CHAPTER 15 – CAPITAL IMPROVEMENT PROGRAM

15.1 Introduction

GWA has a great challenge as the organization carries forward its program to enhance the reliability and accountability of the water and wastewater utility. As developed and defined in the WRMP, the required capital expenditures over the next 20 to 30 years could total $900 million in 2007 dollars. To properly manage its CIP expenditures, manage its fiscal strength, and provide its rate payers the best value for the dollar, GWA will be required to develop and adhere to a structured CIP.

GWA has a policy in place that distinguishes an Operations Maintenance and Rehabilitation (OM&R) project from a CIP funded project. Exhibit 15A presents the differentiation between the two types of projects. The essence of the existing policy biases a majority of the typical OM&R funded projects to CIP projects.

The WRMP defines a number of CIP projects over the next 20 years that are essential for GWA to build a solid utility foundation. A focused effort in defining projects is the first step to aid the GWA team in meeting Chapter 4 - Levels of Service of this volume, expectations established by the CCU and GWA's customers. Successful implementation of the proposed CIP requires GWA to communicate and seek buy-in of its developed CIP policy by the staff, CCU, PUC and its rate payers.

15.2 Elements for a CIP

Until recently, GWA did not have a well defined process for identifying CIP projects. Determination of what the CIP included was based on the perception that a system or a piece of equipment was not functional or reliable, the inability to properly operate a system or facility, or other subjective means. This approach for developing a CIP has proved costly as it focuses on short-term problems at the expense of long-term solutions and is open to abuse. Today's technology and tools provide utilities with the necessary information to make sound decisions in defining CIP projects and establishing priorities.

The major components required to support a sound CIP decision making policy include:

- Asset management program (asset inventory, asset database)
- Hydraulic models
- Geographic Information System (GIS)
- Computerized Maintenance Management System (CMMS)
- Replacement Planning Model (RPM)
- Business Case Evaluation (BCE) protocol
- Rate setting models
- Communication outreach program

Once the above tools are in place, the utility must maintain the process to achieve the greatest return on their investment. A total alignment of processes and commitment is required from all levels of the utility from the Chair of the CCU to the front line staff of GWA.

The WRMP develops all of the components discussed above with the exception of the CMMS program. The challenge for GWA is to assume the ownership of these tools and maintain the integrity of the information through continuous updating of the respective databases, GIS, and models.

15.3 Elements of a CIP Policy

GWA's process for development of the annual budget for a CIP is similar to many municipalities throughout the United States. A 5-year CIP project listing is created for every annual budget. The development and commitment to an on-going policy will ensure that the CIP is truly a dynamic process and does not need to be recreated every budget year. The elements for a successful policy include:

- Defined Levels of Service expectations
- Utility master plans that provide a roadmap to meet future needs
- A process to evaluate selected projects before they are listed as a CIP item, preferably through the use of a BCE protocol
- Procedures to obtain feedback from the operations group on major OM&R issues that are CIP projects
- A risk evaluation process to guide decision making
- A prioritization process for proposed CIP projects
- An understanding of utility budgetary constraints
- A communication plan to involve and share with GWA staff and decision makers

The basic framework for a policy is presented in the WRMP. In order for GWA to effectively implement the program requires a champion team be designated to carry forward the development of the CIP policy.

The WRMP will serve as the initial guidance roadmap to outline the current state of GWA and define the future improvements needed to rehabilitate the utility systems and meet Guam's economic growth. The asset management and BCE concept has been introduced to the key members of GWA's management and accounting teams. A strategic communications plan has been prepared for GWA consideration and implementation.

15.4 Delivery of CIP Projects

A structured and efficient process for defining CIP projects needs to be matched by an equally structured and efficient process for delivering identified projects. Consideration should be given to a wide variety of delivery mechanisms available for designing, constructing and operating water and wastewater infrastructure. Different types of project delivery mechanisms include:

- Traditional design by a consultant and construction by a contractor
- Design and construct under one contract (also called Design-Build)
- Contracts to build, own and operate facilities for periods of 10 to 20 years
- Alliances, partnerships and operations support arrangements

Each type of project delivery arrangement has strengths and weaknesses and an analysis of the objectives and risks involved with each project and long-term operating activity is best undertaken at a time close to their implementation to assess the best approach in the circumstances prevailing at the time.

The project delivery mechanism chosen will also be influenced by factors such as whether privatization proceeds and in what form, the capabilities of GWA staff to manage different size and types of projects, and the need for alternative types of financing.

There are many hundreds of millions of dollars of CIP projects defined in the WRMP and the delivery of these projects in a structured and efficient way will be an important issue for GWA and the CCU in coming years.

15.5 WRMP CIP Projects

The WRMP Volumes 2 and 3 present the technical basis and justification for the proposed water and wastewater system CIP. The specific projects are summarized and prioritized for the water system in Volume 2, Chapter 9 and for the wastewater system in Volume 3, Chapter 9. Projects were ranked and prioritized based on the specific needs they fulfilled including:

- Life and Safety
- Regulatory Compliance
- System Reliability
- System Redundancy
- System Capacity
- Operation Maintenance and Rehabilitation Recommendations

The defined CIP indicates that GWA will be in a catch up mode for the first 5 to 10 years to reestablish the base foundation for the utility. The highest priority projects will focus on meeting the level of service expected by the CCU, GWA staff and GWA's customers. Primary among the expectations are:

- Continuity of water supply
- Safe drinking water quality
- Mitigating wastewater spills
- Appropriate wastewater treatment

Concurrent with rebuilding the foundation of the utility, GWA must complete projects that will ensure that water and wastewater systems can meet Guam's immediate growth requirements.

