Pignon Water Project

JM Eagle™

In partnership with
Community Coalition for Haiti, Illinois Institute of Technology,
and Haiti Outreach

Technical Plan

November 11, 2008

Technical Specs and Phases

Below is a summary of the Technical Phases for the Pignon Water Project. The Preparatory Phase, completed in May 2008, consisted of streambed stabilization, reforestation of the watershed, Water Committee management training, and construction of a new pump house through the Herndon and Alexandria Rotaries. Phase I is in the process of implementation.
Note: All estimates are reasonable cost ranges including labor.

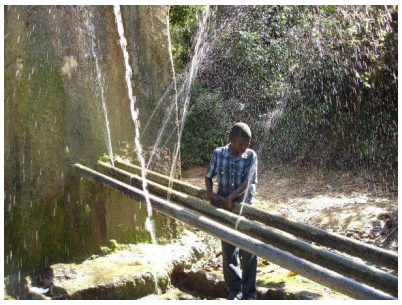
Phase I

1) **Work Description:** Install new pumping system, repair capped springs and downstream pipe, stop unhindered water flow through public fountains, regulate flow to private users and maintain structural integrity of existing tank.

a) Purchase and install two – 3" RIFE 30 HDU RAM pumps. RAM pumps use kinetic energy from waterfall to pump 24 hours a day with virtually no maintenance.
b) Repair four existing public fountains to prevent unregulated water flow and provide future water supply to a portion of the population not connected to the network. Public fountains will be closed during Phase I and until secondary pumping system is installed.
c) Repair concrete at five capped springs.
d) Scrape and paint existing 45,000-gallon cistern to maintain structural integrity.
e) Provide automatic stop valves for 200 current commercial and private connections to prevent water wastage. The users must hold the valve in order to allow water flow.
f) Repair five – 6" PVC catchment pipes connecting the five capped springs to junction box. Each pipe is approximately 300' long. Two pipes have been disconnected during flooding events and the three other pipes are damaged and dirty water is currently flowing inside the pipes through major holes. The five pipes need to be repaired in order to maximize the flow to the RAM pumps and increase pumping capacity.
g) Rebury and repair leaks in 16,000' of 8" PVC pipe from junction box to stand pipe. Install concrete collars to maintain the pipe placement during flooding event.
h) Repair three 3" galvanized pipe between the stand pipe and the pump house.

PVC pipes are broken off, which prevents spring water from entering the system. People and animals bathing at the water source allows contamination to infiltrate the water system farther downstream. Increased, cleaner water will result with pipe reconnection and dry area reinforcement (with aggregate or fencing of the springs).

PVC pipes from capped springs to junction box are broken, exposed and move during flooding causing additional breakage and leaks. At this location, only three pipes remain connected.



2) **Resulting Improvements:** Double the volume of water distributed to households connected to the public water distribution network. Increase system efficiency by repairing leaks, protecting pipelines and limiting water wastage.

a) Increase water flow to the cistern with two new RAM pumps from less than 5gpm to approximately 13 gpm. Approximately 19,000 gallons* will be delivered to the cistern per day. *Total gallons provided assumes 25% water loss in the distribution network.
b) Increase amount of water distributed to private and commercial users. Approximately 14,000 gallons* will be distributed daily. *Total gallons provided assumes 25% loss of water from the delivery system. Each private connection will receive an average volume of 210 gallons every three days. Each household occupant will receive an average daily volume of 12.3 gallons which is higher than the World Health Organization recommendation (10.5 gallons per day).
Note: If there are 200 existing private connections, 14,000 gallons per day will not be enough to supply both private connections and public fountains. The public fountains will be open during phase II.
c) Increase system efficiency. All major leaks will be repaired and concrete collars will be built to stabilize main pipes.
d) Decrease water wastage. All private connections will be equipped with automatic stop valves. Prevent use of household cisterns and water over usage. See picture below.

