PROJECT PRESENTATION:
MCWDD Sewerage Metering Facility
Rehabilitation/Repair Project

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PROJECT BACKGROUND

- OMID and MID systems were constructed by DWSD in the early to mid-1970’s.

- DWSD operated and maintained these systems until 2009-2010 at which time Interceptor and metering facility ownership was transferred to the participating counties.

- OMCPWC took advantage of the State’s S2 Grant Program (90% reimbursable) to perform facility and site inspections at 18 newly acquired sewerage metering facility sites.

- A Condition Assessment and Engineering Report (CA&ER) was completed as part of an S2 Grant and included recommendations for improvements at each site.

- This CA&ER was utilized to prepare a Project Plan and secure a State Revolving Fund (SRF) low-interest loan to complete the recommended improvements.
MCWDD services approximately 100,000 acres, including all or portions of:

- Cities of Fraser, Sterling Heights, and Utica
- Chesterfield, Clinton, Harrison, Lenox, Macomb, Shelby, and Washington Townships
- Village of New Haven
MCWDD SERVICE AREA
PROJECT TIMELINE

- Facility inspections; February/March 2011
- Condition Assessment & Engineering Report; June 2011
- SRF Project Plan; July 1, 2011
- Project Award; August 2012
- Start Construction; October 2012
- Contractor Bankruptcy; April 2014
- Project Completion; June 2017?
FACILITY INSPECTIONS

- Preliminary/Non-Destructive Inspection of 18 sewerage metering facilities
- Bypass Pumping was not in the scope
- This limited the breadth of the inspections
- Level 1 NASSCO inspection of Effluent Drop Manholes
- Facilities were designed as a CIP Concrete Structure or a Precast Concrete Pipe turned on its side
- Overall, precast structures were in better condition
- Facility access, safety, and electrical systems were in poor condition and/or not present
- Internal concrete soft in CIP structures, aggregate exposure in Precast structures
- Pipe Connections, Effluent Pipe in poor condition in most facilities
- Level sensor supports not sturdy
CA&ER recommended the following Rehabilitation/Repair approach

15 Rehabilitation Sites
- Concrete Repairs and Protective Coatings
- Safety Improvements (Tethers, Ladders, Grating Retrofits, Lighting, etc.)
- Stabilize Flow Sensor and Support Brackets
- Update Mechanical Equipment, Controls and SCADA capabilities

3 Replacement Facilities
- Complete Replacement of Metering Facility and other Macomb County owned Infrastructure
PROJECT PLAN

- Present Worth Analysis of Recommended Structural Rehabilitation Options
  - Structure Monitoring
    - Concrete integrity monitoring in newer structures
  - Structure Maintenance
    - 20 year rehabilitation interval for structures in good shape
  - Structure Repair
    - 10 year rehabilitation interval for structures in fair condition
  - Structure Rehabilitation
    - 5 year rehabilitation interval for structures easy to rehabilitate or structures where the replacement costs exceeded PWA for the repairs
  - Structure Replacement
    - The rehabilitation needs and frequency for the sites recommended for replacement were not as cost effective as complete replacement

- All structures needed updated electrical, level sensor and supports, mechanical component rehab, and access improvements so the structural condition of the structure was the driving force behind the selected rehab option

- Goal for replacement sites is to provide as much new infrastructure and equipment as possible within Macomb County ownership limits.
MACOMB COUNTY OWNERSHIP LIMITS
DESIGN CONSIDERATIONS (REHABILITATION SITES)

- Facility Concrete Repairs
  - Heavy Power Wash of all facilities
  - Coating System (3-part)
    - Saureisen (F-120 Underlayment, 210S primer coat, 210X topcoat)
    - New concrete must be fully cured (28-days) before 2-part application
    - Existing concrete must be structurally sound and environment dry

- Pipe Rehabilitation
  - Influent Piping
    - CCTV’d all influent piping, planned CIPP, site constraints and costs dictated another solution
    - Used a trowelable mortar (calcium aluminate), Quadex Alumiliner (comparable to a Sewpercoat)
  - Effluent Piping
    - Short runs of pipe between metering facility and effluent drop manhole (8 feet to 20 feet)
    - Required a fully structural repair
    - Link-Pipe was specified
SEWER REHABILITATION DETAIL

1/2" min. thickness, typ.

