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)

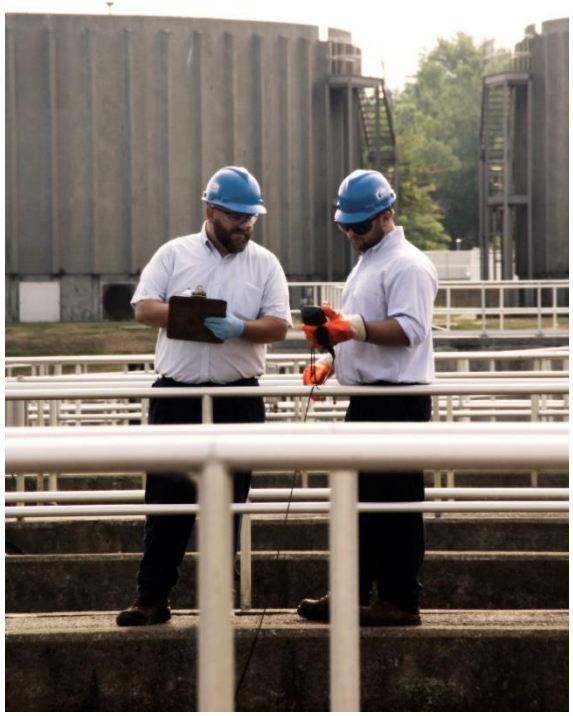
– Our mission is to supply safe drinking water to our homes, clean water to our rivers and prevent unnecessary fill to our land

Water + Solid Waste + Sewer

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

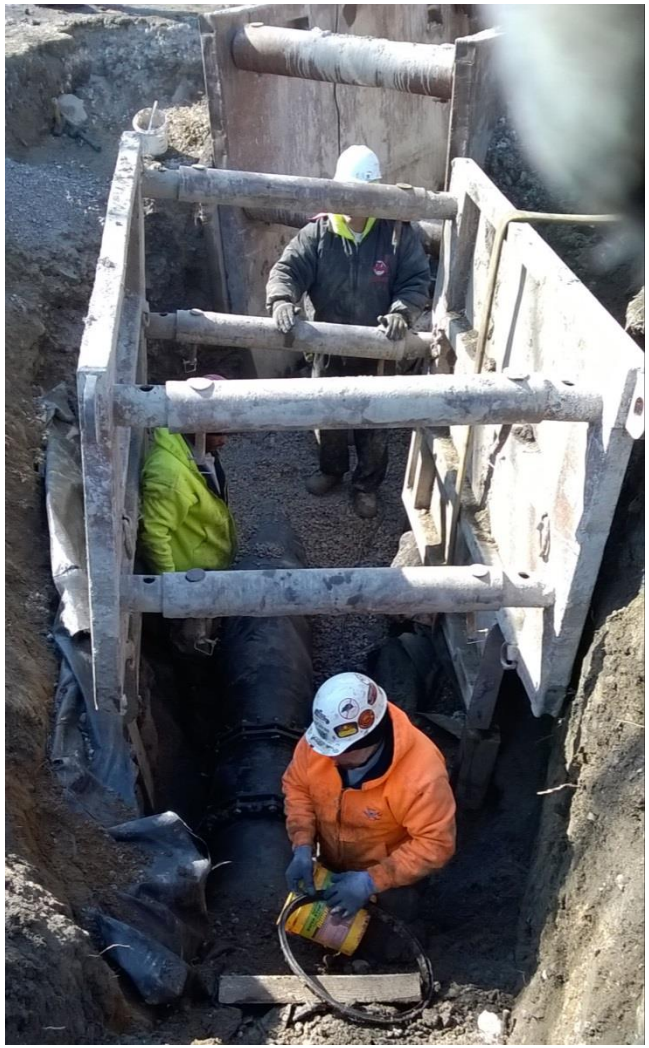
- 500 miles of each of sanitary and water pipeline
- Pipelines last approximately 50–100 years
- Need to replace approximately 8 miles per year to remain sustainable
- Pump stations need upgraded in addition to pipelines
  - Averaging replacement/rehab of two pump stations per year

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

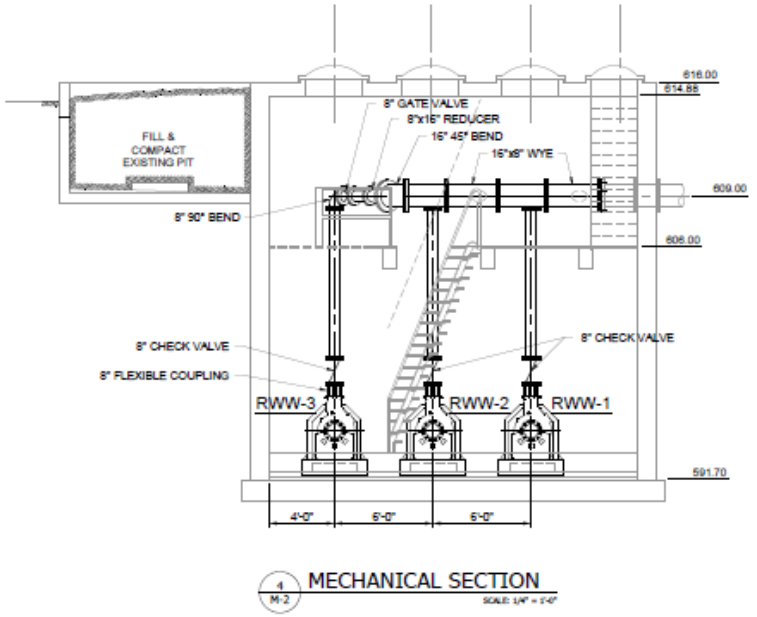
- Review and budget Fall 2017
- Design 2018
- Construction 2019
- Repeat Cycle

