History of Construction

For Compliance with the EPA Coal Combustion Residuals (CCR) Rule 40 CFR §257.73(c)

Erickson Power Station –
Forebay and Retention Basin

August 10, 2020

Prepared for:
Lansing Board of Water and Light
Erickson Power Station
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1 Introduction

HDR MICHIGAN, Inc. (HDR) has prepared this History of Construction for the Forebay and Retention Basin at Erickson Power Station following the requirements of the Federal Coal Combustion Residuals (CCR) Rule to demonstrate compliance of the existing Erickson Power Station in Lansing, Michigan.

On April 17, 2015, the United States Environmental Protection Agency (EPA) issued the final rule (Ref. [1]) for disposal of Coal Combustion Residuals (CCR) under Subtitle D of the Resource Conservation and Recovery Act (RCRA). CCR Rule 40 CFR §257.73(b) requires that owners or operators of an existing CCR surface impoundment that either 1) has a height of five feet or more and a storage volume of 20 acre-feet or more; or 2) has a height of 20 feet or more compile a history of construction, which shall contain, to the extent feasible, the information specified in 40 CFR §257.73(c)(1)(i) through (xii). It was determined that the existing Forebay and Retention Basin at the Erickson Power Station meet the first criteria with a height of five feet or more and a storage volume greater than 20 acre-feet.

The History of Construction report presented herein addresses the specific requirements of 40 CFR §257.73(c)(1)(i) through (xii). Furthermore, if there is any significant change to any information compiled under paragraph 40 CFR §257.73(c)(1), the owner or operator of the CCR unit must update the relevant information and place it in the facility's operating record as required by 40 CFR §257.105(f)(9).

This History of Construction was prepared by Mr. Bryce Burkett, P.E., reviewed in accordance with HDR's internal review policy by Mr. Adam N. Jones, P.E., both of HDR. Mr. Burkett is a registered Professional Engineer in the State of Michigan.

1.1 Site Location

Erickson Power Station is an electrical power generation facility located at 3725 South Canal Road, Lansing, Michigan which is owned and operated by Lansing Board of Water & Light (BWL). The latitude and longitude of the Erickson Power Station are approximately 42.692422 N and 84.657764 W. The site is located in southwest Lansing, Michigan near the intersection of Interstates 69 and 96, as shown in the vicinity map, Figure 1.

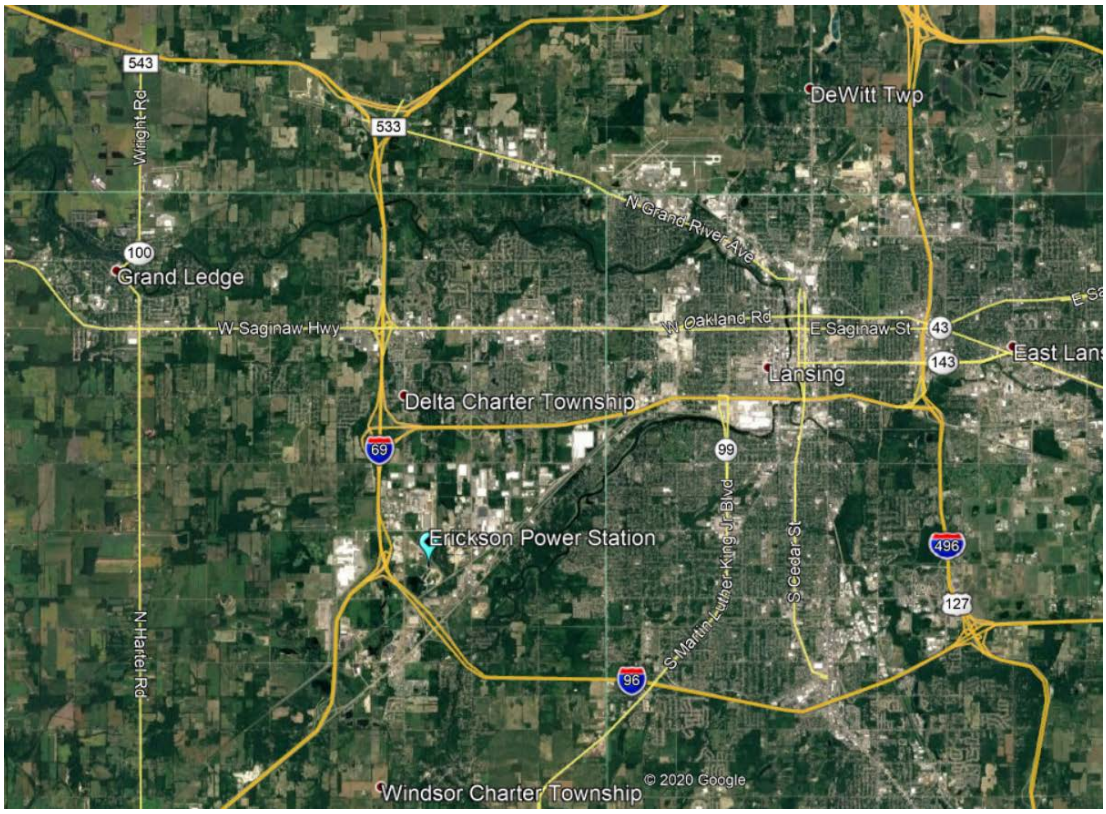


Figure 1. Site Vicinity Map

1.2 Site Description

Erickson Power Station was constructed starting in 1970, was completed in 1973, and is scheduled to close in 2025 as part of the BWL's move to cleaner energy sources. Erickson Power Station contains a single coal-fired steam turbine/generator capable of producing 165 megawatts of electricity.

Currently, the system consists of a series of three impoundments: the Forebay, Retention Basin, and Clear Water Pond. Figure 2 displays the Erickson Power Station site configuration, including the current impoundment system.

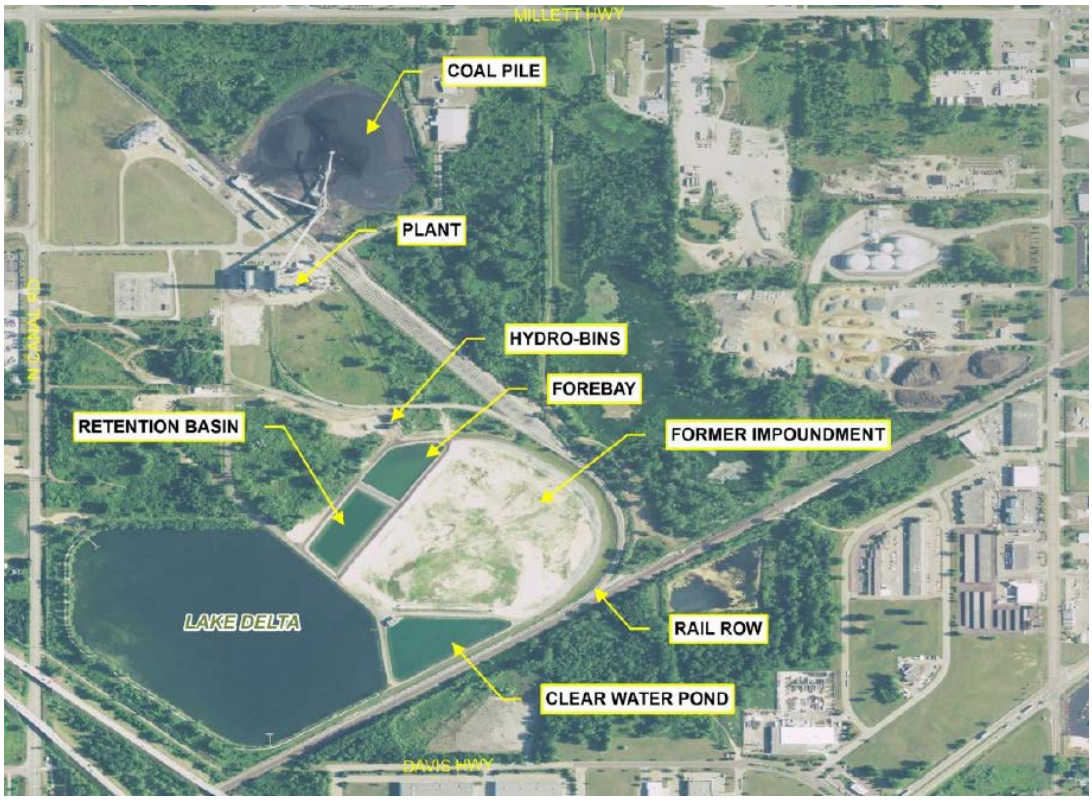


Figure 2. Erickson Power Station Site Configuration

Figure 3 presents a Google Earth view looking NNE, identifying the Forebay and Retention Basin in relation to the impoundment system. Also viewable in Figure 3 is the Clear Water Pond, Lake Delta, Former Impoundment, coal pile, and Erickson Power Station.

Figure 3. Google Earth Image of Impoundment System

2 History of Construction Requirements

The requirements to be included in the History of Construction Report for existing CCR surface impoundments are detailed in 40 CFR §257.73: *Structural integrity criteria for existing CCR surface impoundments*. CCR Rule 40 CFR §257.73(c) states that the history of construction for an existing CCR impoundment (i.e. Forebay and Retention Basin) is to be compiled and contain the information specified in 40 CFR §257.73(c)(1)(i) through (xii). Table 2-1 summarizes the information from paragraphs 40 CFR §257.73(c)(1)(i) through (xii), as well as the location of the information presented in this document.

It should be noted that elevations presented in this report refer to NGVD 29[1] and NAVD 88[2] as elevations presented in existing documents reference to each vertical datum. A survey was performed by BWL on May 7, 2020 which provided elevations at many of the structures for the impoundment system. At the site, the conversion from NGVD 29 to NAVD 88 is -0.63 feet (i.e. NGVD 29 is 0.63 feet higher than NAVD 88). Elevations are provided referencing each datum throughout this report for clarity.

[1] National Geodetic Vertical Datum of 1929. NGVD 29 was used by Mayotte Design & Engineering, P.C. (MD&E) during construction and is referenced in their report (Ref. [6]).

[2] North American Vertical Datum of 1988.

Table 2-1. List of History of Construction Requirements

40 CFR Rule	Rule Information	Document Section
§257.73 (c)(1)(i)	Owner/Unit Information	Section 3.1
§257.73 (c)(1)(ii)	USGS Map Location	Section 3.2
§257.73 (c)(1)(iii)	Purpose of CCR Unit	Section 3.3
§257.73 (c)(1)(iv)	Name and Size of Watershed	Section 3.4
§257.73 (c)(1)(v)	Description of Foundation and Abutment Materials	Section 3.5
§257.73 (c)(1)(vi)	Statement of Materials Used in Construction, Method of Site Preparation, Dates of Construction	Section 3.6
§257.73 (c)(1)(vii)	Detailed Drawings of Unit	Section 3.7
§257.73 (c)(1)(viii)	Existing Instrumentation Details	Section 3.8
§257.73 (c)(1)(ix)	Area-Capacity Curves	Section 3.9
§257.73 (c)(1)(x)	Spillway and Diversion Design Features	Section 3.10
§257.73 (c)(1)(xi)	Construction Specifications and Surveillance, Maintenance, and Repair Provisions	Section 3.11
§257.73 (c)(1)(xii)	Structural Instability Records	Section 3.12

3 History of Construction

3.1 §257.73 (c)(1)(i) - Owner and Unit Identification

§257.73 (c)(1)(i): The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

Erickson Power Station is an electrical power generation facility located at 3725 South Canal Road in Lansing, Michigan and is owned and operated by the Lansing Board of Water & Light (BWL).

The names associated with the units are the Forebay and Retention Basin.

The units have not been assigned identification numbers by the State of Michigan.

3.2 §257.73 (c)(1)(ii) - Unit Location on USGS Quadrangle

§257.73 (c)(1)(ii): The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7 ½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.

Attachment 1 presents the *Site Location Map* with the Dimondale Quadrangle, Michigan, Eaton County, 7.5-minute series USGS Quadrangle, dated 2019. The locations of the Forebay and Retention Basin are shown on the quadrangle.

3.3 §257.73 (c)(1)(iii) - Purpose of the CCR Unit

§257.73 (c)(1)(iii): A statement of the purpose for which the CCR unit is being used.

Erickson Power Station was constructed starting in 1970, was completed in 1973, and is scheduled to close in 2025 as part of the BWL's move to cleaner energy sources. Erickson Power Station contains a single coal-fired steam turbine/generator capable of producing 165 megawatts of electricity.

Historically, fly ash and bottom ash resulting from the coal combustion process were mixed with water to form a slurry and pumped from the plant to the 33-acre impoundment system (physically closed in 2014). From the impoundment, the water then flowed hydraulically to the Clear Water Pond. Water from the Clear Water Pond was recycled back to the plant via the Pump House for reuse.

From 2009 through 2014, the ash was removed from the 33-acre impoundment, and a new system (including the construction of the Forebay and Retention Basin) (Ref. [7]) was installed. The Forebay and Retention Basin were installed within the footprint of the excavated 33-acre former impoundment and cover approximately 5-acres, leaving the former impoundment with a surface area of 28-acres.

Currently, bottom ash from the coal-fired boiler is sluiced from the plant to dewatering tanks (hydro-bins). The dewatered bottom ash is trucked to a sanitary landfill and the decant water is hydraulically fed through the current impoundment system, which consists of a series of three impoundments: the Forebay, Retention Basin and Clear Water Pond.

The Forebay and Retention Basin were designed to promote: 1) settling of ash and 2) nutrient uptake by wetlands vegetation, respectively (Ref. [7]).

Water discharged from Erickson Power Station flows directly to the Forebay and enters through three influent pipes: 1) a 10-inch main extending from a sump within Erickson Power Station, 2) a 10-inch main from the Hydro-Bins, and 3) a 6-inch main extending from the Coal-Pile Run-Off Pump House. The three influent pipes are located at the northeast corner of the Forebay. The locations of the conveyances described in this section can be found on the Mayotte Design & Engineering Drawings (MD&E) (Ref. [7]), provided in Attachment 3.

Water then flows from northeast to southwest across the Forebay where water exits through three 24-inch diameter effluent pipes at the southwest corner of the Forebay, which serve as the spillway for the Forebay passes through the dike separating the Forebay and Retention Basin, and enters the Retention Basin. The inverts of the three effluent pipes (from west to east on the Forebay side) are set at approximately El. 882.4, 882.5, and 882.6 feet NAVD 88 (883.1, 883.2, 883.3 feet NGVD 29). The inverts of the three influent pipes (from west to east on the Retention Basin side) are set at approximately El. 881.6, 881.4, and 881.7 feet NAVD 88 (882.2, 882.0, 882.3 feet NGVD 29).

Water then flows from northeast to southwest across the Retention Basin where water exits through a 72-inch diameter pre-cast concrete overflow riser pipe at the south corner of the Retention Basin, which serves as the spillway for the Retention Basin. The crest of the vertical riser of the overflow pipe is set at approximately El. 879.9 feet NAVD 88 (880.5 feet NGVD 29) and the invert of the outlet pipe is at approximately EL. 873.4 feet NAVD 88 (874.0 feet NGVD 29). At the bottom of the riser pipe structure lies a 36-inch diameter

corrugated plastic pipe (CPP) pipe that directs flow to the Old Ash Impoundment Transfer Structure and then into the Clear Water Pond.

There is an additional outlet located in the northeast corner of the Retention Basin which consists of one 24-inch diameter CPP which serves the purpose of allowing water to enter the Retention Basin from the Former Impoundment in the event of flooding in the Former Impoundment. The invert of the effluent pipe (Former Impoundment side) is set at approximately El. 881.5 feet NAVD 88 (882.2 feet NGVD 29) and the invert of the influent pipe (Retention Basin side) is set at approximately El. 880.8 feet NAVD 88 (881.4 feet NGVD 29).

Considering the normal pool level in the Retention Basin (approximately El. 881.8 NAVD 88) and considering that the Former Impoundment is closed and only contains rainfall/runoff, water intermittently flows from the Retention Basin into the Former Impoundment during significant precipitation events.

3.4 §257.73 (c)(1)(iv) – Watershed Information

§257.73 (c)(1)(iv): The name and size in acres of the watershed within which the CCR unit is located.

According to the EPA WATERS GeoViewer (Ref. [2]), the Forebay and Retention Pond impoundments are located within the Carrier Creek-Grand River subwatershed, which has a size of approximately 22,700 acres. Erickson Power Station is part of the Carrier Creek drainage basin shown in Figure 4.

No natural drainage runs into the Forebay or Retention Basin and the drainage areas of the Forebay and Retention Basin have approximate normal pool surface areas of 2.1 acres and 2.6 acres, respectively.

