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Village Supply Household Infrastructure

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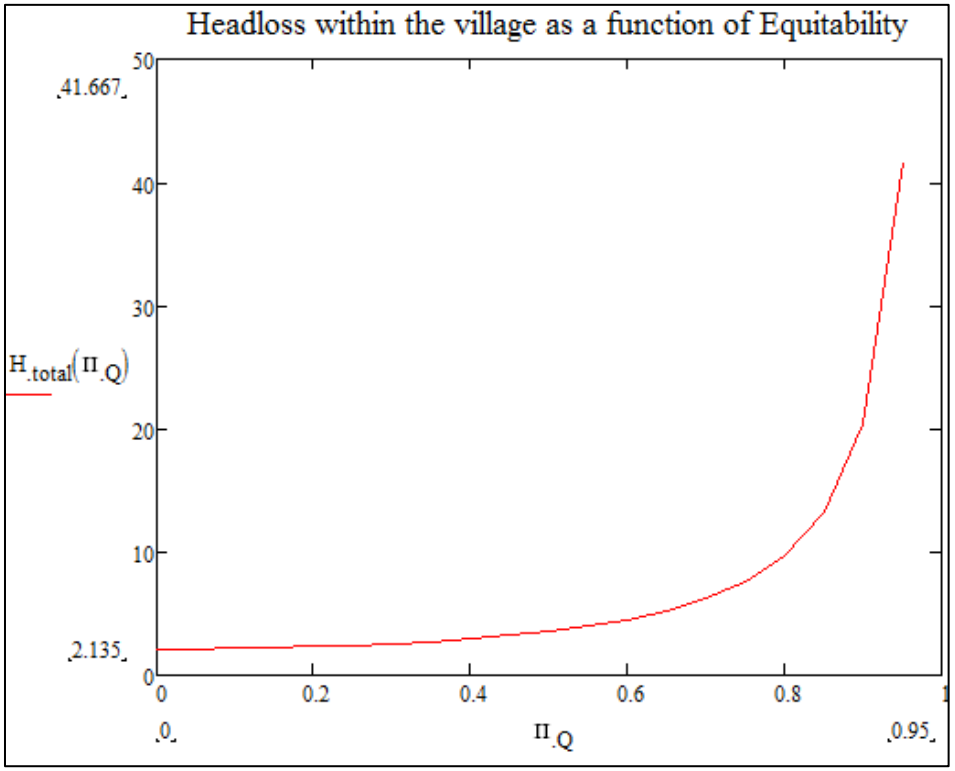
Semester Goals

- Deliver equal flow to each one of the households
- Design a household storage tank
- Design a functional and hygienic sink.

Water Equity

- Desired household flow rate:
  Qhouse = 0.0021L/s

- We use a Equity Constant of Π_c=0.8 to force all the flow rates to be in a range of 20% of the average.

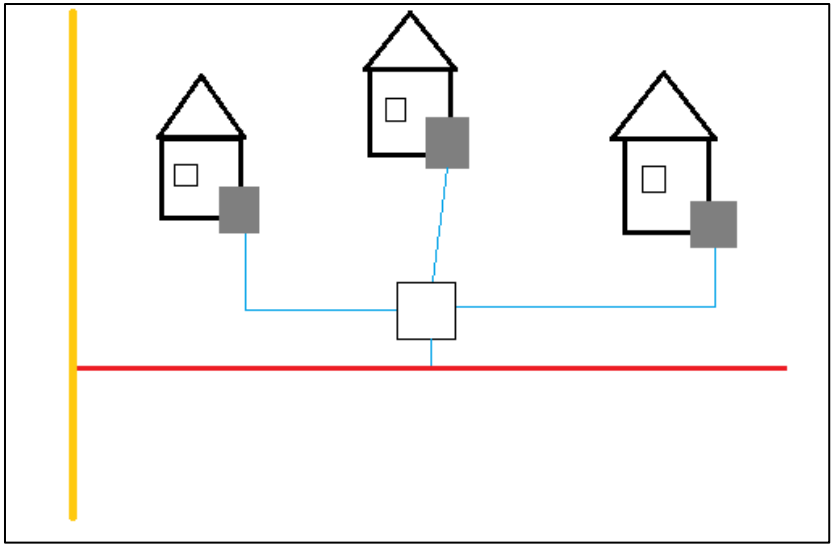


Pressure Regulator

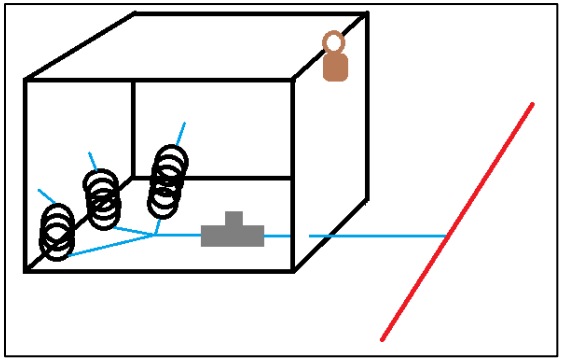
- Not feasible to create a homemade device.
- Single stage regulator adjusted to 30 psi and a cost of $40. Size depends on pipes.
- More useful in villages where the slope in steeper.