LIMITS OF DETERIORATION (varies by location)

REHABILITATION MORTAR

OBSERVED WATER FLOW LINE

REINFORCED CONC. PIPE
DIAMETER VARIES
SEE SCHEDULE

(1) CCTV OF THE INFLUENT SEWERS
AT METERING FACILITIES
HR–S–2 & HR–S–3 HAVE NOT
BEEN PROVIDED BY THE
CONTRACTOR. OWNER RESERVES
THE RIGHT TO AMEND THIS
DETAIL TO ADD ADDITIONAL
QUANTITY.

(2) AS INDICATED IN INSPECTION
REPORTS BY ADVANCED
UNDERGROUND INSPECTION, LLC

(3) QUANTITIES SHOWN ARE
APPROXIMATE. CONTRACTOR
SHALL BE PAID IN FULL FOR
ACTUAL INSTALLED AMOUNTS
USED ABOVE OR BELOW
ESTIMATED QUANTITY SHOWN.

SINGLE COMPONENT
FIBER-REINFORCED
CALCIUM ALUMINATE
REHABILITATION
MORTAR.
"ALUMINALINER"
BY QUADEX OR
APPROVED EQUAL
LINK PIPE DETAIL
DESIGN CONSIDERATIONS (REHABILITATION SITES)

- **Level Sensor & Supports**
  - Siemens Hydroranger 200 Ultrasonic Transmitter, XPS-10F Transducer
  - Wall mounted, 316 S.S. Unistrut, mounting brackets, anchors, spacers, etc.

- **Electrical/Lighting**
  - Existing electrical did not meet Class 1 Division 1 requirements for hazardous locations
  - Class 1, Division 1 Luminaires, Cooper Crouse-Hinds (explosion-proof but not submergence proof)

- **Access/Safety Improvements**
  - New ladders, ladder-up devices, access hatches were needed, safety grating, flume grating, safety line

- **Rehabilitation of Effluent Drop Manholes not in scope**
  - Required bypass pumping of Effluent Drop Manhole (i.e. significant cost)
DESIGN CONSIDERATIONS (REPLACEMENT SITES)

- **Tranquil Flow Calculations**
  - U.S. Department of the Interior Bureau of Reclamation Water Measurement Manual recommends approach conditions for flumes with open channel flow characteristics at 40 times the hydraulic radius of straight, unobstructed flow.
  - Theoretically improves the accuracy of the flume
  - Used ADF to determine approach lengths

- **Meter Sensitivity Analysis**
  - Determined potential yearly revenue losses based on meter inaccuracy
  - Justified additional costs of improvements to lengthen approach conditions

- **Ventilation & Corrosion Control**
  - Corrosion Identification & Control Study by V&A Company (Houston, TX)
  - Recommended Eduction and Reduced Turbulence in Effluent Drop Manholes
  - Vortex Flow Insert Evaluated but ultimately excluded

- **Bypass Pumping**
  - Significant cost; attempted to design around shortest duration needed.
  - Brought in Contractor to help with design intent and minimum requirements.
VORTEX APPROX. FLOW RANGE: 3.08 - 12.45 MGD
VORTEX DESIGNED FOR A PEAK FLOW OF: 10.83 MGD
(AS SPECIFIED BY OTHERS)

VORTEX APPROX. DRY WEIGHT: 2000 LBS
DESIGN CONSIDERATIONS (REPLACEMENT SITES)

- **Constructability**
  - **Parallel Construction**
    - Endeavored to keep meters in service as long as possible
    - Helped to minimize bypass pumping duration
  - **Utility Relocations/Conflicts**
    - Coordination with local communities
  - **Temporary Earth Retention Systems**
  - **Social Impacts** (Road closures, Vibrations, Noise, Odors, etc.)
CONSTRUCTION

Pre-Award Meeting
Coordination of Rehabilitation Site Work
Pitfalls of Unit Price Work on jobs with large Lump Sum items
Surety Completed Project
TERS Issues
  Impact on 54-inch storm concurrent with August 2014 flooding
  Soil migration; undermines WM
  Installation and Excavation Progress was challenging
Shop Drawing Submittals
  Multiple reviews on most every submittal
  One (1) bypass pumping submittal took 6 months to complete
Substitution Request
Bypass Pumping
  Suction manhole sizes
Facility Construction
Document, Document, Document........
SPECIAL THANKS

ELDON “GENE” ADAMS
Field Project Representative
HRC Employee
Hired 1970 – Retired 2017
QUESTIONS ?
THANK YOU

If you have questions about the presentation, please contact us:

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