15.6 WRMP CIP Schedule

Two CIP schedules have been identified. Both use the same proposed projects needed to rehabilitate the water and wastewater infrastructure and bring GWA into full compliance with current and anticipated future regulations. The "Recommended WRMP CIP– Base Case" shown in Table 15-1 provides a project schedule that would complete the essential CIP project work in 20 years, averaging about $45 million annually. In recognition that such a schedule may not be financially feasible, a second schedule entitled "Recommended WRMP CIP – Minimum Case" is

presented in Table 15-2, which extends the project schedule an additional 10 years. In the "Minimum Case", the construction pace is slower for water distribution system upgrades, lower priority sewer upgrades, wastewater treatment plant upgrades, and connection of unsewered areas. The deferrals reduce CIP expenditures in the first 5 years by $54 million and postpone $154 million in expenditures to beyond 20 years. The funding and rate impacts for both schedules are shown in Chapter 14 - Financial Program of this volume.

15.7 WRMP CIP Cost Estimating

Cost estimating range of accuracy is defined based on the level of project definition. The Association for the Advancement of Cost Engineering (AACE) International has created a Cost Estimate Classification System (Recommended Practice No. 18R-97) that defines 5 classes of cost estimates as presented in Exhibit 15B, Classification Matrix for Process Industries. Using this matrix as a guide, the GWA WRMP cost estimate accuracy range should vary from -50% to +100%.

The construction cost estimates developed for the WRMP considered the following cost information resources and assumptions.

- Comparable bid tabs from similar Guam or stateside projects
- Conceptual cost estimates
- Guam construction cost adjustment (140%) for stateside bid tabs
- Fifty percent adjustment for level of project definition
- 2007 dollars

In addition, capital cost estimates (as distinguished from construction cost estimates) accounted for engineering and construction management services based on the following assumptions using construction cost as a base.

- Design fees – 10%
- Engineering services during construction – 5%
- Construction management – 7%

Project cost estimates should be reviewed and revised on an annual basis as part of the budget process to account for the volatile construction marketplace. The past 5 years have seen material and construction cost skyrocket based on the worldwide competitive market for materials and construction resources.

Moving from the WRMP estimates, the next logical activity is a preliminary engineering study in which alternatives are developed concurrent with more accurate cost estimation in the range of -15% to +50%. As more definition of the project is gained, more accuracy is possible. This master plan fits the definition of a Class 5 activity.

15.8 CAPE Application (hit beginning and ending)

The CAPE Application can be used by GWA to effectively manage changes in CIP project schedules. Details on CAPE are presented in Chapter 10 -CAPE of this volume. The specific module for CIP activities is titled the Capital Improvement Manager and provides a simple Gant chart interface for managing capital improvement information. Project schedules (including anticipated start and completion dates) can be changed by dragging boxes in the chart.

Expenditures across a variety of funds are automatically recalculated whenever the schedule is modified. Customized reports can be automatically generated for the CIP, including the Project Summary sheets shown in Volumes 2 and 3, Chapter 9 for the individual water and wastewater projects.

15.9 Conclusions

This chapter provides a basis for the development of the WRMP CIP and emphasizes the need for and usefulness of several tools to significantly upgrade the present method of CIP development. Key elements discussed include:

- CIP Development
- CIP Policy Development
- CIP Delivery Options
- CIP Tools - Capacity Assurance Planning Environment (CAPE) Application
- CIP Cost Estimating

15.10 Recommendations

In order to maintain a viable CIP it will be necessary to implement recommendations in the WRMP. Volume 2, Chapter 9 – Recommended Water System CIP and Volume 3, Chapter 9 – Recommended Wastewater System CIP addressing water and wastewater systems respectively identify a number of specific CIP projects which, when completed will vastly improve the performance of GWA's utility systems. In addition, the process for identifying, tracking and implementing projects with the help of the tools identified in this chapter will assist in the program's success.

15.11 CIP Impact

Each of the CIP Chapters named in the Recommendations section above address specific CIP impacts for both water and wastewater projects.