3) **Estimated Costs:**

a) Purchase and install 2-3" RIFE 30 HDU RAM pumps = $10,000.00 ($2,900 each pump plus shipping)
b) Repair and close four existing public fountains = $500.00
c) Repair concrete at five capped springs = $500.00
d) Repair 8” PVC pipe between the collection box and the stand pipe and install concrete collars = $2,000
e) Repair 240' of galvanized 3" pipe from stand pipe to RAMS with couplings = $1,500
f) Scrape and paint existing cistern = $1,000

g) Purchase two hundred automatic stop valves to equip private and commercial connections = $2,400 (Installation costs is user responsibility)

Total = $16,500.00 - $19,000.00 USD

Phase II

1) **Work Description:** Install secondary electric pumping system with buffer tank to boost rate of water flow to the existing cistern. Repair/install a new 6" supply line between the pump house and the future primary loop. Open four public fountains repaired in phase II. Build a 15,000-gallon reinforced concrete buffer tank to collect excess water from the ram pumps.
   a) Purchase and install a 125 gpm electric pump
   b) Replace 1,000' of 6" supply pipe. The current 4" supply pipe is too small to accommodate new increased flow rate (13 gpm supplied by the RAM pumps + 125gpm supplied by the electric pump). If 6" Schedule 40 is used it must be buried to avoid damage and vandalism. *Optional replacement with ductile cast iron pipe on concrete collars.
   c) Open four public water fountains in order to provide water to people who don't have a private connection.
2) **Resulting Improvements:** Increase the pumping capacity to the cistern from 19,000 to 34,000 gallons per day. Provide an additional one bucket per day to four hundred households.
   a) Increase pumping capacity to the cistern from 19,000 to 34,000 gallons* per day considering that the electrical pump will be on service two hours per day. * Assumes 25% loss of water from the delivery system.
   b) Provide water to four hundred households who don't have a private connection through temporary public distribution. Four hundred 5-gallon buckets will be delivered daily. *Note: Electricity will be provided by the Pignon Electric Co-Op. The pump will use 268 kWh per month for 2 hours per day.*
   c) Increase water available to private and commercial connections. Out of the 11,250 gallons of water injected in the network by the electrical pump (25% loss included), 9,250 will be available for private and commercial users.
3) **Estimated Costs:**
   a) Build a 15,000 gallon reinforced buffer tank = $5,000
   b) Purchase and install a 125 gpm electric pump = $12,000
   c) Replace 1,000 ' 6" PVC Schedule 40 supply pipe from pump house to the future prmary loop = $5,000 (*Optional use of ductile cast iron)
   d) Open four public fountains = $1,500

Total = $22,500-$25,000 USD

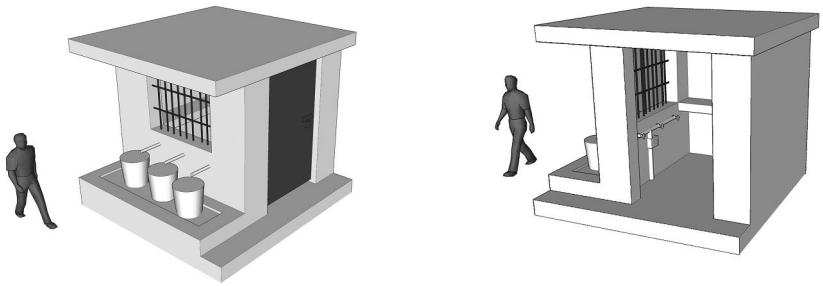
Phase III

I) Work Description: Install secondary cistern. Implement a new primary distribution loop and build seven water kiosks while maintaining the old renovated system in service. Existing private connections will remain connected to the old system. Kiosks will be connected to the new system. Disinfection of water before distribution for public water kiosks.
   a) Purchase and install a 65,000-gallon fiberglass cistern at higher elevation than existing cistern.
   b) Install a new 6" supply PVC Schedule 40 line between the newly built primary loop and cistern.