Coiled tubing

- Small diameter creates large amounts of headloss
- Scalable across villages



$$L_{Tubing} = \frac{2g * h_{f.tubing}\left(\pi \frac{D_{Tubing}^2}{4}\right)^2 * D_{Tubing}}{f_{factor} * Q_{Tubing}^2}$$



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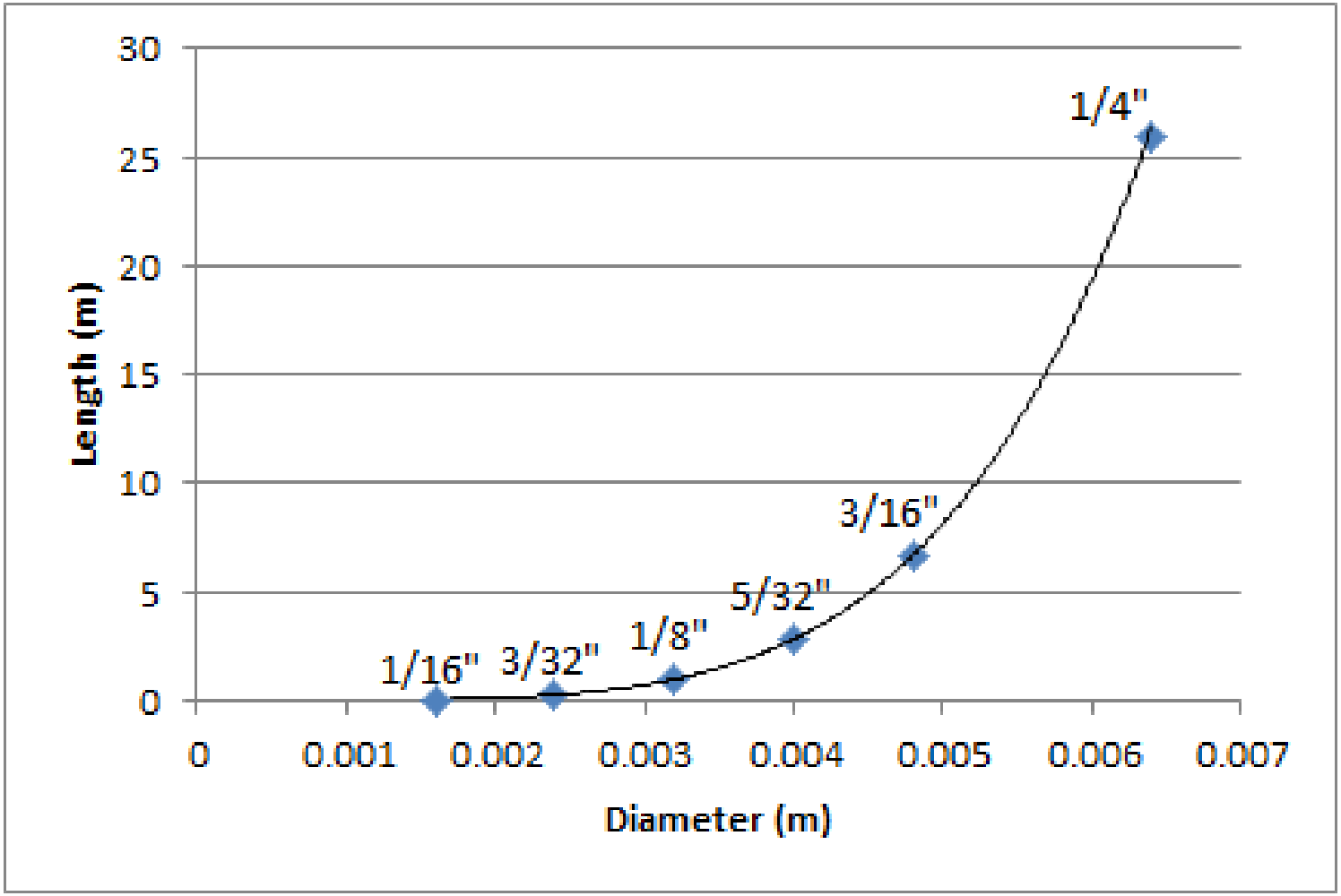
Coiled Tubing Length vs Tube Diameter



