Design Process

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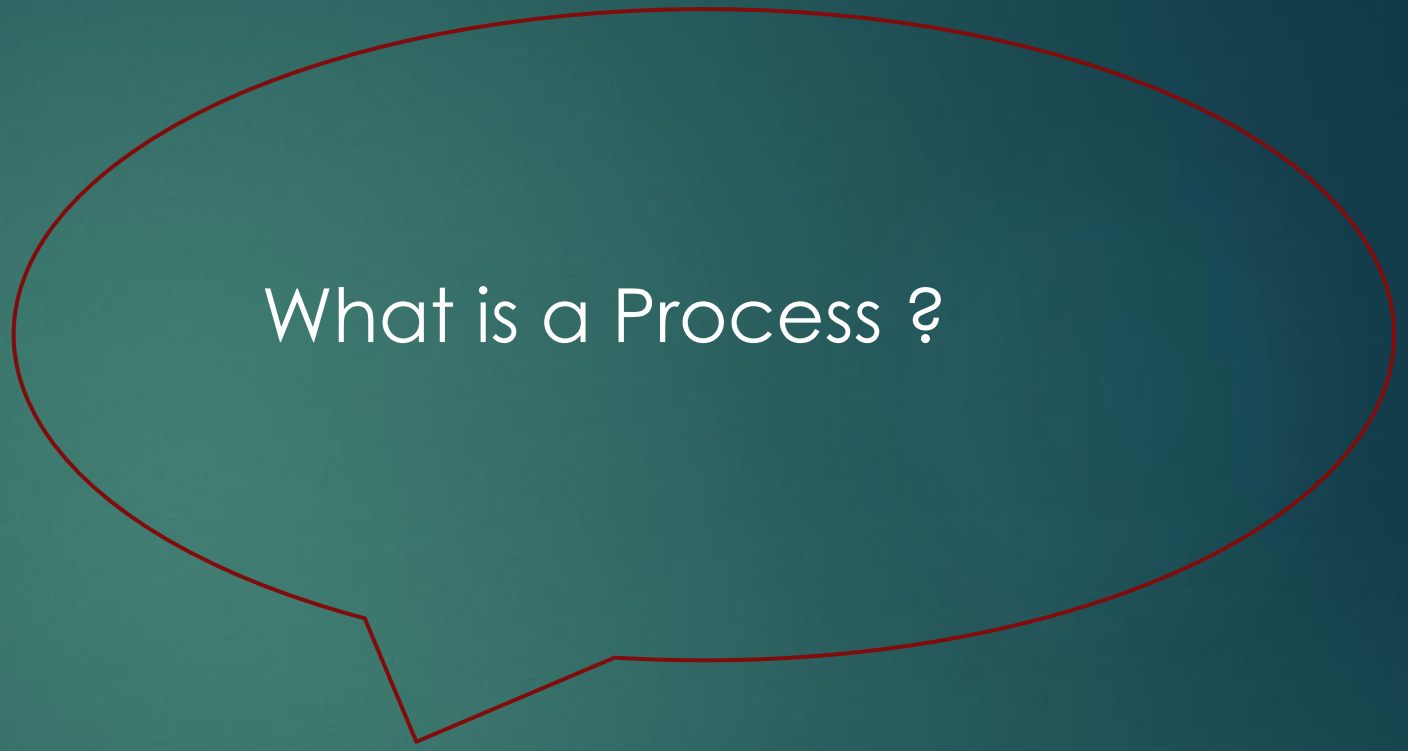
Our Approach

- This session will be very interactive
- It will be informative
- It will be a good learning experience
- We will utilize a real life example to explain the Design Process

The Design Process



Question 2

- Why do you think it is imperative to use a real life example to explain the Design Process?

Potential Response

- Must be able to apply our Theoretical Study to solve real problems.
- You will recall the old adage " You may have book sense but no common sense"
- This approach allows for a greater understanding and leads to buy in from stakeholders.. In this case the student here today.

The Background

- A rural community in Guyana
- Best known for its large herd of cattle - West Coast Berbice Public Road.
- The citizens who do not have potable water supplied by Guyana Water Inc
- They Depend on precipitation, through rainfall harvesting to provide for domestic needs

The Design Process

Do we have a Problem? – Yes or No

Potential Problems

- No water during the dry season
- Less Economy Activity
- Increase case of Commutable Diseases
- Cycle of Poverty

Step One – Feasibility Study

- What are some of the information likely to be collected there and why it is important?

Potential Data Collected

- **Social Profile**
- **Economic Data**
- **Demographics**
- **Current Water Supply Challenges**
- **Environmental Factors**
- **Preliminary Designs and Costing**
- **Cost / Benefit Analysis**

Stage 2 – Design Criteria

- **Design Horizon**
- Mechanical Equipment – 20-30 years
- Pipelines - 50 years
- Structures - 50 years

Stage 2 – Design Criteria

- **Population**
- Benchmark community population to be based on the 2012 census figures
- Annual growth rate – 0.75%
- New development – 5 persons per household

Stage 2 – Design Criteria

- **Water Demand**
- Domestic-270 Litres/per capita/day
- Industrial – to be determined based on type of business.
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- **Peaking factor**
- 24hrs - Peak factor = 2.1
- 16hrs – Peak factor = 2.2
- 12hrs – Peak factor = 2.8

Stage 2 – Design Criteria

- **Facility Sizing**
- Transmission Main – Peak Hour
- Distribution Main – Peak Hour
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- **Minimum Residual Pressures in Distribution System**
- Peak Hour – 5m at critical nodes
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- **Pipes**
- Minimum size – 100 mm diameter
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Stage 2 – Design Criteria

- **Material**
- 100 to 150 mm – PVC SDR 26 or PPR PN6
- 200mm to 300mm – PVC SDR 21 or HDPE PN16 or PPR PN16
- Greater than 300 mm – HDPE PN16

- **Velocity**
- Minimum –0.4 to 0.5 m/s
- Maximum –1.2 to 1.8 m/s
- Optimum – 0.8 to 1.0 m/s
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- **Other Parameters**
- Number of persons per household - 5 persons
- Materials for stream and trench crossing - Ductile iron
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Stage 3: Design Calculations

Parameter	Value
Specific Head Loss ft H20 / 100 FT Pipe	0.22
Specific Head Loss psi / 100 ft pipe	0.1
Actual Head Loss (ft H20)	3.281
Actual Head Loss psi	1.4
Velocity ft / s	0.3048

Question

- What is the next stage of the Process?
- What does it entail?

Stage 4: Budget

Summary Cost	Estimate Total - G$	Total Estimate - US$	Budget Cost	Variance
Premlinaries	$ 1,625,000.00	$ 8,125.00		
Pipeworks	$ 8,335,000.00	$ 41,675.00		
Sub Total	$ 9,960,000.00	$ 49,800.00		
Contingency	$ 996,000.00	$ 4,980.00		
Grand Total	$ 10,956,000.00	$ 54,780.00	$ 65,000.00	$ 10,220.00

Stage 5: Bidding Documents

- Bid Forms
- Performance Bonds
- Bills of Quantities
- Contract
- Drawings

Stage 6: Construction Management

- Project Plans
  - Project Schedule
  - Project Budget and Cost Management Plans
  - Safety Management Plans
  - Human Resource Management Plans
  - Risk Management Plans
  - Change Management
  - Stakeholder Management
  - Communication Management

Stage 7: Project Close and Handover

- Operation Management Plans
- Additional Training
- Hand Over