



**BUSINESS OF THE CITY COUNCIL  
CITY OF MERCER ISLAND, WA**

**AB 4371  
November 3, 2008  
Study Session**

**EMERGENCY WATER SUPPLY PHASE 4 -  
WELL FACILITY DESIGN**

**Proposed Council Action:**

No formal action required. Provide comments to staff on the 90% design.

**DEPARTMENT OF** Maintenance (Glenn Boettcher)

**COUNCIL LIAISON** Bruce Bassett

**EXHIBITS** 1. Memorandum from Roth Hill

**APPROVED BY CITY MANAGER**

<b>AMOUNT OF EXPENDITURE</b>	\$	n/a
<b>AMOUNT BUDGETED</b>	\$	n/a
<b>APPROPRIATION REQUIRED</b>	\$	n/a

**SUMMARY**

**Background**

In April 2008, staff presented to the Council the schematic design for the above-ground well facility and its power supply. At the end of the project discussion, Council directed staff to proceed immediately with the well facility design. At the November 3 Study Session, staff and the project team will present the 90% design to Council. Staff is seeking comments from the Council primarily on the building style and features at this time.

On October 14, 2008, staff brought the 60% design and three similar but slightly different design renderings to the Utility Board. The Board unanimously agreed to recommend the simplest building design. The Board also liked the same design with additional post-to-beam knee braces which provides visual separation of the unbroken wall facing the street.

The major focus of the design at this time includes:

- **Well building:** designed to be as small and inconspicuous as possible with a footprint of 24 ft by 32 ft.
- **Storage:** three pressurized bladder tanks with a total capacity of over 3000 gallons are to be installed in the well building.
- **Pump:** will be selected with a capacity range from 200 to of 250 gallons per minute (gpm).
- **Wellhead:** will be housed in an underground vault with electrical conduits and water pipes connected to the well building.
- **Mechanical components:** pipes, valves, and associated assemblies to convey the ground water from the wellhead to the well building then to the beginning point of the distribution system have been designed with consideration for both regular maintenance and emergency operations. The system was designed to allow foolproof operation by volunteers and should be as simple as turning on a switch.

- **Electrical components:** from the existing switchboard and generator at the reservoir to the well building and wellhead are designed with both manual and automatic operation features.

The architectural style of the building is intended to blend in with the surrounding neighborhood. The proposed well building will be located at the northwest corner of the Park and will have a pitched metal roof with cedar siding, and a single dormer.

Staff is working with the Parks Department to make sure the well facility meets Parks' needs and expectations. Issues discussed include the material and finishing coat of the exterior walls for easy cleanup in case of graffiti, and planting schemes around the well building for easy long term maintenance.

Parks staff suggested constructing the facility to incorporate the City's sustainability goals where feasible, and this desire has been conveyed to the design consultants. The design team has been asked to incorporate recycling materials and/or environmentally friendly materials into the design as much as possible with the understanding that the quality of the building will not be compromised and the costs will not be higher.

Attached as Exhibit 1 is a memorandum from the consultant team at Roth Hill Engineering. A most current probable construction cost estimate is included.

**Project Budget**

To date, \$515,500 has been spent on feasibility, pre-design, test well design and construction, temporary use planning, and final design. A summary is included in the table below:

<b>TOTAL PROJECT BUDGET AND COSTS TO DATE</b>			
<u>Description</u>	<u>Budget</u>	<u>Actual (to date)</u>	<u>Est. to Complete</u>
Feasibility and Alternatives for Emergency Supply (2005-2006)	100,000	105,518	
Pre-Design, Test Well Construction, & Temp Use Planning (2006-2008)	460,000	383,986	
Final Design of Production Well Facility (2008)	135,000	26,000	109,000
Construction - Production Well Facility (2009)	<u>890,000</u>	<u>-</u>	<u>810,000</u>
<b>Total - Emergency Supply Well</b>	<b>1,585,000</b>	<b>515,504</b>	<b>919,000</b>

Based on the engineer's 90% design (see Exhibit 1), the construction of the permanent well facility is estimated to cost \$810,000. A summary of this construction cost estimate including costs for construction, contingency, project management, inspection and 1% for the arts is listed in the following table:

<b>EMERGENCY WATER SUPPLY PERMANENT WELL FACILITY CONSTRUCTION COST ESTIMATE</b>	
Construction	\$ 565,000
<u>Sales Tax @ 9%</u>	<u>50,850</u>
<b>Total Construction Contract</b>	<b>\$ 615,850</b>
Construction Contingency @ 15%	92,990
Project Management / Construction Admin	65,000
Inspection Services	30,000
1% for the Arts	6,160
<b>Total Construction Cost Estimate</b>	<b>\$ 810,000</b>

## **Construction Funding**

When the 2007-2008 budget was adopted, it was anticipated that \$1 million in new funding would be needed to fund the construction of the well facility. This funding could come from a variety of sources including rates, debt or sale of Water Utility property on First Hill.

