



Herbert, Rowland & Grubic, Inc.
Engineering & Related Services

369 East Park Drive
Harrisburg, PA 17111
(717) 564-1121
www.hrg-inc.com

OCTOBER 21, 2010

**Water System 5-Year
Capital Improvements Plan
(2011-2015)**

**THE HARRISBURG AUTHORITY
DAUPHIN COUNTY, PENNSYLVANIA**

HRG Project No. 4379.0000

The Harrisburg Authority
 Table 1 - Water System 5-Year Capital Improvements Plan (2011-2015)
 10/21/2010

	Estimated Cost	Financed	Annual Debt Service* Years 1-5	Est Const Year	Debt Repayment Start Date	2011 Expenditure	2012 Expenditure	2013 Expenditure	2014 Expenditure	2015 Expenditure
1 North 23rd Street 4" DI main Installation	55,000	N	NA	2011	NA	55,000				
2 Elmerton Avenue/Edgemont Extension	2,500,000	Y	177,381	2011	2012		177,381	177,381	177,381	177,381
3 DCS System & Telemetry Upgrades	900,000	Y	63,857	2011	2012		63,857	63,857	63,857	63,857
4 Emergency Power Connections	300,000	Y	21,286	2011	2012		21,286	21,286	21,286	21,286
5 GIS System Mapping	150,000	Y	10,643	2011	2012		10,643	10,643	10,643	10,643
6 Filter Media Replacement	920,000	N	NA	2011-2014	NA	230,000	230,000	230,000	230,000	
7 Raw Water PRV	35,000	N	NA	2012	NA		35,000			
8 Edward Street Main Installation on 500 Block	56,000	N	NA	2012	NA		56,000			
9 Industrial Road Main Replacement	702,000	Y	49,809	2012	2013			49,809	49,809	49,809
10 Market Street Road Main Replacement	222,000	Y	15,751	2012	2013			15,751	15,751	15,751
11 Instrumentation Replacement (Chlorine Analy	70,000	N	NA	2012	NA	70,000				
12 Repaving DeHart Complex	642,000	N	NA	2013	NA			642,000		
13 Walnut Street Main Installation 3900 Block	67,000	N	NA	2014	NA				67,000	
14 Valve Replacement (Front/Paxton, Front/Vine,	77,000	N	NA	2014	NA				77,000	
15 Paxton Street Bridge Main Replacement	165,000	N	NA	2014	NA				165,000	
16 Woodbine St Main Replacement	201,000	N	NA	2014	NA				201,000	
17 Backwash Water Tank	333,000	N	NA	2015	NA					333,000
18 Fluoride System Boiler	28,000	N	NA	2015	NA					28,000
19 Progress Ave Main Ext between Union Depot I	1,326,000	Y	94,083	2015	2016					
20 Miscellaneous Projects	400,000	N	NA	2012-2015	NA		100,000	100,000	100,000	100,000
WATER PROJECT TOTAL	\$ 9,149,000					\$ 285,000	\$ 764,167	\$ 1,310,727	\$ 1,178,727	\$ 799,727
Total Amount Financed through Debt Service						\$ 0	\$ 273,167	\$ 338,727	\$ 338,727	\$ 338,727
Total Amount Not Financed						\$ 285,000	\$ 491,000	\$ 972,000	\$ 840,000	\$ 461,000

NOTES:
 *Assumes projects funded with Bonds at 5% interest rate for 25 years.

Proposed Capital Improvements

THA, HRG and staff from the City of Harrisburg Bureau of Water met several times in Spring 2010 to review capital and maintenance needs. As a result, a 5-year Capital Improvements Plan (CIP) was created which includes a compilation of items identified by Bureau staff and those generated from previous onsite observations of long-term needs. The Plan has been used to prioritize capital expenditures and incorporate upcoming costs into the Authority's 2010 Water Rate Study.

The opinions of probable project costs are very preliminary and most were developed based upon visual analysis, most without any type of detailed review. They are intended to provide an order of magnitude of cost estimate of total project cost. As individual studies are prepared, costs shown in the CIP may increase or decrease based upon further definition of project scope. A copy of the Plan is attached as Table 1. Projects listed in the Plan include the following:

2011 Proposed Projects

1. North 23rd Street 4" DI main Installation – This portion of the distribution system has reached the end of its useful life resulting in multiple labor intensive repairs over the past two years. Project includes replacing approximately 300 linear feet (LF) of 4" PVC with ductile iron pipe (DIP). Total probable project cost is estimated at \$55,000. City staff could likely perform this work.

2. Elmerton Avenue/Edgemont Extension – This project involves acquiring existing lines owned by the Pennsylvania Department of General Services and extending additional lines along Elmerton Avenue and to the Edgemont Area. THA desires to implement this project for several reasons, including the following:
 - This project will improve water quality at the Londonderry School.
 - The project will address low water volumes in the Edgemont Area that cause pressure drops in residential service during fire flows by creating a loop in the distribution system.
 - The proposed project will benefit potential development in this area, specifically the planned Pennsylvania State Employee Credit Union (PSECU) building.
 - Through the acquisition of DGS lines, THA will acquire several customers currently served by DGS.
 - Improvements made by the proposed project would address water pressure issues currently experienced by these DGS customers.

