MEETING MINUTES
December 14, 2021
Virtual Meeting

Attendees:

Name of Attendee(s)	Company / Agency Name	Email Address
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Announcements:

- ***PUG***
  - ***PUG Annual Sharing Technology Seminar February 17, 2022, Live***
    PUG BOD selected abstracts. Thank you.
    The Seminar is Thursday, February 17, 2022.
  - ***PUG Membership Renewal***
    The PUG new year has started in June. We are looking forward to this new year.
  - ***Future Presentations for Monthly Meetings***
    For future meetings, PUG is open to presentations for future topics.
- ***NASTT***
  - ***NASTT 2021 - November 14 to 15, 2021 – NASTT Pipe Bursting Good Practices Course Virtual***
  - ***NASTT 2022 - April 10 to 14, 2022 –*** *No-Dig Show, Minneapolis, MN - Live*
- ***WEFTEC 2022***
  - *October 8-12 WEFTEC 2022 Conference - LIVE New Orleans Memorial Convention Center, New Orleans, LA.*
- ***UESI Pipelines 2022 Conference***
  - *July 31-August 3 – Live - Indianapolis, Indiana*
    - *Public Sector Utility Scholarship Application Deadline December 15, 2021*
    - *Registration Opens January 26, 2022*

General:

November 2021 Meeting Minutes: An overview of the November meeting minutes was presented.

Financial Update: The current total in the organization account as of November 30 is $80,786.51 (Dustin La Vallee)

Project Discussions:

Napa near Highway 29 (Glenn Hermanson**):**

- 66” RCP corroded pipe Design called for a 66” CIPP

- Bypass was challenging since there was a creek cross. Bypassing involved 90 degrees turn before the creek and continue to reach the nearest road. Where bypassed crossed the road and reach the treatment facility.
- Bypass incorporated 6 bypass pumps
- The Old northwest pipe fabrication facility

Port of Oakland Pipe Bursting completed (Adam Brown):

- Earhart Road project consisted of CIPP, open cut, and pipe bursting.
- Pipe bursting is 1800 ft size from 15" to 18" diameter
- Dewatering issues
- Bay mud was 7 to 12 feet in depth
- Ranger Pipeline was the contractor

City of San Mateo CCTV Sewer (Zaheer Shaikh Harris)

- Project involves CCTV sewer system approximately 300 thousand feet

WEFTEC 2021 Conference Recap (Jimmy Dang – OLSD)

"The Savings are in the Details: Fundamentals of ABAC Design"

Information required:

- Effluent process requirements
- Blower Capacity and turndown
- Aeration pipe sizing
- Aeration control valve selection
- Diffuser zones and densities
- Minimum aeration for mixing
- Do and ammonia instrumentation and locations
- Control logic and programing

Presentation: "Large Diameter Pipe Rehabilitation with a Spray Applied Structural Geopolymer Mortar Lining," Joe Royer and Kurtis Chirbas, GeoTree.

Overview:

The presentation was on Geopolymer by GeoTree for structural rehabilitation of pipes 36-inch and larger as an alternative to CIPP, sliplining and other spray applied systems. What is a Geopolymer, when to use a Geopolymer, how to design Geopolymer liner and three case studies presented.

Highlights from the presentation include:
Overview:

A. Introduction to GeoTree
B. Typical causes for piper rehabilitation
C. Geopolymer Introduction
D. Mechanism of sewer corrosion
E. Corrosion Testing (methods, standards)

F. Example Case Studies

***Background*:**

GeoTree® Geopolymer

Cementitious spry lining for structural repair.
Applications culvert renewal, storm, sanitary sewer rehabilitation, manhole lining, industrial plants/facilities.

GeoStrong® Geopolymer

Cementitious concrete repair mortar
Applications: bridge columns, piers, caps, and abutments.
Slabs and structures
Properties fast-setting and not-shrink

Renewwrap® FRP Strengthening

FRP Repair System for columns, beams, slabs, walls, steel pilings, concrete piers, bridges, jetties, pipes, tunnels.
CFRP NSM bars for upgrade structures in flexural and shear such as bridge decks and slabs

Typical Causes of Pipe Rehabilitation or Replacement (storm and sanitary sewers)

- Hydraulic capacity
- Corrosion (part of presentation)
- Structural (part of presentation)
- Abrasion
- Environmental
- Re-alignment

Typical Causes of Pipe Rehabilitation or Replacement (storm and sanitary sewers)

- Assess the condition of pipe (corrosion, fatigue, deformity, separation, leakage abrasion, etc.)
- Assess the loads affecting the pipe (Buried depth, groundwater, live loads operation flows, soil conditions, etc.)
- Identify performance requirements (strength, surface protection, hydraulics, min clearance, etc.)
- Evaluate rehabilitation technologies (functional longevity, installation time, construction issues, bypass, environmental conditions, climate conditions, traffic, overall cost, etc.)
- Determine performance testing procedures to verify installation
- Specify materials performance properties to meet the design criteria's (flexural, tensile, acid resistance, etc.)

