

NORTHERN CONCRETE PIPE



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Precast concrete box system controls stormwater and extends surface parking

The Planning Commission of Pittsfield Charter Township met with the Farmington Hills-based Beztak Land Company in March 2017 to discuss the preliminary site plans of a multiple building and multiple use development at the NW corner of Ann Arbor-Saline Road and Oak Valley Road. The site of the development includes two parcels totaling approximately 15 acres. The development includes 84 apartment units in three buildings. There are 94 rowhome units in 11 buildings and two mixed-use commercial buildings, a clubhouse, and a pool.

The site has seven wetlands totaling 2.51 acres of which, 2.34 acres are regulated by the State of Michigan. The wetlands serve as a buffer between the development and existing neighborhoods. Construction of the development, including the stormwater retention system, commenced in the spring of 2019.

System design

Two underground stormwater retention systems were designed using precast concrete boxes to control discharge into regulated wetlands and accommodate 482 commercial and residential parking spaces. The system was designed to capture water from impervious surfaces during large rain events and to detain the stormwater until it could be slowly released into the soils and wetlands. Concordia Contracting installed the smaller of the two systems in five days and the larger system in seven. Easy installation and a steady supply of boxes from Northern Concrete Pipe helped keep the project on schedule and within budget.

The reason behind the decision to construct the system with precast concrete boxes came from the need for a smaller footprint than a specified retention system that required the excavation of a large area to pour a concrete base slab.

Northern Concrete Pipe, designed the layout of the retention system and manufactured it to ASTM C1577 Standards to support loads according to LRFD HL-93.

The first system includes 44 box sections of twin-cell boxes. Each cell has an outside width of 24 feet 10 inches. The system was designed to



have two parallel runs of twin cells, set two inches apart. Each run was comprised of box sections with an 11-foot 5-inch span and 5-foot 6-inch rise. It has one 24-inch diameter inlet pipe and one 24-inch diameter outlet pipe. During rain events, it is designed to fill evenly throughout the entire system before releasing stormwater to the outlet control structure. The total system included three 24-inch diameter access holes from the top of the boxes for maintenance, and six 24-inch x 42-inch openings in individual boxes for maintenance and to allow water flow throughout the system. There are nine, 12-inch diameter openings that allow incoming water to flow throughout the system. The retention system has a 6-inch diameter weep hole placed in the bottom of six boxes to allow infiltration into the soil. The storage capacity is 21,610.85 cubic feet.

The second system includes 98 sections of twin-cell boxes. Each cell has an outside width of 24 feet 10 inches. The system was designed to have three parallel runs of twin cells, each set two inches apart. Each run was comprised of box sections with an 11-foot 5-inch span and 5-foot 6-inch rise. The system has one 21-inch diameter reinforced concrete pipe (RCP) inlet, one 12-inch diameter RCP inlet, one 4-inch diameter polyvinyl chloride (PVC) inlet, and one 24-inch diameter outlet. It was designed to fill evenly throughout the entire system as it releases stormwater to the outlet control structure. The system includes five 2-inch diameter access holes from the top of the boxes for maintenance, and eleven 24-inch x 42-inch openings in individual boxes for maintenance and to allow water flow throughout the system. There are eighteen 12-inch diameter openings that allow incoming water to flow throughout the system. The system has a 6-inch diameter weep hole placed in the bottom of 22 boxes to allow for infiltration into the soil. The storage capacity is 48,140 cubic feet.

Each box was set on 4 to 6 inches of stone which eliminated the need to pour a concrete base. With the ability to set 14 box sections per day, the contractor was able to meet the project deadlines and provide a stormwater retention system that will service this area now and in the future.

About Northern Concrete Pipe

Precast concrete producers can assist design engineers and contractors with projects when they have site or design challenges. With its 60 years of experience in the precast industry, Northern Concrete Pipe was able to design a precast concrete retention system to meet the needs and capabilities of the contractor.