Monte Castillo Phase II Comprehensive Long-term Sustainable Infrastructure Improvements

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Project Background

- Monte Castillo is an impoverished and growing community near Piura, Peru
- Since its construction in the late 1990's, the wastewater system in Monte Castillo has seen little to no maintenance or repairs
- Infrastructure is currently failing and barely functional.
- Immediate repairs are needed

Objectives

- Perform a risk-based analysis of the system to determine what parts of the system are most in need of repair
- Develop a prioritized list of reparations
- Develop repair and improvement plans for different system components
- Create a maintenance plan following system improvements

Risk-Based Analysis

- Risk of failure and consequence of failure criteria were developed to assess the state of each area of concern and organized into an evaluation matrix
- Each area of concern (manholes and sewer mains) throughout the system was scored according to the criteria
- Sites with the highest overall score were given top priority

Criteria	Weighted Score
Risk of Failure (RoF)	
Structural condition of manhole lid	0.40
Condition of infrastructure surrounding sewer features	0.40
Structural condition of fittings and other supporting features	0.20
Total RoF	**1.00**
Consequence of Failure (CoF)	
Impact to public health	0.35
Impact to waste-water distribution system	0.15
Location of failure within community public facilities	0.30
Construction requirements and duration	0.20
Total CoF	**1.00**
	Total Evaluated Score

Evaluation Matrix used to evaluate the manholes

Criteria	Weighted Score
Risk of Failure (RoF)	
Structural condition of pipeline	0.40
Length of segment of pipe	0.20
Condition of gaskets and other supporting pipeline features	0.40
Total RoF	**1.00**
Consequence of Failure (CoF)	
Impact to public health	0.35
Impact to waste-water distribution system	0.15
Location of failure within community public facilities	0.30
Construction requirements and duration	0.20
Total CoF	**1.00**
	Total Evaluated Score

Evaluation Matrix used to evaluate the collapsed pipelines

Repair Recommendations

Reparations will be specific to each site but are summarized as follows:

Manholes:

- Debris excavation and chimney cleanout
- Installation of pre-fabricated cast iron lid with built in steel skirt
- Removal of existing damaged concrete supports and application of new concrete collar and support slab
- Addition of cementitious mortar lining to manhole chimneys

Collapsed Pipeline:

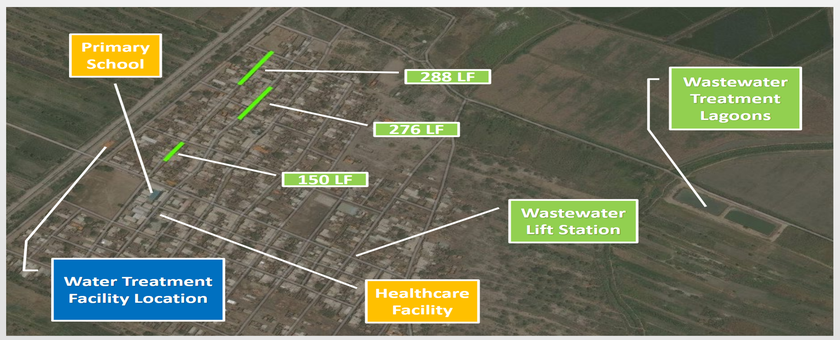
- Open-trench excavation of existing collapsed pipe
- Temporary shut-off of existing lateral service lines and connecting sewer mains
- Replacement of collapsed segments with 8-inch PVC pipe
- Installation of fernco type couplings to secure new pipes to the existing
- Trench refill and compaction testing

Internally Damaged Pipeline:

- Trenchless repair
- Cleanout of existing pipe reach using an abrading agent or other viable method
- Insertion of an epoxy sleeve liner to an act as a new pipe interior
- Follow ideo inspection to make certain the repair was successful

Lift Station:

- Cleanout and disposal of grease and other solids
- Installation of automated float system
- Ideal update: replace the existing pumps with higher capacity pumps



Maintenance Requirements

- Recommended annual routine wastewater system inspections by a service provider
- Recommended internal televised video inspection every two to four years by a service provider
- Recommended full sewer system cleaning by way of rodding, hydro jetting, sewer ball, or other trusted method conducted by a service provider
- Recommended planning, scheduling, and budgeting of inspections and cleanings by a Monte Castillo Representative or service provider

Construction Costs

- Materials and services cost estimates taken from US civil construction databases and converted to Peruvian Soles

Phase II Opinion of Probable Construction Cost (OPCC) in Soles:

S/.617,680.00

- Total includes added 15% contingency and 5% Inflation
- OPCC accounts for all collapsed pipe, manhole, and lift station construction efforts

Construction Schedule

- Immediate repairs - areas in severe condition
  - Replacement of three existing collapsed pipe segments
  - Repair of 15 highest scoring manholes from evaluation matrix
- Secondary repairs
  - Repair of the remaining manholes throughout the village
  - Add automatic float switch to lift station
- Future construction efforts
  - Point repairs to existing force mains
  - Improvements to treatment lagoon
  - Upgrade pumps on lift station