CASE STUDY

Savanna Street Wastewater Treatment Plant

City of Jackson, Mississippi, USA

Flint Industries TITANTube ®

Owner: City of Jackson, MI

Consultants: United Water

Contractor: Flint Industries

Construction: 2013

Background

The City of Jackson, Mississippi, operates three wastewater treatment plants (WWTP). Savanna Street WWTP is the primary treatment facility, with a 46 million gallon per day permitted capacity, which stores, handles and processes the sludge from all three plants. The sludge is generated at the Savanna Plant from two main sources: waste activated sludge; and storm cell storage. All wastewater sludge generated in the City of Jackson and contributing satellite communities is centrally handled at the Savanna Street WWTP. The Storm cell storage results from any excess wet weather flow diverted to the storm cell flow basins for temporary storage and contains some solids. Over time these solids accumulate and require removal. Sludge removed from the storm cells will be disposed of off-site by land application or landfilling from the Savanna Street WWTP approximately every five years. The plant is a conventional activated sludge facility without primary clarifiers.

The original plant configuration consisted of a series of treatment lagoons and a mechanical treatment plant which has been in operation since the early 1970s.

Challenge

In 2013 the City of Jackson was placed under a Federal Consent Order to remove sludge from the lagoons. The cost of dredging, dewatering and removing the sludge was beyond the city's budget. The City of Jackson elected to dredge and dewater only, obtaining geotextile tubes to contain the material until the funding for the removal of the solid sludge became available.

Dewatering Process

The goal for dewatering the municipal wastewater sludge was to start with 1,500,000 yds^3 (1,185,060 m^3) and result in 92,000 dry tons of solid material which is 520,000 yds^3 (397,568 m^3).

The polymer system had to be able to retain dredged dewatered solids, provide a means of passive dewatering of captured solids, act as a temporary storage of dewatered bio-solids, and have the ability to be stacked. For municipal sludge, 25% of dewatering was anticipated.

Main picture: Aerial view taken during the filling of the geotubes and the installation of the drainage systems

Above first picture: The quality of the water drained from the TITANTube®

Above second picture: Installing the TITANTube®

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Left and above: Overview of the TITANTube® during the dewatering process

Solution

TITANTube® geotextile tubes are large tubes (ranging up to 30m in circumference) used for containment and sludge/sediment dewatering. The TITANTube® design maximizes operational strength, UV stability, and interface friction. Two areas for the tube placement required extensive work to accommodate the tubes, including: cut and fill; precise grading, a half degree of slope was necessary on each side of both cells for drainage; addition of lime along the compaction; installation of a HDPE liner; and the installation of pumps and piping to handle the tube discharge and for heavy rainfall events.

The dredged material is pumped into the permeable geotextile TITANTube®. The moisture is allowed to evaporate and drain through the geotube. Filling and dewatering is carried out over several cycles for maximum utilization of the container. At the end of the final filling/dewatering cycle the solids within the TITANTube® continue to consolidate as the self weight of the sludge remaining in the tube causes more water to emerge through the woven fabric.

Conclusion

The TITANTube® high flow rate dewatering tubes were used to contain and dewater waste activated sludge to result in approximately 92,000 dry tons of dredged solids. By stacking the tubes up to 4 tiers high, the sediment was dewatered in 2 dewatering cells. It is estimated that this approach saved the City of Jackson over US$3 million in future solids handling costs due to the decreased volume of material to be transported. The TITANTube® is composed of high-tenacity yarns, which are woven into a network in such a manner that the yarns retain their relative position to each other for the high demands required. The tube is inert to biological degradation and resistant to naturally encountered chemicals typically found in these type of environments making a perfect temporary storage facility.

Project specifications

System	TITANTube® dewatering geotextile tubes
Finish	Sand coloured
Structure	High tenacity polypropylene yarns
Size	Ranging up to 30m in circumference
Water Flow	408 l/m/m²
UV Resistance	95% (after 500 hours)
Strength	95kN/m

Filtration Opening Size US Sieve .300mm

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