605
Property Taxes	$1,823
Printing & Publication	$281
Utilities	$115,000
Miscellaneous	$2,650
Uniforms	$4,263
Rents	$2,357

3. Debt Repayments

The District has no Water Enterprise Fund debts at this time.

4. Reserves

a. Debt Service Reserves

The District has no debts associated with the water system at this time.

b. Short-Lived Asset Reserve

The District currently has a balance of $41,990.33 in their short-lived asset reserve. Due to their financial situation, the District has not been making any contributions to this reserve since October of 2011.

The following is a list of existing water system components that may need to be replaced within the next 5, 10 and 15 years.

i. 5-years

- Replace well motor start switches to variable speed drive systems (Wells #5 and #6)
- Cellular-based SCADA system capable of indicating continuous flow and CL2 residual readings at each well.
- Reline interior of tank at Well #3, replace oil cool turbine pump motor to submersible pump and install variable speed drive system.

ii. 10-years

- Replace Sensus meters, as needed (meters currently installed have projected life expectancy of ten years)
- Replace 2" water main in Terry St. island.

iii. 15-years

- Replace cement sewer mains throughout town if needed.
- Replace transite water mains on Bigler and Amitsad Streets if needed.
- Project for new well on east side of town.

SECTION 8. CONCLUSIONS AND RECOMMENDATIONS

The proposed project will allow the District to comply with the metering requirements of AB 2572, the minimum pressure requirements of Title 22 and the San Joaquin air quality standards. The addition of water meters will help customers be more mindful of their water usage and ultimately conserve water. The new generator will provide a more secure back-up power source for Well 5 while reducing emissions. Both the pipeline upgrades and water meters will facilitate a more efficient water system, thus reducing O&M costs for the District while providing quality drinking water to the community.