Table 15-1 – Recommended Capital Improvement Program – Base Case

Project	Project Types[3]	Priority Ranking	Budget Year[1,2] 2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Water System																							
Water Reservoir Internal/External Corrosion Assessment Program	LS/SR/OMR	47.6	$125,000																				$125,000
Water Reservoir Internal/External Corrosion Rehabilitation Program	LS/SR/OMR	47.6		$500,000	$500,000	$500,000	$500,000																$2,000,000
Ugum Water Treatment Plant Membrane Filtration	SC/OMR	23.3	$8,500,000																				$8,500,000
Ugum Water Treatment Plant Reservoir Replacement	LS/SR/SRED	49.9			$8,700,000																		$8,700,000
Ugum Water Treatment Plant Intake Modifications	SR	16.3	$550,000																				$550,000
Water Distribution System Pipe Replacement	LS/SR/OMR	47.6	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$53,140,000
Mechanical/Electrical Equipment Replacement	LS/SR/OMR	47.6		$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$17,670,000
Southern System Water Distribution System 2005 Improvements	LS/SR	38.1		$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000							$4,000,000		$6,000,000	$23,000,000
Central System Water Distribution System 2005 Improvements	LS/SR	38.1		$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000										$6,000,000
Northern System Water Distribution System 2005 Improvements	LS/SR	38.1		$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000										$26,000,000
Pressure Zone Realignment/Development 2005 Improvements	LS/SR	38.1		$2,700,000	$2,700,000	$2,700,000																	$8,100,000
Water Booster Pumping Station 2005 Improvements	LS/SR	38.1		$700,000	$500,000																		$1,200,000
Water System Reservoirs 2005 Improvements	LS/SR	38.1		$2,600,000	$2,600,000	$2,600,000	$8,700,000					$8,700,000											$25,200,000
Northern System Raw Water Transmission Lines	LS/SR	38.1	$4,500,000	$4,300,000		$18,000,000		$19,000,000	$20,000,000	$20,000,000		$19,000,000		$15,000,000		$4,000,000							$123,800,000
Water System Supply Wells 2025 Improvements	SC	13.8																		$5,000,000			$5,000,000
Southern System Water Distribution System 2025 Improvements	LS/SR	38.1																		$4,000,000		$6,000,000	$10,000,000
Northern System Water Distribution System 2025 Improvements	LS/SR	38.1											$5,700,000	$5,700,000	$5,700,000	$5,700,000	$5,700,000	$5,700,000	$5,700,000	$5,700,000	$5,700,000	$5,700,000	$57,000,000
Water Booster Pumping Station 2025 Improvements	LS/SR	38.1																			$1,600,000		$1,600,000
Water System Reservoirs 2025 Improvements	LS/SR	38.1												$3,000,000	$4,300,000	$3,000,000	$8,700,000	$8,700,000					$27,700,000
Northern System GWUDI Filtration Compliance[4]	RC	17							$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000					$145,000,000
Year Total			*$18,675,000*	*$21,230,000*	*$25,430,000*	*$34,230,000*	*$19,630,000*	*$29,430,000*	*$44,930,000*	*$44,930,000*	*$24,930,000*	*$48,370,000*	*$26,370,000*	*$39,870,000*	*$26,170,000*	*$28,870,000*	*$30,570,000*	*$30,570,000*	*$7,370,000*	*$20,370,000*	*$8,970,000*	*$19,370,000*	***$550,285,000***
Wastewater Collection System - Capacity Related																							
Northern District STP Rte 16 PS Overflow Study	SR/SC	30.1	$50,000																				$50,000
Northern District STP Eliminate Flow Split	SR/OM&R	25.8	$50,000																				$50,000
Northern District STP Priority 1 Sewer Upgrades	RC/LS	38.8				$2,400,000																	$2,400,000
Northern District STP Priority 2 Sewer Upgrades	RC/SC	30.8														$280,000							$280,000
Northern District STP Priority 3 Sewer Upgrades	RC/SC	30.8																			$4,500,000		$4,500,000
Hagatna STP Priority 1 Sewer Upgrades	RC/LS	38.8				$4,000,000																	$4,000,000
Hagatna STP Priority 2 Sewer Upgrades	RC/SC	30.8														$17,000,000							$17,000,000
Hagatna STP Priority 3 Sewer Upgrades	RC/SC	30.8																			$11,000,000		$11,000,000
Hagatna STP Pump Station Upgrades	RC/SC	30.8				$440,000	$4,400,000				$120,000	$1,200,000					$4,500,000		$45,000,000				$55,660,000
Agat-Santa Rita STP Priority 1 Sewer Upgrades	RC/SC	30.8				$1,200,000																	$1,200,000
Agat-Santa Rita STP Priority 3 Sewer Upgrades	SC	13.8																			$4,500,000		$4,500,000
Baza Gardens STP Priority 1 Sewer Upgrades	RC/SC	30.8				$650,000																	$650,000
Baza Gardens STP Priority 2 Sewer Upgrades	SC	13.8														$580,000							$580,000
Inarajan STP Pressure Sewer Upgrades	RC/SC	30.8				$1,200,000																	$1,200,000
Year Total			*$100,000*	*$0*	*$0*	*$9,890,000*	*$4,400,000*	*$0*	*$0*	*$0*	*$120,000*	*$1,200,000*	*$0*	*$0*	*$0*	*$17,860,000*	*$4,500,000*	*$0*	*$45,000,000*	*$0*	*$20,000,000*	*$0*	***$103,070,000***
Wastewater Collection System - Unsewered Areas																							
NDSTP and Hagatna STP Unsewered Properties – Sewer Hookups[5]	RC/Other	17						$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000											$6,500,000