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

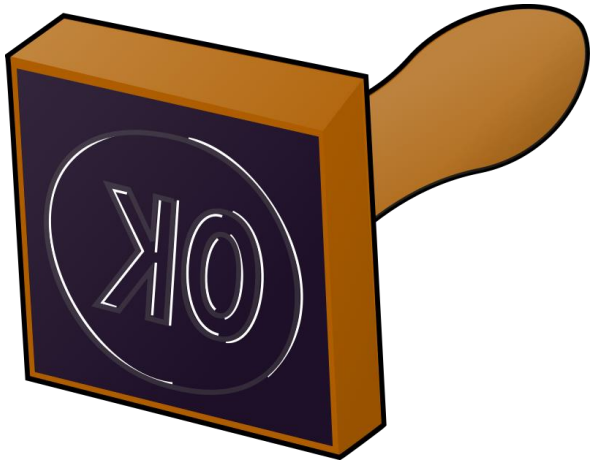


LCDU – Plan Review – 100%

- 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
    - Police
    - School Administrators
    - 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

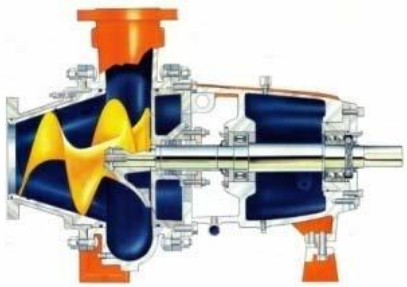
Pump Types

Solids Handling - Dry

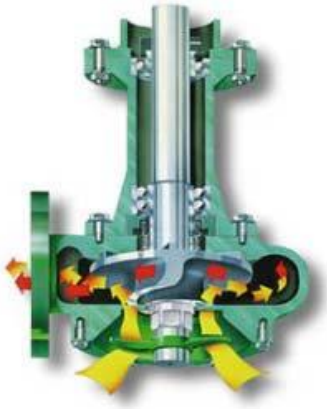
Submersible

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