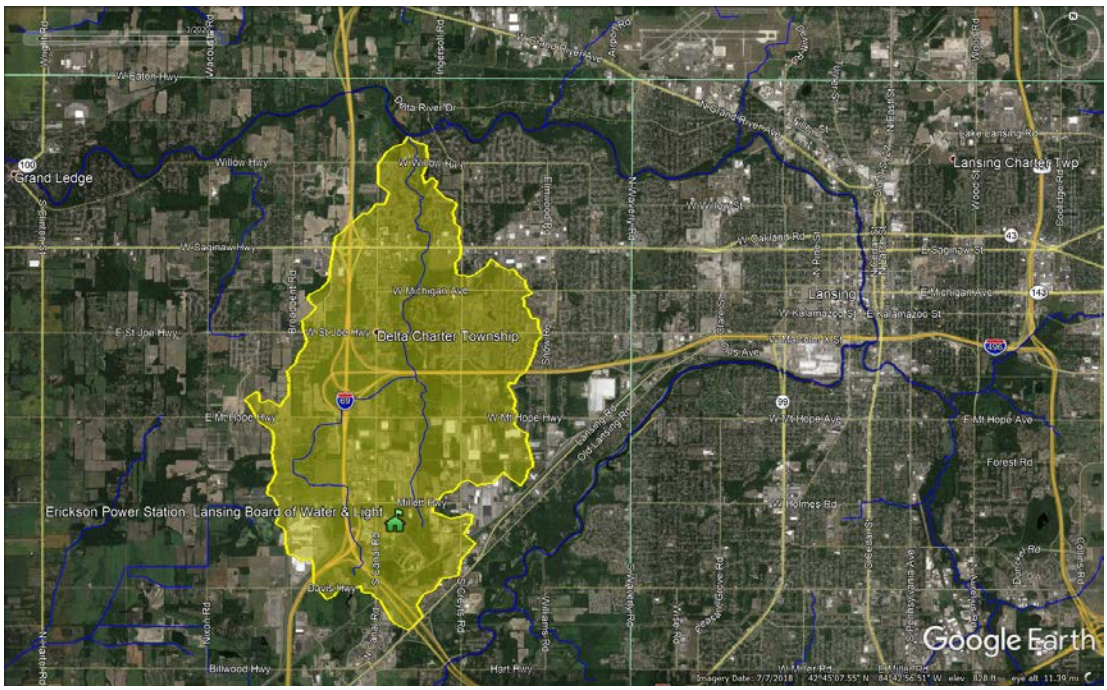


Figure 4. Carrier Creek Drainage Basin

3.5 §257.73 (c)(1)(v) - Foundation and Abutment Materials

§257.73 (c)(1)(v): A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.

Surficial soils in the area of the Forebay and Retention Basin are shown to be composed of medium-textured glacial till on the Quaternary Geology of Southern Michigan Map (1982). Glacial till is typically a dense, heterogeneous mixture of soil ranging from clay to cobbles or boulders. Additionally, the map shows that glacial outwash and postglacial alluvium are present close to the site, which is typically comprised of sand or alternating layers of small gravel to heavy cobbles. These soils are anticipated to form the foundation of the Forebay and Retention Basin. The Forebay and Retention Basin were constructed entirely with perimeter embankments, therefore there are no abutments.

Prior to the construction of the Erickson Power Station impoundment system, a subsurface investigation program was performed in 1969 by Dames & Moore. The soil boring logs performed for that study are presented in the Location Restrictions Report prepared by Mayotte Design & Engineering (MD&E) (Ref. [6]). In addition to the 1969 soil borings, test pits were performed at the site by MD&E in 2018. In 2018, SME performed three soil borings to the west of the Forebay and Retention Basin for the new gas-fired combustion turbine power plant for BWL (Ref. [8]). In 2019 and 2020, HDR installed six monitoring wells across the site, with two monitoring wells (MW-3 and MW-4) being installed in the vicinity of the Forebay and Retention Basin (Ref. [3]).

Table 3-1 details the borings, test pits, and monitoring wells which were reviewed for the physical and engineering properties of the foundation material of the Forebay and Retention Basin.

Table 3-1. List of Available Borings, Test Pits, Monitoring Wells

ID	Type	Year	Engineering Firm	Reference
AP-3 and AP-5	Geotechnical Borings	1969	Dames & Moore	Ref. [6]
AP-2	Test Pit	1969	Dames & Moore	Ref. [6]
ECT-18-B01 thru ECT-18-B03	Geotechnical Borings	2018	SME	Ref. [8]
EW-F-1 thru EW-F-6	Test Pits	2018	MD&E	Ref. [6]
MW-3 and MW-4	Monitoring Wells	2019/2020	HDR	Ref. [3]

The approximate boring, test pit, and monitoring well locations are shown on Figure 5. The borings logs, test pit records, and monitoring well logs are provided in Attachment 2.

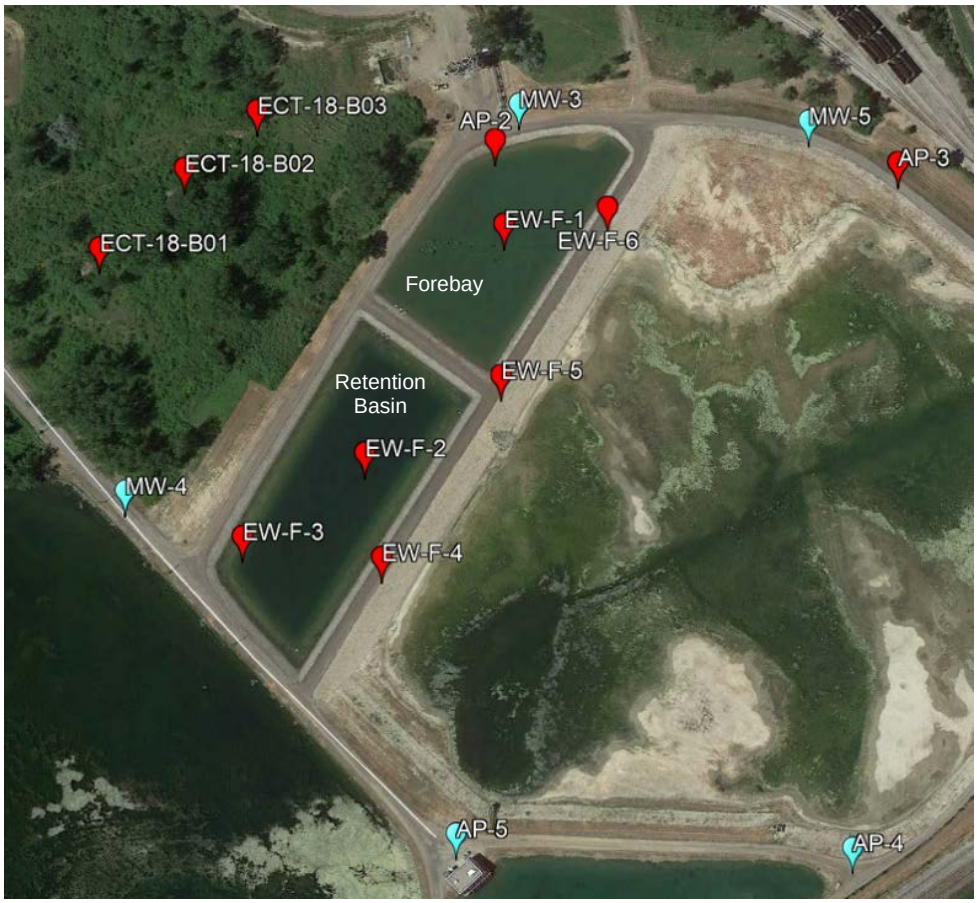


Figure 5. Approximate Boring/Monitoring Well Locations

The physical and engineering properties of the embankment and foundation materials are described in Sections 3.5.1 and 3.5.2.

3.5.1 Physical Properties

The foundation of the Forebay and Retention Basin embankments was cut to approximately El. 870.9 feet NAVD 88 (871.5 feet NGVD 29) prior to construction of the embankments. The boring logs, test pit records, and monitoring well logs indicate that the Forebay and Retention Basin foundation is comprised primarily of alternating layers of clays, sands and silts (i.e. Lean Clay, Sandy Clay, Clayey Sand, Sand, Silt, and Silty Sand) from the surface to depths of approximately El. 810.4 feet NAVD 88 (811 feet NGVD 29) below existing grade. Sandstone was encountered in the deepest boring (AP-5) at El. 810.4 feet NAVD 88 (811 feet NGVD 29), which was the limit of the deepest boring in the vicinity of the impoundments. Gravel, shale fragments, and limestone fragments were observed in the alternating cohesive and granular layers.

Laboratory tests were available for samples taken from Borings ECT-18-B01 through ECT-18-B03, which were performed outside of the footprint of the Forebay and Retention Basin, but in the vicinity of the site (i.e. approximately 300 feet northwest of the impoundments). Laboratory tests were available for the subsurface foundation material (i.e. below El. 870.9 feet NAVD 88 (871.5 feet NGVD 29)). Undrained shear strengths obtained from field estimates with a hand penetrometer or torvane in the cohesive soils ranged from 1,000 psf

(stiff) to greater than 4,500 psf (very stiff). Moisture contents in the cohesive soils ranged between 7 and 13 percent. SPT blow counts indicated that the granular soils ranged from very loose to very dense, with blow counts ranging from 3 to greater than 50 blows per foot.

There were no records of borings performed through the embankments of the Forebay and Retention Basin embankments.

3.5.2 Engineering Properties

Engineering properties for the foundation materials assumed for the original design of the Forebay and Retention Basin are not available. Standard Penetration Tests (SPT) were performed at four borings (ECT-18-B01 through ECT-18-B03 and AP-3) in the vicinity of the impoundments which include blow counts (N-values) of the foundation material, however, these four borings were not performed within the footprint of the Forebay and Retention Basin.

The N-values typically ranged from 5 to 20 blows per foot (bpf), from approximately El. 871.5 feet NGVD 29 to approximately El. 866 feet NGVD 29, with shear strength values ranging from 1,000 psf to greater than 4,500 psf, as measured in the field with a penetrometer or torvane, indicating stiff to hard cohesive soils (Sandy Lean Clay and Lean Clay). Underlying the stiff to very stiff cohesive soils, very loose to medium-dense granular soils (Clayey Sand and some Silt), with N-values ranging from 3 to 30 bpf, were encountered to approximately El. 854 feet NGVD 29. Cohesive soils consisting of stiff to very stiff Sandy Lean Clay were observed interbedding the granular soils in some of the borings. Underlying the very loose to medium-dense granular soils, stiff to hard cohesive soils (Sandy Lean Clay) were encountered to approximately El. 850 feet NGVD 29 with N-values ranging from 6 to 34 bpf and shear strength values of greater than 4,500 psf, indicating stiff to hard cohesive soils. Below the stiff to hard cohesive soils, medium-dense to very dense granular soils were encountered with N-values ranging from 15 to greater than 50 bpf to El. 811 feet NGVD 29, which is where sandstone was encountered. The sandstone was encountered in in Boring AP-5 (the deepest boring performed) and the boring was ultimately terminated after refusal from the SPT.

The boring logs, along with recorded SPT blow counts, performed in the vicinity of the Forebay and Retention Basin are presented in Attachment 2.

For additional discussion of the engineering properties of the embankment and foundation soils, refer to the HDR Initial Structural Stability and Safety Factor Assessment Report (Ref. [5]).

3.6 §257.73 (c)(1)(vi) - Construction, Description of the Materials, Methods, and Timeframe of Construction

§257.73 (c)(1)(vi): A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.

The Forebay and Retention Basin were constructed between 2014 and 2015 as part of the reconfiguration of the impoundment system for Erickson Power Station. Details of the construction procedures and construction materials, as summarized below, can be found in the Construction Documentation Report prepared by Mayotte Design & Engineering, P.C. (May 2015) (Ref. [7]). Construction Drawings and As-Built Drawings are presented in Attachment 3 and Attachment 4 of this report, respectively.

The foundation preparation activities were performed between July 7 and July 26, 2014 and included rehabilitation and reshaping of the existing embankments (Former Impoundment) and excavation of trenches for the placement of low-permeable clay fill for the hydraulic cut-off core of the new embankments.

The footprint of the construction activities was first stripped to an approximate depth of 6 inches to remove vegetation, residual coal ash, and other unsuitable materials. The foundation was then excavated to El. 870.9 feet NAVD 88 (871.5 feet NGVD 29), and the removed soil was stockpiled on-site for reuse. In fill areas within the impoundments, backfill was placed to achieve El. 870.9 feet NAVD 88 (871.5 feet NGVD 29). Backfill was placed in lifts with loose lift thicknesses no greater than 8 inches, and compacted to within 95% of the maximum dry density.

Between July 15 and July 26, 2014, cut-off trenches were excavated in accordance with the drawings and specifications and excavated material was stockpiled on-site for reuse. The cut-off trenches were then dewatered and clay-rich backfill was placed and compacted to the top of foundation elevation of El. 870.9 feet NAVD 88 (871.5 feet NGVD 29). Backfill was placed in lifts with loose lift thicknesses no greater than 8 inches and compacted to within 95% of the maximum dry density. Field density testing was performed to verify the adequacy of proof-rolling, and foundation and lift compaction activities. The stockpiled materials obtained from the excavations were tested to determine the maximum dry density and optimum moisture content.

Between July 15 and October 6, 2014, the new embankments were constructed. The embankment construction consisted of placement and compaction of fill material in successive lifts, with a maximum uncompacted thickness of 8-inches. The fill materials were placed in this manner until design elevations were achieved and the slopes of the embankments were graded during the vertical progression of the embankments.

The embankments of the Forebay and Retention Basin were constructed in zones. Clay-rich engineered fill (Granger Clay) of low hydraulic permeability (less than 10-7 cm/s) was placed within the cut-off trench and central portions of the embankments to form a structurally competent and hydraulically impervious core. Clay-rich fill material was then placed adjacent to the core (Granger Clay, Kesler Pit Clay and Clark Farms Clay) forming the embankment shells. After construction of the embankments, granular base-coarse was placed and compacted over the top 6-inches to facilitate road construction. Field density testing was performed to verify the adequacy of lift compaction.

Between August 1 and October 28, 2014, the hydraulic conveyances and appurtenances, as described in Section 3.3 were installed. The pipes were placed at the design elevations and joints were properly sealed per manufactures guidelines. The excavations were then backfilled with the excavated spoils and then compacted.

The Old Ash Impoundment Transfer Structure (referred to as Overflow Structure on Sheet 5 of MD&E drawings Ref. [7]) through which effluent water from the Retention Basin drains

into the Clear Water Pond was originally constructed in 1970, and was modified in 2014 to accommodate the current use of the reconfigured impoundment system and to rehabilitate the weathered surface of the original concrete.

The liner systems of the interior embankments and impoundment floors for the Forebay and Retention Basin were installed from September 17 to October 29, 2014. The liner system consists of geosynthetic clay liners (GCL) overlain with a 40 millimeter-thick flexible polyvinylchloride membrane (FML). Each FML is protected with geofabric and 6- to 12-inches of granular fill. Vents are positioned at 40-feet intervals along the perimeter of the embankments to relieve buildup of gases that may develop under the installed liner system.

Prior to installation, proofrolling of the floor and embankments of each basin was performed. Additionally, 12-inch wide by 18-inch deep trenches were excavated around the perimeter of each basin to allow anchoring of the liners and prevent slippage of liner components down embankment slopes. The felt strips (12-inch wide) of the venting system were installed and anchored across and at the ends of each basin on approximately 40-feet centers. After the installation of the felt strips, GCL panels installed over the floor and interior slopes of the embankments to the crest. FML panels were then placed atop the GCL panels and seamed together using heat fusion welding. Additionally, chemical fusion welding was performed to seal the FML around piping, along with glue and stainless steel straps. The seams were air lance tested in the field and samples were taken for laboratory testing.

After the panels were in place and the seams completed, geofabric panels were placed over the FML layer and connected with zip ties and anchor trenches. After the placement of the geofabric panels, 6- to 12-inches of granular fill was placed over the entire interior surfaces of the impoundments.

After the placement of the granular fill, concrete slabs were placed beneath the effluent conveyances to dissipate the flow of water. Approximately 6- to 12-inches of stone and concrete rip-rap was then placed in areas subject to wave action near the top of the slopes of the embankments.

From November 6 to 21, 2014, MD&E performed hydraulic integrity testing of the outlet piping and associated structures by filling the entire impoundment system with water pumped in from Lake Delta. A crack was observed in the overflow weir at the Old Ash Impoundment Transfer Structure. The crack was repaired and subsequent testing and inspections identified no additional leakage.

On December 2, 2014, LBWL commissioned Michigan Plumbing to hydraulically jet the 36-inch ductile iron pipe connecting the Overflow Weir to the Clear Water Pond. Jetting successfully removed sediments emplaced to block the pipe back in 2009. With the blockage removed, the Forebay and Retention Basin were hydraulically connected to the Clear Water Pond and the impoundment system was then fully operational, with subsequent adjustment of the water level in the Clear Water Pond to the design elevation. The system was considered on-line on December 2, 2014.

A review of the available records and discussions with BWL staff indicate that there have been no modifications made to the Forebay and Retention Basin since construction.

3.7 §257.73 (c)(1)(vii) – Drawings

§257.73 (c)(1)(vii): At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.