NDSTP and Hagatna STP Unsewered Properties - New Sewers [6]	RC/Other	17						$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$40,500,000
NDSTP and Hagatna STP Unsewered Properties - Additional Sewer Hook-ups[5]	SC/Other	13.8									$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$15,000,000
South System Sewer Hook-ups[5]	RC	17																$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$7,500,000
Year Total			*$0*	*$0*	*$0*	*$0*	*$0*	*$4,000,000*	*$4,000,000*	*$4,000,000*	*$5,250,000*	*$5,250,000*	*$3,950,000*	*$3,950,000*	*$3,950,000*	*$3,950,000*	*$3,950,000*	*$5,450,000*	*$5,450,000*	*$5,450,000*	*$5,450,000*	*$5,450,000*	***$69,500,000***
Wastewater Collection System - Other																							
Manhole Frame Seal Repair	SR/OMR	25.8	$84,000																				$84,000
Agat Manhole Rehabilitation	SR/OMR	25.8	$54,000																				$54,000
Wastewater Collection System Recurring Inspection Program[7]	SR/OMR	25.8	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$12,200,000
Wastewater Collection System Replacement/Rehabilitation Program[7]	SR/OMR	25.8	$1,100,000	$1,100,000	$1,100,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$37,300,000
Year Total			*$1,848,000*	*$1,710,000*	*$1,710,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	***$49,638,000***
Wastewater Facilities																							
Facilities Plan/Design for the Agat-Santa Rita STP Replacement	RC/SR/SRED/SC	58.9		$600,000		$2,600,000																	$3,200,000
Agat-Santa Rita STP Replacement	RC/SR/SRED/SC	58.9						$30,000,000															$30,000,000
Facilities Plan/Design for the Baza Gardens STP Replacement	RC/SR/SRED	45.1	$500,000		$1,500,000																		$2,000,000
Baza Gardens STP Replacement	RC/SR/SRED	45.1					$18,000,000																$18,000,000
Facilities Plan/Design for the Hagatna STP Improvements & Effluent WWPS	SR/SRED/SC	41.9							$1,900,000														$1,900,000
Hagatna STP Improvements & Effluent WWPS	SR/SRED/SC	41.9									$18,000,000												$18,000,000
Facilities Plan/Design for Inarajan STP Expansion	SR/OM&R	25.8										$190,000											$190,000
Inarajan STP Expansion	SR/OM&R	25.8												$420,000									$420,000
Facilities Plan/Design for the Northern District STP – Biosolids	RC/SR	30.1	$500,000									$1,800,000											$2,300,000
Northern District STP Expansion - Biosolids	RC/SR	30.1			$5,000,000								$16,000,000										$21,000,000
Facilities Plan/Design for the Northern District STP Expansion	SR/SRED	25.6							$1,200,000														$1,200,000
Northern District STP Expansion	SR/SRED	25.6									$10,000,000												$10,000,000
Facilities Plan/Design for the Umatac-Merizo STP Improvements	SR/OM&R	25.8						$140,000															$140,000
Umatac-Merizo STP Improvements	SR/OM&R	25.8							$420,000														$420,000
Pago Socio STP Conversion	SR/OM&R	25.8										$3,700,000											$3,700,000
Year Total			*$1,000,000*	*$600,000*	*$6,500,000*	*$2,600,000*	*$18,000,000*	*$30,140,000*	*$3,520,000*	*$0*	*$28,000,000*	*$5,690,000*	*$16,000,000*	*$420,000*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	***$112,470,000***
Electrical/SCADA																							
Electrical Upgrade - Water Booster Stations (Pago Bay, etc)	LS/SR	38.1	$650,000																				$650,000
Electrical Upgrade - Water Booster Stations (Gayinero, etc)	LS/SR	38.1		$350,000																			$350,000
Electrical Upgrade - Water Booster Stations (Other WBPS)	LS/SR	38.1			$250,000																		$250,000
Electrical Upgrade - Water Wells	LS/SR	38.1	$2,000,000																				$2,000,000
Electrical Upgrade – Agat-Santa Rita STP	LS/SR	38.1	$400,000																				$400,000
Electrical Upgrade – Baza Garden STP	LS/SR	38.1					$300,000																$300,000
Electrical Upgrade – Northern District STP	LS/SR	38.1		$1,900,000																			$1,900,000
Electrical Upgrade – Umatac-Merizo STP	LS/SR	38.1			$300,000																		$300,000
Wastewater Pumping Station Electrical Upgrade	RC/SR	33.3	$1,000,000																				$1,000,000
GWA SCADA System - Phase 1	RC/SR	16.3	$250,000																				$250,000
GWA SCADA System - Phase 2	RC/SR	16.3		$1,100,000																			$1,100,000
GWA SCADA System - Phase 3	RC/SR	16.3			$2,500,000																		$2,500,000
GWA SCADA System - Phase 4	RC/SR	16.3				$850,000																	$850,000
Year Total			*$4,300,000*	*$3,350,000*	*$3,050,000*	*$850,000*	*$300,000*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	***$11,850,000***
Other																							
GIS	Other	--	$160,000	$160,000	$160,000	$160,000	$160,000																$800,000
Year Total			*$160,000*	*$160,000*	*$160,000*	*$160,000*	*$160,000*																***$800,000***
Annual Total			**$26,083,000**	**$27,050,000**	**$36,850,000**	**$50,340,000**	**$45,100,000**	**$66,180,000**	**$55,060,000**	**$51,540,000**	**$60,910,000**	**$63,120,000**	**$48,930,000**	**$46,850,000**	**$32,730,000**	**$53,290,000**	**$41,630,000**	**$38,630,000**	**$60,430,000**	**$28,430,000**	**$37,030,000**	**$27,430,000**	**$897,613,000**
							$185,423,000					$296,810,000					$223,430,000					$191,950,000	