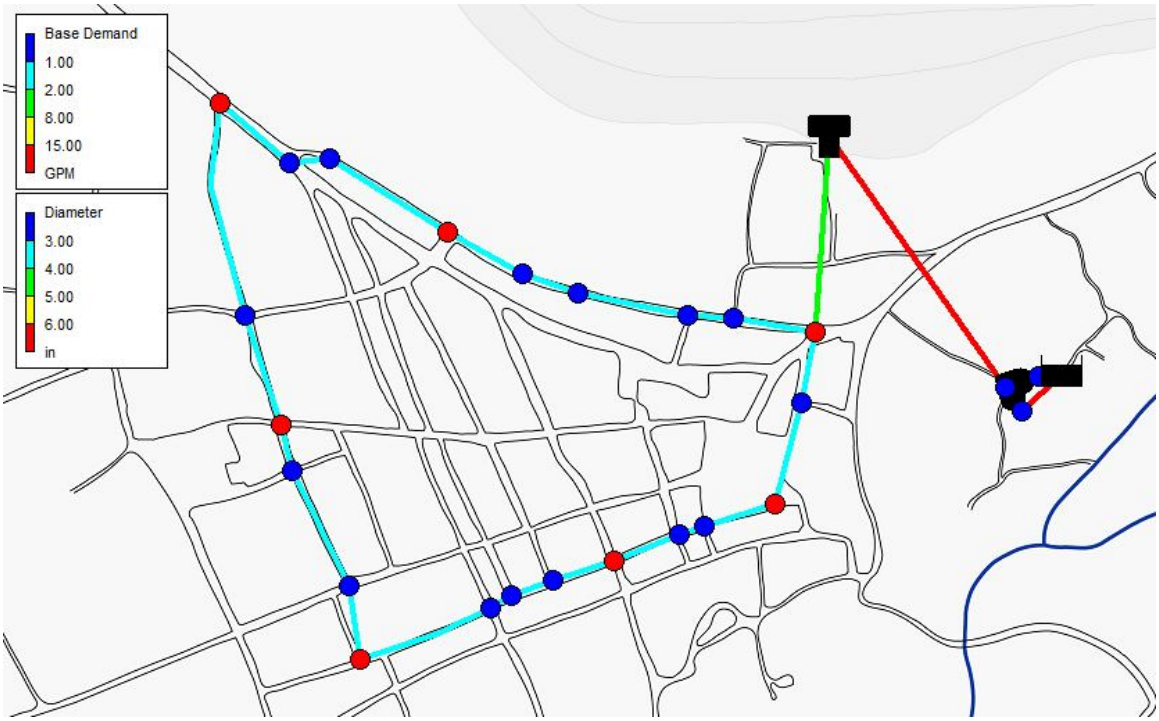
c) Install a new 4" PVC Schedule 40 primary loop. The primary loop is designed to provide constant water pressure to the entire town and to anticipate future network expansion.
d) Close four old water fountains.
e) Build a disinfection unit. Calcium hypochlorite will be used because of its stability.
f) Build seven new public water kiosks connected to the primary loop. The connection to the water kiosk will be equipped with a main water meter. The water will be distributed through five faucets for two to four hours per day. An employee will be responsible for fee collection. A fee of one gourde per bucket is recommended.
g) Increase service duration of the electrical pump in order to satisfy water demand from the entire population. As population growth occurs and more households are connected to the water distribution network, the time of service will be increased.

II) Resulting Improvements: Increase water storage capacity. Increase water distribution capacity. Implement a permanent public service and provide water to the entire population. Treated water distributed at public kiosks.
a) Disinfected water is distributed at the public water kiosks and is available for all the population.
b) Network is totally new and system efficiency is close to 100%.
c) Meet estimated demand at seven water kiosks of 14, 360 gallon per day (6 gallons per person per day for approximately 2,400 people).
d) 48,500 gallons per day pumped to new cistern. Assume 20% total system loss (reduced from previous levels), 29, 535 gallons would be available for private and commercial users, approximately 17.4 gallons per day, larger than the World Health Organization recommendation of 10.5 gallons per day per person and larger than the recommended daily consumption value of 12 gallons per person per day given by SNEP.

III) Estimated Costs:
a) Install a 65,000-gallon fiberglass cistern = $75,000.
b) Build seven public water kiosks = $21,000 (Below is picture of proposed kiosk).



c) Install 1,425' of 6" PVC Schedule 40 between the newly built primary loop and the new cistern = $5,800
d) Install 275' of 6" PVC Schedule 40 = $1,120 and 5,750' of 4" PVC Schedule 40 for a new primary loop = $16,100
e) Provide treatment system for Pignon Water System = $10,000
Total = $130,000 – $150,000



Main Loop and 7 Kiosks

Phase IV

1) Work Description: Transfer private and commercial connections from the old system to the new primary loop. Build a secondary loop with three additional public water kiosks. Option of providing solar energy to the system to increase pumping capacity and reduce operational costs.