Appendix A

Water System Map

Appendix B

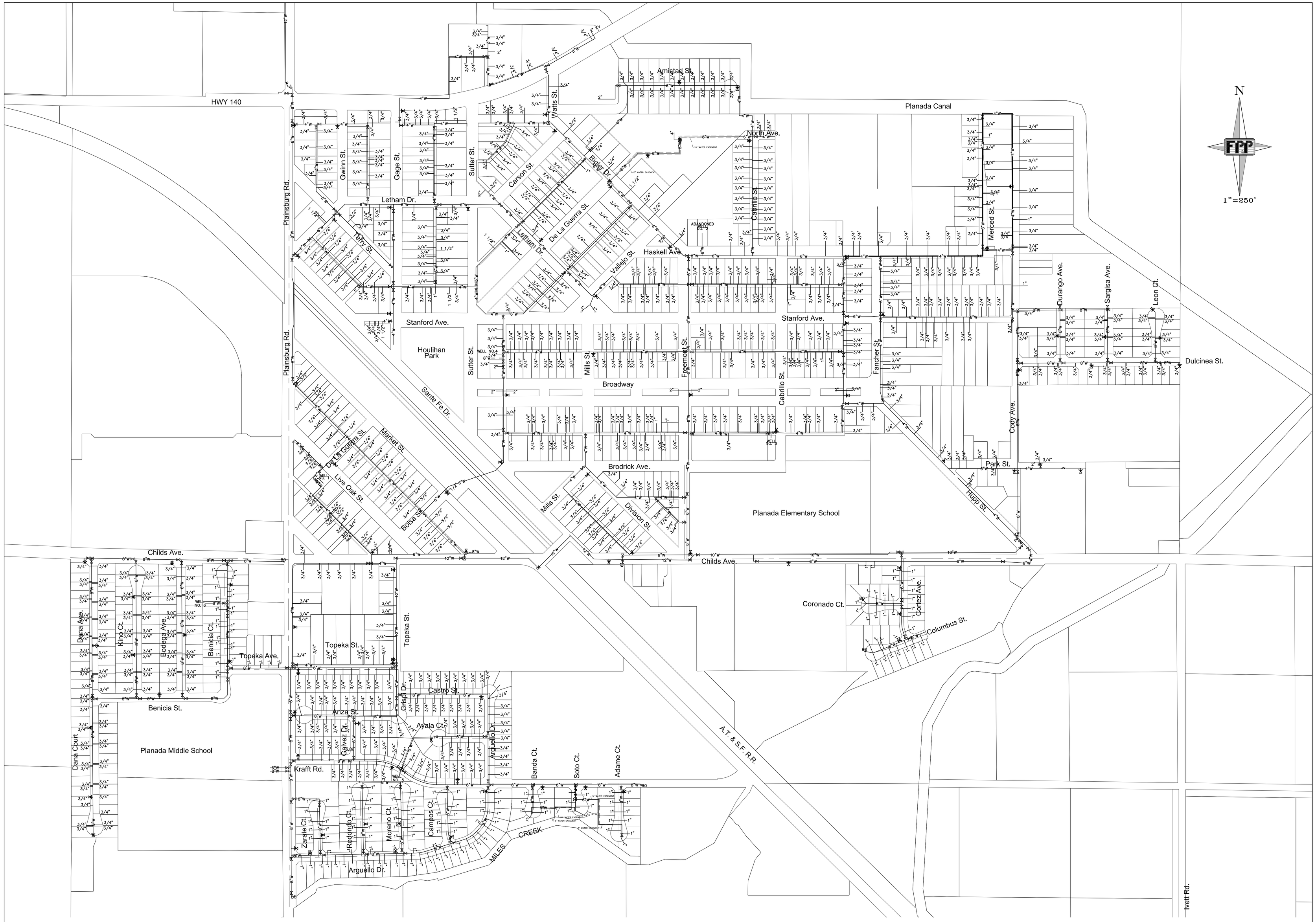
WaterCAD Model Results

Appendix C

Map of Upgrade Area

Appendix D

Construction Cost Estimate



Water System Map - Planada Community Services District

FlexTable: Junction Table (P001-2009B.wtg)

Current Time: 0.000 hours

Id	Label	Elevation (ft)	Demand (gpm)	Pressure (psi)
262	J-130	236.00	1,000	-75.3
298	J-169	234.00	16	-69.3
263	J-132	232.00	19	26.5
261	J-129	232.00	0	27.2
264	J-133	230.00	19	36.7
315	J-186	230.00	9	37.3
310	J-181	230.00	14	37.3
311	J-182	230.00	0	37.3
314	J-185	230.00	9	37.3
309	J-180	230.00	9	37.3
308	J-179	230.00	7	37.3
312	J-183	230.00	0	37.3
313	J-184	230.00	9	37.3
307	J-178	230.00	9	37.3
306	J-176	230.00	6	37.3
303	J-173	229.00	14	38.1
271	J-140	230.00	9	39.2
266	J-135	229.00	23	39.6
270	J-139	231.00	9	40.0
269	J-138	231.00	0	40.2
272	J-141	229.00	10	40.3
265	J-134	229.00	0	40.4
267	J-136	229.00	16	40.4
251	J-119	229.00	24	40.5
231	J-99	229.00	17	40.5
276	J-146	229.00	22	40.6
268	J-137	229.00	0	41.2
287	J-157	230.00	13	41.4
286	J-156	230.00	9	41.4
288	J-158	230.00	0	41.4
299	J-170	230.00	10	41.4
289	J-159	230.00	13	41.4
285	J-155	230.00	12	41.4
297	J-168	230.00	17	42.1
255	J-123	230.00	0	42.1
256	J-124	230.00	0	42.2
257	J-125	230.00	0	42.2
278	J-148	230.00	0	42.4
213	J-79	230.00	0	42.4
214	J-80	230.00	0	42.4
212	J-78	230.00	0	42.5
211	J-77	230.00	29	42.6
296	J-167	229.00	70	42.6
295	J-166	229.00	0	42.6
258	J-126	229.00	17	42.7
254	J-122	228.00	24	42.7
294	J-165	229.00	0	42.7
259	J-127	229.00	0	42.7
210	J-76	230.00	29	42.8
293	J-164	228.00	0	43.2
230	J-98	229.00	16	43.2
252	J-120	228.00	17	43.2
253	J-121	228.00	19	43.2