Construction drawings prepared by MD&E (Ref. [7]), provided by BWL, are presented in Attachment 3, along with a plan views and cross-sectional views of the Forebay and Retention Basin. As-built drawings are presented in Attachment 4.

3.8 §257.73 (c)(1)(viii) - Instrumentation

§257.73 (c)(1)(viii): A description of the type, purpose, and location of existing instrumentation.

In 2019 and 2020, HDR installed six monitoring wells for Erickson Power Station as part of the Hydrogeologic Characterization of the site to monitor the groundwater across the Erickson Power Station impoundment system (Ref. [3]). Two of these monitoring wells (MW-3 and MW-4) were installed in the vicinity of the Forebay and Retention Basin as shown previously in Figure 5. The installation logs of MW-3 and MW-4 are provided in Attachment 2.

3.9 §257.73 (c)(1)(ix) - Area Capacity Data

§257.73 (c)(1)(ix): Area-capacity curves for the CCR unit.

Area capacity curves for the Forebay and Retention Basin developed by HDR and are included in the Inflow Design Flood Control System Plan Report (Ref. [4]).

3.10 §257.73 (c)(1)(x) - Spillway and Diversion Design Features

§257.73 (c)(1)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

The three 24-inch diameter effluent pipes at the southwest corner of the Forebay serve as the spillway for the Forebay. These pipes pass through the dike separating the Forebay and Retention Basin, and enters the Retention Basin. The inverts of the three effluent pipes (from west to east on the Forebay side) are set at approximately El. 882.4, 882.5, and 882.6 feet NAVD 88 (883.1, 883.2, 883.3 feet NGVD 29). The inverts of the three influent pipes (from west to east on the Retention Basin side) are set at approximately El. 881.6, 881.4, and 881.7 feet NAVD 88 (882.2, 882.0, 882.3 feet NGVD 29).

The Retention Basin Overflow Structure located at the south corner of the Retention Basin serves as the spillway for the Retention Basin. The overflow into the Retention Basin flows through the 72-inch overflow riser and is directed to the Clear Water Pond through 941 feet long, 36-inch diameter storm sewer which discharges to the Old Ash Impoundment Transfer Structure located at the southwest corner of the Former Impoundment. From there, the effluent water then enters the Clear Water Pond. The pipe consists of 36-inch CPP, equipped with square, (8-feet x 8-feet) concrete, anti-seep collars.

The crest of the vertical riser of the overflow pipe is set at approximately El. 879.9 feet NAVD 88 (880.5 feet NGVD 29) and the invert of the outlet pipe is at approximately EL. 873.4 feet NAVD 88 (874.0 feet NGVD 29).

The capacities and calculations used in the hydraulic analysis of the Retention Basin Overflow Structure is included in the Construction Documentation Report prepared by MD&E (Ref. [7]) and also presented in Attachment 5.

3.11 §257.73 (c)(1)(xi) - Construction Specifications and Provisions for Operations and Maintenance

§257.73 (c)(1)(xi): The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.

The construction specifications for the Forebay and Retention Basin are included in the Construction Documentation Report prepared by MD&E (Ref. [7]) and are also presented in Attachment 6.

BWL performs weekly inspections for the entire CCR impoundment system. A typical Weekly Inspection Report is provided in Attachment 7. BWL reportedly conducts maintenance, such as embankment crest re-grading, on an as-needed basis. Documentation of provisions for operations and maintenance for the Forebay and Retention Basin was not available.

3.12 §257.73 (c)(1)(xii) - Record of Structural Instability

§257.73 (c)(1)(xii): Any record or knowledge of structural instability of the CCR unit.

BWL performs weekly inspections for the entire CCR impoundment system. The weekly inspections are completed by qualified individuals to check for potentially hazardous conditions or structural weakness and the results of the inspections are documented internally on Weekly Inspection Reports. An inspection of the Forebay and Retention Basin was performed by HDR in 2020. The results of 2020 inspection performed by HDR will be submitted under separate cover.

No records of structural instability were available, and the BWL representatives involved in the preparation of this report were not aware of any history of instability of the Forebay, Retention Basin, or associated structures.

4 References

Ref. [1] Environmental Protection Agency, 40 CFR Parts §257 and §261; Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, Washington D.C., April 2015.

Ref. [2] Environmental Protection Agency, WATERS GeoViewer (2020). https://www.epa.gov/waterdata/waters-geoviewer

Ref. [3] HDR Michigan, Inc. Monitoring Wall Installation Report, Lansing Board of Water & Light Erickson Power Station, Lansing, Michigan, March 25, 2020.

Ref. [4] HDR Michigan, Inc. Inflow Design Flood Control System Plan, Erickson Power Station – CCR Surface Impoundments, Lansing Board of Water & Light, Lansing, Michigan, June 9, 2020.

Ref. [5] HDR Michigan, Inc. Initial Structural Stability and Safety Factor Assessment, Erickson Power Station – CCR Surface Impoundments, Lansing Board of Water & Light, Lansing, Michigan, August 10, 2020.

Ref. [6] Mayotte Design & Engineering, P.C. Compliance with 40CFR257-Locations Restrictions. Lansing Board of Water & Light Erickson Station. October 10, 2018.

Ref. [7] Mayotte Design & Engineering, P.C. Construction Documentation Report Ash Impoundment System Reconfiguration, Lansing Board of Water & Light Erickson Station, Lansing, Michigan, May 2015.

Ref. [8] SME. Geotechnical Data Report, Lansing Board of Water and Light, New Gas Combined Cycle Plant, Delta Township, Michigan. August 16, 2018.

5 Attachments

Attachment 1	Site Location Map
Attachment 2	Boring Logs and Monitoring Well Logs
Attachment 3	Construction Drawings
Attachment 4	As-Built Drawings
Attachment 5	Original Capacity Calculations
Attachment 6	Construction Specifications
Attachment 7	Typical BWL Weekly Inspection Report

ATTACHMENT 1
SITE LOCATION MAP

DATA SOURCE
7.5 MINUTE USGS QUADRANGLE DIMONDALE, MICHIGAN, 2019.
DOWNLOADED FROM USGS WEBSITE MARCH 2020.

0 FEET 2,000

ATTACHMENT 2
BORING LOGS AND MONITORING WELL LOGS

MW-3

CLIENT Lansing Board of Water and Light
PROJECT NAME LBWL Confidential
PROJECT NUMBER 10173187
PROJECT LOCATION Erickson Power Station, Lansing, MI
DATE STARTED 10/15/19 10:36 **COMPLETED** 10/15/19 12:30
GROUND ELEVATION 885.12 ft MSL **HOLE DIAMETER** 8"
DRILLING CONTRACTOR SME **DRILLER** Derek Blackburn
GROUND WATER LEVELS:
DRILLING METHOD HSA **EQUIPMENT** Truck-Mounted CME 55
AT TIME OF DRILLING 15.00 ft / Elev 870.12 ft
LOGGED BY Emily Munoz **CHECKED BY**
72 HRS AFTER DRILLING 15.21 ft / Elev 869.91 ft
NOTES Sample ID prefix LBWL-MW3-. Driller recorded blow counts on SME logs.

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION		WELL DIAGRAM
0					Casing Top Elev: 884.81 (ft) Casing Type: 2" Sch 40 PVC
			CLAYEY SAND, (SC) brown (10YR 4/3), poorly graded, fine grained, moist, dense	883.6	
1.5					
2.0			LEAN CLAY, (CL) grayish brown (10YR 5/2), moist, medium stiff, low plasticity, sand	883.1	
4.0			POORLY GRADED SAND, (SP) brown (10YR 4/3), fine to medium grained, moist, dense, clay	881.1	
4.5			LEAN CLAY, SILTY, (CL) very dark grayish brown (2.5Y 3/2), moist, soft, low plasticity, sand	880.6	
5					
6.0			LEAN CLAY, (CL) yellowish brown (10YR 5/4), moist, medium stiff, mottled, low plasticity	879.1	
7.0			LEAN CLAY, (CL) very dark grayish brown (2.5Y 3/2), moist, medium stiff, low plasticity, sand	878.1	
8.0			LEAN CLAY, (CL) yellowish brown (10YR 5/4), moist, stiff, mottled, low plasticity, gravel	877.1	
8.5			LEAN CLAY, SANDY, (CL) very dark grayish brown (2.5Y 3/2), moist, soft, low plasticity	876.6	
10					Bentonite Chips, Hydrated in Lifts
10.0			LEAN CLAY, (CL) yellowish brown (10YR 5/4), moist, soft, mottled, low plasticity, sand	875.1	
10.8			LEAN CLAY, SANDY, (CL) very dark grayish brown (2.5Y 3/2), moist, soft, low plasticity	874.4	
12.0			LEAN CLAY, (CL) yellowish brown (10YR 5/4), moist, soft, mottled, low plasticity, sand	873.1	
15					
15.0			LEAN CLAY, SANDY, (CL) very dark grayish brown (2.5Y 3/2), moist, soft, low plasticity	870.1	
16.0			LEAN CLAY, SANDY, (CL) yellowish brown (10YR 5/4), moist, soft, low plasticity, fine gravel	869.1	
			LEAN CLAY, (CL) yellowish brown (10YR 5/4), moist, medium stiff, low plasticity, sand, gravel		
19.5			CLAYEY SAND, (SC) yellowish brown (10YR 5/4), poorly graded, fine grained, wet, loose	865.6	
20					
			LEAN CLAY, SANDY, (CL) very dark grayish brown (10YR 3/2), wet, soft, low plasticity		
			CLAYEY SAND, (SC) very dark grayish brown (10YR 3/2), poorly graded, fine grained, wet, loose, gravel		
25					
	SS 26-28				Silica Sand Filter Pack
	SS 28-30				Slot Size 0.010"
30					
34.5				850.6	Endcap
35					
35.5			POORLY GRADED SAND WITH CLAY, (SP) very dark grayish brown (10YR 3/2), fine to medium grained, wet, loose	849.6	
36.0				849.1	
			LEAN CLAY, SILTY, (CL) very dark grayish brown (10YR 3/2), moist, soft, low plasticity, fine sand, Stiff, plastic fat clay (CH) in shoe.		

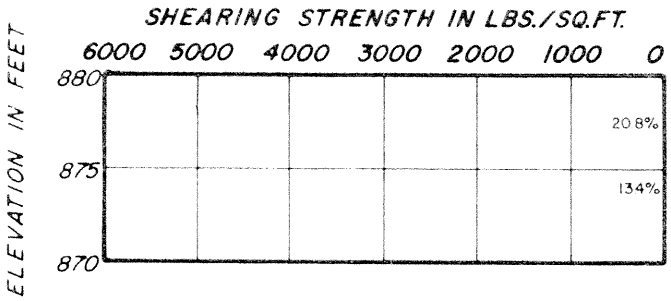
Bottom of borehole at 36.0 feet.

MW-4

CLIENT Lansing Board of Water and Light
PROJECT NAME LBWL Confidential
PROJECT NUMBER 10173187
PROJECT LOCATION Erickson Power Station, Lansing, MI
DATE STARTED 01/06/20 10:09 **COMPLETED** 01/06/20 11:05
GROUND ELEVATION 885.23 ft MSL **HOLE DIAMETER** 8"
DRILLING CONTRACTOR SME **DRILLER** Derek Blackburn
GROUND WATER LEVELS:
DRILLING METHOD HSA **EQUIPMENT** Truck-Mounted CME 55
▽ **AT TIME OF DRILLING** 13.00 ft / Elev 872.23 ft
LOGGED BY Emily Munoz **CHECKED BY**
▼ **94.3 HRS AFTER DRILLING** 11.51 ft / Elev 873.72 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION		WELL DIAGRAM
0					Casing Top Elev: 889.15 (ft) Casing Type: 2" Sch 40 PVC
			LEAN CLAY, SILTY, (CL) very dark brown (7.5YR 2.5/2), moist, soft, low plasticity, fine sand	884.2	
			LEAN CLAY, SILTY, (CL) brown (10YR 4/3), moist, soft, low plasticity		
5				880.2	
			LEAN CLAY, SILTY, (CL) dark brown (7.5YR 3/2), moist, soft, low plasticity, fine sand	879.2	
			LEAN CLAY, SILTY, (CL) brown with dark brown (10YR 5/3), moist, medium stiff, mottled, low plasticity, fine sand, fine gravel	878.2	
			LEAN CLAY, SILTY, (CL) dark yellowish brown with dark grayish brown (10YR 4/6), moist, soft, mottled, low plasticity, fine sand, fine gravel	876.2	Hydrated bentonite chips
10			LEAN CLAY, SILTY, (CL) yellowish brown (10YR 5/4), moist, soft, medium plasticity, fine sand, fine gravel		
			▽	872.2	
			LEAN CLAY, SILTY, (CL) yellowish brown (10YR 5/4), wet, soft, medium plasticity, fine sand, fine gravel	871.2	
			WELL GRADED SAND WITH GRAVEL, (SW) brown (10YR 4/3), fine to coarse grained, wet, loose	870.7	
15			LEAN CLAY, SILTY, (CL) yellowish brown (10YR 5/4), wet, stiff, medium plasticity, fine sand, fine gravel	869.7	
			CLAYEY SAND, (SP) yellowish brown (10YR 5/4), fine grained, wet, loose, fine gravel	868.7	
			LEAN CLAY, (CL) brown (7.5YR 4/2), wet, medium stiff, low plasticity, fine sand, fine gravel		
20				865.5	
			CLAYEY SAND, (SP) brown (7.5YR 5/2), fine to coarse grained, wet, loose, fine gravel	865.2 865.0	
			CLAYEY SAND, (SP) brown (7.5YR 5/2), fine grained, wet, loose	864.2	
			LEAN CLAY, (CL) brown (7.5YR 5/2), wet, soft, low plasticity, fine sand	863.2	
	GB		POORLY GRADED SAND, (SP) dark gray (7.5YR 4/1), coarse grained, wet, loose, fine gravel	862.2	0.010" Slotted PVC Screen
25			LEAN CLAY, (CL) gray (7.5YR 5/1), moist, stiff, low plasticity, fine sand, fine gravel		
			LEAN CLAY, (CL) brown (7.5YR 5/2), wet, stiff, low plasticity, fine sand	859.0	
			LEAN CLAY, SANDY, (CL) dark gray to black (7.5YR 4/1), wet, medium stiff, low plasticity	857.2	

Bottom of borehole at 28.0 feet.



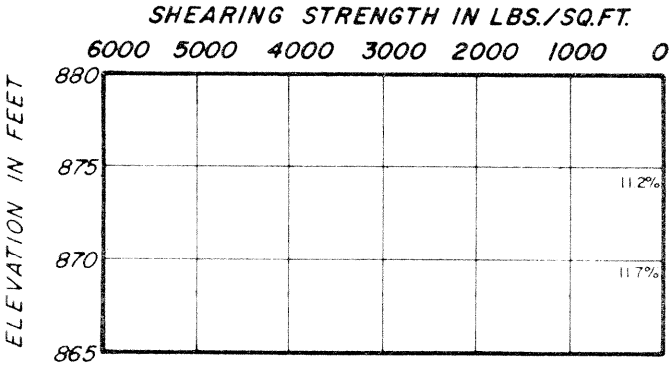
BULK SAMPLES
BAG SAMPLES

TEST PIT AP-1

SURFACE ELEVATION 879.6

SYMBOLS	DESCRIPTIONS
ML	DARK BROWN CLAYEY SILT WITH ROOTS - TOPSOIL (9")
SC	MOTTLED BROWN AND GRAY CLAYEY FINE SAND WITH SOME SMALL GRAVEL ROOTS TO 2'-6"
ML	BROWN FINE SANDY SILT WITH SOME SMALL GRAVEL AND TRACE OF CLAY 3" POCKET OF WATER BEARING FINE SAND ON WEST WALL OF PIT AT 6.0'

TEST PIT COMPLETED AT 8.0'
ON 6/23/69
MINOR SEEPAGE WATER FROM POCKET OF SAND AT 6.0'



BULK SAMPLES
BAG SAMPLES

TEST PIT AP-2

SURFACE ELEVATION 877.8

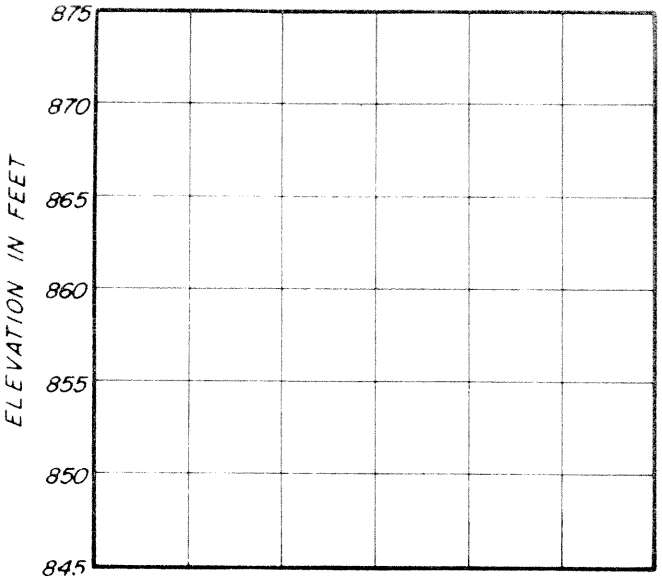
SYMBOLS	DESCRIPTIONS
ML	DARK BROWN CLAYEY SILT WITH ROOTS - TOPSOIL (10")
SC	MOTTLED BROWN AND GRAY CLAYEY SAND
SM	MOTTLED BROWN AND GRAY FINE SILTY SAND WITH SOME CLAY AND SMALL GRAVEL
ML	BROWN SILT 2" SEAM OF BROWN FINE TO COARSE SAND WITH GRAVEL AT 5.5'
ML	GRAY CLAYEY SILT WITH SOME FINE SAND AND SMALL GRAVEL