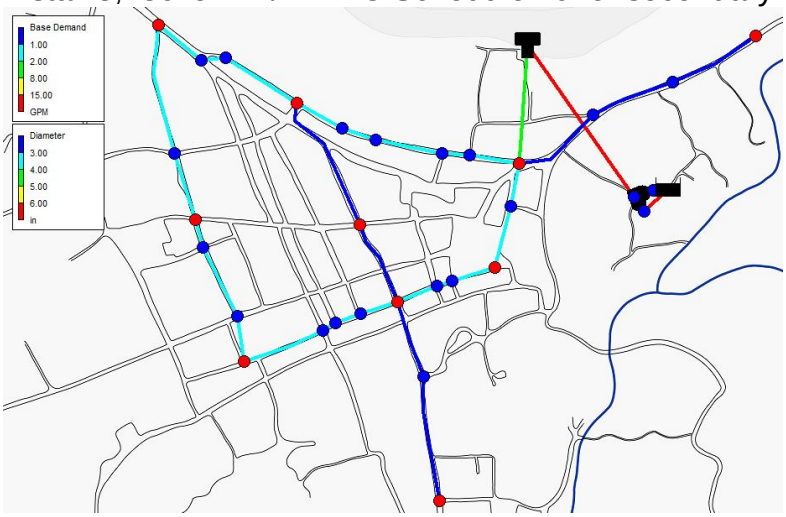
a) Install secondary loop. Layout will depend on location of existing and ordered private and commercial connections.
b) Install three additional public water kiosks.
c) Create new private connections as network is expanded.
d) Optional: Add solar pump system

2) Resulting Improvements: Increase water distribution capacity by adding three new public water kiosks to the system. Provide disinfected water to the entire population by transferring old connections to the new primary and secondary loops.

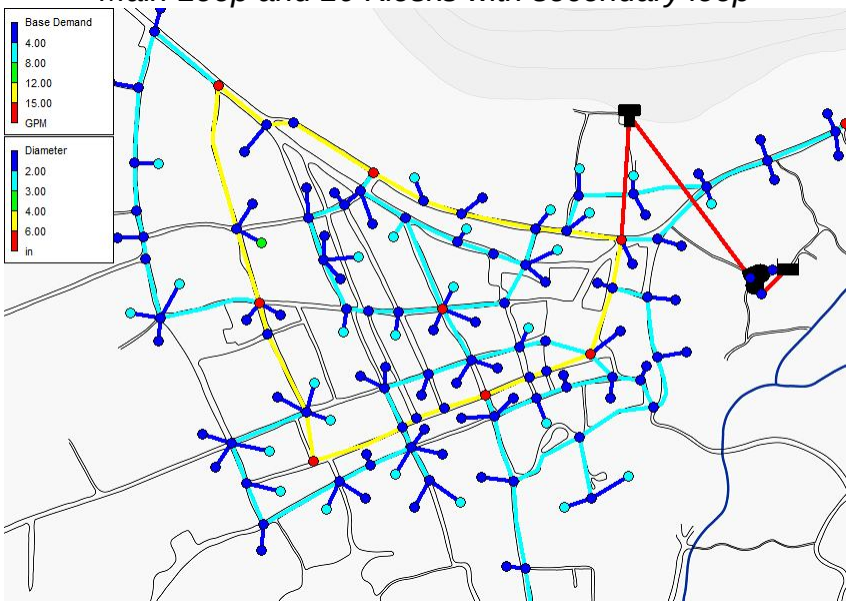
a) Build secondary network to transfer private and commercial connections to the new system in order to provide disinfected water to the entire population.
b) Increase water distribution capacity by increasing the number of public kiosks from seven to ten.
c) Meet estimated demand at ten public water kiosks of approximately 20,520 gallons per day (6 gallons per person per day for 3,420 people).
d) 48,500 gallons per day pumped to new cistern. Assume 17.5% total system loss (reduced from previous levels), 19,500 gallons would be available for private and commercial connections, approximately 11.5 gallons, larger than the World Health Organization recommendation of 10.5 gallons per day per person.

4) Estimated Costs:

a) Expand to secondary loop for water distribution.
b) Install three new public water kiosks = $9,000
c) Install 3,150' of 2 1/2" PVC Schedule 40 for secondary loop = $6,600



Main Loop and 10 Kiosks with secondary loop



Scenario Private Connections

d) Optional: Add solar pump system

Total = $15,000 - $20,000

Aerial View of Pignon with completed JM Eagle system.