Staff understands that the First Hill property will not be listed on the market until the appropriate public involvement can be carried out. This is the primary reason the Council tabled discussion of proposed Resolution No. 1395 on December 3, 2007. This resolution would declare the First Hill Water Utility property as surplus. The Resolution directs that the property be sold and that "the proceeds of the sale be used by the Water Utility for investing in future water utility assets that would have the effect of decreasing the need for future rate increases".

The City's Planning staff has recently started preliminary work in preparation of the sale of the First Hill property. A public hearing is required by State law prior to the sale. After the hearing, the Council would consider Covenants, Conditions, and Restrictions (CC & Rs) prior to adopting this resolution. Staff will present a timeline and process for considering the CC&R's and property marketing in March, 2009.

## **Discussion**

Staff is seeking feedback from the Council on the 90% design of the well facility at tonight's meeting. Based on the current economy, the housing market, and the need for establishing the well facility, staff is seeking direction from the Council on next steps of the project prior to completion of the final design. Specifically, the staff is asking:

1. Given the parks setting, is the scale and design of the proposed well facility appropriate?
2. Should the staff proceed to final design and bid documents with the goal of project bid and award in the first half of 2009? (If yes, staff will return to seek Council authorization to advertise for bids when plans, specs and bid documents are complete.)

## **RECOMMENDATION**

*Project Manager*

MOVE TO: No formal action is required.



## MEMORANDUM

TO: Honorable Mayor and City Council

FROM: Richard M. Hefti, PE, Project Manager 

RE: Mercer Island Emergency Water Supply Design Summary

COPIES: File

Project No: 0057.00005.004

DATE: October 27, 2008

Page 1 of 4

---

### Introduction

The City has installed an 8-inch diameter water well in Rotary Park near the existing reservoirs and pump station. The well construction was completed in March of 2007. The intended purpose of the well is to provide limited amounts of water to the residents of Mercer Island in the event that the City's current water supply is compromised. The water would be dispersed by a header system with filling stations at which containers can be filled and carried from the site and distributed off site via large, truck mounted tanks.

Earlier this year the City Council decided to proceed as soon as possible with the design and construction of a permanent emergency water supply facility at the well site, even though construction of the project is not funded at this time.

### Facilities Overview

#### Control Building

The mechanical and control equipment will be housed in a building tucked in the northwest corner of the Rotary Park site. Discussions with Park staff resulted in designing the building to be as small and inconspicuous as possible. The proposed building is 24 feet by 32 feet (768 sq. ft.).

In order to provide a more residential flavor to this building, we propose a pitched green metal roof with cedar siding and a single dormer. The dormer will also allow for natural light into the building. In addition, we propose two skylights in the northerly facing roof. The building will be equipped with the most efficient fluorescent lights available, a dehumidifier and a radiant heater in addition to the mechanical and control equipment. The building and foundation are seismically designed in accordance with the International Building Code to remain operational in case of a significant seismic event.

The building will house three small hydro-pneumatic bladder type storage tanks to reduce waste of water and to greatly facilitate the operation of the pumping equipment. Each storage tank holds a little over 1,000 gallons. The hydro-pneumatic tanks will be pressurized. This will allow a very smooth delivery of water and pressure plus store water for later use. The building may also house portions of the mobile header system, collapsible containers for customers or other emergency

response supplies.

The site is subject to obtaining a Conditional Use Permit, which staff is pursuing now.

## **Pump**

The pump is designed to provide 250 gpm at 550 feet of total dynamic head. This is a conservative design as it accounts for roughly a 50 foot drop in the static water level. This is not likely to occur because 1) the existing groundwater level is only about 17 feet above sea level and 2) according to test pumping reports, at 250 gpm of continuous pumping the estimated drawdown is less than 10 feet.