TEST PIT COMPLETED AT 9.0'
ON 6/23/69
MINOR SEEPAGE WATER AT 5.5'

LOG OF TEST PITS

DAMES & MOORE

PLATE A-1T

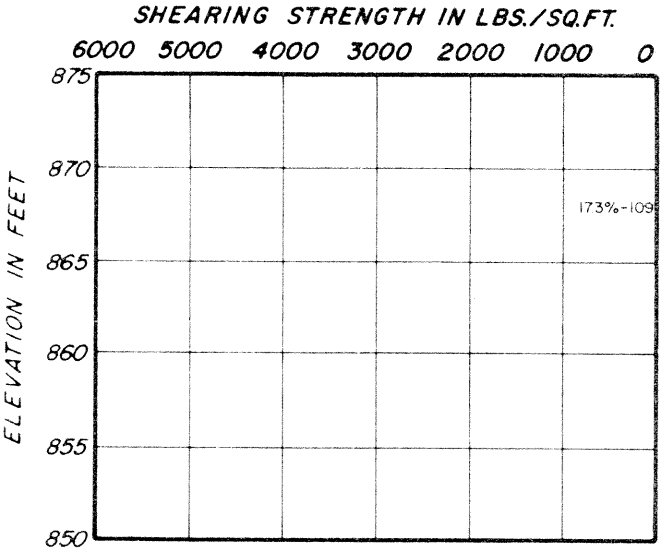


BORING AP-3

SURFACE ELEVATION 872.8

BLOW COUNTS / SAMPLES	SYMBOLS	DESCRIPTIONS
	ML	BROWN SANDY SILT WITH ROOTS – TOPSOIL (6")
7	CL	BROWN SANDY CLAY WITH SOME ROOTS ROOTS GRADING OUT AT 2.5'
5	SC	BROWN CLAYEY SAND GRADING SOME SMALL GRAVEL
17	CL	BROWN SANDY CLAY WITH SOME SMALL GRAVEL
19	SP	BROWN FINE TO MEDIUM SAND SEEPAGE WATER ENCOUNTERED AT 7 - 3' WATER ROSE TO 5 - 10' IN 15 MINUTES
30		
	SP	GRAYISH - BROWN FINE SAND
25	ML	GRAY FINE SANDY SILT
6	SC	GRAY CLAYEY FINE SAND WITH SOME SMALL GRAVEL
21	SP	GRAY SILTY FINE SAND WITH SOME GRAVEL

BORING COMPLETED AT 25.0'
ON 7/8/69
CASING USED TO A DEPTH OF 14.0'
WATER LEVEL NOT RECORDED



BORING AP-4

SURFACE ELEVATION 870.7

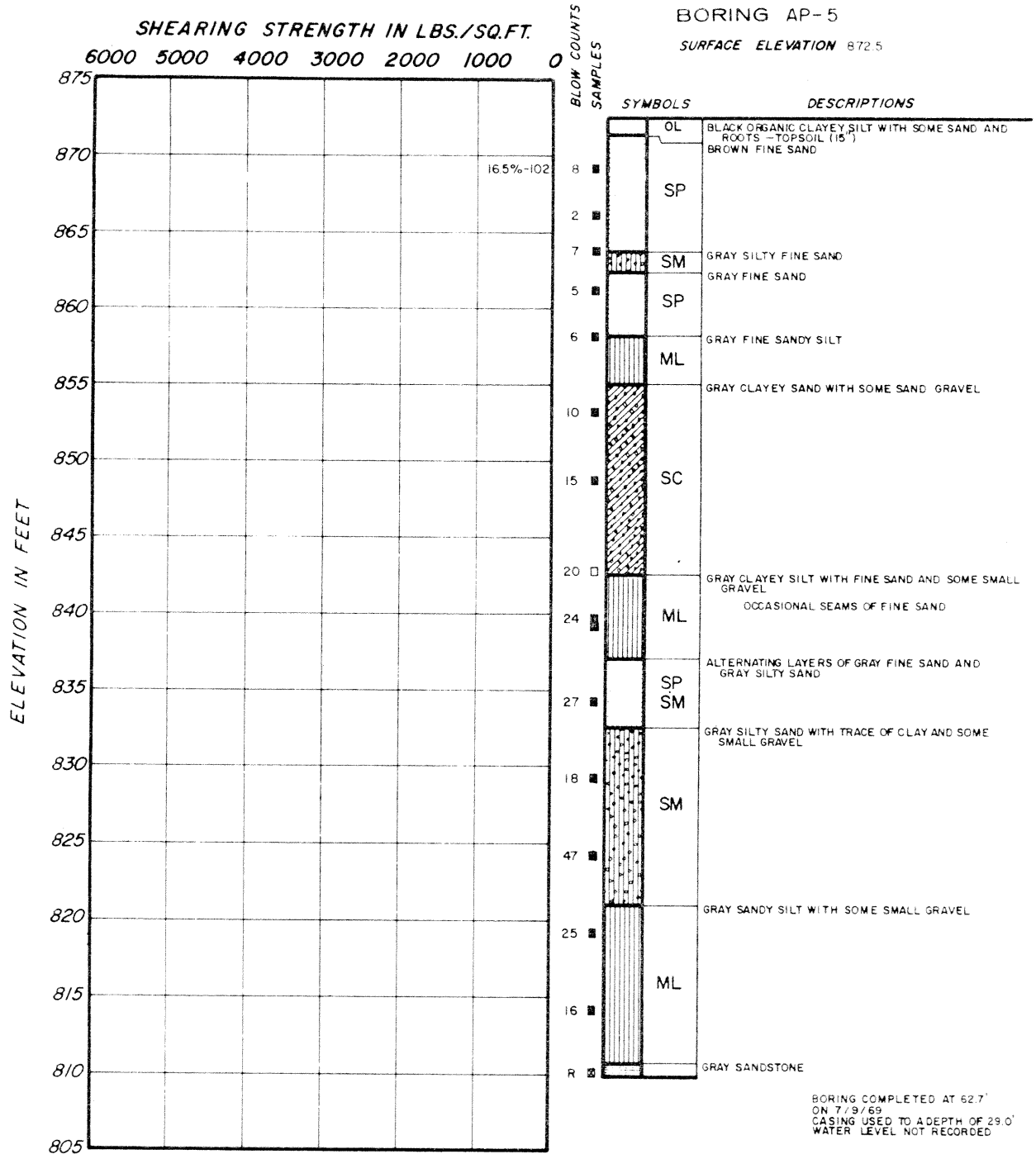
BLOW COUNTS / SAMPLES	SYMBOLS	DESCRIPTIONS
	OL	BLACK ORGANIC SILT WITH ROOTS – TOPSOIL (12")
2	SC	GRAY CLAYEY SAND WITH ORGANIC MATTER SEEPAGE WATER ENCOUNTERED AT 2'-6"
3	SC	MOTTLED BROWN AND GRAY CLAYEY SAND WITH POCKETS OF BROWN FINE SAND
4	ML	MOTTLED BROWN AND GRAY CLAYEY SILT WITH SOME SAND
5	ML	GRAY CLAYEY SILT WITH FINE SAND
19	ML	GRAY SILT
	SW	GRAY FINE TO COARSE SAND WITH SOME SMALL GRAVEL
	ML	GRAY SILT

BORING COMPLETED AT 15.0'
ON 7/11/69
NO CASING USED
WATER LEVEL NOT RECORDED

LOG OF BORINGS

DAMES & MOORE

PLATE A-10



LOG OF BORINGS

DAMES & MOORE

PLATE A-IV

BORING ECT-18-B01

PROJECT NAME: LBWL New Gas Combined Cycle Plant
PROJECT NUMBER: 079295.00
CLIENT: Lansing Board of Water & Light
PROJECT LOCATION: Delta Township, Michigan
DATE STARTED: 6/28/18 **COMPLETED:** 6/28/18
BORING METHOD: Hollow-stem Augers
DRILLER: BS (Strata) **RIG NO.:** CME 55 - ATV
LOGGED BY: JAR **CHECKED BY:** JSW

SURFACE ELEVATION: 881.5 FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES
880	0	0.9 11 inches of TOPSOIL 880.6	SB1	16	2 4 6
			SB2	18	6 8 9
875	5	Sandy LEAN CLAY- Occasional Roots- Occasional Wet Sand Seams from 5 feet to 8 feet- Brown- Hard to Stiff (CL)	SB3	18	4 6 7
			SB4	18	6 6 11
870	10	11.0 870.5	SB5	18	3 4 4
		Sandy LEAN CLAY- Gray- Stiff (CL) 13.5 868.0	SB6	18	1 1 2
865	15	Fine to Medium SILTY CLAYEY SAND- Brown- Wet- Very Loose (SM-SC) 15.5 866.0	SB7	18	3 6 8
			SB8	18	4 5 7
860	20	Sandy SILT- Little Clay- Brown to Gray at 18 feet- Wet- Medium Dense (ML) 23.5 858.0	SB9	18	4 7 6
855	25	Sandy LEAN CLAY- Gray- Stiff (CL) 25.5 856.0	SB10	12	10 35 16
	30	Fine to Coarse SAND- Grayish Brown- Wet- Medium Dense to Very Dense (SP)			

N-VALUE -- ○ (10 20 30 40)

DRY DENSITY (pcf) -- ■ (90 100 110 120)
MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)

▽ HAND PENE.
⊠ TORVANE SHEAR
○ UNC.COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1 2 3 4)

REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	13.5	868.0
▼ AT END OF BORING:	27.0	854.5

BACKFILL METHOD: Cement- Bentonite Grout

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Bulk sample obtained from auger cuttings while drilling from 0' to 10'

(Continued Next Page)

BORING ECT-18-B01

PROJECT NAME: LBWL New Gas Combined Cycle Plant **PROJECT NUMBER:** 079295.00

CLIENT: Lansing Board of Water & Light **PROJECT LOCATION:** Delta Township, Michigan

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	SURFACE ELEVATION: 881.5 FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE -- ○ (10 20 30 40)	DRY DENSITY (pcf) -- ■ (90 100 110 120) MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)	▽ HAND PENE. ⊠ TORVANE SHEAR ○ UNC.COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) (1 2 3 4)	REMARKS
850	30									
	35		Fine to Coarse SAND- Grayish Brown- Wet- Medium Dense to Very Dense (SP) *(continued)*	SB11	12	8 12 14	26			
845										
	40			SB12	6	8 17 55	72			
840										Driller reported hard drilling from 41.0 feet to 43.5 feet.
	43.8		837.7	SB13	0	100/3"	100+			Driller reported no recovery for Sample SB13.
			END OF BORING AT 43.8 FEET.							
835	45									
830	50									
825	55									
820	60									
815	65									
	70									

BORING ECT-18-B02

PROJECT NAME: LBWL New Gas Combined Cycle Plant
PROJECT NUMBER: 079295.00
CLIENT: Lansing Board of Water & Light
PROJECT LOCATION: Delta Township, Michigan
DATE STARTED: 6/29/18 **COMPLETED:** 6/29/18
BORING METHOD: Hollow-stem Augers
DRILLER: BS (Strata) **RIG NO.:** CME 55 - ATV
LOGGED BY: JAR **CHECKED BY:** JSW

SURFACE ELEVATION: 880.2 FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES
880	0	0.8 10 inches of TOPSOIL 879.4			
		Sandy LEAN CLAY- Occasional Roots- Brown and Gray- Hard to Very Stiff (CL)	SB1	18	3 4 5
			SB2	18	3 4 5
875	5	5.5 874.7			
		Sandy LEAN CLAY- Occasional Wet Sand Seams- Brown- Stiff (CL)	SB3	18	3 4 4
		8.5 871.7			
		Sandy LEAN CLAY- Brown- Hard (CL)	SB4	1	5 9 11
870	10	10.5 869.7			
		Sandy LEAN CLAY- Gray- Very Stiff (CL)	SB5	8	4 6 7
		12.0 868.2			
		Sandy SILT- Trace Clay- Gray- Wet- Loose to Medium Dense (ML)	SB6	18	4 4 4
865	15		SB7	6	4 6 8
		18.5 861.7			
		Sandy LEAN CLAY- Occasional Shale Fragments- Dark Gray- Very Stiff to Hard (CL)	SB8	18	3 4 6
860	20				
		23.0 857.2			
		Sandy LEAN CLAY- Frequent Sand Seams- Brown- Hard (CL)	SB9	18	12 19 26
855	25				
		28.5 851.7			
	30		SB10		8 16 18

N-VALUE -- ○ (10 20 30 40)

DRY DENSITY (pcf) -- ■ (90 100 110 120)

MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)

▽ HAND PENE.
⊠ TORVANE SHEAR
○ UNC.COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1 2 3 4)

REMARKS

Loss-on-ignition (LOI) test performed on Sample SB1 indicates an organics content of about 2.2 percent. Loss-on-ignition (LOI) test performed on Sample SB2 indicates an organics content of about 1.3 percent.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	12.0	868.2
▼ **AT END OF BORING:**	14.5	865.7

BACKFILL METHOD: Cement- Bentonite Grout

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.

(Continued Next Page)

BORING ECT-18-B02

PROJECT NAME: LBWL New Gas Combined Cycle Plant **PROJECT NUMBER:** 079295.00

CLIENT: Lansing Board of Water & Light **PROJECT LOCATION:** Delta Township, Michigan

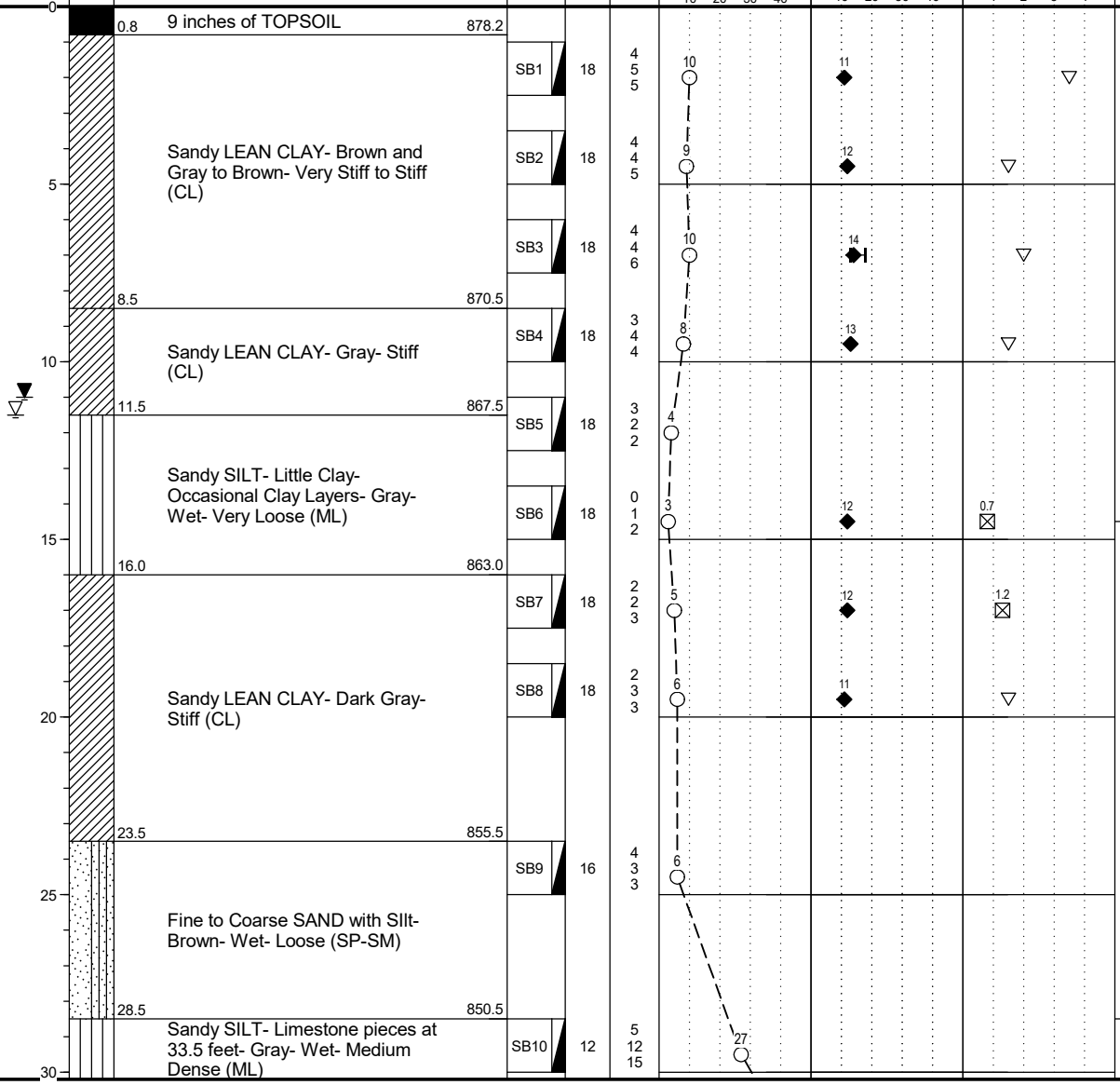
ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	SURFACE ELEVATION: 880.2 FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE -- ○ (10 20 30 40)	DRY DENSITY (pcf) -- ■ (90 100 110 120) MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)	▽ HAND PENE. ⊠ TORVANE SHEAR ○ UNC.COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) (1 2 3 4)	REMARKS
850	30		Fine to Coarse SAND with Silt and Gravel- Limestone pieces at 33.5 feet- Brown and Gray- Wet- Medium Dense (SP-SM) *(continued)*							
			33.6	846.6 SB11	1	50/1"	50+			
			END OF BORING AT 33.6 FEET.							
845	35									
840	40									
835	45									
830	50									
825	55									
820	60									
815	65									
	70									