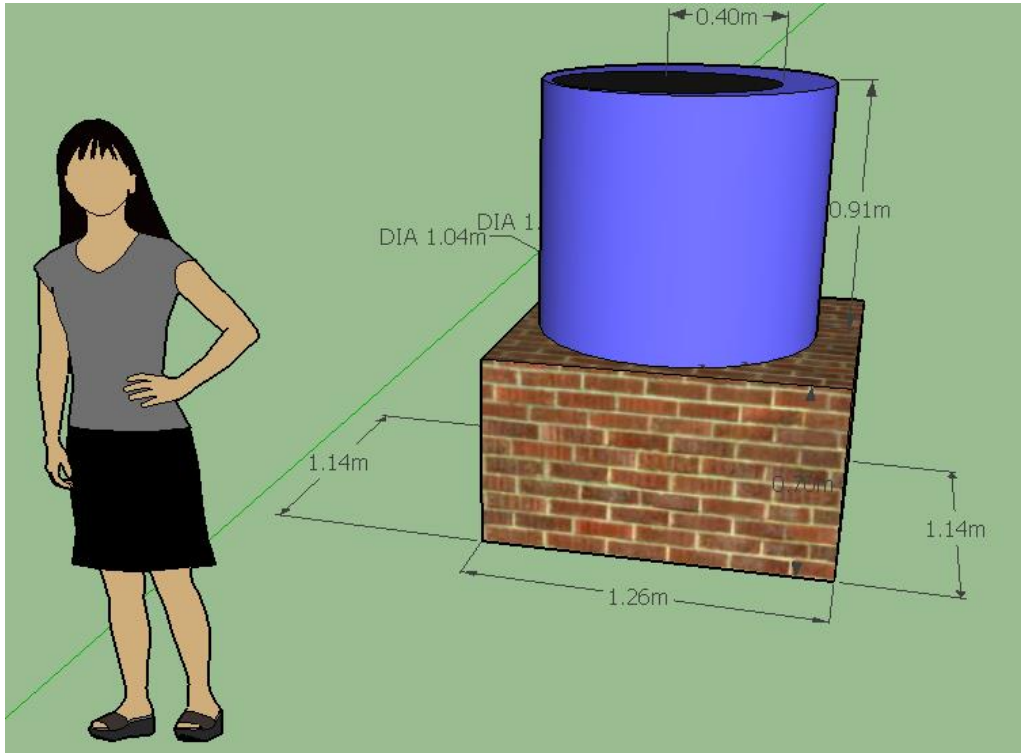
Float Valves

- Flow valve regulates water in storage tank
  - ¼” orifice diameter
  - $22

$$h_{orifice}(D, Pi_{VenaContractaOrifice}, Q) := \left(\frac{Q}{Pi_{VenaContractaOrifice} \cdot A_{circle}(D)} \right)^2 \cdot \frac{1}{2 \cdot g}$$

Tank Design

- 600L HDPE Drum
  - Tank will not be made out of brick
  - Families can scale up and down with the plastic tanks
  - Hygienic material
- Brick Stand
  - Elevated 1m
  - $17 to build



Sink Design Methods

- **New Design:**
  - Reduce contamination issue
    - Buckets and concrete
  - Practicality
  - Versatility
  - Improve conservation of grey water

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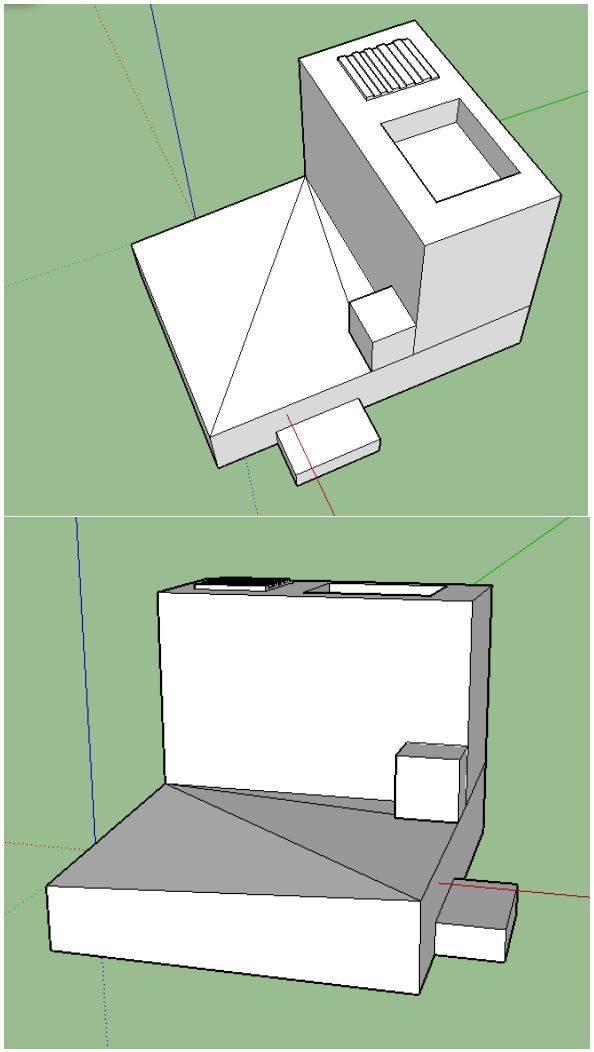
Sink Design

- Dual platform and elevated sink
  - Versatility in dish washing and clothes washing
  - Concrete lined with steel
  - Basin, washboard and platform
- Raised and angled platform for agricultural grey water recycling
  - Open piping on far left and bottom edges to allow for collection at bottom left corner
- Determining stringent size dimensions would be impractical



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Future Work

- Integrate code with the rest of the distribution team
- Is coiled tubing the best way to regulate flow?
- Determine how much each villager is willing to pay in changes to household infrastructure
  - Currently Indian Government pays for water systems

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