Water Utility Infrastructure Challenges in Underserved Communities

Gilbreeze Subdivision Water and Sewer Systems, Yigo, Guam

Miguel C. Bordallo, P.E.,
Guam Waterworks Authority
Presentation Agenda

• Guam Waterworks Authority System Overview
• History of Capital Planning and Improvement Program
• Current 5-year Capital Improvement Program
• Project Highlight: Gilbreeze Subdivision Water and Sewer Systems
• Challenges and Considerations
GWA’s Water System

Water System
• ~43,000 customers
• 580+ miles of distribution piping
• 25 storage tanks
• 25 booster pump stations
• 120 water supply wells
• 1 surface water treatment plant
• Operation of US DoD-owned Tumon ‘Maui’ Well
GWA Wastewater System

Wastewater System

- ~29,000 customers
- ~300 miles of collection system piping
- 78+ wastewater lift stations
- 6 wastewater treatment plants
GWA’s **FY20-24 Financial Plan** & **2018 Water Resource Master Plan Update**

- GWA has achieved significant progress since 2006 plan
- 70% of 2006 WRMP Projects completed or in-progress
- 2018 WRMP Update is 20-yr plan with $1.2B in CIP projects
- FY20-FY24 Financial Plan & CIP builds from 2018 WRMP
- **$292M CIP** anticipated $260M in new bonds to continue improvements to service from 2006 levels

*Progress to 2018*

*Setting New Standards for a Well-run, Sustainable Utility*

- ~$300M in CIP since 2006
- FY20-FY24 FP/CIP $260M in Bonds
- 2006 WRMP
- 2018 WRMP Update: $1.2B 20-Yr CIP
- 2037
GWA Capital Improvement Program
$342M for FY20-FY24

Capital Program Allocation
By Project Type - ($000)

- Court Order, $46,633, 14%
- Consent Decree, $113,129, 33%
- Non-Revenue Water, $66,366, 19%
- Env-Safety Compliance, $31,768, 9%
- Capacity, $26,577, 8%
- Efficiency, $55,754, 16%
- Discretionary, $2,000, 1%

Capital Program Allocation
By System - ($000)

- Potable Water, $173,870, 51%
- Wastewater, $131,567, 38%
- SCADA Electrical, $15,340, 5%
- Miscellaneous, $21,450, 6%
Before: Original Agat-Santa Rita WWTP
After: New Agat-Santa Rita WWTP
Before: Original Chaot Water Storage
After: New Water Chaot Storage Tank
Before: Original Testing Laboratory
After: New Compliance Laboratory
Before: “Down Hard” Well D-17
After: Refurbished Well D-17
Project Highlight: Gilbreeze Subdivision
Underserved Community in the Northern Village of Yigo, Guam

- No current water or sewer infrastructure
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• Homes may not be constructed to Building Code requirements
• Temporary / makeshift water storage facilities (drums/totes)
• Unimproved subdivision / no drainage or paved roads
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Gilbreeze Subdivision
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in the Northern Village of Yigo, Guam

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Proposed Water Infrastructure Improvements
Gilbreeze Subdivision - Yigo, Guam

- Replace existing water lines with 6-inch water lines
- Proposed sewer pump station
- Santa Rosa Water Tank
Water System Improvements

Water System Description:
Six-inch diameter water mains with hydrants will be constructed in the Gilbreeze Subdivision. Due to the subdivision’s elevation, a booster pump is needed to provide sufficient water pressure. Two options for booster pumps are:

- Option 1: Construction of a 6-inch water main from the Santa Rosa Tank and future booster pump to the top of Mt. Santa Rosa to connect to the Gilbreeze water system. An easement will be required for this option.

- Option 2: Construction of 6-inch water main from a hydrant on Gayinero Road to the Gilbreeze water system. A booster pump station and land will be required for this option.

Cost Estimate:

<table>
<thead>
<tr>
<th>System Component</th>
<th>Estimated Unit Cost</th>
<th>Number of Units</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-inch water mains at the Gilbreeze Subdivision</td>
<td>$275/linear foot (LF)</td>
<td>9,600LF</td>
<td>$2,640,000</td>
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<tr>
<td>Offsite water system improvements – Option 1</td>
<td>6-inch water main from the Mt. Santa Rosa tank to the subdivision</td>
<td>$275/LF</td>
<td>5,000LF</td>
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<tr>
<td></td>
<td>Land purchase for easement</td>
<td>$100,000</td>
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<tr>
<td>Offsite water system improvements – Option 2</td>
<td>6-inch water main from a hydrant on Gayinero Road to the subdivision</td>
<td>$275/LF</td>
<td>2,000</td>
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<tr>
<td></td>
<td>Booster pump station and land purchase</td>
<td>$1,500,000</td>
<td>1</td>
</tr>
</tbody>
</table>
Sewer System Improvements

Sewer System Description:
A gravity sewer system will be installed in the Gilbreeze Subdivision. Due to elevations, most of the lots will need to drain towards a sewer pump station in the southeast corner of the subdivision. A force main will convey wastewater to another gravity system at the entrance to the subdivision. This gravity system will drain towards a low point east of Route 15, where a second pump station is needed to pump wastewater to Gayinero Road. A second force main will convey wastewater to west of the Route 15/Gayinero Road intersection, where a new 3,000-foot gravity system will connect to an existing manhole. Wastewater eventually drains to the Yigo Sewer Pump Station, which might need to be upgraded to accommodate the new wastewater load.

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<tr>
<td>Gravity sewer system (8-inch diameter)</td>
<td>$630/LF</td>
<td>15,500 LF</td>
<td>$9,765,000</td>
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<tr>
<td>Sewer pump stations, including land</td>
<td>$2,100,000 / station</td>
<td>2 stations</td>
<td>$4,200,000</td>
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<tr>
<td>Sewer force main (6-inch diameter)</td>
<td>$275/LF</td>
<td>4,700 LF</td>
<td>$1,292,500</td>
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<tr>
<td>Potential Yigo Sewer Pump Station upgrade</td>
<td>$800,000</td>
<td>1</td>
<td>$800,000</td>
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<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Water Option 1 and Sewer Costs</td>
<td></td>
<td></td>
<td>$20,172,500</td>
</tr>
<tr>
<td>Water Option 2 and Sewer Costs</td>
<td></td>
<td></td>
<td>$20,847,500</td>
</tr>
</tbody>
</table>
Execution Challenges and Considerations

**COST ISSUES**
Customer Costs for Service
- Service Lateral Construction
- System Development Charges (one time)
  - Water: $2,126
  - Sewer: $3,474
- Monthly Water / Sewer Charges
  - Average Monthly Bill $XX.XX

**CONSTRUCTION / CONNECTION ISSUES**
- Substandard Construction
  - Building Code requirements
  - Interior piping quality
- Backflow prevention
- Onsite water sampling
- Separation of buried utilities on private property
- Potential damages for private piping failure
BIL Implementation Challenges

- Rising construction costs on Guam due to
  - Military buildup
  - Lack of construction labor (H2-B Visa Issue)
  - Global supply chain issues
- Buy America / Buy American provisions add to implementation costs
  - 30% increase in material costs over equivalent available products
- Increase in oil/fuel prices contribute to higher construction costs
  - Shipping cost impacts from fuel surcharges
  - Construction equipment related fuel costs
Potential Solutions

• H-2B visa waiver for non-military construction
• Blanket waiver of Buy America / Buy American provisions
• Flexibility on use of BIL funds for private property improvements to defray connection / construction costs for low-income customers