Self-Priming



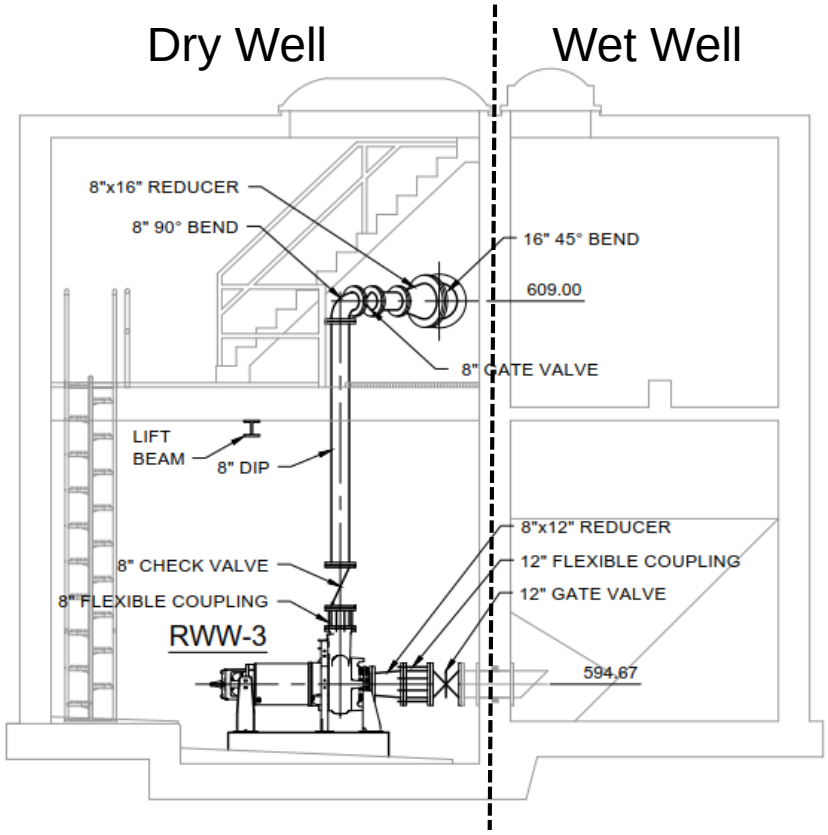
Screw Centrifugal



Chopper

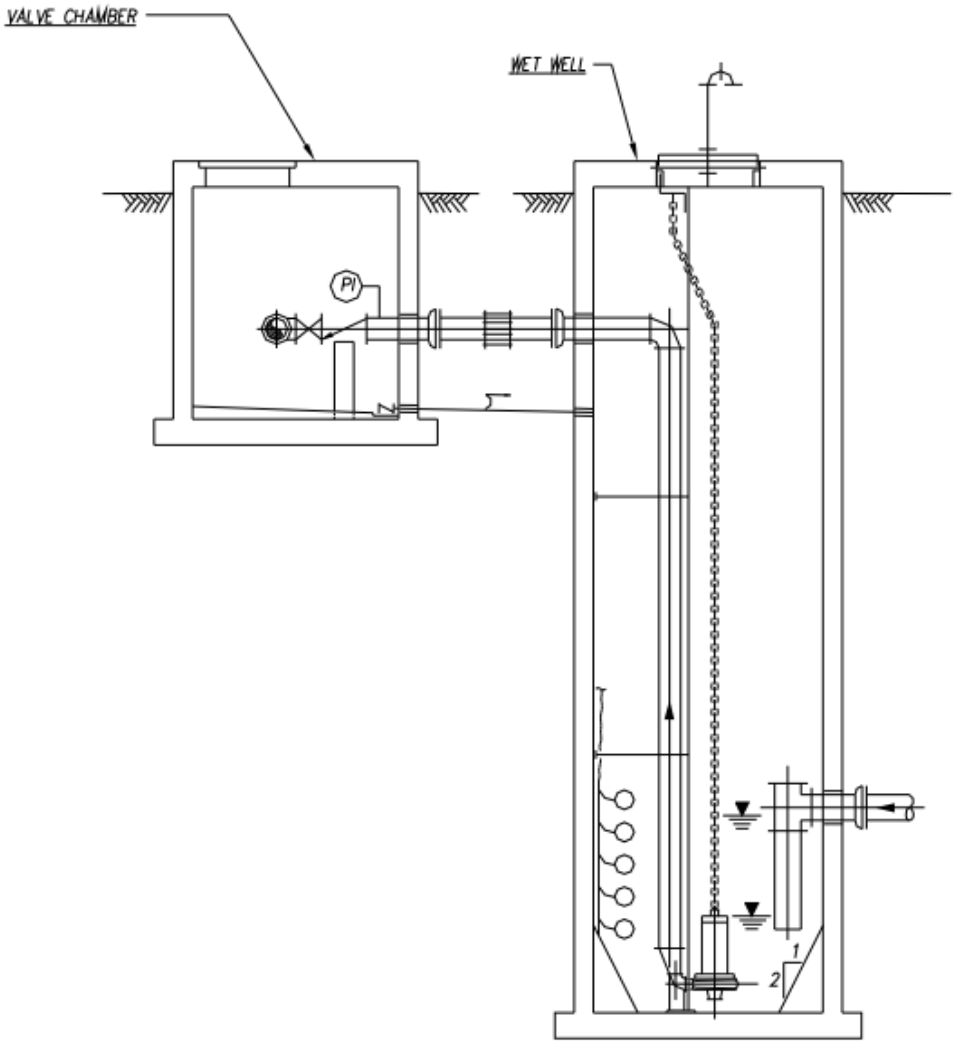
Recessed Impeller

Pump Station Types – Dry Well/Wet Well



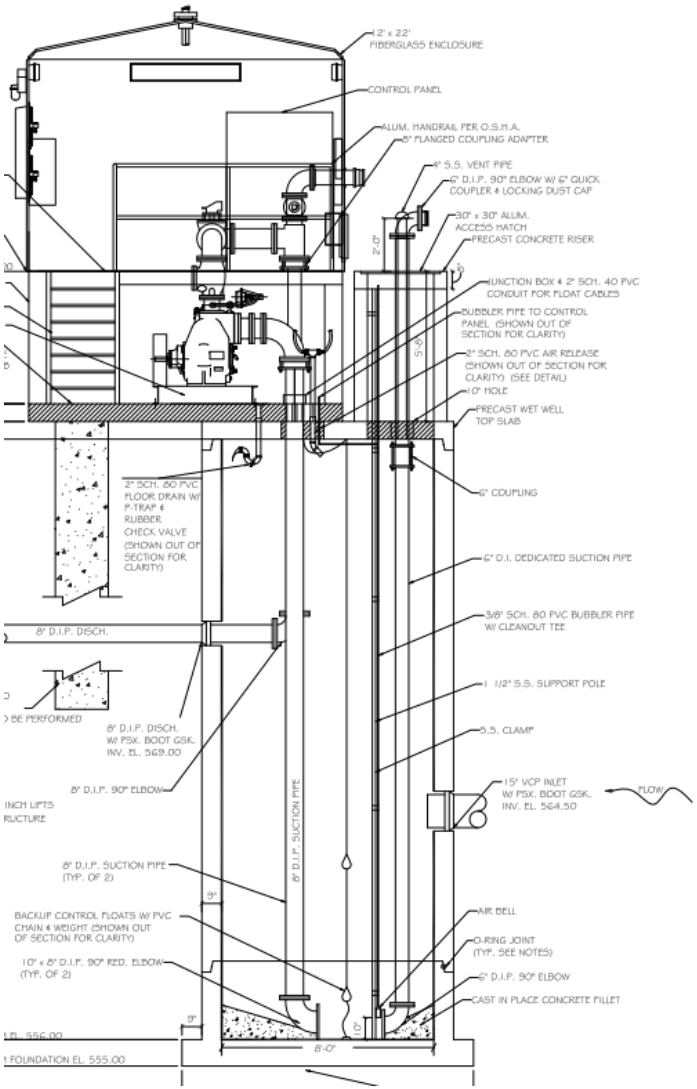
- Separate dry well and wet well
- Pumps, piping, valves, and electrical on the dry side
- Leaks or flooding of the dry well can damage pumps or electrical
- Can utilize dry-pit submersible pumps to allow pumping if flooded

