Sanitary Sewer Pump Station Rehabilitation, Replacement and Upgrade Planning – Lake County Department of Utilities

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Agenda

– Lake County Department of Utilities Background
– Ten States Standards Requirements
– Typical Pumps and Pump Station Arrangements
– Lake County Pump Station Improvement Examples
Lake County Department of Utilities (LCDU)

– Our mission is to supply safe drinking water to our homes, clean water to our rivers and prevent unnecessary fill to our land
Lake County
LCDU – Sanitary Sewer Collection and Treatment

- Sanitary Sewer Collection and Treatment
- GLKWRF – 20,000,000 gal/day
- Madison WWTP – 5,900,000 gal/day
- 500 miles of sanitary sewer
- Four package wastewater treatment plants
- 52 sanitary sewage pump stations
LCDU – Water Treatment and Distribution

- Aquarius WTP – 20,000,000 gal/day
- Bacon Road WTP – 9,000,000 gal/day
- 546 miles of waterline
LCDU – Solid Waste Disposal

– 800 tons per day
– 900 acre site

– Special Collections:
  • Scrap tires
  • Household hazardous waste
  • Electronics and TVs
LCDU – System Sustainability

– 500 miles of each of sanitary and water pipeline
– Pipelines last approximately 50–100 years
– Need to replace approximately 8 miles per year to remain sustainable
– Pump stations need upgraded in addition to pipelines
  • Averaging replacement/rehab of two pump stations per year
LCDU – Project Determination

– Review complaints

– Count breaks, maintenance costs, pump repairs, etc.

– Discuss with municipalities

– Review with internal LCDU personnel

– Review and prioritize
LCDU – Considerations

– Number of breaks, overflows
– Flow capacity improvements
– Regional impact
– Customer criticality
– Difficulty to repair
– Combined project
LCDU – Schedule

– Review and budget Fall 2017
– Design 2018
– Construction 2019
– Repeat Cycle
LCDU – Project Development

– As-Built Drawings
– Provide Account Information
– Survey Existing Utilities
– Develop Base Map
LCDU – Plan Review – 50%

- Group Meeting to discuss design
- Who attends the meeting?
  - Distribution staff or Collections staff, Engineers, Consultant, Inspectors
- Rules and Regulations
  - Example: Manhole or Hydrant spacing, Mainline Stationing and Materials
- Major Changes
- Engineer’s Estimate
LCDU – Plan Review – 100%

- Review of 90% comments
- Legal reviews contract language
- Design is complete
- Engineer’s Estimate
LCDU – Commissioners’ Approval

– Approval process – 2 weeks
  • Recommendation Letter for Project
  • Legal Notice
  • Draft Resolution

– Approval
  • Sign Title Sheet
  • Advertise the following Friday
LCDU – Contractor Bidding

– Required 2.5 week advertise period
– Bids due on Wednesday
– Simple vs. Complex project
– Pre-Bid Meeting
– Addendum
  • 3 day notice
  • Error/Clarification of plans
  • During advertising period
LCDU – Choosing a Contractor

- Review bid packages
  - Experience
  - Math
  - Bonding

- Recommendation to Sanitary Engineer

- Recommendation to Commissioners
  - Draft Award Resolution

- Notice of Award/Sign Construction Contract
  - 6 sets to Contractor
LCDU – Choosing a Contractor

– Pre-construction meeting

– Who attends?
  • City Engineer
  • Fire Chief
  • Other Utilities
  • Prevailing Wage Coordinator
  • LCDU Inspector and Engineer
    o Police
    o School Administrators
    o City Administrators
LCDU – Project Challenges

– How to entirely replace an existing pump station?
– Transfer of wastewater flow
– New electrical service
– Start up new pumps and equipment
– Check out of electrical systems, SCADA and communication devices
– Construction work at low flow in the middle of the night
– Coordination with local business and residents
– Local building department approval for new building housing equipment
Pump Station Improvements

– One Size Does NOT Fit All

– Consider many factors
  • Flow rates
  • Site restrictions
  • Maintenance preferences
  • Accessibility
  • Electrical needs
  • Future growth
  • Pump types

– Evaluate alternatives and determine best fit for each application
  • Dry pit
  • Submersible
  • Suction lift
  • Trench wet well
Pump Types

- Solids Handling – Dry & Wet
- Recessed Impeller
- Screw Centrifugal
- Chopper
- Self-Priming

Solids Handling - Dry
Submersible
Self-Priming
Screw Centrifugal
Chopper
Recessed Impeller
Pump Station Types – Dry Well/Wet Well