BORING ECT-18-B03

PROJECT NAME: LBWL New Gas Combined Cycle Plant
PROJECT NUMBER: 079295.00
CLIENT: Lansing Board of Water & Light
PROJECT LOCATION: Delta Township, Michigan
DATE STARTED: 6/28/18 **COMPLETED:** 6/28/18
BORING METHOD: Hollow-stem Augers
DRILLER: BS (Strata) **RIG NO.:** CME 55 - ATV
LOGGED BY: JAR **CHECKED BY:** JSW

SURFACE ELEVATION: 879 FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	REMARKS
879	0	0.8 9 inches of TOPSOIL				
878.2	0.8		SB1	18	4 5 5	
875	5	Sandy LEAN CLAY- Brown and Gray to Brown- Very Stiff to Stiff (CL)	SB2	18	4 4 5	
			SB3	18	4 4 6	
870.5	8.5		SB4	18	3 4 4	
870	10	Sandy LEAN CLAY- Gray- Stiff (CL)				
867.5	11.5		SB5	18	3 2 2	
865	15	Sandy SILT- Little Clay- Occasional Clay Layers- Gray- Wet- Very Loose (ML)	SB6	18	0 1 2	Shear strength test performed on clay layer.
863.0	16.0		SB7	18	2 2 3	
860	20	Sandy LEAN CLAY- Dark Gray- Stiff (CL)	SB8	18	2 3 3	
855.5	23.5		SB9	16	4 3 3	
855	25	Fine to Coarse SAND with SIlt- Brown- Wet- Loose (SP-SM)				
850.5	28.5		SB10	12	5 12 15	Driller reported cobbles from 28.5 feet to 32.0 feet.
850	30	Sandy SILT- Limestone pieces at 33.5 feet- Gray- Wet- Medium Dense (ML)				



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	11.5	867.5
▼ AT END OF BORING:	11.0	868.0

BACKFILL METHOD: Cement- Bentonite Grout

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Bulk sample obtained from auger cuttings while drilling from 0' to 10'

(Continued Next Page)

BORING ECT-18-B03

PROJECT NAME: LBWL New Gas Combined Cycle Plant

PROJECT NUMBER: 079295.00

CLIENT: Lansing Board of Water & Light

PROJECT LOCATION: Delta Township, Michigan

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	SURFACE ELEVATION: 879 FT **PROFILE DESCRIPTION**	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE -- ○ (10 20 30 40)	DRY DENSITY (pcf) -- ■ (90 100 110 120) MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)	▽ HAND PENE. ⊠ TORVANE SHEAR ○ UNC.COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) (1 2 3 4)	REMARKS
			Sandy SILT- Limestone pieces at 33.5 feet- Gray- Wet- Medium Dense (ML) *(continued)*							Driller reported hard dilling from 32.0 feet to 33.7 feet.
			33.7							
845.3			END OF BORING AT 33.7 FEET.	SB11	1	50/2"	50+			
845	35									
840	40									
835	45									
830	50									
825	55									
820	60									
815	65									
810	70									

GEOTECHNICAL TESTING SUMMARY

LBWL - Erickson Station - Foundation Samples

MD&E Project No.

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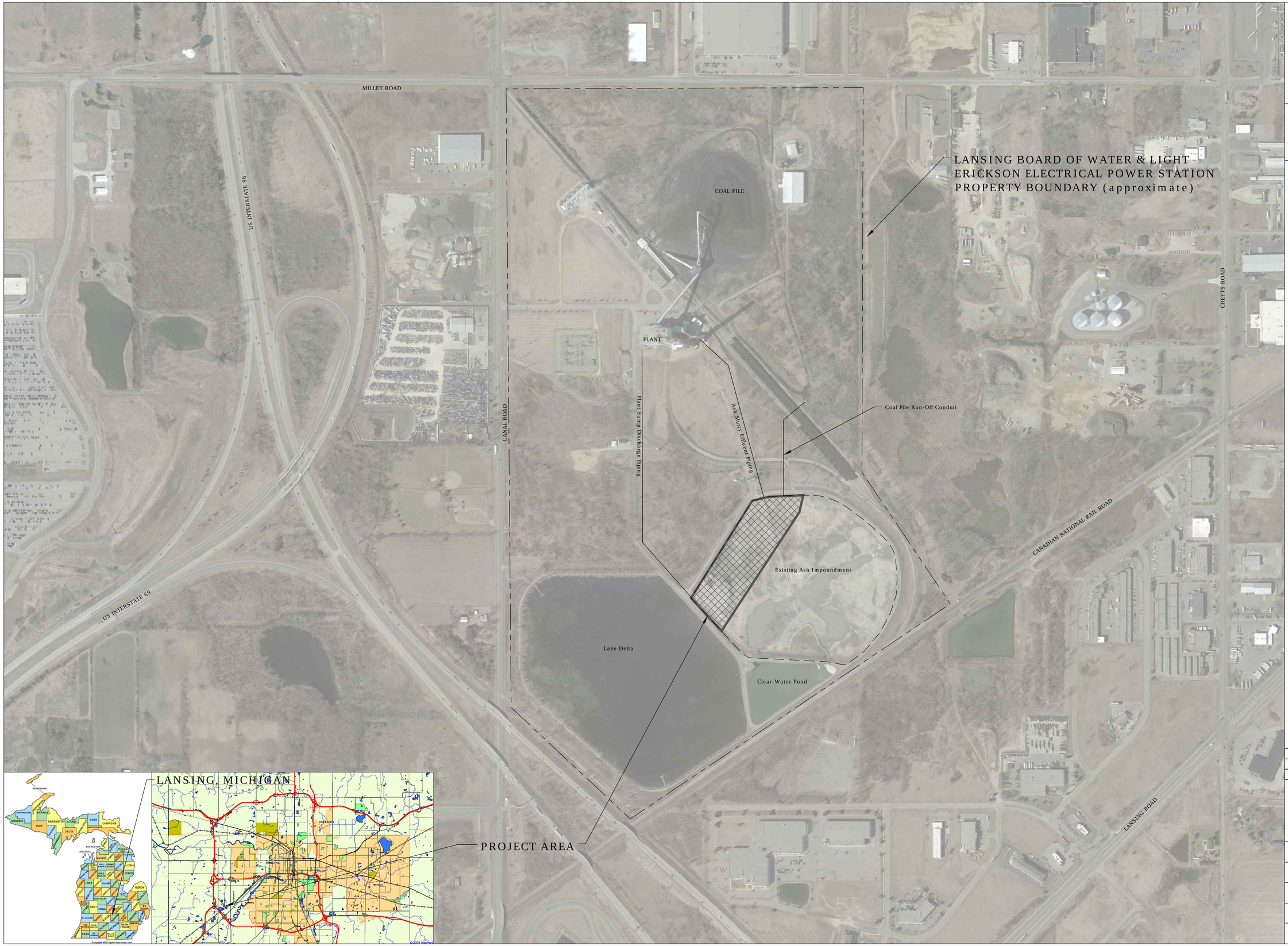
Civil & Environmental Engineering

SAMPLE	CLASSIFICATION	%Fines	LL%	PI%	$w\%_{field}$	$w\%_{opt}$	ρ_d (lbs/ft^3)	K (cm/s)
EW-F-01	Clayey Sand	29.50	NA	NA	NA	9.20	124.24	NA
EW-F-02	Clayey Sand	14.10	NA	NA	NA	8.25	129.23	NA
EW-F-03	Clayey Sand	9.70	NA	NA	NA	12.00	121.11	NA
EW-F-04	Clayey Sand	9.80	NA	NA	NA	8.50	125.92	NA
EW-F-05	Clayey Sand	16.30	NA	NA	NA	8.30	126.86	NA
EW-F-06	Clayey Sand	12.20	NA	NA	NA	7.85	131.10	NA
EW-T-01	Clayey Sand	NA	NA	NA	NA	10.00	133.60	NA
EW-T-02	Clayey Sand	NA	NA	NA	NA	9.80	127.67	NA
EW-T-03	Clayey Sand	NA	NA	NA	NA	9.30	127.98	NA
West Floor	Clayey Sand	13.10	NA	NA	NA	9.00	128.61	NA
South Floor	Clayey Sand	17.60	NA	NA	NA	7.95	129.98	NA
Ranges/Averages:								

NOTES:

ATTACHMENT 3
CONSTRUCTION DRAWINGS



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Mayotte Design & Engineering, PC
1130 Hitching Post Road
East Lansing, Michigan 48823
Phone: (517) 367-2674
Fax: (517) 367-2674
Web: www.mayottdesign.com

NOTES:

1. Project requires the reconfiguration of the existing LBWL ash impoundment.
2. The reconfiguration will entail construction of an impoundment encompassing approximately 5-acres of the existing impoundment, as depicted.
3. The reconfigured impoundment will consist of a sedimentation forebay hydraulically connected to a downstream retention basin by a culvert outlet structures.
4. Effluent from the retention basin will overflow to the existing Clear-Water Pond through a culvert and existing Monk-type outlet structure.
5. The volume of the existing ash impoundment that remains after the reconfiguration will be allowed to naturally fill with precipitation and groundwater infiltration. The resulting pond will drain to the retention basin through culvert outlet structures.

Background graphics provided by Google Earth.

No.	Revision/Issue	Date

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
Project Site Diagram

SCALE:
1" = 300'

DATE:
June 30, 2014

DRAWN BY:
TJM

FILE NAME:
Ash Pond Reconfiguration A 6-29-14.dwg

COVER

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East Lansing, Michigan 48823
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N

NOTES:

1. Dewater designated area for ash pond reconfiguration.
2. Re-located temporary ash pond to designated proposed area.
3. Backfill trucked to the project site or existing fill to be re-located may be staged within the designated stockpiling areas.
4. Extend temporary piping of appropriate size for maximum effluent throughput along designated transects.
5. Note that temporary sump effluent piping must cross the existing ash impoundment embankment at the northwest corner of the structure. The crossing shall be completed in accordance with project specifications.

Background graphics provided by Google Earth.

No.	Revision/Issue	Date

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
Pre-Construction Activities

SCALE:
1" = 60'

DATE:
June 15, 2014

DRAWN BY:
TJM

FILE NAME:
Ash Pond Reconfiguration A 6-29-14.dwg

SHEET 1

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NOTES:

Background graphics provided by Google Earth.

No.	Revision/Issue	Date

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
Pre-Construction Grades

SCALE:
1" = 60'

DATE:
June 30, 2014

DRAWN BY:
TJM

FILE NAME:
Ash Pond Reconfiguration A 6-29-14.dwg

SHEET 2

Cut–Off Trench Alignments

Point #	Northing	Easting	Description
828	433220.26	13045654.65	Short Trench – 0+00
829	433190.82	13045695.06	Short Trench – 0+50
830	433161.38	13045735.48	Short Trench – 1+00
831	433131.94	13045775.89	Short Trench – 1+50
832	433102.50	13045816.31	Short Trench – 2+00
833	433086.93	13045837.68	Short Trench – 2+26

Cut–Off Trench Alignments

Point #	Northing	Easting	Description
834	433506.11	13046092.17	Long Trench – 0+00
835	433460.12	13046078.41	Long Trench – 0+50
836	433418.10	13046051.31	Long Trench – 1+00
837	433376.09	13046024.21	Long Trench – 1+50
838	433334.07	13045997.10	Long Trench – 2+00
839	433292.05	13045970.00	Long Trench – 2+50
840	433250.04	13045942.90	Long Trench – 3+00
841	433208.02	13045915.79	Long Trench – 3+50
842	433166.00	13045888.69	Long Trench – 4+00
843	433123.99	13045861.59	Long Trench – 4+50
844	433081.97	13045834.48	Long Trench – 5+00
845	433039.95	13045807.38	Long Trench – 5+50
846	432997.94	13045780.28	Long Trench – 6+00
847	432955.92	13045753.17	Long Trench – 6+50
848	432913.90	13045726.07	Long Trench – 7+00
849	432871.89	13045698.97	Long Trench – 7+50
850	432829.87	13045671.86	Long Trench – 8+00
851	432787.85	13045644.76	Long Trench – 8+50
852	432745.84	13045617.66	Long Trench – 9+00
853	432703.82	13045590.55	Long Trench – 9+50
854	432661.80	13045563.45	Long Trench – 10+00
855	432640.89	13045549.96	Long Trench – 10+25

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NOTES:

1. Cut and fill surface to from toe of existing embankment surface to elevation of 871.5 feet NGVD.
2. Use cut approved cut materials for fill, where needed. Refer to Cut-and-Fill estimates provided on Sheet 4A.
3. Excavate Cut-Off Trench to specified elevation and dimensions.
4. Prepare Impoundment Foundation surface in accordance with specifications to ensure bond with Impoundment Embankment and Liner fill materials.

Background graphics provided by Google Earth.

No.	Revision/Issue	Date

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
Impoundment Foundation Details

SCALE:
1" = 60'

DATE:
June 30, 2014

DRAWN BY:
TJM

FILE NAME:
Base Grading.dwg

SHEET 3

Cut and Fill Bands				
Number	Minimum Elevation	Maximum Elevation	Area	Color
1	−7.00	−4.00	9153.31	
2	−4.00	−3.00	12812.12	
3	−3.00	−1.00	110680.93	
4	−1.00	−0.50	38891.08	
5	−0.50	0.00	35012.92	
6	0.00	0.50	33047.37	
7	0.50	1.00	25244.21	
8	1.00	2.00	1068.39	

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Foundation Cut and Fill	1.000	1.000	266119.61 Sq. Ft.	12219.80 Cu. Yd.	1032.36 Cu. Yd.	11187.44 Cu. Yd.<Cut>
Embankment Cut and Fill	1.000	1.000	330418.17 Sq. Ft.	524.11 Cu. Yd.	54613.88 Cu. Yd.	54089.78 Cu. Yd.<Fill>
Totals			596537.78 Sq. Ft.	12743.91 Cu. Yd.	55646.25 Cu. Yd.	42902.34 Cu. Yd.<Fill>

1" = 60'

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N

NOTES:

1. Cut and fill surface to from toe of existing embankment surface to elevation of 871.5 feet NGVD.
2. Use cut approved cut materials for fill, where needed. Refer to Cut-and-Fill estimates provided on Sheet 4A.
3. Excavate Cut-Off Trench to specified elevation and dimensions.
4. Prepare Impoundment Foundation surface in accordance with specifications to ensure bond with Impoundment Embankment and Liner fill materials.

Background graphics provided by Google Earth.

No.	Revision/Issue	Date

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
Foundation Cut and Fill

SCALE:
1" = 60'

DATE:
June 30, 2014

DRAWN BY:
TJM

FILE NAME:
Cut and Fill.dwg

SHEET 4

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NOTES:

1. Modify the Existing Ash Impoundment to configuration depicted on this sheet.
2. Reconfigured Ash Impoundment will consist of the Forebay for solids settling and a Retention Basin for additional sedimentation and nutrient uptake.
3. Base grading and foundation preparation details are summarized on Sheet 3. Associated Cut-and-Fill details are provided on Sheet 4.
4. Embankment details are provided on Sheet 6.
5. Route Coal Run-Off Discharge piping, Hydro-Bin Effluent piping, and Plant Sump Effluent piping to Forebay at the approximate points identified on this sheet and in accordance with the details provided on Sheet 7 and associated specifications.
6. Overflow from Forebay will be conveyed to the Retention Basin through a gang of three 24-inch CPP diameter culverts, as depicted on Sheet 7.
7. Existing Ash Impoundment shall drain to the Retention Basin through one 24-inch diameter CPP culvert, as depicted on Sheet 7.
8. Overflow from the Retention Basin will be conveyed to the Clear-Water Pond through 36" CPP (N-12) to the existing Overflow riser, as noted.