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

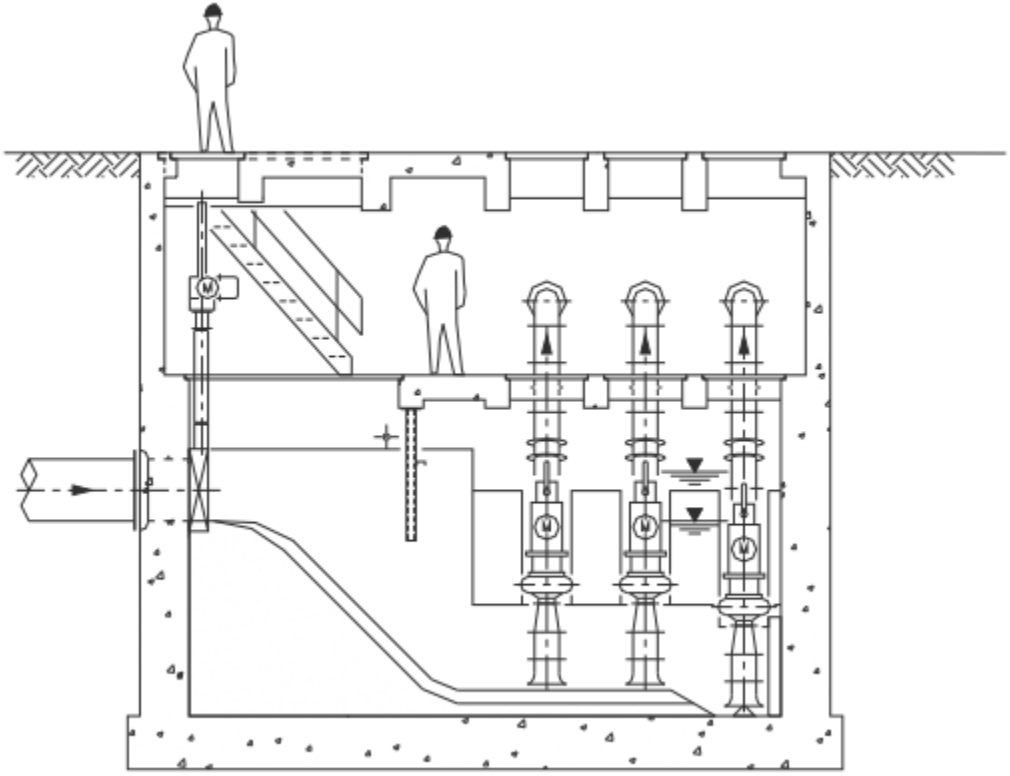
Pump Station Types – Suction-Lift

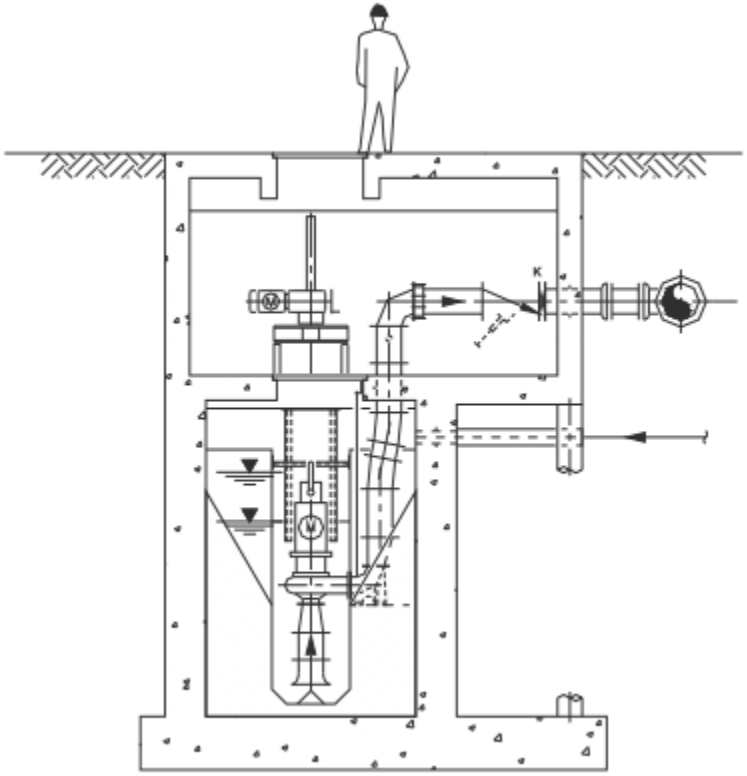


- Self-priming suction-lift
- Pumps can be above grade or below grade
- Need to confirm head conditions
- Air release

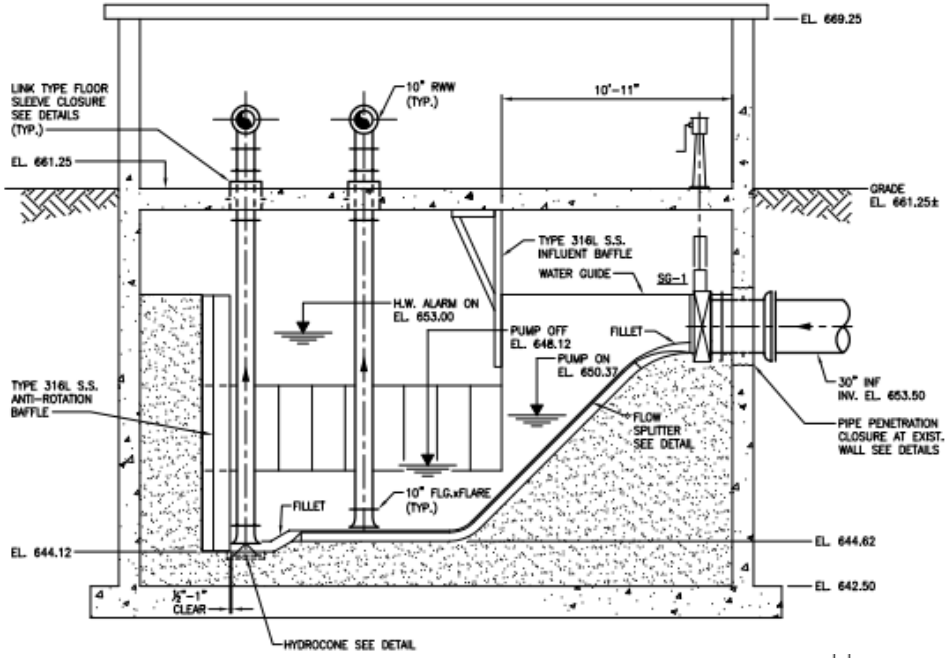
Pump Station Types – Self-Cleaning Trench Type

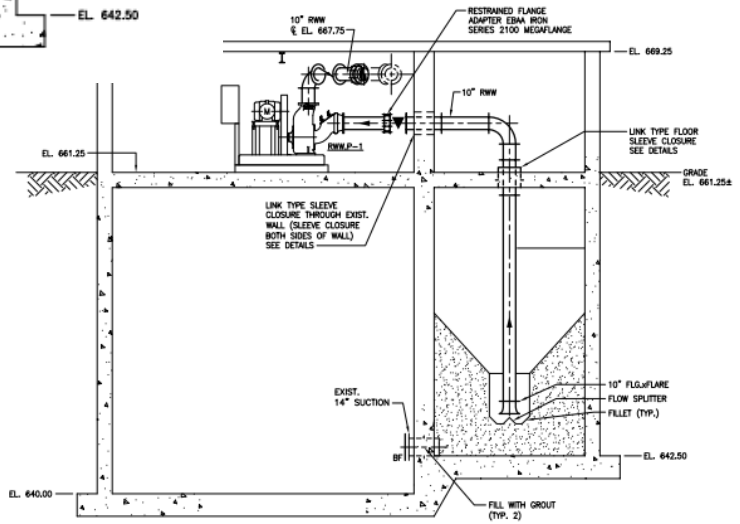
- High velocity scours solids to pumps
- Can use different types of pumps





