



Thorntown Wastewater Treatment Plant Liner Installation

Town of Thorntown
Boone County, Indiana
November, 2023

Surface Preparation

(November 15th)

- The entire lagoon was re-graded
 - Weeds were cut down
 - Sidewall erosion was repaired
 - Cracks and sink holes in the soil were repaired
 - The bottom profile was sloped towards the northwest corner to allow for a single pump location to remove water after a rain event
- After grading, the surface was rolled smooth and compacted using multiple passes with a drum roller



Material Delivery

(November 22nd)

- The geotextile fabric and HDPE liner were shipped to the jobsite via three flat-bed trailers
- A two-foot wide by two-foot deep anchor trench was cut into the top of the dike to receive the geotextile fabric and HDPE liner



Liner Installation

(November 27 – December 2)

- The installation begins by installing the geotextile fabric on the freshly prepared soil base
- The liner materials in installed in a North-South orientation with the ends extending into the anchor trench
- The liner material is stretched to minimize wrinkles and staked in the anchor trench with rebar (sandbags were later removed)
- The liner around the withdrawal structure with installed with pipe boots, batten bars, and extrusion welds for a water-tight seal



Liner Installation

(November 27 – December 2)

- The geotextile fabric and the HDPE liner are secured to the existing concrete influent structure using batten bars
- Anchor bolts are embedded into the concrete base
- A gasket and bottom batten are installed over the bolts
- The liner materials are pushed over the bolts and secured with a top batten
- Nuts are placed on the bolts and tightened to compress the liner to the structure



Liner Installation

(November 27 – December 2)

- The liner installation proceeds only when the panel temperature is above 40°F, high winds are not present, and no precipitation is occurring
- The black HDPE liner material absorbs solar radiation, the panel temperature in this picture is 57.9°F while the air temperature is 19°F



Quality Control

(Test Seams)

- At the beginning of each day, or after welding equipment has been turned off, test seams will be performed on the HDPE liner material to verify that seaming conditions are adequate. Test seams are performed for each welding machine and associated equipment.
 - Fusion welded test seams are ten-feet long, extrusion welded test seams are 3-feet long
 - Ten 1" wide coupons are cut from the trial seams. Five of the coupons are tested for shear strength and five coupons are tested for peel strength.
 - Each of the ten coupons are tested on the field tensiometer
 - Shear test – 4 of 5 coupons must meet or exceed the bonded seam strength values in shear. The 5th coupon must meet or exceed 80% of the required seam strength. Each specimen must fail in the parent material and not in the weld.
 - Peel test – 4 of 5 coupons must meet or exceed the bonded seam strength values in shear. The 5th coupon must meet or exceed 80% of the required seam strength. Each specimen must fail in the parent material and not in the weld.
- No seaming may commence until trial seam tests are completed and passed. Any failure to meet the trim seam criteria is test failure and the whole process must be repeated.
- The QA Technician records each trial seam sample.
- Trial welds are marked with Date, Welding unit ID, Welding unit speed and temperature, and technician ID.

Quality Control

(Air Pressure Testing)

- In most locations, the HDPE liner is welded using a double-seam fusion welding machine.
- The liner seams are overlapped for fusion welding by a minimum of 4"
- The channel between the seams is air tested to between 30 and 35 psi and held for 5 minutes
- If the pressure loss does not exceed 4 psi of the starting pressure, the seam is considered leak tight
- After passing the air test, the seam is marked and initialed
- All information regarding air pressure testing is logged by the QA technician



Quality Control

(Destructive Seam Testing)

- Samples are taken at 30' intervals at transition from horizontal to sloped surfaces
- Coupons are cut from the sample, five coupons are tested in shear, and five coupons are tested in peel
- The pass/fail criteria is the same as the test seams
- The test location is patched with an extrusion welder and vacuum tested
 - Surfaces are cleaned and dried at the time of the repair
 - Patches extend a minimum of 6" beyond the edge of the defect
- The QA technician records each destructive test sample



Warranty

- When the work was complete, the QA technician conducted a final walk-thru of the liner installation to verify that all repairs were appropriately performed, all tests results were positive, and the area was cleared of all scrap, trash, and debris
- The anchor trench was backfilled
- A Certificate of Completion was signed, this document transfers title from IEC to the Town of Thorntown
- Warranties are as follows:
 - One (1) year from date of substantial completion, guaranteeing the workmanship of the installation
 - Five (5) years material warranty

