The Importance of Master Planning

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Words of Wisdom ........

We have met the enemy and he is us
Walt Kelly

Adventure is just bad planning
Roald Amundsen

Failing to plan is planning to fail
Alan Lakein
OVERVIEW

This module covers Master Planning

The topics covered are:
1. Definition of a Master Plan
2. Master Planning Issues
3. Evaluation of Alternatives
4. Program Development
5. Master Plan Updating
The Master Plan is the orderly planning of a system’s future improvement program; it’s the initial step before specific designs of parts of the system.

The Master Plan is often incorporated in the long-range capital improvement program.

The Master Plan identifies present and future needs and direction for developing the system’s facilities.
Definition of a Master Plan
- What is a Master Plan -

A Master Plan……

– is a plan to achieve a vision
  - Protect the environment, Improve Productivity, Performance

– is a “Contract” between Interested Parties
  - Government, Engineers, Regulatory Agencies, End User, Public

– looks at the big picture i.e.; the forest not the tree
  - Concentrates on a set of Projects not one Project (Program)

– is a roadmap to bring pieces together
  - Brings all projects together to serve one vision
Definition of a Master Plan
- Who Needs a Master Plan -

Master Plans are developed for:
- Country
- City or Town
- Company or Facility

Examples
- Develop a plan to modernize a Water Treatment and Distribution network to sustain growth of a City
- Upgrade a sewage system of a town to serve a growing population and protect the environment
Master Planning Issues
- Planning Periods -

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A major capital investment program requires many years lead time to develop:

- Individual Project Planning
- Design
- Financial Arrangement
- Construction
- Training / Transition Period
- Operation and Maintenance
Master Planning Issues
- Planning Periods -

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Planning Periods Vary Depending on Component

- For Water or Wastewater Treatment → 30 to 50 Years
  - Phase I → 15 Years ✓ Size Main Component
  - Phase II → 25 Years ✓ Expandability
  - Phase III → Beyond ✓ Future Provisions

- Sewers, Water Intake Structures, Tunnels, Outfalls → 30-50 Years
- Treatment Units Processes → 15 to 25 Years
- Equipment → 10 to 15 Years
Master Planning Issues - Population Growth -

It is important to identify the project area future Population.

Ultimate Population: 200K
Design Population 90 to 120 K
## Master Planning Issues - Service Area -

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**Example of Issues to be addressed:**

- Land Use Changes
- Future Expansions
- Presently Serviced Areas
- Unconnected Areas
- Population Shifts
- Seasonal Pop. Shifts

![Future Development: Presently Un-serviced](image-url)
A Master Plan Identifies Current System Components & Needs

Example – Wastewater Treatment Plant (WWTP)

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<td>Current connected population to WWTP 60% → 300,000</td>
<td>Projected Serviced Population → 525,000</td>
<td>Projected Connected Population in 10 Years 85% + 2% Growth/year</td>
<td>Need: 100 Km of Gravity Sewers, 6 Lift Stations (Project 1, 2, and 3)</td>
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Existing Capacity of WWTP → 120,000 m³/day
Projected Flow in 10 and 20 years → 160,000 and 200,000 m³/day
Need: Expand WWTP in two phases (Project 4 and 5)
Identify Current System Components and Deficiencies – Example – Wastewater Treatment Plant (WWTP) - Continued

- Existing Treatment Type → Secondary
- Projected Effluent Requirements in 2018 → Tertiary
- Need: Build Tertiary Treatment at WWTP (Project 6)

- Ground Water Safe Yield For Irrigation → 90 million m³ / Year
- Projected Irrigation Water Need → 180 million m³ / Year
- Reuse Tertiary Treatment to Irrigation and Reuse
- Need: 90 Km of Lines, 9 Reservoirs, 2 Pump Stations (Project 7, 8, 9, 10)
Evaluation of the alternatives includes

- **Technical Issues**
  - Identification of Solutions
  - Evaluation of Process Alternatives
  - Site and facility location and general arrangement
  - Ease of Operation and Maintenance

- **Financial Issues**
  - Construction Costs
  - Operations and Maintenance Costs
  - Cost Effectiveness

- **Regulatory Constraints**
  - Environmental Impact
  - Safety
Evaluation of Alternatives

- Identification of Solutions -

Identification of Solutions ⇒ To Meet Identified Deficiencies

Examples:

- Expand Facility OR Build New One

- Build Oxygen Generation Plant
  OR Use Oxygen Pipeline From Nearby Manufacturer
Evaluation of Alternatives
- Cost and Economic Analysis -

- Compare Alternatives in an Economic Evaluation Using Present Worth
- Bring all costs to present value and compare, the project with the lowest cost is the most cost effective solution.
  - Discount Factor
  - Lifecycle Period
  - Future Investment
  - Salvage Value
  - O&M Costs
Once all projects are identified, a Program is developed.

Update Master Plan
Improve WW Collection
Install Sewers Area 1 & 2
Expand WWTP PH 1
Tertiary Treatment
New City Sewers
Expand WWTP - PH-2
Effluent Reuse PH -1
Effluent Reuse PH -2

Environ. Impact
Many utility commissions keep an active Master Plan to anticipate systems upgrades/improvements

Example of Items Affecting Master Plans

- New Regulatory Requirements
  - Electrical Code, Environmental Issues, Safety
- New City Developments
  - Major Population Shifts, New Needs
- Operation and Maintenance Issues
  - Deteriorating Equipment, Frequent Shutdowns
- New Technologies
  - More cost effective and Friendly Operation
QUESTIONS .......