- Separate dry well and wet well
- Pumps, piping, valves, and electrical on the dry side
- Leaks or flooding of the dry well can damage pumps or electrical
- Can utilize dry-pit submersible pumps to allow pumping if flooded
Pump Station Types - Submersible

- Typical submersible pump station layout
- Minimum 8’-0” diameter wet well
- Separate valve vault
- Influent sewer below wet well water line or add baffle
- Access to remove pumps
Pump Station Types – Suction-Lift

- Self-priming suction-lift
- Pumps can be above grade or below grade
- Need to confirm head conditions
- Air release
Pump Station Types – Self-Cleaning Trench Type

– High velocity scours solids to pumps
– Can use different types of pumps
Pump Station Types – Self-Cleaning Trench Type – Cont.
Pump Station Requirements – 10 States Standards

– Sec. 42.8 – Flow Measurement
  • Suitable devices for measuring wastewater flow shall be provided at all pumping stations.

– Sec. 47.2 – Emergency Pumping Capability
  • …by provision of portable or in-place internal combustion engine equipment..
  • …portable pump connection to the force main..
LCDU – AECOM Pump Station Projects

- Glyco II Pump Station – 2011
- River Street Pump Station – 2013
- Richmond Road Pump Station – 2013
- Glyco I Pump Station – 2016
- Prouty Road Pump Station – 2016
- Melridge Pump Station – 2018
- Adams Court Pump Station – 2018
- Industrial Park Pump Station – 2018
Glyco II Pump Station

- 8.2 MGD maximum capacity
- Existing pump station – dry well/wet well
- Electrical, structural, mechanical, HVAC upgrades needed
- Flooding of dry well damaged electrical equipment and pumps
- Wet well experiencing corrosion issues
1. Rehab existing station and install new equipment
2. New wet well, rehab existing structure for new equipment
3. New submersible pump station adjacent to existing pump station
   - Selected Option 3 due to lowest capital cost and reduced need of bypass pumping
   - Installed new pump station while maintaining existing
Glyco II Pump Station – Selected Design
Glyco II Pump Station - Construction
River Street Pump Station

- Originally constructed in 1976 – Grand River
- 1.15 MGD maximum capacity
- Separate dry well and wet well
- Electrical, structural, mechanical HVAC upgrades needed
- Flooding of dry well damaged electrical equipment and pumps
- Difficult to access and maintain pumps
- Flooding of site – need to raise elevation
- Generator building needed upgrades
River Street Pump Station
River Street Pump Station – Design and Construction

– Evaluated rehabilitation of the existing station versus replacement
– More cost effective to replace
– Kept existing station online while constructing new structures
– Minimize downtime for tying into existing force main
– Utilize existing wet well for additional storage capacity
Richmond Road Pump Station

– Originally constructed in 1976 – Painesville Township
– 0.55 MGD maximum capacity
– Dry pit and wet pit
– Electrical, structural, mechanical, HVAC upgrades needed
– Flooding of dry well damaged electrical equipment and pumps
– Difficult to access and maintain pumps
– Dry well experiencing corrosion issues
– Generator needed replacing
Richmond Road Pump Station – Construction
Glyco I Pump Station

- Originally constructed in 1976 – Painesville Twp.
- 5.75 MGD maximum capacity
- Existing pump station – dry well/wet well – Same as Glyco II
- Electrical, structural, mechanical, HVAC upgrades needed
- Flooding of dry well damaged electrical equipment and pumps
- Existing structure in adequate shape
Glyco I Pump Station – Alternatives Evaluation

1. Rehab existing station and install new equipment
2. New wet well, rehab existing structure for new equipment
3. New submersible pump station adjacent to existing pump station
   - Selected Option 1 including new generator/electrical building
   - Longer bypass pumping to replace pumps and piping
   - Need to utilize existing force main
   - 2018 construction
Prouty Road Pump Station

- Existing dry well/wet well
- County replaced pumps in last five years
- Electrical and controls needs to be moved above grade
- Evaluated prefabricated building versus construct on site
- Utilize existing wet well structure and incorporate into new building over dry well
- Misc. other improvements
- 2018 construction
Prouty Road Pump Station – Design
Adams Court, Industrial Park, and Melridge Pump Stations

- Three existing separate below grade wet well and dry well
- AECOM to evaluate rehabbing versus new submersible stations
- Design: 2018
- Construction 2019

Industrial Park Pump Station

Adams Court Pump Station

Melridge Pump Station
Questions?

Thank You

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