The pump will be driven by a 60 HP electric submersible motor.

## **General Operation**

The design operating pressure is between 20 psi and 40 psi. At initial startup, the pump will manually be turned on. Prior to manually starting up the pump, the startup valve on the pump waste line will be opened and then the pump switched on. The startup valve will stay open for about two minutes to allow the water sitting in the pump column to flush out. Then the distribution valve will be slowly opened. After the distribution valve is open, the startup valve will need to be slowly closed. The pressure will build allowing water to begin filling the tanks and system. The pump runs until the pressure in the system reaches 40 psig and a pressure switch sends a signal to the pump controller to shut off. The pump remains off until the system pressure drops to 20 psig, which then signals the pump motor to start again.

If need be, the system can be gravity drained by opening a valve on the proposed tank filling line located in the truck/tank loading area within the reservoir site. Additional ball valves will be placed appropriately to completely drain the system. We recommend leaving the system pressurized and running the system periodically for short durations to insure all components are operating.

One of the most significant project challenges is the delivery of the water to the end user. Although not part of this proposed construction contract, the discussions and planning for the header system are being narrowed down to having several individual dispensing stations along the west and south park perimeter and a small truck loading station within the reservoir site. Delivery of the water to the customers will include hose bibs connected to an underground pipe header system. Customers will fill personal containers or collapsible bag containers provided by the City. The distribution of the water from the well head to the header systems will be through dedicated buried pipe, to be installed by the City forces. The City will also install a 4-inch pipe from the building to the reservoir site to allow the City to load small plastic water tanks attached to trailers. These tanks can hold about 250 to 275 gallons of water and can be taken and dropped off at strategic locations within the City.

Deep water well pumps require electrical, control and mechanical equipment to facilitate their operation. The electrical service may be either from PSE or from an engine driven electrical generator unit. The plan for providing electrical power and emergency backup power for the well is to utilize the City's existing PSE service and diesel engine generator that is housed at the reservoir site. Conduit and conductors will be routed from the existing PSE service and generator set to the well building. Switch gear will allow the City to use either PSE or the emergency backup generators for the control building & well, depending on the emergency situation. As a further precaution, the new

facility will also have a manual transfer switch to accommodate a portable generator.

The mechanical equipment that is required for the well pump unit facilitates its operation in several ways. Initially, the mechanical equipment will be used to allow the pump unit to start and begin delivery of water to the end user in a way that prevents damage during operation from excessive pressure spikes, or water hammers, that slowly degrade and damage the pump, piping and mechanical equipment, or can cause immediate and catastrophic failure such as rupturing a pipe. The mechanical equipment facilitates the startup of the pump and motor so that pressure spikes are eliminated. The mechanical equipment also facilitates the operation of the pump unit to control the volume and pressure of water delivered. When the pump unit is in the process of being turned off, the mechanical equipment allows the pump to shut down without excessive pressure build up and resulting spikes. In order to keep the operation as simple and volunteer-friendly as possible, the mechanical equipment for this operation includes manually operated valves and mechanical check valves.

As our goal is to keep the control system as simple as possible, the recommended control system for this unit is a manually operated on/off switch. This will provide the City with the most reliable option and best suited for supporting an emergency response unit. It should be noted that the control operation will most likely be relying on resident volunteers as emergencies may take place at any time.

Attached to the memo are preliminary plans that will assist in the discussion.

### **Estimated Cost**

The engineer's opinion of probable construction cost at this stage is **\$697,600**. Final cost projections may be revised as the design is finalized.

Item	Estimated Cost
Mobilization	\$25,000
Well Pump & Motor	\$90,000
Tanks & Mechanical	\$145,000
Building	\$190,000
Electrical	\$80,000
Site Work	\$35,000
Subtotal	\$565,000
Contingency	\$75,000
Total	\$640,000
Sales Tax	\$57,600
<b>Total OPCC<sup>1</sup></b>	<b>\$697,600</b>

<sup>1</sup> Excludes Allied Cost

**Estimated Operational Cost**

As a result of the Utility Board's inquiry regarding energy usage, we estimate the electrical cost for pumping, heating and lighting during actual use to be less than \$20 per day. The heater will be set to come on if the interior temperature falls below 45°F. For a typical winter season we estimate the heating cost at about \$65.