Total probable project cost is estimated at \$2,500,000.

3. DCS & Telemetry System Upgrades – This Data Control System (DCS) Upgrade is required as part of the Consent Order and Agreement between THA and the DEP. The project will include replacing the existing Foxboro Data Control System (DCS) with a Programmable Logic Controller (PLC) system which utilizes traditional or modular PLC's. The project will also include proposed

telemetry upgrades at remote facilities including DeHart Dam, Gate House Pump Station, Riverfront Pump Station and City Island. Total probable project cost is estimated at \$900,000.

4. Emergency Power Connections – A backup power source for the Dr. Robert E. Young Water Services Center (REYWSC) is recommended to keep the facility functioning during times of power failure. The turbine generator at the REYWSC lacks adequate capacity to power the treatment facility. When the MCC loses power, key operations at the filtration and treatment facility are unable to continue causing costly, labor intensive shutdowns and startups and posing safety issues throughout the system. Options for ensuring continued operation may include the installation of an automatic transfer switch, junction box and proper wiring to allow for generator hookup and/or installing an automatic transfer switch at the substation so that power can be supplied to the facility from either section of the power grid. Probable project cost is estimated at \$300,000.
5. GIS System Mapping – Distribution system maps are outdated and complete sections missing. Project includes the creation of a Geographic Information System (GIS) which would include electronic mapping of pipes, valves, hydrants and other features. The project would involve locating and determining coordinates and elevation of existing system features (fire hydrants, main line valves, etc.) using realtime kinetic (RTK) GPS. This allows for the accurate location of components within +/- 2 cm. This system could also be used to store and access maintenance records along with data on component size, age, material, etc. Development of the GIS system would cost approximately \$150,000.
6. Filtration Media Replacement – The filtration cells at the Dr. Robert E. Young Water Services Center remove materials in the raw water using multiple layers of gravel, sand and anthracite. Existing media has been in use since facility startup and surpassed its 10-year life expectancy. Staged removal, disposal, and replacement of this material is recommended by completing two (2) of the eight (8) cells each year for the next four (4) years. The opinion of probable annual replacement cost is \$230,000.

2012 Proposed Projects

7. Raw Water PRV – The Raw Water Pressure Regulating Valve is located in the Ammonia Building at the head of the REYWSC and controls the volume of source water entering the facility. Function of the existing valve is inconsistent causing difficulty in regulating flows especially when the turbine generator is shut down. Probable project cost is estimated at \$35,000.
8. Edward Street Main Installation – This project includes replacing approximately 300 LF of pipeline along the 500 block of Edward Street. Existing pipe has reached the end of its useful life and will be replaced with 4" DIP. Probable project cost is estimated at \$56,000. Work could likely be performed by City staff.

9. Industrial Road Main Installation – Pipeline has reached the end of its useful life and resulting in five (5) main breaks over the past two years. Project includes replacing approximately 3,300 LF of pipeline with 12” DIP. Replacement of the line is expected to cost approximately \$702,000. Due to size and complexity, it may be appropriate to use an outside contractor to complete the work.
10. Market Street Road Main Replacement - Project includes replacing approximately 1,100 LF of 4” pipeline along Market Street. Probable project cost is estimated at \$222,000. THA and City staff will need to further evaluate the project scope to determine if it’s appropriate for City staff to complete the work.

2013 Proposed Projects

11. Instrumentation Replacement - The residual chlorine analyzers and turbidimeters have reached the end of their useful life and require replacement. This project involves the replacement of three residual chlorine analyzers, two turbidimeters and the necessary control modules, software and programming for a complete installation. The opinion of probable project cost is \$70,000.
12. Repaving DeHart Complex - Project involves the repaving of approximately one (1) mile of access roads at the Dehart Dam complex. The access gate could also be converted from wire to a gate style access deterrent. The opinion of probable project cost is \$642,000.
13. Walnut Street Main Installation – Project includes replacing approximately 300 LF of pipeline along the 3900 block of Walnut Street. Existing pipe has reached the end of its useful life and will be replaced with 4” DIP. Probable project cost is estimated at \$67,000. City staff could likely perform this work.

2014 Proposed Projects

14. Valve Replacement (Front/Paxton, Front/Vine, 1300 Cameron) – Project includes replacing four (4)- 10” and two (2) - 14” direct bury plug valves at the locations listed above. Probable project cost is estimated at \$77,000.
15. Paxton Street Bridge Main Replacement - Project includes replacing approximately 300 LF of 16” DIP. Probable project cost is estimated at \$165,000. City staff may be able to complete this work.
16. Woodbine Street Main Replacement - Project includes replacing approximately 1,000 LF of 6” DIP. Probable project cost is estimated at \$201,000.