[1] Cost based on (10% design, 5% Services during construction, 7% Construction Management, 50% Planning Level Adjustment)
[2] Costs are 2007 Dollars
[3] Project Types: **RC**=Regulatory Compliance; **SR**=System Reliability; **SRED**=System Redundancy; **SC**=System Capacity; **OMR**=OM&R; **LS**=Life & Safety
[4] Costs for design, planning, and construction of full treatment for GWUDI compliance; If filtration avoidance is allowed, total costs will be approximately $5,000,000 after transmission lines are complete
[5] Funded by Sewer Hook-up Revolving Fund
[6] GWA may not be able to provide new sewers to existing customers without a connection fee. New legislation or alternative funding sources may be required.
[7] Cost is an annual recurring cost to inspect and replace/rehabilitate the gravity and force main systems

Table 15-2 – Recommended Capital Improvement Program – Minimum Case

Project	Project Types[3]	Priority Ranking	Budget Year[1,2] 2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Years 1 to 20	Years 21 to 30[4]
Water System																								
Water Reservoir Internal/External Corrosion Assessment Program	LS/SR/OMR	47.6	$125,000																				$125,000	$0
Water Reservoir Internal/External Corrosion Rehabilitation Program	LS/SR/OMR	47.6		$500,000	$500,000	$500,000	$500,000																$2,000,000	$0
Ugum Water Treatment Plant Membrane Filtration	SC/OMR	23.3	$8,500,000																				$8,500,000	$0
Ugum Water Treatment Plant Reservoir Replacement	LS/SR/SRED	49.9			$8,700,000																		$8,700,000	$0
Ugum Water Treatment Plant Intake Modifications	SR	16.3	$550,000																				$550,000	$0
Water Distribution System Pipe Replacement	LS/SR/OMR	47.6	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$740,000	$53,140,000	$0
Mechanical/Electrical Equipment Replacement	LS/SR/OMR	47.6		$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$930,000	$17,670,000	$0
Southern System Water Distribution System 2005 Improvements	LS/SR	38.1		$1,300,000		$1,300,000		$1,300,000		$1,300,000		$1,300,000		$1,300,000		$1,300,000		$1,300,000		$1,300,000		$1,300,000	$13,000,000	$10,000,000
Central System Water Distribution System 2005 Improvements	LS/SR	38.1		$600,000	$600,000		$600,000		$600,000		$600,000		$600,000		$600,000		$600,000		$600,000		$600,000		$6,000,000	$0
Northern System Water Distribution System 2005 Improvements	LS/SR	38.1		$2,600,000	$2,600,000		$2,600,000		$2,600,000		$2,600,000		$2,600,000		$2,600,000		$2,600,000		$2,600,000		$2,600,000		$26,000,000	$0
Pressure Zone Realignment/Development 2005 Improvements	LS/SR	38.1		$2,700,000		$2,700,000		$2,700,000															$8,100,000	$0
Water Booster Pumping Station 2005 Improvements	LS/SR	38.1		$700,000			$500,000																$1,200,000	$0
Water System Reservoirs 2005 Improvements	LS/SR	38.1		$2,600,000		$2,600,000		$2,600,000		$8,700,000		$8,700,000											$25,200,000	$0
Northern System Raw Water Transmission Lines	LS/SR	38.1	$4,500,000	$4,300,000			$9,000,000	$9,000,000		$19,000,000		$20,000,000		$20,000,000		$19,000,000		$15,000,000				$4,000,000	$123,800,000	$0
Water System Supply Wells 2025 Improvements	SC	13.8																		$5,000,000			$5,000,000	$0
Southern System Water Distribution System 2025 Improvements	LS/SR	38.1																					$0	$10,000,000
Northern System Water Distribution System 2025 Improvements	LS/SR	38.1															$5,700,000	$5,700,000	$5,700,000	$5,700,000	$5,700,000	$5,700,000	$34,200,000	$22,800,000
Water Booster Pump Station 2025 Improvements	LS/SR	38.1																					$0	$1,600,000
Water System Reservoirs 2025 Improvements	LS/SR	38.1																$3,000,000	$4,300,000	$3,000,000	$8,700,000	$8,700,000	$27,700,000	$0
Northern System GWUDI Filtration Compliance[4]	RC	17											$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$14,500,000	$145,000,000	$0
Year Total			*$18,675,000*	*$21,230,000*	*$18,330,000*	*$13,030,000*	*$19,130,000*	*$21,530,000*	*$9,130,000*	*$34,930,000*	*$9,130,000*	*$31,670,000*	*$19,370,000*	*$37,470,000*	*$19,370,000*	*$36,470,000*	*$25,070,000*	*$41,170,000*	*$29,370,000*	*$31,170,000*	*$33,770,000*	*$35,870,000*	***$505,885,000***	***$44,400,000***
Wastewater Collection System - Capacity Related																								
Northern District STP Rte 16 PS Overflow Study	SR/SC	30.1	$50,000																				$50,000	$0
Northern District STP Eliminate Flow Split	SR/OM&R	25.8	$50,000																				$50,000	$0
Northern District STP Priority 1 Sewer Upgrades	RC/LS	38.8				$2,400,000																	$2,400,000	$0
Northern District STP Priority 2 Sewer Upgrades	RC/SC	30.8														$280,000							$280,000	$0
Northern District STP Priority 3 Sewer Upgrades	RC/SC	30.8																					$0	$4,500,000
Hagatna STP Priority 1 Sewer Upgrades	RC/LS	38.8				$4,000,000																	$4,000,000	$0
Hagatna STP Priority 2 Sewer Upgrades	RC/SC	30.8																					$0	$17,000,000
Hagatna STP Priority 3 Sewer Upgrades	RC/SC	30.8																					$0	$11,000,000
Hagatna STP Pump Station Upgrades	RC/SC	30.8				$440,000		$4,400,000			$120,000	$1,200,000									$4,500,000		$10,660,000	$45,000,000
Agat-Santa Rita STP Priority 1 Sewer Upgrades	RC/SC	30.8				$1,200,000																	$1,200,000	$0
Agat-Santa Rita STP Priority 3 Sewer Upgrades	SC	13.8																			$4,500,000		$4,500,000	$0
Baza Gardens STP Priority 1 Sewer Upgrades	RC/SC	30.8				$650,000																	$650,000	$0
Baza Gardens STP Priority 2 Sewer Upgrades	SC	13.8														$580,000							$580,000	$0
Inarajan STP Pressure Sewer Upgrades	RC/SC	30.8				$1,200,000																	$1,200,000	$0
Year Total			*$100,000*	*$0*	*$0*	*$9,890,000*	*$0*	*$4,400,000*	*$0*	*$0*	*$120,000*	*$1,200,000*	*$0*	*$0*	*$0*	*$860,000*	*$0*	*$0*	*$0*	*$0*	*$9,000,000*	*$0*	***$25,570,000***	***$77,500,000***