Background graphics provided by Google Earth.

No.	Revision/Issue	Date
1	Inlet Elevations	Jul 7, 2014

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
Impoundment Reconfiguration Plan

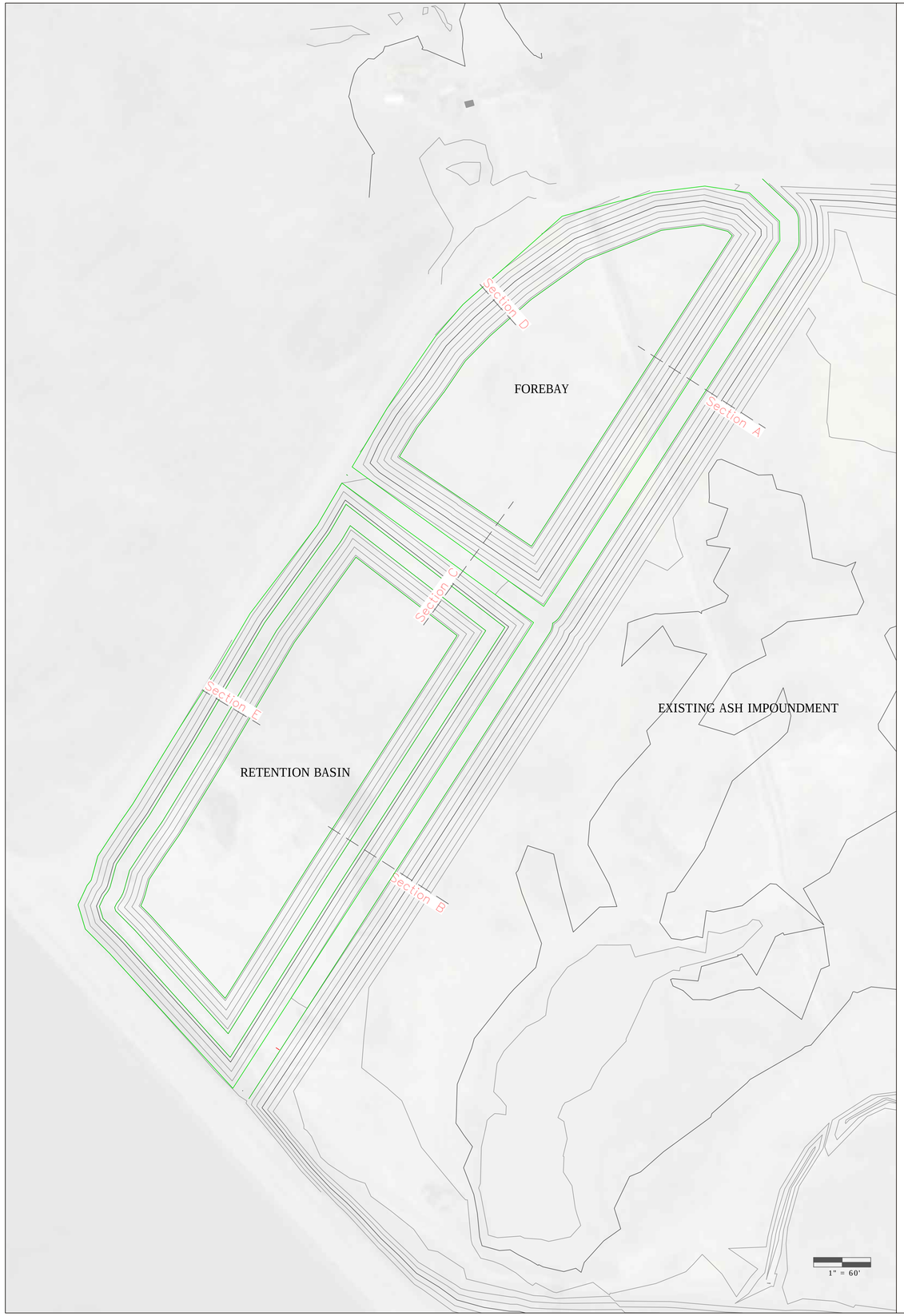
SCALE:
1" = 60'

DATE:
June 30, 2014

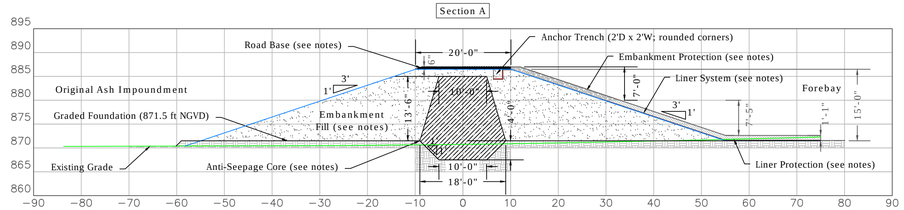
DRAWN BY:
TJM

FILE NAME:
Ash Pond Reconfiguration A 6-29-14.dwg

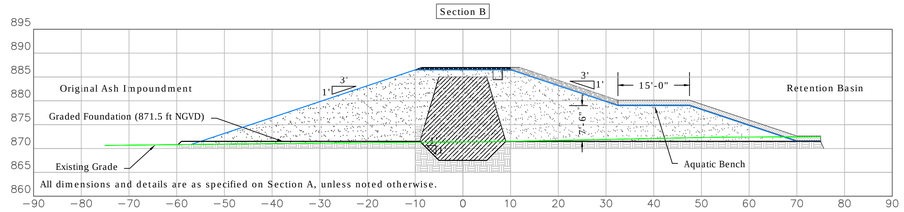
SHEET 5



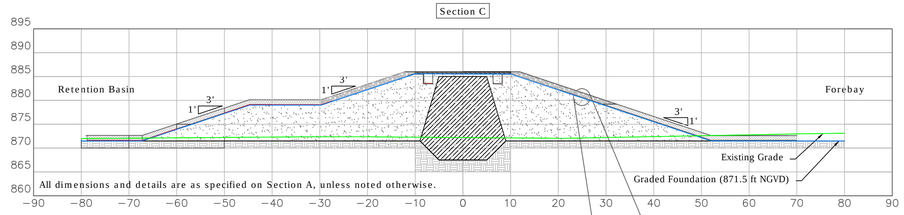
Section A



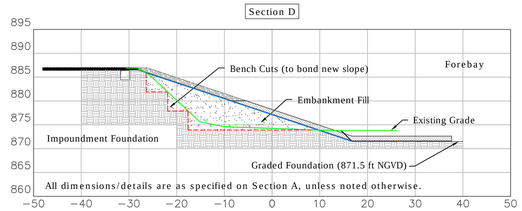
Section B



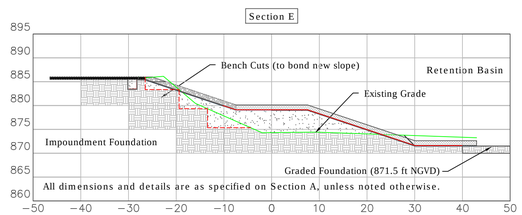
Section C

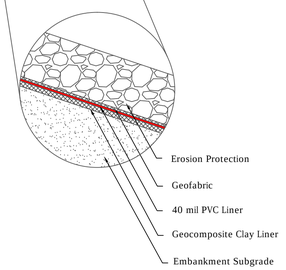


Section D



Section E





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Web: www.mayottdesign.com

NOTES:

1. All dimensions are in feet and inches.
2. Embankment Fill material: should conform to Unified Soil Classification SP or SC.
3. Anti-Seepage Core material: should conform to Unified Soil Classification GC, SC, CL or CH and maintain a permeability of less than 10E-7 cm/s following compaction.
4. Synthetic Liner System: 40 mil PVC liner over Geocomposite clay liner (Bentomat ST).
5. Existing embankments shall be benched per specifications to create a bond with new embankment fill.
6. Embankment protection materials shall be 2" x 5" crushed concrete over a suitable geotextile mat.
7. Liner protection materials shall consist of fine-grained granular aggregate over a suitable geotextile mat.
8. Road Base materials: should be 22-1A crushed concrete placed to a depth of 4-6".
9. See specifications for placement, compaction and testing requirements for the materials specified above.

Background graphics provided by Google Earth.

No.	Revision/Issue	Date

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
Typical Embankment Details

SCALE:
1" = 60'

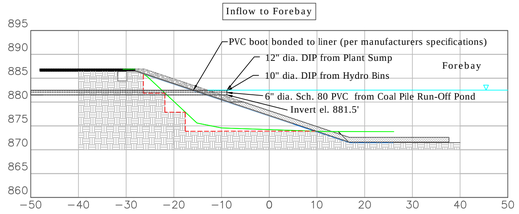
DATE:
June 30, 2014

DRAWN BY:
TJM

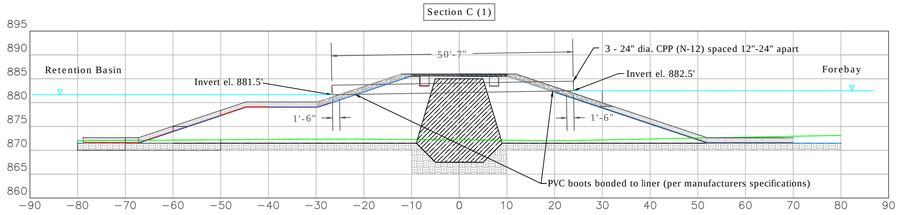
FILE NAME:
Ash Pond Reconfiguration A Profiles.dwg

SHEET 6

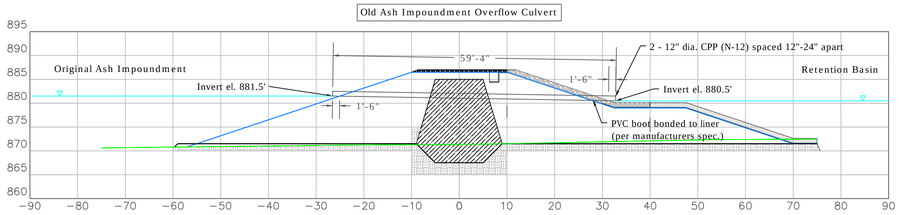
Inflow to Forebay



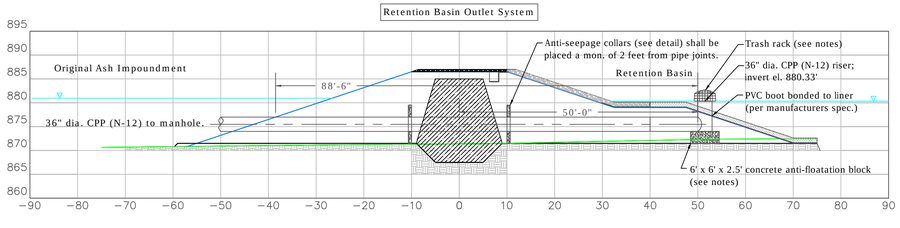
Section C (1)



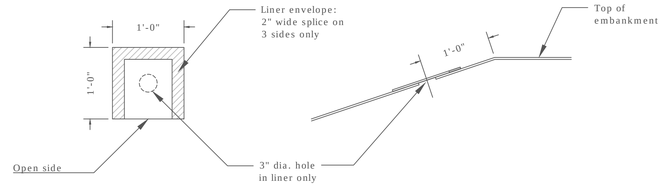
Old Ash Impoundment Overflow Culvert



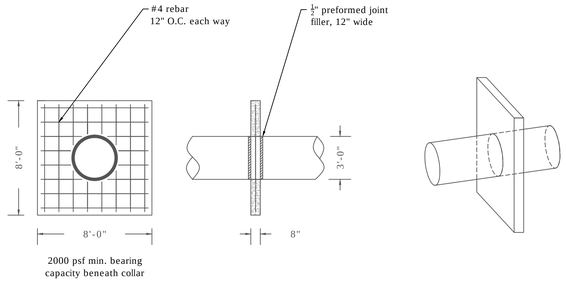
Retention Basin Outlet System



PLAN SECTION

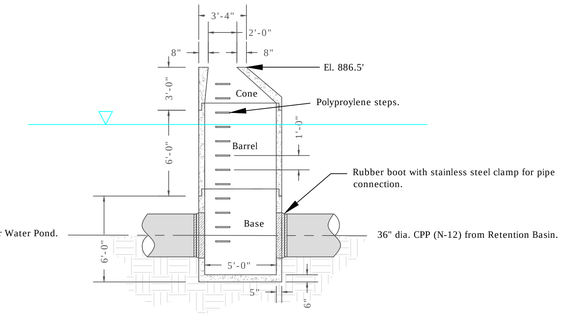


AIR/GAS VENT DETAIL

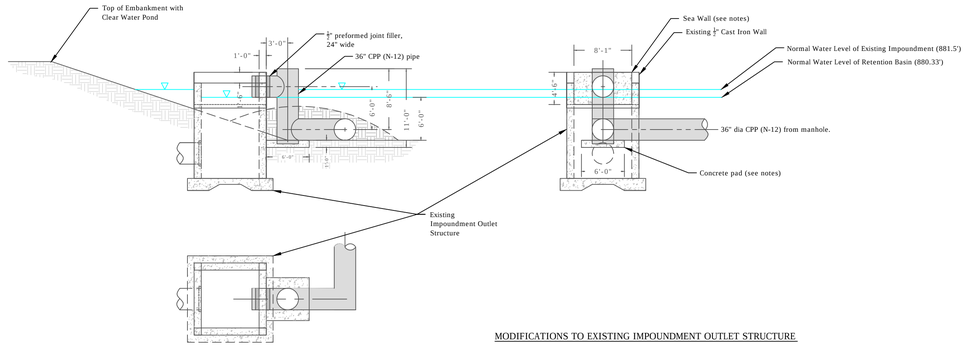


2000 psf min. bearing capacity beneath collar

ANTI-SEEPAGE COLLAR



PRE-CAST MANHOLE



MODIFICATIONS TO EXISTING IMPOUNDMENT OUTLET STRUCTURE

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NOTES:

1. All poured concrete shall be min. 3,000 psi (28 day), unless noted otherwise.
2. Concrete anti-floatation block shall be integrally attached to riser base to prevent riser/block separation.
3. Trash Rack: Contech Construction Products Inc. Round Series, RS-48.
4. Air/Gas Vents to be positioned as detailed on 30' centers around both the Forebay and Retention Basin.
5. Pre-cast manhole to be constructed of 4000 psi concrete (at 28 days).
6. Manhole to be designed for H-20 wheel loading.
7. Manhole construciton to conform to ASTM C-478 and MDOT specifications.
8. Manhole concrete to be reinformced to 0.12 in sq/L.F.
9. Mahole shiplap joints to be sealed with butyl rubber gaskets.
10. Concrete block for overflow structure shall be integrally attached to riser base to prevent riser/block separation.
11. Sea Wall shall be reinforced with #4 rebar, 12" O.C. each direction.

Background graphics provided by Google Earth.