FlexTable: Junction Table (P001-2009B.wtg)

Current Time: 0.000 hours

Id	Label	Elevation (ft)	Demand (gpm)	Pressure (psi)
260	J-128	228.00	0	43.3
209	J-75	230.00	0	43.3
215	J-81	227.00	0	43.7
232	J-100	227.00	7	43.8
273	J-142	227.00	24	43.9
208	J-74	230.00	0	43.9
216	J-83	227.00	13	44.0
217	J-84	227.00	0	44.3
233	J-101	227.00	16	44.5
241	J-109	227.00	9	44.8
238	J-106	227.00	57	45.0
218	J-85	226.00	0	45.0
243	J-111	226.00	23	45.0
219	J-86	226.00	12	45.2
250	J-118	225.00	0	45.4
220	J-87	226.00	0	45.5
240	J-108	226.00	0	45.5
249	J-117	225.00	13	45.5
207	J-73	227.00	0	45.6
246	J-114	227.00	14	45.6
204	J-69	226.00	17	45.9
196	J-59	226.00	0	45.9
248	J-116	225.00	0	45.9
242	J-110	226.00	7	46.1
239	J-107	225.00	7	46.2
227	J-94	225.00	16	46.3
197	J-61	226.00	17	46.4
245	J-113	225.00	22	46.6
237	J-105	225.00	30	46.8
205	J-70	225.00	4	46.8
234	J-102	227.00	17	46.8
198	J-62	225.00	12	46.9
192	J-55	226.00	12	47.1
236	J-104	224.00	0	47.1
203	J-68	224.00	0	47.3
200	J-65	225.00	23	47.4
292	J-163	224.00	23	47.4
206	J-71	224.00	0	47.4
291	J-162	224.00	0	47.4
199	J-63	224.00	7	47.4
194	J-57	226.00	0	47.4
244	J-112	224.00	17	47.5
277	J-147	224.00	6	47.5
195	J-58	224.00	0	47.5
202	J-67	224.00	7	47.5
235	J-103	224.00	13	47.6
290	J-161	227.00	0	47.6
247	J-115	224.00	7	47.6
193	J-56	224.00	12	47.6
201	J-66	224.00	13	47.7
191	J-52	226.00	0	47.8
226	J-93	224.00	12	47.8
225	J-92	224.00	0	47.8

FlexTable: Junction Table (P001-2009B.wtg)