Wastewater Collection System - Unsewered Areas																								
NDSTP and Hagatna STP Unsewered Properties – Sewer Hookups[5]	RC/Other	17						$1,300,000		$1,300,000		$1,300,000		$1,300,000		$1,300,000							$6,500,000	$0
NDSTP and Hagatna STP Unsewered Properties - New Sewers [6]	RC/Other	17							$2,700,000		$2,700,000		$2,700,000		$2,700,000		$2,700,000			$2,700,000		$2,700,000	$18,900,000	$21,600,000
NDSTP and Hagatna STP Unsewered Properties - Additional Sewer Hook-ups[5]	SC/Other	13.8										$1,250,000		$1,250,000		$1,250,000		$1,250,000		$1,250,000		$1,250,000	$7,500,000	$7,500,000
South System Sewer Hook-ups[5]	RC	17																$1,500,000		$1,500,000		$1,500,000	$4,500,000	$3,000,000
Year Total			*$0*	*$0*	*$0*	*$0*	*$0*	*$1,300,000*	*$2,700,000*	*$1,300,000*	*$2,700,000*	*$2,550,000*	*$2,700,000*	*$2,550,000*	*$2,700,000*	*$2,550,000*	*$2,700,000*	*$2,750,000*	*$2,700,000*	*$2,750,000*	*$2,700,000*	*$2,750,000*	***$37,400,000***	***$32,100,000***
Wastewater Collection System - Other																								
Manhole Frame Seal Repair	SR/OMR	25.8	$84,000																				$84,000	$0
Agat Manhole Rehabilitation	SR/OMR	25.8	$54,000																				$54,000	$0
Wastewater Collection System Recurring Inspection Program[7]	SR/OMR	25.8	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$12,200,000	$0
Wastewater Collection System Replacement/Rehabilitation Program[7]	SR/OMR	25.8	$1,100,000	$1,100,000	$1,100,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$37,300,000	$0
Year Total			*$1,848,000*	*$1,710,000*	*$1,710,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	***$49,638,000***	***$0***
Wastewater Facilities																								
Facilities Plan/Design for the Agat-Santa Rita STP Replacement	RC/SR/SRED/SC	58.9				$600,000		$2,600,000															$3,200,000	$0
Agat-Santa Rita STP Replacement	RC/SR/SRED/SC	58.9								$30,000,000													$30,000,000	$0
Facilities Plan/Design for the Baza Gardens STP Replacement	RC/SR/SRED	45.1	$500,000				$1,500,000																$2,000,000	$0
Baza Gardens STP Replacement	RC/SR/SRED	45.1							$18,000,000														$18,000,000	$0
Facilities Plan/Design for the Hagatna STP Improvements & Effluent WWPS	SR/SRED/SC	41.9							$1,900,000														$1,900,000	$0
Hagatna STP Improvements & Effluent WWPS	SR/SRED/SC	41.9									$18,000,000												$18,000,000	$0
Facilities Plan/Design for Inarajan STP Expansion	SR/OM&R	25.8										$190,000											$190,000	$0
Inarajan STP Expansion	SR/OM&R	25.8												$420,000									$420,000	$0
Facilities Plan/Design for the Northern District STP – Biosolids	RC/SR	30.1	$500,000										$1,800,000										$2,300,000	$0
Northern District STP Expansion - Biosolids	RC/SR	30.1			$5,000,000										$16,000,000								$21,000,000	$0
Facilities Plan/Design for the Northern District STP Expansion	SR/SRED	25.6							$1,200,000														$1,200,000	$0
Northern District STP Expansion	SR/SRED	25.6									$10,000,000												$10,000,000	$0
Facilities Plan/Design for the Umatac-Merizo STP Improvements	SR/OM&R	25.8						$140,000															$140,000	$0
Umatac-Merizo STP Improvements	SR/OM&R	25.8							$420,000														$420,000	$0
Pago Socio STP Conversion	SR/OM&R	25.8										$3,700,000											$3,700,000	
Year Total			*$1,000,000*	*$0*	*$5,000,000*	*$600,000*	*$1,500,000*	*$2,740,000*	*$21,520,000*	*$30,000,000*	*$28,000,000*	*$3,890,000*	*$1,800,000*	*$420,000*	*$16,000,000*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	***$112,470,000***	***$0***
Electrical/SCADA																								
Electrical Upgrade - Water Booster Stations (Pago Bay, etc)	LS/SR	38.1	$650,000																				$650,000	$0
Electrical Upgrade - Water Booster Stations (Gayinero, etc)	LS/SR	38.1		$350,000																			$350,000	$0
Electrical Upgrade - Water Booster Stations (Other WBPS)	LS/SR	38.1			$250,000																		$250,000	$0
Electrical Upgrade - Water Wells	LS/SR	38.1	$2,000,000																				$2,000,000	$0
Electrical Upgrade – Agat-Santa Rita STP	LS/SR	38.1	$400,000																				$400,000	$0
Electrical Upgrade – Baza Garden STP	LS/SR	38.1					$300,000																$300,000	$0
Electrical Upgrade – Northern District STP	LS/SR	38.1		$1,900,000																			$1,900,000	$0
Electrical Upgrade – Umatac-Merizo STP	LS/SR	38.1			$300,000																		$300,000	$0
Wastewater Pumping Station Electrical Upgrade	RC/SR	33.3	$1,000,000																				$1,000,000	$0
GWA SCADA System - Phase 1	RC/SR	16.3	$250,000																				$250,000	$0
GWA SCADA System - Phase 2	RC/SR	16.3		$1,100,000																			$1,100,000	$0
GWA SCADA System - Phase 3	RC/SR	16.3			$2,500,000																		$2,500,000	$0
GWA SCADA System - Phase 4	RC/SR	16.3				$850,000																	$850,000	$0
Year Total			*$4,300,000*	*$3,350,000*	*$3,050,000*	*$850,000*	*$300,000*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	***$11,850,000***	***$0***
Other																								
GIS	Other	--	$160,000	$160,000	$160,000	$160,000	$160,000																$800,000	$0
Year Total			*$160,000*	*$160,000*	*$160,000*	*$160,000*	*$160,000*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	***$800,000***	***$0***
Annual Total			**$26,083,000**	**$26,450,000**	**$28,250,000**	**$27,140,000**	**$23,700,000**	**$32,580,000**	**$35,960,000**	**$68,840,000**	**$42,560,000**	**$41,920,000**	**$26,480,000**	**$43,050,000**	**$40,680,000**	**$42,490,000**	**$30,380,000**	**$46,530,000**	**$34,680,000**	**$36,530,000**	**$48,080,000**	**$41,230,000**	**$743,613,000**	**$154,000,000**
							$131,623,000					$221,860,000					$183,080,000					$207,050,000		***$897,613,000***
																								30-Year Total