No.	Revision/Issue	Date

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
As Noted

SCALE:
Varies

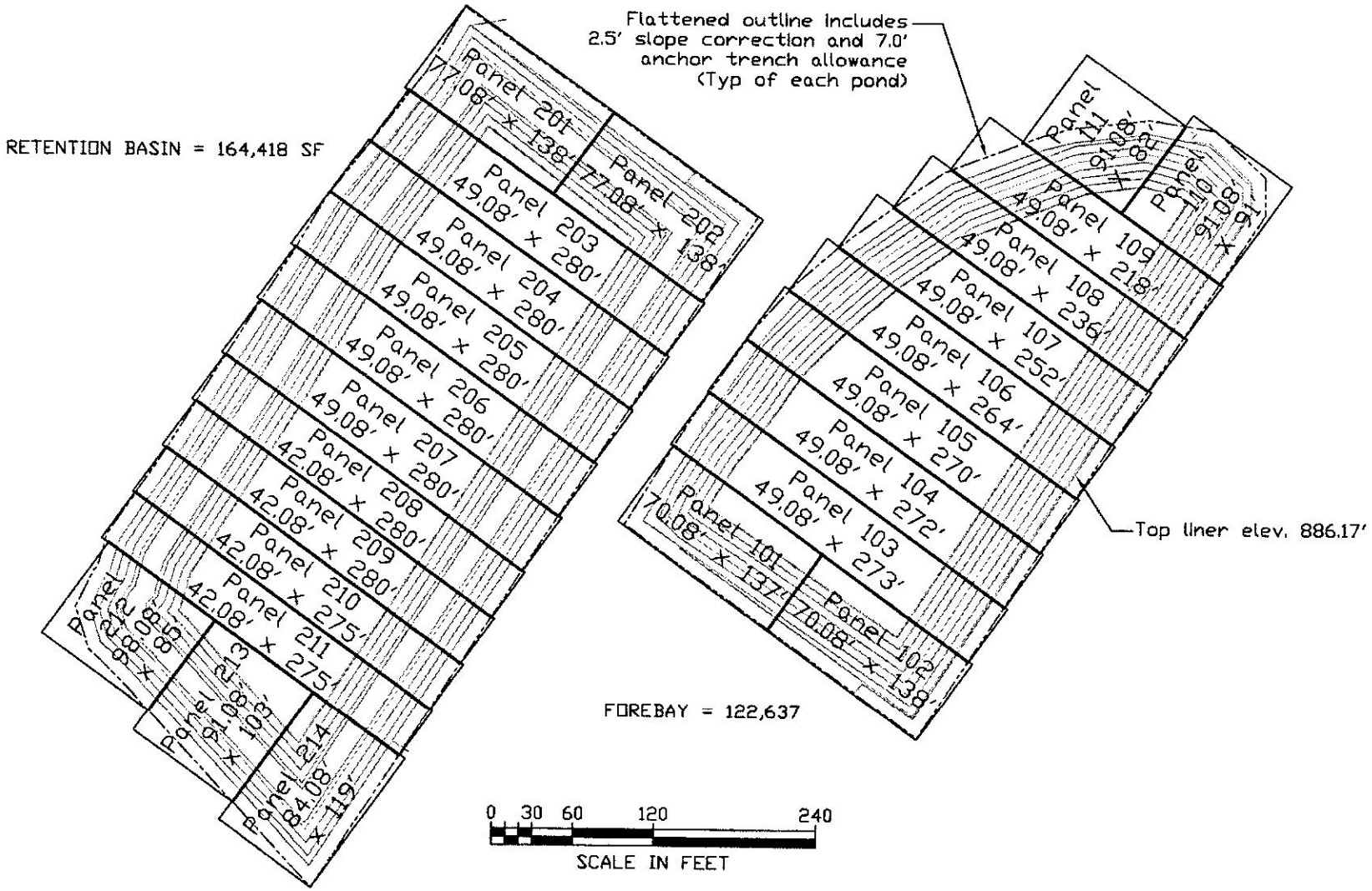
DATE:
June 30, 2014

DRAWN BY:
TJM

FILE NAME:
Ash Pond Reconfiguration A Profiles.dwg

SHEET 7

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



TOTAL AREA OF LINER REQUIRED: 287,055 SF

NORTH

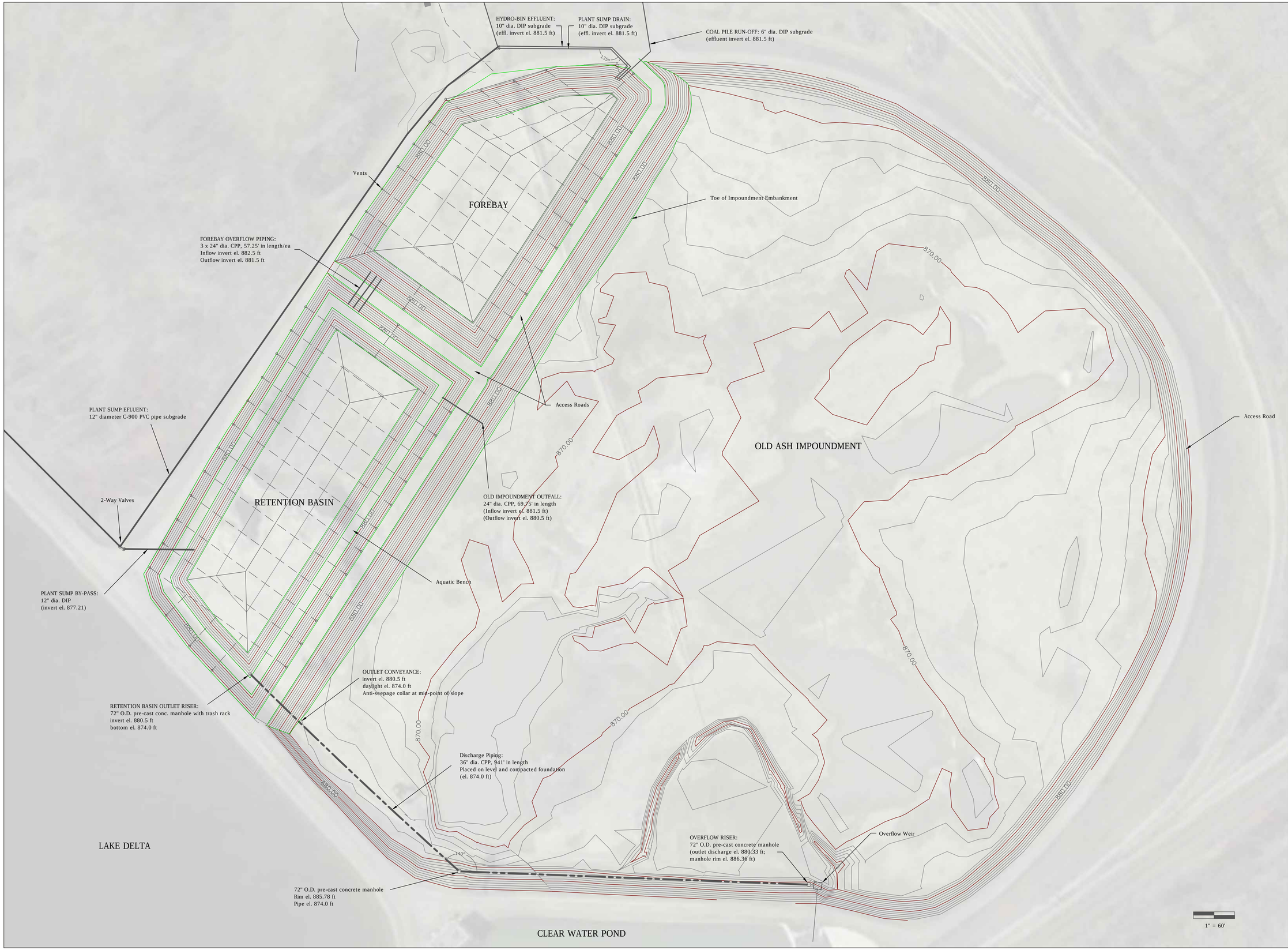
LANGE CONTAINMENT SYSTEMS, INC.
5150 RACE COURT
DENVER, CO 80216
(303) 446-8644 FAX (303) 446-8798

Lansing Water & Light

40 Mil PVC Liner for Retention and Forebay Basins

SIZE: A	DRAWN BY: C. Thomas	APPROVED BY: _____	REV: 7/25
SCALE: NTS	DWG NO: 114-0110A_LansingWater&Light		DATE: 7/22/14

ATTACHMENT 4
AS-BUILT DRAWINGS



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N

NOTES:

1. Grading of old ash pond floor was completed during the reconfiguration of the Ash Impoundment System. However, no survey data was avaialble for the surface of the old ash pond floor. Elevations of the old ash pond floor depicted on this sheet were interpolated from data collected in 2012.

Background graphics provided by Google Earth.

No.	Revision/Issue	Date
1	Inlet Elevations	Jul 7, 2014

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
As-Built Ash Impoundment System

SCALE:
1" = 60'

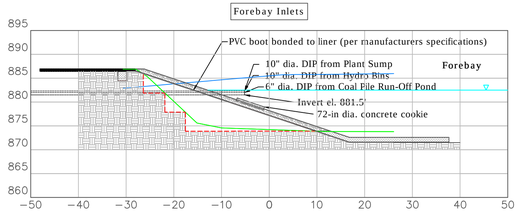
DATE:
May 22, 2015

DRAWN BY:
TJM

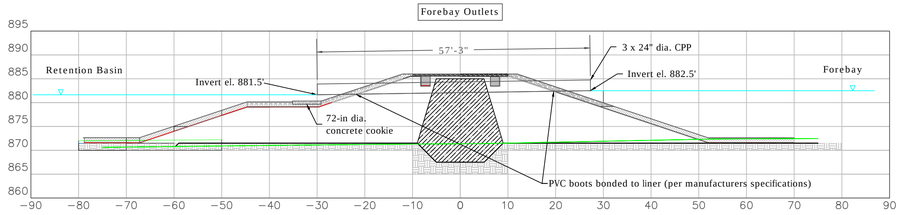
FILE NAME:
Ash Pond Reconfiguration A Floor Regrading.dwg

SHEET 5AB

Forebay Inlets

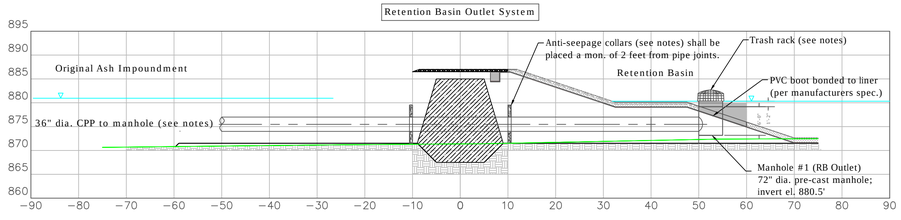


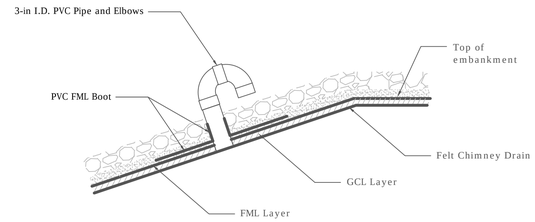
Forebay Outlets



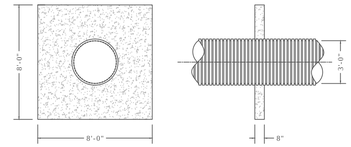
Old Ash Impoundment Outlet

Retention Basin Outlet System



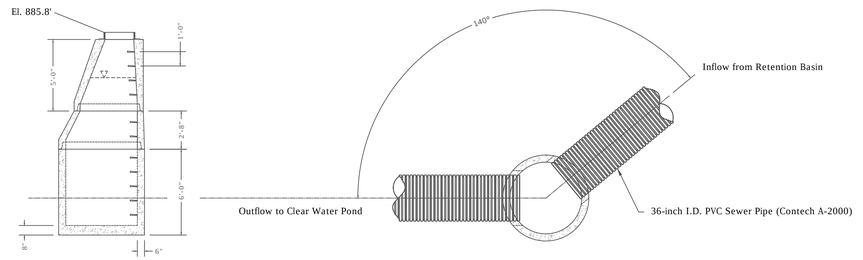


AIR/GAS VENT DETAIL

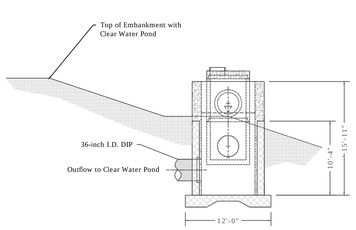


2000 psf min. bearing
capacity beneath collar

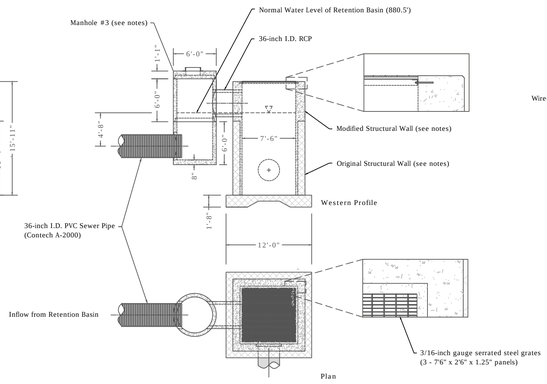
ANTI-SEEPAGE COLLARS



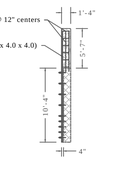
PRE-CAST MANHOLE #2



Southern Profile



Plan



Concrete Reinforcement Plan

ASH IMPOUNDMENT OVERFLOW STRUCTURE - DECEMBER 2014

NOTES:

1. All poured concrete is 3000 psi (28 day), unless noted otherwise.
2. Trash Rack: Contech Construction Products Inc. Round Series, RS-60.
3. Air/Gas Vents are positioned at the perimeters of the Forebay and Retention Basins as depicted on SHEET 5AB.
4. Pre-cast manholes constructed of 4000 psi concrete (at 28 days).
5. Manholes designed for H-20 wheel loading.
6. Manholes constructed to conform to ASTM C-478 and MDOT specifications.
7. Manhole concrete to reinforced to 0.12 in sq/L.F.
8. Mahole shiplap joints sealed with butyl rubber gaskets.
9. PVC and concrete pipe sealed in manhole structures with cement/grout mixture.
10. Manhole covers and frames are Model 1040 from East Jordan Iron Works, Inc.
11. Dimensions for Anti-Seepage Collars are approximate.
12. Details of the original concrete and piping elements of the Overflow Weir are summarized on Ash Pound Structures SHEET 2, BWL Drawing No. 4848-184, approved Sept. 4, 1970.

MD&E®
Civil & Environmental Engineering
Mayotte Design & Engineering, PC
1130 Hitching Post Road
East Lansing, Michigan 48823
Phone: (517) 367-2674
Fax: (517) 367-2674
Web: www.mayottdesign.com

N

No.	Revision/Issue	Date

PROJECT NAME AND ADDRESS:

Lansing Board of Water & Light
Erickson Station
Ash Impoundment Modifications
3725 South Canal Road
Lansing, Michigan 48917

PROJECT DETAIL:
As Noted

SCALE:
Varies

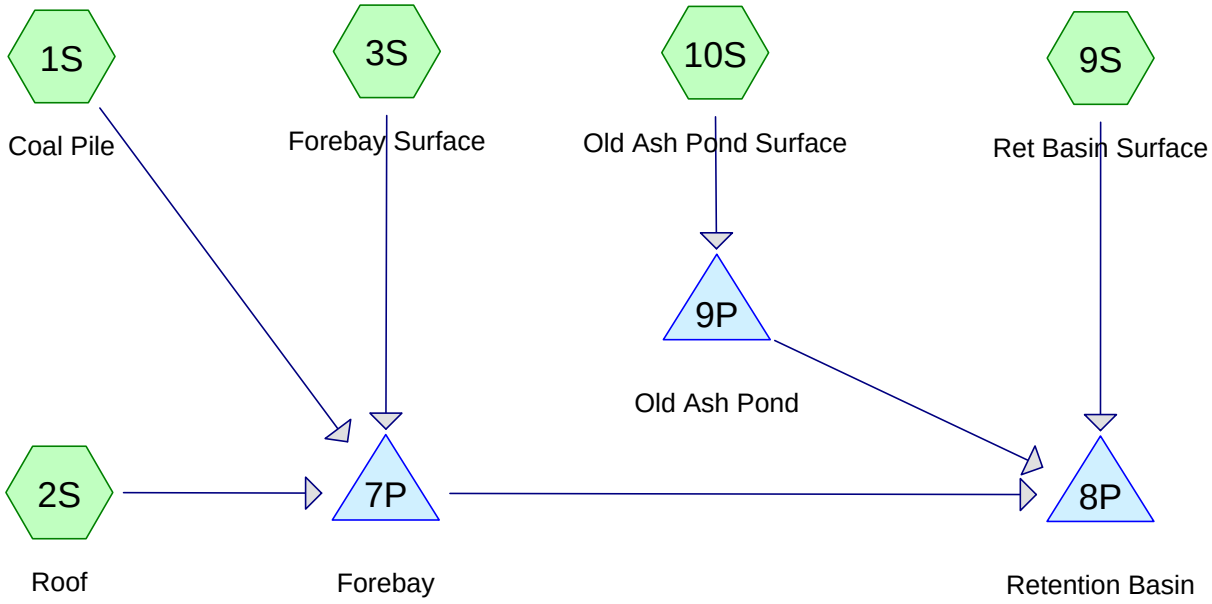
DATE:
May 22, 2015

DRAWN BY:
TJM

FILE NAME:
As-Built Profiles.dwg

SHEET 7AB

ATTACHMENT 5
ORIGINAL CAPACITY CALCULATIONS



Subcat Reach Pond Link

Routing Diagram for Erickson Retention Pond Design A (6)
Prepared by {enter your company name here}, Printed 4/27/2015

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
34.090	98	(2S, 3S, 9S, 10S)
15.000	56	Coal (1S)
11.000	86	Margins (1S)
60.090	**85**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
60.090	Other	1S, 2S, 3S, 9S, 10S
60.090		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	34.090	34.090		2S, 3S, 9S, 10S
0.000	0.000	0.000	0.000	15.000	15.000	Coal	1S
0.000	0.000	0.000	0.000	11.000	11.000	Margins	1S
0.000	**0.000**	**0.000**	**0.000**	**60.090**	**60.090**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	7P	882.50	881.50	75.0	0.0133	0.025	24.0	0.0	0.0
2	9P	881.50	880.50	70.0	0.0143	0.025	24.0	0.0	0.0

Time span=0.00-500.00 hrs, dt=0.20 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Coal Pile Runoff Area=26.000 ac 0.00% Impervious Runoff Depth=0.81"
Flow Length=1,780' Tc=629.8 min CN=69 Runoff=1.66 cfs 1.750 af

Subcatchment 2S: Roof Runoff Area=0.240 ac 100.00% Impervious Runoff Depth=3.02"
Flow Length=20' Slope=0.0010 '/' Tc=1.3 min CN=98 Runoff=0.76 cfs 0.060 af