Current Time: 0.000 hours

Id	Label	Elevation (ft)	Demand (gpm)	Pressure (psi)
224	J-91	224.00	0	48.1
305	J-177	226.00	167	48.4
170	J-30	225.00	46	48.5
157	J-12	225.00	0	48.5
283	J-153	225.00	6	48.5
159	J-14	225.00	14	48.5
150	J-5	225.00	7	48.5
158	J-13	225.00	14	48.5
160	J-15	225.00	17	48.5
161	J-16	225.00	13	48.5
163	J-18	225.00	13	48.5
162	J-17	225.00	16	48.5
151	J-6	225.00	7	48.5
223	J-90	224.00	0	48.5
164	J-19	225.00	13	48.6
152	J-7	225.00	13	48.6
282	J-152	225.00	9	48.6
165	J-22	225.00	6	48.6
281	J-151	225.00	0	48.6
279	J-149	225.00	0	48.6
280	J-150	225.00	6	48.6
166	J-24	225.00	6	48.6
176	J-36	225.00	6	48.6
229	J-97	224.00	26	48.6
175	J-35	225.00	7	48.6
153	J-8	225.00	0	48.6
274	J-143	224.00	9	48.7
184	J-44	223.00	16	48.7
178	J-38	224.00	9	48.8
188	J-48	223.00	22	48.8
172	J-32	224.00	19	48.8
171	J-31	224.00	19	48.9
320	J-191	224.00	24	48.9
149	J-4	224.00	9	48.9
177	J-37	224.00	10	48.9
221	J-88	223.00	16	48.9
174	J-34	224.00	17	48.9
222	J-89	223.00	0	48.9
167	J-26	224.00	17	48.9
173	J-33	224.00	14	49.0
168	J-27	224.00	17	49.0
154	J-9	224.00	14	49.0
284	J-154	224.00	9	49.0
156	J-11	224.00	14	49.1
155	J-10	224.00	9	49.1
169	J-28	224.00	13	49.1
275	J-145	227.00	0	49.1
228	J-95	224.00	36	49.2
300	J-29	224.00	0	49.2
181	J-41	223.00	0	49.2
189	J-49	222.00	7	49.2
187	J-47	222.00	0	49.2
186	J-46	222.00	0	49.2

FlexTable: Junction Table (P001-2009B.wtg)

Current Time: 0.000 hours

Id	Label	Elevation (ft)	Demand (gpm)	Pressure (psi)
185	J-45	222.00	12	49.3
318	J-189	223.00	27	49.3
317	J-188	223.00	19	49.3
319	J-190	223.00	33	49.3
316	J-187	223.00	19	49.3
180	J-40	223.00	7	49.3
321	J-192	223.00	19	49.3
302	J-172	222.00	0	49.3
183	J-43	222.00	35	49.3
322	J-193	223.00	19	49.3
323	J-194	223.00	7	49.4
179	J-39	223.00	7	49.4
182	J-42	222.00	14	49.5
148	J-2	222.00	9	49.5
190	J-51	222.00	0	49.5
301	J-171	223.00	16	49.7
304	J-174	225.00	85	50.0
147	J-1	221.00	7	50.0

FlexTable: Junction Table (P001-2009B-upgrades.wtg)

Current Time: 0.000 hours

Id	Label	Elevation (ft)	Demand (gpm)	Pressure (psi)
262	J-130	236.00	1,000	31.3
298	J-169	234.00	16	32.6
261	J-129	232.00	0	35.2
263	J-132	232.00	19	35.2
303	J-173	229.00	14	38.4
231	J-99	229.00	17	38.9
264	J-133	230.00	19	39.0
315	J-186	230.00	9	39.4
310	J-181	230.00	14	39.4
311	J-182	230.00	0	39.4
314	J-185	230.00	9	39.4
309	J-180	230.00	9	39.4
308	J-179	230.00	7	39.4
312	J-183	230.00	0	39.4
313	J-184	230.00	9	39.4
307	J-178	230.00	9	39.4
306	J-176	230.00	6	39.4
251	J-119	229.00	24	39.4
266	J-135	229.00	23	39.6
265	J-134	229.00	0	39.6
276	J-146	229.00	22	39.9
271	J-140	230.00	9	40.6
267	J-136	229.00	16	40.8
270	J-139	231.00	9	41.0
272	J-141	229.00	10	41.1
269	J-138	231.00	0	41.1
268	J-137	229.00	0	41.2
297	J-168	230.00	17	41.5
255	J-123	230.00	0	41.5
256	J-124	230.00	0	41.5
257	J-125	230.00	0	41.5
254	J-122	228.00	24	41.8
278	J-148	230.00	0	41.9
213	J-79	230.00	0	41.9
214	J-80	230.00	0	41.9
296	J-167	229.00	70	41.9
295	J-166	229.00	0	42.0
212	J-78	230.00	0	42.0
258	J-126	229.00	17	42.0
294	J-165	229.00	0	42.0
211	J-77	230.00	29	42.0
259	J-127	229.00	0	42.1
287	J-157	230.00	13	42.2
286	J-156	230.00	9	42.2
288	J-158	230.00	0	42.2
299	J-170	230.00	10	42.2
289	J-159	230.00	13	42.2
285	J-155	230.00	12	42.2
210	J-76	230.00	29	42.3
293	J-164	228.00	0	42.5
252	J-120	228.00	17	42.6
253	J-121	228.00	19	42.6
260	J-128	228.00	0	42.7