[1] Cost based on (10% design, 5% Services during construction, 7% Construction Management, 50% Planning Level Adjustment)
[2] Costs are 2007 Dollars
[3] Project Types: **RC**=Regulatory Compliance; **SR**=System Reliability; **SRED**=System Redundancy; **SC**=System Capacity; **OMR**=OM&R; **LS**=Life & Safety
[4] Costs for design, planning, and construction of full treatment for GWUDI compliance; If filtration avoidance is allowed, total costs will be approximately $5,000,000 after transmission lines are complete
[5] Funded by Sewer Hook-up Revolving Fund
[6] GWA may not be able to provide new sewers to existing customers without a connection fee. New legislation or alternative funding sources may be required.
[7] Cost is an annual recurring cost to inspect and replace/rehabilitate the gravity and force main systems
[8] Costs for Years 20 to 30 do not include recurring costs like Inspection and Annual Replacement/Rehab, but only costs deferred beyond Year 20 in Base Case.

Exhibit 15A – CIP Definition

O&M vs. CIP Definitions and Examples

Purpose: To provide some simplified examples of the type of expenditures that should be recorded as Operation and Maintenance Expenses and those that should be capitalized and recorded as an asset on the books of GWA. Any questions regarding these matters should be forwarded to the GWA Accounting Department.

