Globeville Landing Outfall Geomembrane Cover / Liner Additional Information

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Liner System Purpose

Cover over buried waste

- Prevent contaminated groundwater from moving into storm water channel

Liner under storm water channel

- Prevent storm water from moving downward into buried waste
Liner System Components

- 60 mil thick Textured Linear Low Density Polyethelene (LLDPE)
- Geotextile and Geonet Composite Protection Layers
- Soil Cover Protection
- Orange Detection Layer
- Strengthening layer with Geogrid
- Stone columns to Bedrock
What forces act on the liner?

- Wet, buried environment
- Potential settlement in waste below
- Soil and water loading from above
- Low concentrations organics/inorganics in groundwater/waste below
- Groundwater uplift potential
- Potential installation stresses
- Potential puncture stresses during construction
- Physical constraints including side-slopes/anchor trench and concrete wall connections
Why this liner system?

- Liner material – 60 mil textured LLDPE:
  - Formulated of 95% pure polymer ensures long life
  - Groundwater concentrations not of concern (and liner material is highly resistant)
  - Highly stable in wet, buried environments
  - High tensile strength/elongation resists settlement
  - Textured surface provides slope stability and prevents slip of geotextiles and soils
  - Flexible so conforms to site conditions and installation stress
  - 23-foot wide rolls provides installation efficiency and minimal seams
Why this liner system?

- Strengthening layer and columns:
  - Geogrid formulated of 97% pure polymer
  - Long-life in buried conditions
  - Interlocks to spread loading
  - Stone columns extend to bedrock
- Distributes load vertically and laterally
- Addresses settlement concerns
- Handles heavy soil and water loads
Why this liner system?

- **Geotextile and Geonet Protection Layers:**
  - Geotextile formulated of Polypropylene for long life
  - Cushions to prevent liner puncture and stress
  - Provides installation base

- **Soil Cover Above:**
  - Provides protection
  - Provides growth medium for vegetation
  - Weight of soil counteracts groundwater uplift pressure
  - Provides constant temperature environment

- **Orange Detection Layer**
What is the liner warranty?

- **Manufacturer warranty** - 20 years
  - Covers polymer and sheet against deterioration
- **Installation warranty** - 2 years
  - Covers installation-related defects or connections
Long-term monitoring

- Electrical Leak Location Survey on a Periodic Basis
- Inspection and maintenance of GLO channel soil cover
- Inspection and maintenance of concrete walls
- Repair of any surface damage such as erosion, soil cover damage
- Removal of undesired vegetation
Leak Location with a Soil-Covered Geomembrane

Advantages

• Only standard ASTM method capable of detecting potential leak sites under a soil cover
• Used as a final CQA test of completed geomembrane installations and integrity testing for future maintenance
Leak Location with a Soil-Covered Geomembrane
Why are we confident the liner is up to the task?

- Geomembranes have been in use for decades in waste and non-waste containments with exceptional performance
- Design concepts are well understood
- This soil covered design
  - Protects for structural concerns including settlement and uplift
  - Protects for liner degradation, including UV, ozone, oxidation, heat, mechanical stress
- Geomembrane will last well over 100 years
- The liner is fully protected from above and below
- We will monitor performance and fix problems
Thank you

Questions?

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