FlexTable: Junction Table (P001-2009B-upgrades.wtg)

Current Time: 0.000 hours

Id	Label	Elevation (ft)	Demand (gpm)	Pressure (psi)
209	J-75	230.00	0	42.9
215	J-81	227.00	0	43.1
232	J-100	227.00	7	43.2
230	J-98	229.00	16	43.2
273	J-142	227.00	24	43.4
216	J-83	227.00	13	43.5
208	J-74	230.00	0	43.6
217	J-84	227.00	0	43.8
218	J-85	226.00	0	44.6
243	J-111	226.00	23	44.7
219	J-86	226.00	12	44.8
233	J-101	227.00	16	44.9
250	J-118	225.00	0	45.0
241	J-109	227.00	9	45.1
249	J-117	225.00	13	45.1
220	J-87	226.00	0	45.2
238	J-106	227.00	57	45.2
207	J-73	227.00	0	45.4
246	J-114	227.00	14	45.4
248	J-116	225.00	0	45.6
204	J-69	226.00	17	45.6
196	J-59	226.00	0	45.6
240	J-108	226.00	0	45.8
227	J-94	225.00	16	46.0
242	J-110	226.00	7	46.2
197	J-61	226.00	17	46.2
245	J-113	225.00	22	46.4
239	J-107	225.00	7	46.4
205	J-70	225.00	4	46.6
198	J-62	225.00	12	46.8
237	J-105	225.00	30	46.8
234	J-102	227.00	17	46.9
192	J-55	226.00	12	47.0
203	J-68	224.00	0	47.1
236	J-104	224.00	0	47.2
292	J-163	224.00	23	47.3
199	J-63	224.00	7	47.3
206	J-71	224.00	0	47.3
291	J-162	224.00	0	47.3
200	J-65	225.00	23	47.3
244	J-112	224.00	17	47.3
277	J-147	224.00	6	47.3
195	J-58	224.00	0	47.3
202	J-67	224.00	7	47.4
194	J-57	226.00	0	47.4
247	J-115	224.00	7	47.5
193	J-56	224.00	12	47.5
290	J-161	227.00	0	47.5
201	J-66	224.00	13	47.6
226	J-93	224.00	12	47.6
235	J-103	224.00	13	47.7
225	J-92	224.00	0	47.7
191	J-52	226.00	0	47.7

FlexTable: Junction Table (P001-2009B-upgrades.wtg)