Trenchless Technologies Basic Selection Criteria chart:

- Undersize: Replace with large pipe bursting, extraction, dig & replace
- Structural Sound: Non-structural renovation or structural renovation if pipe is likely to become unsound in lifetime.
- Spot Repair: FRP
- Small Diameter <36": CIPP, slip lining, Spiral Wound

- Can Bypass: Slip lining, grout lined insertion

GeoTree are material suppliers, do not bid in project or are not contractors

What is a Geopolymer?

- GeoPolymers are not a plastic Not HDPE/ PVC/ Epoxy
- Looks and feels like cement
    - Workability
    - Material properties
    - Service life
- Chemical structure (like quartz and a solid stone) provides beneficial physical and chemical
    - Monolithic
    - Durable
    - Corrosion Resistance

Chemistry primer: OPV vs Geopolymers

- OPC structure: corrosion on sanitary sewer the main factor is $CA(OH)_2$ major corrosion issues for generic mortar products
- Geopolymers structure minimize bad actors for corrosion issues.
- Geopolymer inorganic polymer long chain cross link molecules covalent bonded with aluminum calcium, iron, magnesium which make it difficult to break the molecules.

Geopolymer Application Advantages:

Flexibility and Risk

- Lower total system cost than alternative methods: installation & ongoing operating costs
- Less installation delays from weather
- Less disruptive to the community
    - Less cost associated with road closures, no-productive labor, traffic delays, impact to local businesses, etc.
- More quickly implementation: Less cure/set-up time

<u>Geeospray Advantages: Summary</u>

	GeoSpray®	Portland Cement
Specific Strength	Excellent	Variable
Early strength	High	Low
Acid Resistance	very good	Poor
Self-Adhesion	High	Low
Flexural Strength	High	Low
CO2 Emissions	Low	High

Single pass thickness 2x to 3x x

Total Installed Cost lower than Portland Cement

Geeospray® Advantages: Self-bonding

Geospray® Physical properties are similar like what is specify on the cementitious materials

- Flexural strength is almost double the value of the compression strength
- Tensile Strength is 10% of the compression strength value

Environmental Benefits

- GeoSpray geopolymer has passed NSF/ANSI 61 and WRAS potable water certification
- WRC approved
- Chemical reactions of geopolymer create only a fraction of CO2

AASHTO NTPEP – Spray applied liners (SAPL)

- Covers standard physical testing for cementitious and polymer coating (ASTM & AASHTO Standards

General Access through existing manholes

- Geopolymer Centrifugal casting process slides.

Price

- Lower than Portland Cement, CIPP, slip line, SPR. Also varies depends on the job.

Slides show examples of chemical corrosion and erosion issues above the water line

The Greenbook" Pickle Jar Test (211-2)

- Standard Specifications for Public Works Construction (California only)
- Specifically specified for California – No Cementitious Materials pass tests (developed for CIPP)
- The cementitious and geopolymer materials will not pass the pickle test but can be the structural repair. Required a thin coat of epoxy to pass the pickle jar test.

Example of a San Jose project pipe crown repair with GeoSpray and added an epoxy protection.

There is a good Standard test, but it is in German language. NASTO has it on the draft specifications for spray apply sewer applications and gives recommendations.

Geopolymer Geospray corrosion resistance

Design Model Testing Pipe Rehabilitation

- The goal of the project was to validate proposed engineering methodologies for structural rehabilitation of large diameter pipes with experimental data.
- Various slides showing data comparison to models and predictions

Case Studies Presented:

- Houston, Texas
    - EPA observed and monitored the project as part of the U.S. Environmental Agency Performance Evaluation of an Innovative technology demonstration program to evaluate technologies that have potential to reduce costs and increase effectiveness.
    - Existing pipe had heavy infiltration and corrosion
    - Initial hand sprayed and troweled application and then a final spin cast pipe
- Markham, Ontario – Canada
    - 100 linear feet section 104-inch diameter
    - Depth 147-feet
    - Water table 131 ft above crown
    - Along the pipe there were leaking joints which were repair prior to GeoSpray application.
    - Client: York Region
    - Engineering Consultant: Aldea Services
    - Contractor: Michels Canada
- Magnolia Avenue City of Santee, California "CMP Storm Sewer
    - 320 ft of 48-inch
    - 700 ft of 54 inch
    - 206,000 lbs. of GeoSpray
    - Corroded invert of the CMP, Corroded joints.
    - Project construction occurred at night
    - Contractor – RePipe California

Thank you to Joe Royer and Kurtis Chirbas, GeoTree for a great presentation and contribution to PUG monthly meeting.

Next Meeting:

The next meeting is scheduled for Tuesday, January 11, 2022. **"Oro Loma Sewer Line Replacement Program - 40 miles,"** Jimmy Dang, Ora Loma Sanitary District,"