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

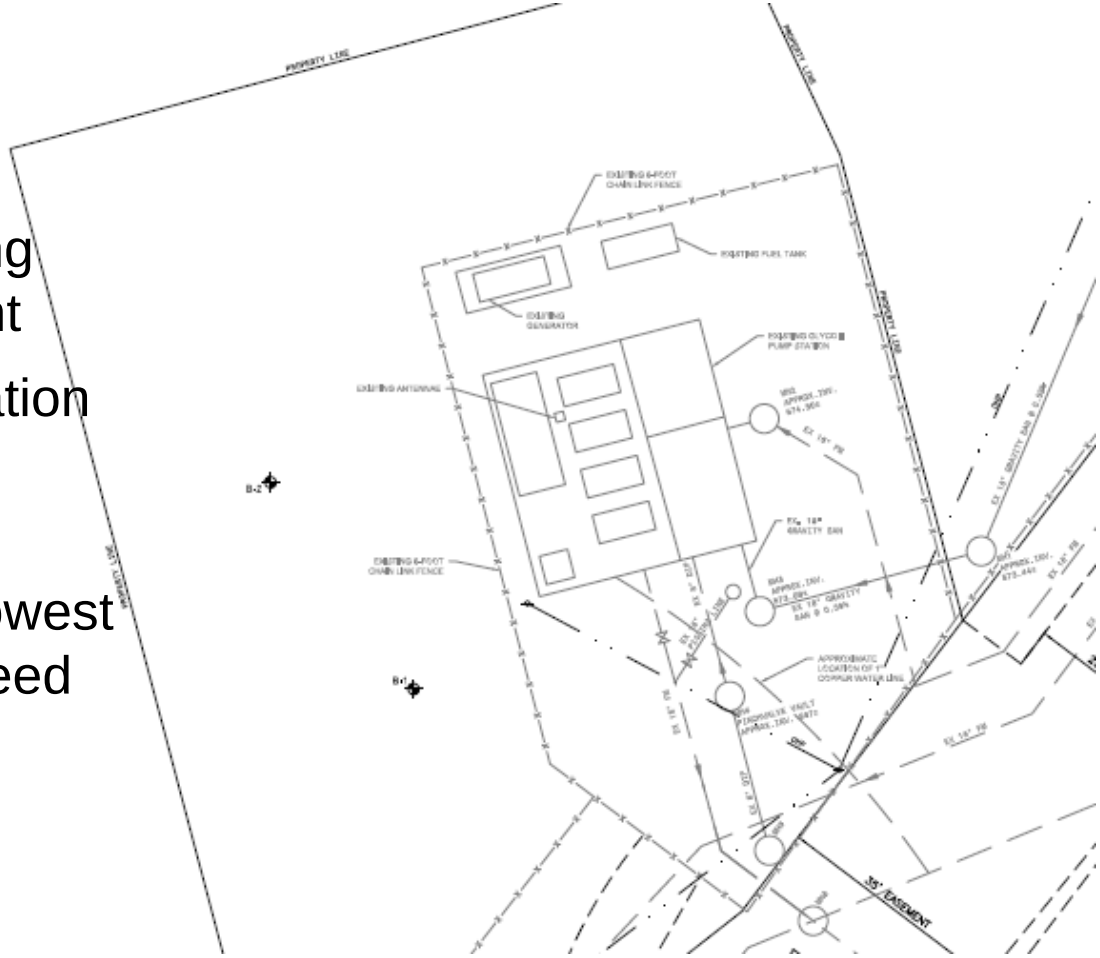
- Glyco II Pump Station – 2011
- River Street Pump Station – 2013
- Richmond Road Pump Station – 2013
- Glyco I Pump Station – 2016
- Prouty Road Pump Station – 2016
- Melridge Pump Station – 2018
- Adams Court Pump Station – 2018
- Industrial Park Pump Station – 2018

Glyco II Pump Station

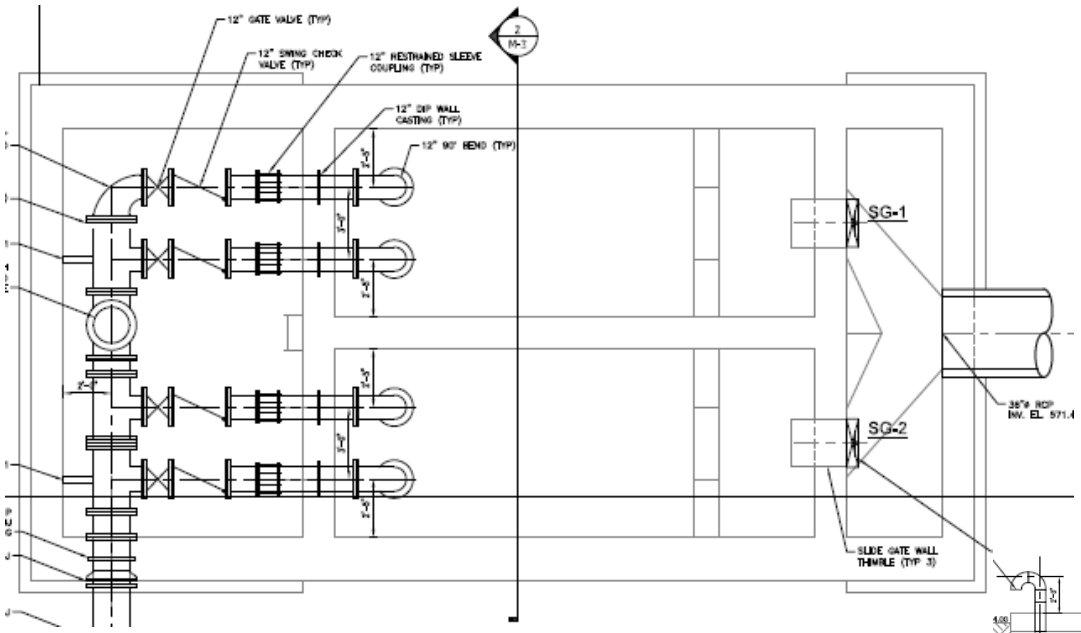
- Originally constructed in 1976 – Fairport Harbor and Painesville Twp.
- 8.2 MGD maximum capacity
- Existing pump station – dry well/wet well
- Electrical, structural, mechanical, HVAC upgrades needed
- Flooding of dry well damaged electrical equipment and pumps
- Wet well experiencing corrosion issues