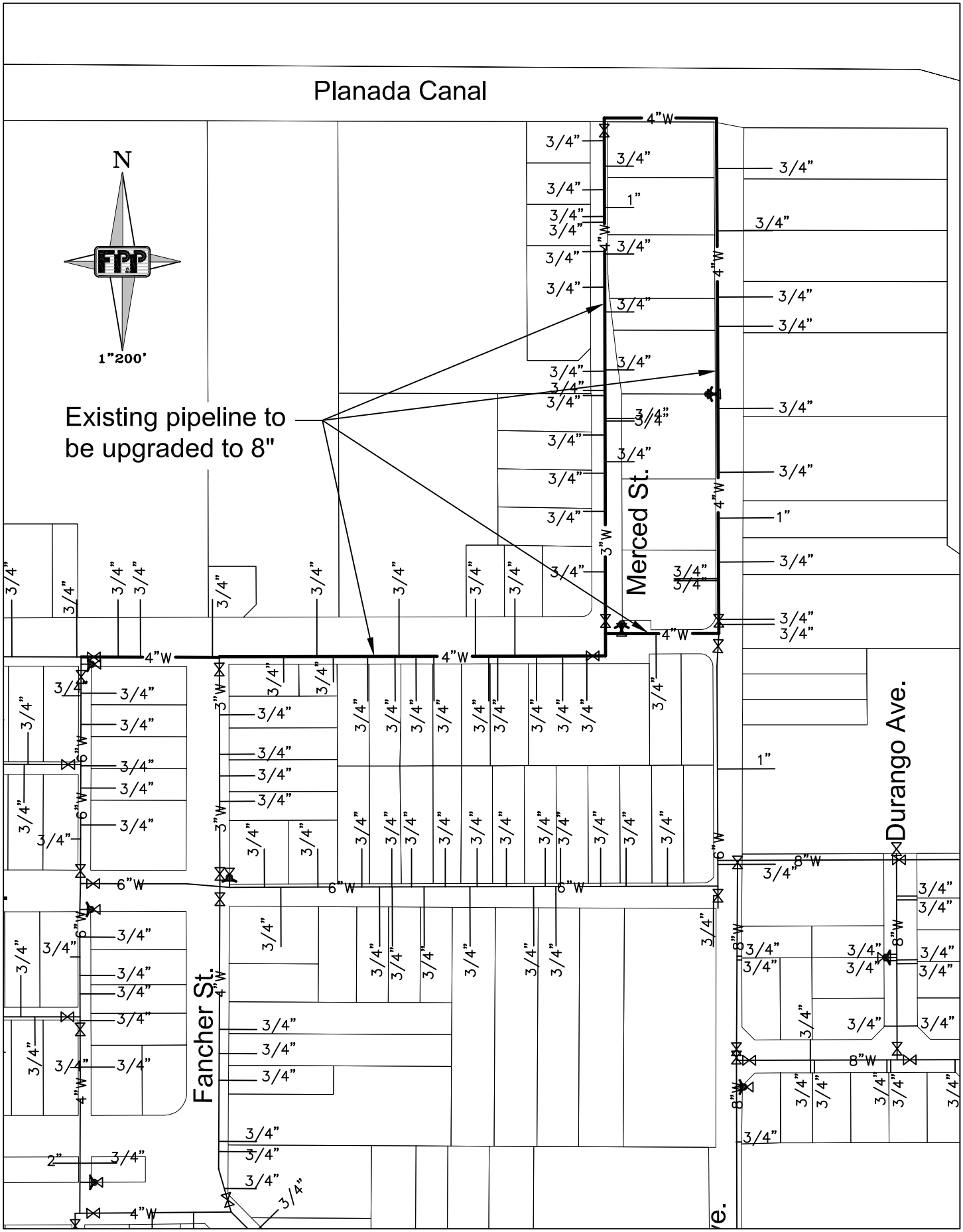
Current Time: 0.000 hours

Id	Label	Elevation (ft)	Demand (gpm)	Pressure (psi)
224	J-91	224.00	0	47.9
305	J-177	226.00	167	48.3
170	J-30	225.00	46	48.5
157	J-12	225.00	0	48.5
283	J-153	225.00	6	48.5
159	J-14	225.00	14	48.5
150	J-5	225.00	7	48.5
158	J-13	225.00	14	48.5
160	J-15	225.00	17	48.5
161	J-16	225.00	13	48.5
163	J-18	225.00	13	48.5
162	J-17	225.00	16	48.5
151	J-6	225.00	7	48.6
223	J-90	224.00	0	48.6
229	J-97	224.00	26	48.6
164	J-19	225.00	13	48.6
152	J-7	225.00	13	48.6
282	J-152	225.00	9	48.6
165	J-22	225.00	6	48.6
281	J-151	225.00	0	48.6
279	J-149	225.00	0	48.6
280	J-150	225.00	6	48.6
166	J-24	225.00	6	48.6
176	J-36	225.00	6	48.6
175	J-35	225.00	7	48.6
153	J-8	225.00	0	48.6
184	J-44	223.00	16	48.7
274	J-143	224.00	9	48.8
188	J-48	223.00	22	48.8
178	J-38	224.00	9	48.8
172	J-32	224.00	19	48.9
171	J-31	224.00	19	48.9
320	J-191	224.00	24	48.9
149	J-4	224.00	9	48.9
177	J-37	224.00	10	48.9
174	J-34	224.00	17	48.9
221	J-88	223.00	16	48.9
222	J-89	223.00	0	48.9
167	J-26	224.00	17	49.0
173	J-33	224.00	14	49.0
168	J-27	224.00	17	49.0
154	J-9	224.00	14	49.0
284	J-154	224.00	9	49.1
156	J-11	224.00	14	49.1
155	J-10	224.00	9	49.1
169	J-28	224.00	13	49.1
275	J-145	227.00	0	49.1
228	J-95	224.00	36	49.1
300	J-29	224.00	0	49.2
189	J-49	222.00	7	49.2
187	J-47	222.00	0	49.2
181	J-41	223.00	0	49.2
186	J-46	222.00	0	49.2

FlexTable: Junction Table (P001-2009B-upgrades.wtg)

Current Time: 0.000 hours

Id	Label	Elevation (ft)	Demand (gpm)	Pressure (psi)
185	J-45	222.00	12	49.3
318	J-189	223.00	27	49.3
317	J-188	223.00	19	49.3
319	J-190	223.00	33	49.3