Definition of an operation and maintenance expense: Routine maintenance and operating costs that enables the asset to function in the manner in which it was intended. Assets whose useful life is expected to be less than one year is an operation and maintenance expense. An example of this is motor oil in a car. Motor oil is required to be changed periodically in order for the car to function in the manner it was intended. Thus, motor oil is an operation and maintenance expense. Similarly, a starter or a distributor would likely be operation and maintenance costs as an owner of a vehicle has a reasonable expectation that these items would need to be replaced at some time during the vehicle's useful life if the expected useful life is to be achieved.

Definition of a capital improvement cost: A new asset with a value greater than $750 and a life expectancy of greater than one year is a capital asset. A capital cost should also be recorded if an expenditure extends the useful life of the asset or if the expenditure significantly changes the ability of the asset to function. The purchase of a new vehicle is the purchase of an asset with a value greater than $750 with a life expectancy of greater than one year. If the engine is blown in the first year and replacement is required, the cost would be an expense because a new engine on a new car would not extend the life of the vehicle. If an engine is blown in the 7^{th} year the vehicle is in existence and there are other improvements made to extend the useful life of the asset beyond its expected useful life when it was first purchased, then the expenditures would be a capital asset.

Specific examples

Hagåtña Treatment Plant: The plant is undergoing a substantial refurbishment which will substantially alter and improve its ability to perform the function for which it was intended. The upgrades will likely increase the useful life of the asset. For these reasons, the costs to refurbish the Hagåtña Treatment Plant would be capitalized.

Water Distribution Line Replacement: The lines being replaced are at or near the end of their useful life. The new lines would substantially extend the useful life of the asset. The cost of replacing the water distribution lines would be capitalized.

Fence Construction: If the fence is new or is replacing a fence that is at or near the end of its useful life, the cost of the fence construction would be capitalized.

Storage Tank Repainting: There is an expectation that a storage tank should be repainted every 3-5 years to ensure the tank is properly protected from corrosion, etc. Painting will not lead to the extension of the life of a tank. Therefore, storage tank repainting is not capitalizable.

Damage Repair: When an asset is damaged due to loss, the dollar value of the loss should be immediately reduced from its book value. When costs are incurred to restore the useful life of the asset to that which it had prior to the loss event, the costs should be capitalized. If the book value of the asset has not been reduced, any costs to restore it to its pre-loss condition could not be capitalized.

Exhibit 15B – Cost Estimate Classification Matrix

COST ESTIMATE CLASSIFICATION MATRIX FOR THE PROCESS INDUSTRIES

The five estimate classes are presented in figure 1 in relationship to the identified characteristics. Only the level of project definition determines the estimate class. The other four characteristics are secondary characteristics that are generally correlated with the level of project definition, as discussed in the generic standard. The characteristics are typical for the process industries but may vary from application to application.

This matrix and guideline provide an estimate classification system that is specific to the process industries. Refer to the generic standard for a general matrix that is non-industry specific, or to other addendums for guidelines that will provide more detailed information for application in other specific industries. These will typically provide additional information, such as input deliverable checklists to allow meaningful categorization in those particular industries.

	Primary Characteristic	*Secondary Characteristic*			
ESTIMATE CLASS	**LEVEL OF PROJECT DEFINITION** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges [a]	**PREPARATION EFFORT** Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Concept Screening	Capacity Factored, Parametric Models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%	1
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%	2 to 4
Class 3	10% to 40%	Budget, Authorization, or Control	Semi-Detailed Unit Costs with Assembly Level Line Items	L: -10% to -20% H: +10% to +30%	3 to 10
Class 2	30% to 70%	Control or Bid/ Tender	Detailed Unit Cost with Forced Detailed Take-Off	L: -5% to -15% H: +5% to +20%	4 to 20
Class 1	50% to 100%	Check Estimate or Bid/Tender	Detailed Unit Cost with Detailed Take-Off	L: -3% to -10% H: +3% to +15%	5 to 100

Notes: [a] The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

[b] If the range index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%. Estimate preparation effort is highly dependent upon the size of the project and the quality of estimating data and tools.

Figure 1. – Cost Estimate Classification Matrix for Process Industries

Exhibit 15B – Cost Estimate Classification Matrix (continued)

CLASS 5 ESTIMATE	
Description: Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systemic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with little effort expended—sometimes requiring less than an hour to prepare. Often, little more than proposed plant type, location, and capacity are known at the time of estimate preparation. **Level of Project Definition Required:** 0% to 2% of full project definition. **End Usage:** Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.	**Estimating Methods Used:** Class 5 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, and other parametric and modeling techniques. **Expected Accuracy Range:** Typical accuracy ranges for Class 5 estimates are - 20% to -50% on the low side, and +30% to +100% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** As little as 1 hour or less to perhaps more than 200 hours, depending on the project and the estimating methodology used. **ANSI Standard Reference Z94.2-1989 Name:** Order of magnitude estimate (typically -30% to +50%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Ratio, ballpark, blue sky, seat-of-pants, ROM, idea study, prospect estimate, concession license estimate, guesstimate, rule-of-thumb.

Figure 2a. – Class 5 Estimate