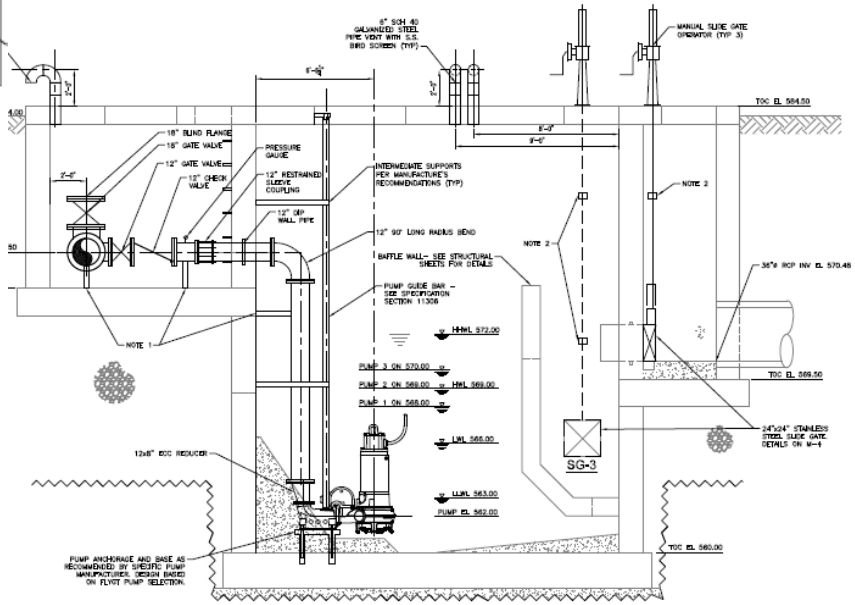
Glyco II Pump Station – Alternatives Evaluation

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 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

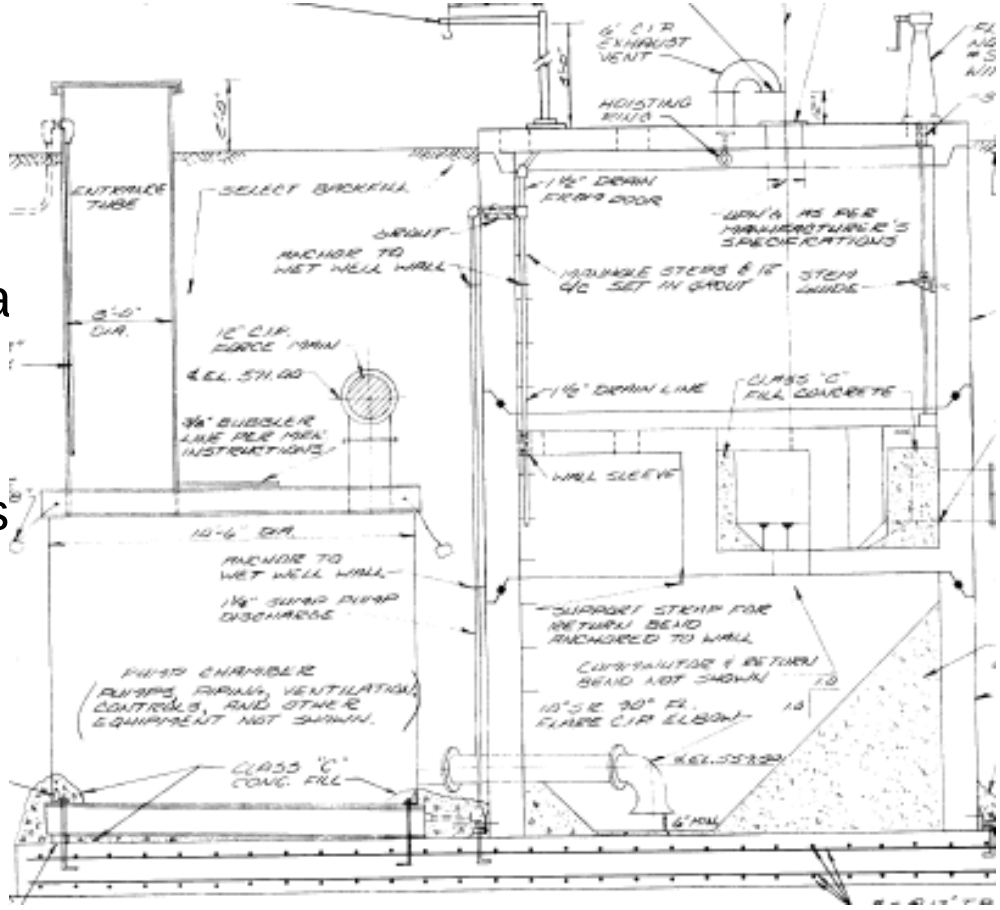




Glyco II Pump Station - Construction

River Street Pump Station

- Originally constructed in 1976 – Grand River
- 1.15 MGD maximum capacity
- Separate dry well and wet well
- Electrical, structural, mechanica 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