316	J-187	223.00	19	49.3
180	J-40	223.00	7	49.3
321	J-192	223.00	19	49.3
322	J-193	223.00	19	49.4
183	J-43	222.00	35	49.4
302	J-172	222.00	0	49.4
323	J-194	223.00	7	49.4
179	J-39	223.00	7	49.4
182	J-42	222.00	14	49.5
148	J-2	222.00	9	49.5
190	J-51	222.00	0	49.5
301	J-171	223.00	16	49.7
304	J-174	225.00	85	49.9
147	J-1	221.00	7	50.0



Water System Upgrades - Planada Community Services District

Alternative 2 - PVC Upgrades with Radio-Read Meters					
ITEM	QUANTITY		DESCRIPTION	UNIT PRICE	AMOUNT
1	1	LS	Mobilization	$10,000.00	$10,000
2	1	LS	Demolition	$15,000.00	$15,000
3	1	LS	Shoring, Sheeting & Bracing	$2,000.00	$2,000
4	1	EA	Temporary Backflow Preventer	$2,000.00	$2,000
5	2,990	LF	8" PVC Water Main	$30.00	$89,700
6	8	EA	8" Gate Valve	$1,500.00	$12,000
7	7	EA	Fire Hydrant, Valve, 6" Pipe	$4,500.00	$31,500
8	3	EA	Connect to existing Water Line	$1,500.00	$4,500
9	52	EA	Replace Existing Water Service	$1,500.00	$78,000
10	3,900	LF	Trench Resurfacing	$10.00	$39,000
11	330	EA	Radio-Read Meter, Box, Meter Stop, Fittings, Etc.	$1,000.00	$330,000
			Subtotal of Construction Costs	$613,700	
12	1	LS	Equipment (Generator)	$65,000.00	$65,000
13	1	LS	Geotechnical/Compaction Testing	$7,000.00	$7,000
14	1	LS	Surveying & Staking	$2,500.00	$2,500
15	1	LS	Engineering	$61,000.00	$61,000
16	1	LS	Construction Observation	$5,100.00	$5,100
17	1	LS	Administration	$25,000.00	$25,000
				Subtotal	$779,300
				Contingency (10% of Construction Costs)	$61,370
				Total Cost for Alternative 2	*$840,670*

Construction	$613,700	
Non-Construction	$165,600	
Total	$840,670	
O&M Costs	$575,000	/year