2015 Proposed Projects

17. Backwash Water Storage Tank – Fluctuations in finished water chemistry can be minimized

through the installation of a backwash water storage tank at the Dr. Robert E. Young Water Services Center. One of the clearwells is currently being used as a backwash water storage tank to supply the pumps during the filter backwash cycles. During a backwash cycle, the backwash pumps withdraw finished water at a significantly higher rate than the finished water pumps. This causes settled material to become re-suspended, resulting in finished water chemistry fluctuations. This project includes the installation of a 250,000 gallon partially buried concrete storage tank and associated piping. The opinion of probable project cost is \$304,000.

18. Fluoride System Boiler – A new boiler is required at the Dr. Robert E. Young Water Services Center to provide hot water and ensure complete dissolution of dry sodium silicofluoride before dosing. This chemical is purchased in 50 pound bags and blended with hot water before it is injected into the filtered water flumes. Use of hot water increases the chemical's solubility and allows the dry product to completely dissolve. The existing hot water heater is offline and should be replaced with a new 235 mbh (235,000 BTU/hour) unit. The opinion of probable project cost is \$25,000.
19. Progress Avenue Main Extension between Union Depot Rd toward Derry St – Properties in this area are currently served through private wells. Project includes providing public water service through the installation of approximately 7,500 LF of 8" DIP. Probable project cost is estimated at \$1,326,000. Financing would include the collection of Tapping Fee charges.
20. Miscellaneous Projects – Due to the age, size and complexity of the system, capital improvement needs routinely arise. The 2010 Rate Study budgets \$100,000 in additional project costs for Years 2012 to 2015 to account for other needs identified over the next five (5) years.

Project Financing

On March 12, 2010, THA Staff met with PENNVEST and DEP to discuss the Elmerton Avenue/Edgemont Extension, along with other projects listed above. The PENNVEST representative determined that PENNVEST would be an appropriate funding tool for all projects listed in the CIP. Specifically, the Elmerton Avenue/Edgemont Extension, DCS & Telemetry System Upgrade and the Emergency Power Connection projects were determined to be a good fit for the PENNVEST program because they each address water quality, water quantity, compliance, safety or vulnerability issues, which will increase the likelihood for a funding award. While the remaining projects are eligible for funds, individually they may not rank high enough to receive a funding offer and other funding sources may need to be identified. Milestones associated with the Consent Order and Agreement for the DCS & Telemetry System Upgrade Project will drive the schedules of all projects seeking 2011 PENNVEST funding. It is currently anticipated that a funding request will be submitted on February 15, 2011 for an April 19, 2011 funding award. Prior to the submission of a PENNVEST application, design for each project should be completed and THA may need to obtain a minor permit amendment from the DEP for the Elmerton/Edgemont project.

A listing of capital expenditures and annual breakdown of expenses funded through debt service versus those funded through user rates or surplus funds is included in Table 2.

Table 2 – Annual Capital Expenditures and Financing Totals

	Year	Cost	Annual Total	Amount Financed Through Debt Service	Amount Not Financed
North 23rd Street 4" DI main Installation	2011	\$55,000			
Elmerton Avenue/Edgemont Extension	2011	\$2,500,000			
DCS System & Telemetry Upgrades	2011	\$900,000			
Emergency Power Connections	2011	\$300,000			
GIS System Mapping	2011	\$150,000			
Filter Media Replacement	2011-2014	\$920,000	\$4,135,000	\$3,850,000	\$285,000
Raw Water PRV	2012	\$35,000			
Edward Street Main Installation on 500 Block	2012	\$56,000			
Industrial Road Main Replacement	2012	\$702,000			
Market Street Road Main Replacement	2012	\$222,000			
Instrumentation Replacement (Chlorine Analyzers & Turbidimeters)	2012	\$70,000			
Miscellaneous Projects	2012-2015	\$400,000	\$1,415,000	\$924,000	\$491,000
Repaving DeHart Complex	2013	\$642,000	\$972,000	\$0	\$972,000
Walnut Street Main Installation 3900 Block	2014	\$67,000			
Valve Replacement (Front/Paxton, Front/Vine, 1300 Cameron)	2014	\$77,000			
Paxton Street Bridge Main Replacement	2014	\$165,000			
Woodbine St Main Replacement	2014	\$201,000	\$840,000	\$0	\$840,000
Backwash Water Tank	2015	\$333,000			
Fluoride System Boiler	2015	\$28,000			
Progress Ave Main Ext between Union Depot Rd toward Derry St	2015	\$1,326,000	\$1,787,000	\$1,326,000	\$461,000
Total Water System Capital Expenditures		\$9,149,000		\$6,100,000	\$3,049,000

Table 1 further evaluates project costs and methods of financing to estimate the actual annual capital expenditures incurred in Years 2011 through 2015. Debt service estimates assume bond financing at 5% for 25 years.