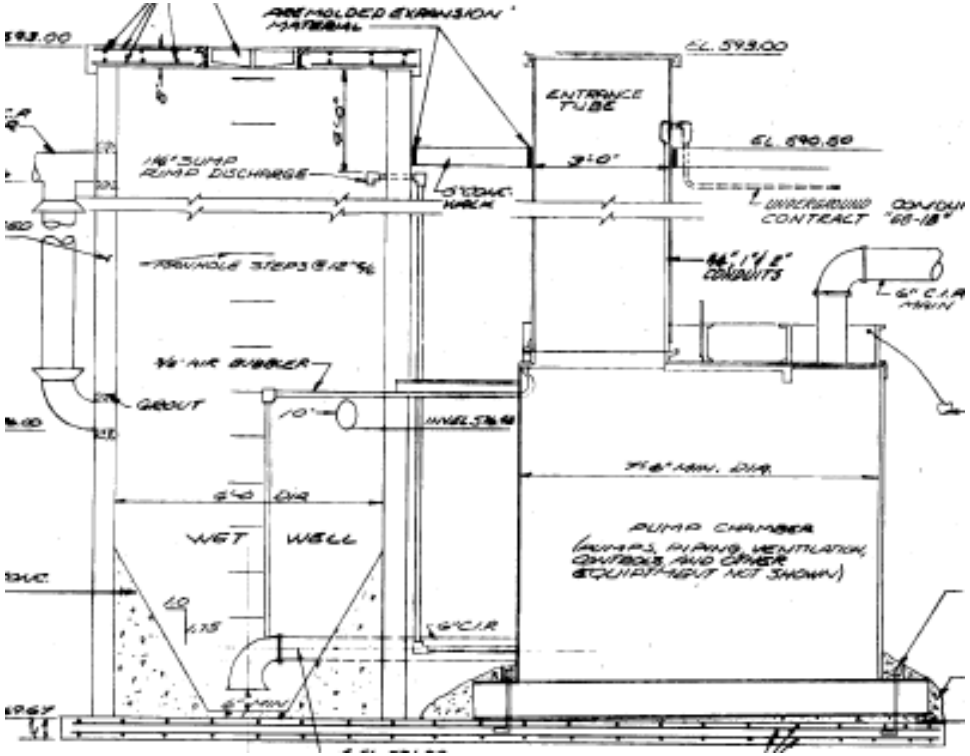
River Street Pump Station

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



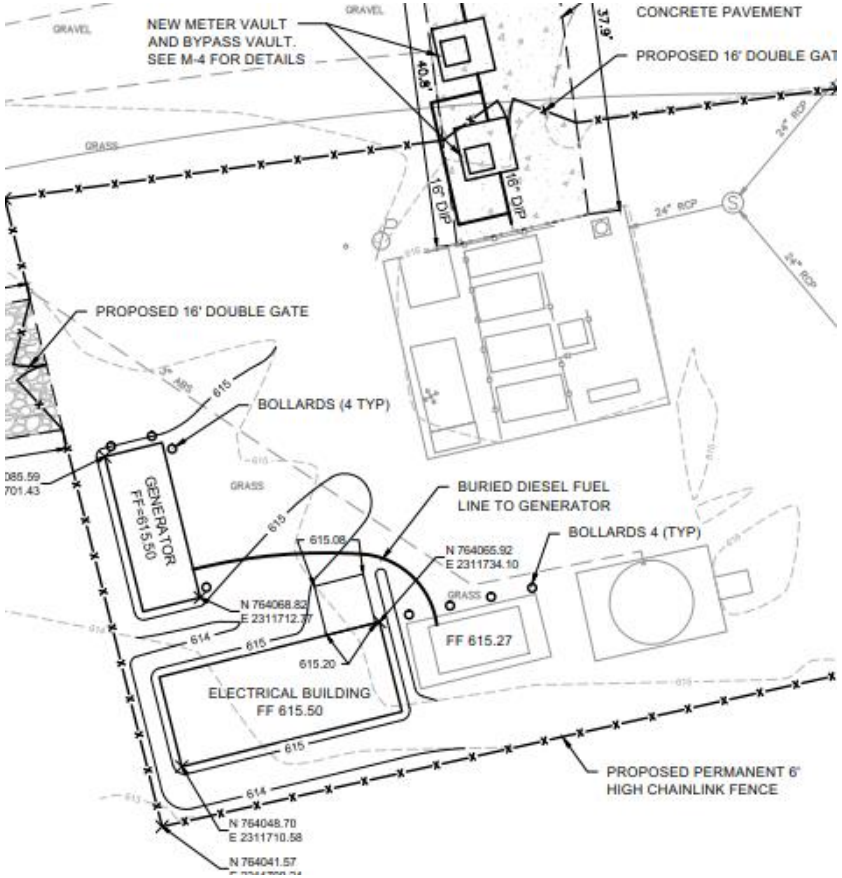
Richmond Road Pump Station – Construction

