Flow Equalization Basins: Uses and Design Variations

WaterCon 2012
March 19th, 2012
Flow Equalization Basins (FEB)

- Use at Wastewater Treatment Plants
- Lining options (geomembrane or concrete)
- Side-line vs. In-line FEBs
- Related equipment
Flow Equalization

- Process of reducing changes in flow rate through a system
- Diurnal changes common in water and wastewater treatment facilities
- Fluctuations affect performance

Source: Greater Wellington Regional Council
Purpose of FEBs

- **Benefits**
  - Cost Effective
  - Assists in providing constant flow rates to plants
  - Easy maintenance
  - Flexibility in materials and design
  - Can eliminate unnecessary overflows from large rain events

*Source: Hickory, NC*

*Source: Greensburg, IN*

*Source: Inland Empire Utility Agency*
Uses of FEBs

- **Wastewater Treatment Plants**
  - Located upstream
    - Accounts for varied plant influent
    - Component in providing near steady influent flow rate
    - Assists during wet weather events

- **Water Treatment Plants**
  - Located downstream
    - Accounts for fluctuation in demand throughout the day
    - Treatment plant allowed to operate at steady, average flow
Lining Options

- Various Options for Liner
  - Soil Cement
  - Concrete
  - Geomembrane
  - Hybrid

- Additional Considerations
  - Access
  - Cleaning Techniques
  - Filling/Drainage
Concrete vs. Geomembrane

Concrete
- Advantages
  - Long lifetime
  - Durability
  - Works for various basin configurations
- Disadvantages
  - Cost
    - Construction
    - Material

Geomembrane
- Advantages
  - Multitude of options
    - Textured vs. Smooth
  - Lower cost
  - Easier to replace
Geomembrane Liner

- Geomembrane
  - Disadvantages
    - Potential for damage
      - Puncture of liner
      - Tearing of liner at pressure points
      - Wind getting beneath liner
  - Lifespan

Source: Google Maps
Cleaning Techniques

- **Water Cannons**
  - Permanent options
  - Designed for optimal coverage
  - Cleaning occurs on the upper bank of the basins

- **Hydrants**
  - Flexibility
  - Use of fire hoses
  - May require entering basins to clean

Source: Elkhart Brass
Types of FEBs

- **In-line:**
  - Used following grit and screening to regulate diurnal flows
  - All flow passes through basins

- **Side-line:**
  - Used to address overloaded conveyance lines
  - Address large wet weather events
  - Used to dampen seasonal flow variations
Types of FEBs

- **Side-line:**
  - Portion of flow pass through flow equalization basins
  - Accepts flow that cannot be handled by treatment plant
  - Minimizes pumping requirements
Types of FEBs

- **In-line:**
  - All flow passes through flow equalization basins
  - Concentration dampening
  - Mass flow dampening
Mixing

- Mixing and aeration required
  - Eliminates excessive solids deposition
  - Makes for easier drainage of the basins
    - Reduces clogging in discharge piping
  - Reduces material left in the basin following drainage
Aerators

- **Mechanical Aerators**
  - Mixing and aeration due to oxygen transfer capabilities
  - Baffling requirements may be necessary for proper mixing

- **Diffused Aerators**
  - Coarse or intermediate diffusers
  - Smaller diffusers lend themselves to inorganic deposits
Questions and Discussion