Glyco I Pump Station

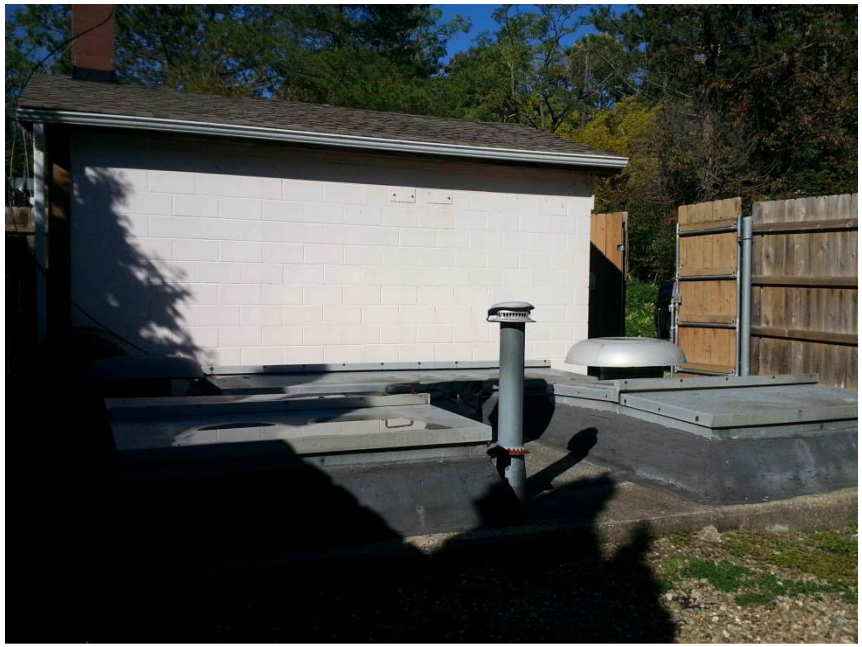
- Originally constructed in 1976 – Painesville Twp.
- 5.75 MGD maximum capacity
- Existing pump station – dry well/wet well – Same as Glyco II
- Electrical, structural, mechanical, HVAC upgrades needed
- Flooding of dry well damaged electrical equipment and pumps
- Existing structure in adequate shape

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

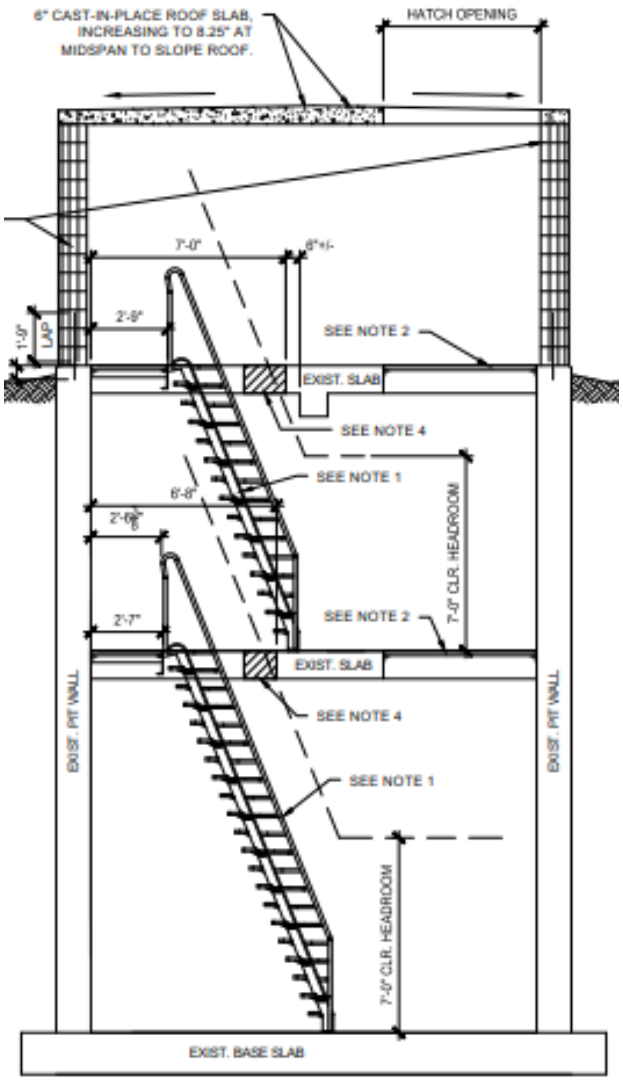


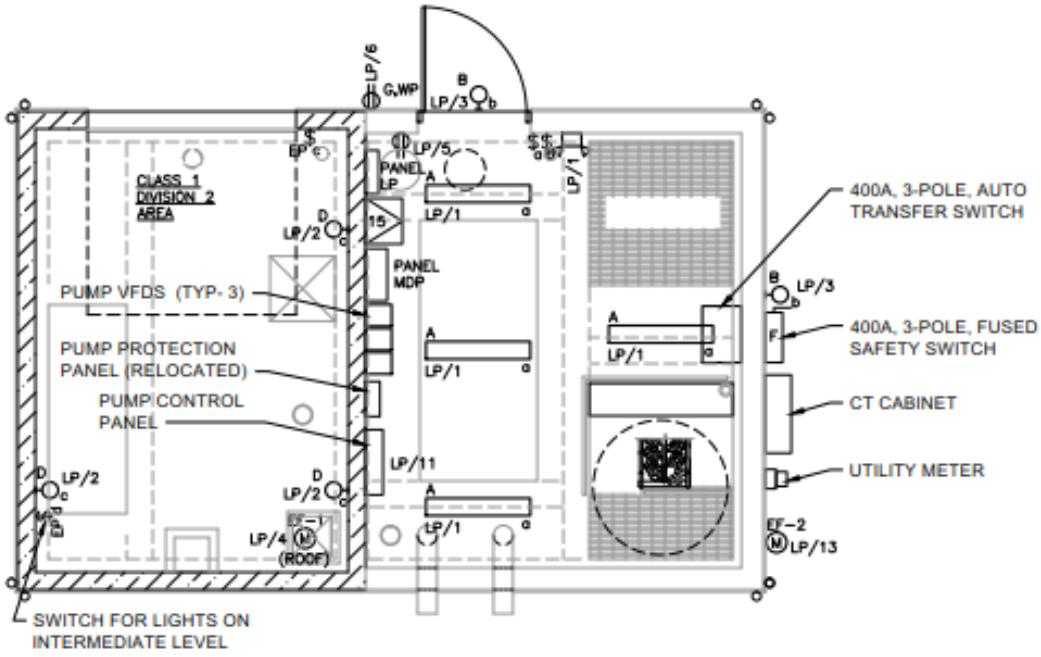
Prouty Road Pump Station



- 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

Industrial Park Pump Station

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

Adams Court Pump Station

Melridge Pump Station

Questions?

Thank You

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