Subcatchment 3S: Forebay Surface Runoff Area=2.760 ac 100.00% Impervious Runoff Depth=3.02"
Flow Length=350' Tc=0.4 min CN=98 Runoff=9.28 cfs 0.694 af

Subcatchment 9S: Ret Basin Surface Runoff Area=3.730 ac 100.00% Impervious Runoff Depth=3.02"
Flow Length=700' Tc=0.7 min CN=98 Runoff=12.29 cfs 0.938 af

Subcatchment 10S: Old Ash Pond Runoff Area=27.360 ac 100.00% Impervious Runoff Depth=3.02"
Flow Length=1,000' Tc=1.0 min CN=98 Runoff=88.41 cfs 6.879 af

Pond 7P: Forebay Peak Elev=883.33' Storage=19.961 af Inflow=15.94 cfs 246.404 af
24.0" Round Culvert x 3.00 n=0.025 L=75.0' S=0.0133 '/' Outflow=8.36 cfs 244.913 af

Pond 8P: Retention Basin Peak Elev=880.72' Storage=17.176 af Inflow=19.97 cfs 252.170 af
Outflow=10.17 cfs 251.543 af

Pond 9P: Old Ash Pond Peak Elev=881.94' Storage=124.599 af Inflow=88.41 cfs 6.879 af
24.0" Round Culvert n=0.025 L=70.0' S=0.0143 '/' Outflow=0.83 cfs 6.318 af

Total Runoff Area = 60.090 ac Runoff Volume = 10.322 af Average Runoff Depth = 2.06"
43.27% Pervious = 26.000 ac 56.73% Impervious = 34.090 ac

Summary for Subcatchment 1S: Coal Pile

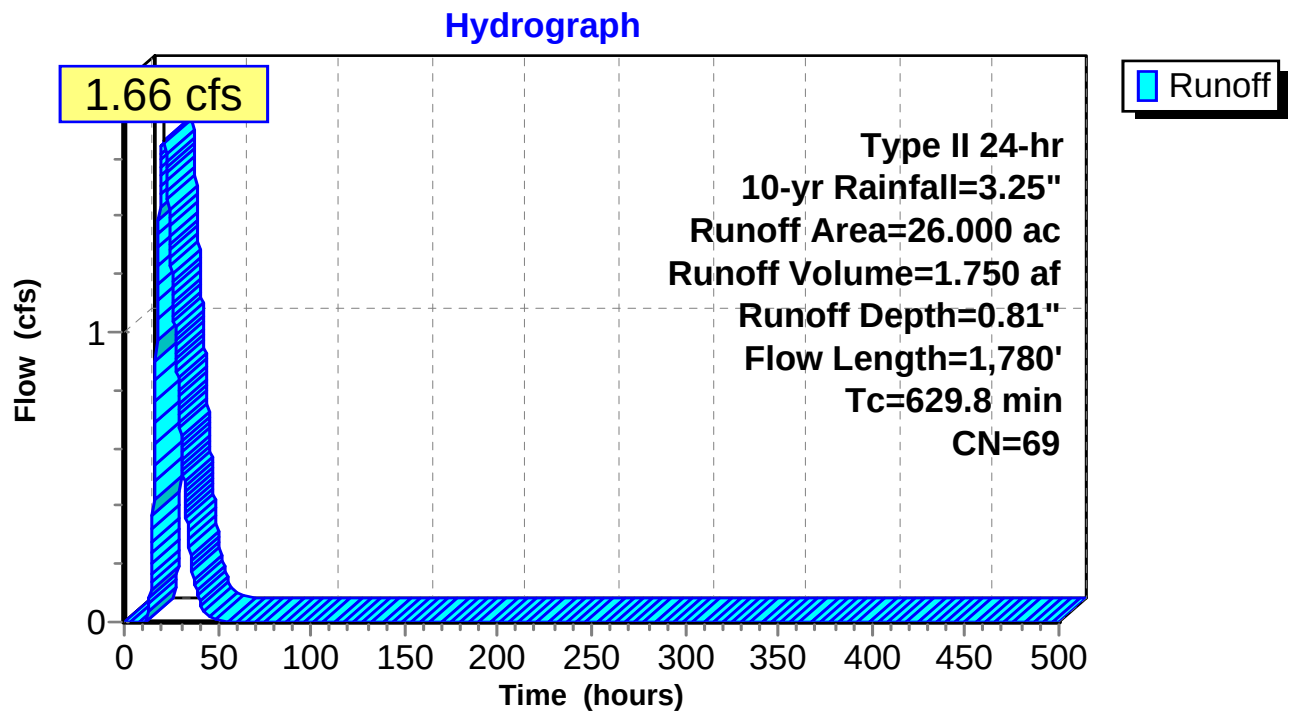
Runoff = 1.66 cfs @ 21.03 hrs, Volume= 1.750 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 10-yr Rainfall=3.25"

	Area (ac)	CN	Description
*	15.000	56	Coal
*	11.000	86	Margins
	26.000	69	Weighted Average
	26.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	100	0.4000	4.03		**Sheet Flow, Coal** Smooth surfaces n= 0.011 P2= 2.50"
2.5	180	0.0300	1.21		**Shallow Concentrated Flow, Coal Margin** Short Grass Pasture Kv= 7.0 fps
626.9	1,500	0.0007	0.04	0.40	**Channel Flow, Drainage Ditch** Area= 10.0 sf Perim= 3,000.0' r= 0.00' n= 0.022 Earth, clean & straight
629.8	1,780	Total			

Subcatchment 1S: Coal Pile



Hydrograph for Subcatchment 1S: Coal Pile

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.59	0.00	0.00
20.00	**3.09**	**0.72**	**1.62**
30.00	**3.25**	**0.81**	**0.69**
40.00	3.25	0.81	0.08
50.00	3.25	0.81	0.01
60.00	3.25	0.81	0.00
70.00	3.25	0.81	0.00
80.00	3.25	0.81	0.00
90.00	3.25	0.81	0.00
100.00	3.25	0.81	0.00
110.00	3.25	0.81	0.00
120.00	3.25	0.81	0.00
130.00	3.25	0.81	0.00
140.00	3.25	0.81	0.00
150.00	3.25	0.81	0.00
160.00	3.25	0.81	0.00
170.00	3.25	0.81	0.00
180.00	3.25	0.81	0.00
190.00	3.25	0.81	0.00
200.00	3.25	0.81	0.00
210.00	3.25	0.81	0.00
220.00	3.25	0.81	0.00
230.00	3.25	0.81	0.00
240.00	3.25	0.81	0.00
250.00	3.25	0.81	0.00
260.00	3.25	0.81	0.00
270.00	3.25	0.81	0.00
280.00	3.25	0.81	0.00
290.00	3.25	0.81	0.00
300.00	3.25	0.81	0.00
310.00	3.25	0.81	0.00
320.00	3.25	0.81	0.00
330.00	3.25	0.81	0.00
340.00	3.25	0.81	0.00
350.00	3.25	0.81	0.00
360.00	3.25	0.81	0.00
370.00	3.25	0.81	0.00
380.00	3.25	0.81	0.00
390.00	3.25	0.81	0.00
400.00	3.25	0.81	0.00
410.00	3.25	0.81	0.00
420.00	3.25	0.81	0.00
430.00	3.25	0.81	0.00
440.00	3.25	0.81	0.00
450.00	3.25	0.81	0.00
460.00	3.25	0.81	0.00
470.00	3.25	0.81	0.00
480.00	3.25	0.81	0.00
490.00	3.25	0.81	0.00
500.00	3.25	0.81	0.00

Summary for Subcatchment 2S: Roof

[49] Hint: Tc<2dt may require smaller dt

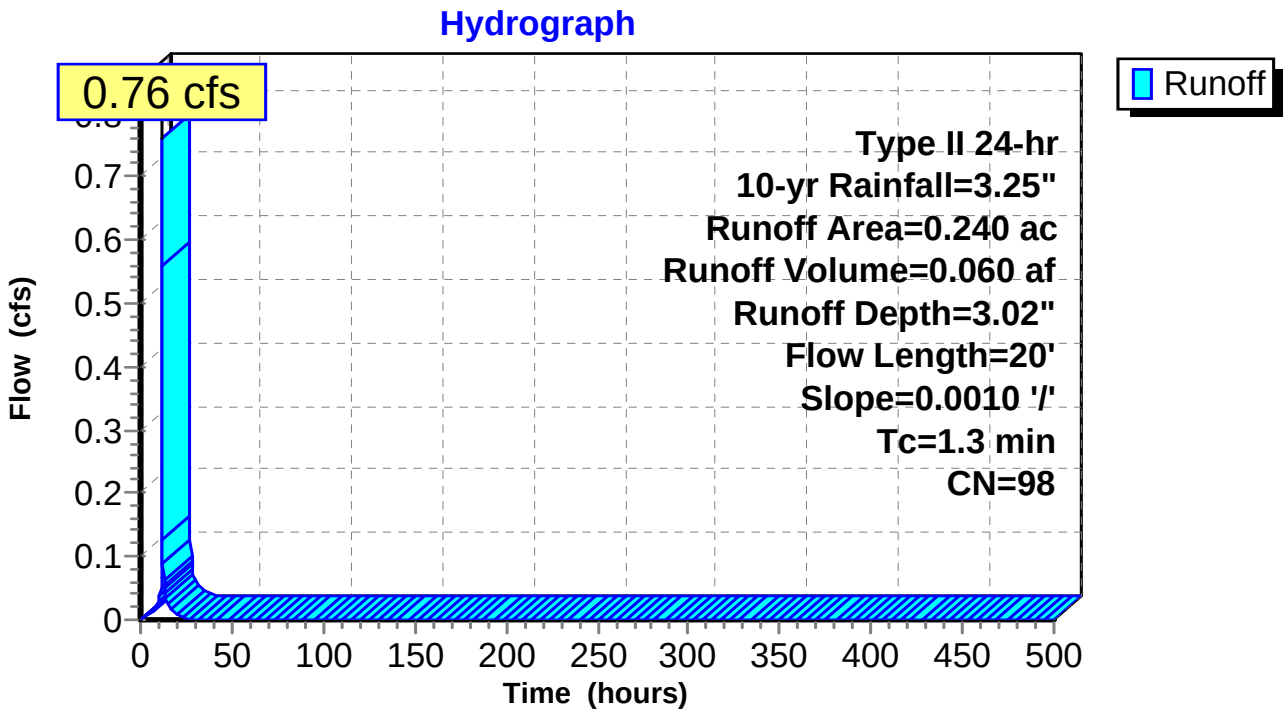
Runoff = 0.76 cfs @ 11.85 hrs, Volume= 0.060 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 10-yr Rainfall=3.25"

	Area (ac)	CN	Description
*	0.240	98	
	0.240		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	20	0.0010	0.27		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: Roof



Hydrograph for Subcatchment 2S: Roof

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.59	0.40	**0.03**
20.00	**3.09**	**2.86**	**0.01**
30.00	**3.25**	**3.02**	0.00
40.00	3.25	3.02	0.00
50.00	3.25	3.02	0.00
60.00	3.25	3.02	0.00
70.00	3.25	3.02	0.00
80.00	3.25	3.02	0.00
90.00	3.25	3.02	0.00
100.00	3.25	3.02	0.00
110.00	3.25	3.02	0.00
120.00	3.25	3.02	0.00
130.00	3.25	3.02	0.00
140.00	3.25	3.02	0.00
150.00	3.25	3.02	0.00
160.00	3.25	3.02	0.00
170.00	3.25	3.02	0.00
180.00	3.25	3.02	0.00
190.00	3.25	3.02	0.00
200.00	3.25	3.02	0.00
210.00	3.25	3.02	0.00
220.00	3.25	3.02	0.00
230.00	3.25	3.02	0.00
240.00	3.25	3.02	0.00
250.00	3.25	3.02	0.00
260.00	3.25	3.02	0.00
270.00	3.25	3.02	0.00
280.00	3.25	3.02	0.00
290.00	3.25	3.02	0.00
300.00	3.25	3.02	0.00
310.00	3.25	3.02	0.00
320.00	3.25	3.02	0.00
330.00	3.25	3.02	0.00
340.00	3.25	3.02	0.00
350.00	3.25	3.02	0.00
360.00	3.25	3.02	0.00
370.00	3.25	3.02	0.00
380.00	3.25	3.02	0.00
390.00	3.25	3.02	0.00
400.00	3.25	3.02	0.00
410.00	3.25	3.02	0.00
420.00	3.25	3.02	0.00
430.00	3.25	3.02	0.00
440.00	3.25	3.02	0.00
450.00	3.25	3.02	0.00
460.00	3.25	3.02	0.00
470.00	3.25	3.02	0.00
480.00	3.25	3.02	0.00
490.00	3.25	3.02	0.00
500.00	3.25	3.02	0.00

Summary for Subcatchment 3S: Forebay Surface

[49] Hint: Tc<2dt may require smaller dt

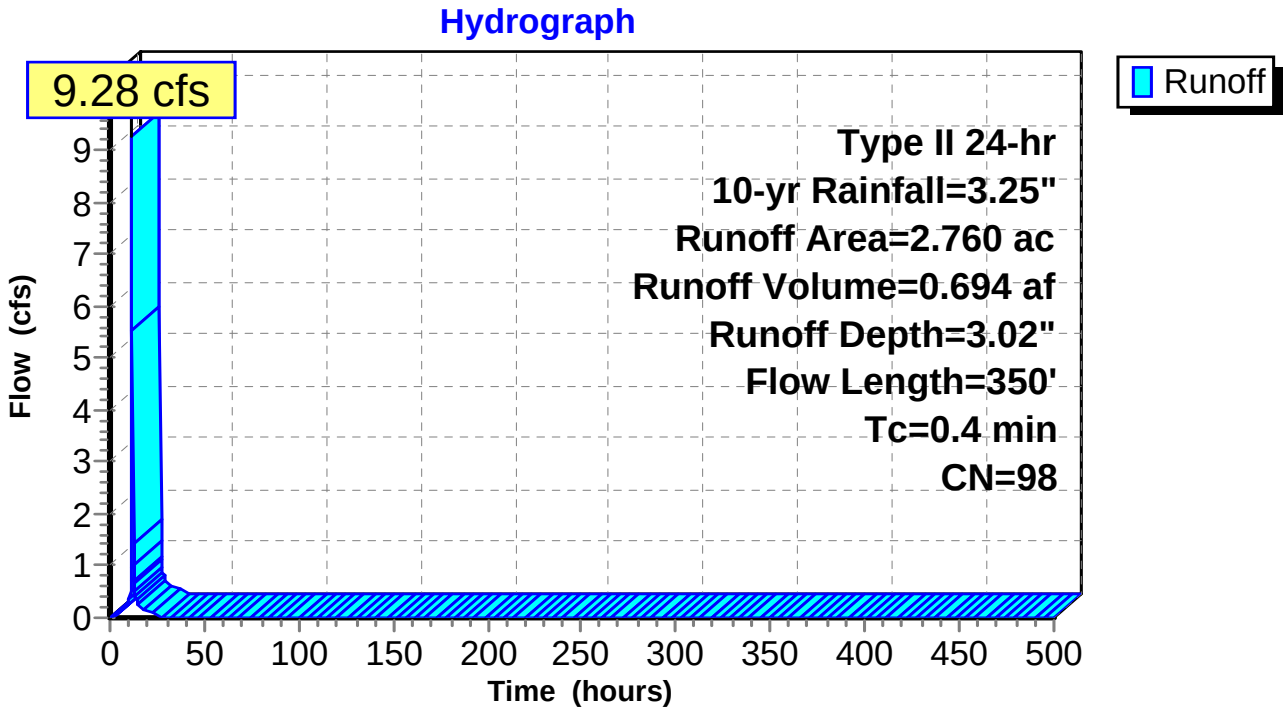
Runoff = 9.28 cfs @ 11.83 hrs, Volume= 0.694 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 10-yr Rainfall=3.25"

	Area (ac)	CN	Description
*	2.760	98	
	2.760		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	350		16.05		**Lake or Reservoir,** Mean Depth= 8.00'

Subcatchment 3S: Forebay Surface



Hydrograph for Subcatchment 3S: Forebay Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.59	0.40	**0.34**
20.00	**3.09**	**2.86**	**0.12**
30.00	**3.25**	**3.02**	0.00
40.00	3.25	3.02	0.00
50.00	3.25	3.02	0.00
60.00	3.25	3.02	0.00
70.00	3.25	3.02	0.00
80.00	3.25	3.02	0.00
90.00	3.25	3.02	0.00
100.00	3.25	3.02	0.00
110.00	3.25	3.02	0.00
120.00	3.25	3.02	0.00
130.00	3.25	3.02	0.00
140.00	3.25	3.02	0.00
150.00	3.25	3.02	0.00
160.00	3.25	3.02	0.00
170.00	3.25	3.02	0.00
180.00	3.25	3.02	0.00
190.00	3.25	3.02	0.00
200.00	3.25	3.02	0.00
210.00	3.25	3.02	0.00
220.00	3.25	3.02	0.00
230.00	3.25	3.02	0.00
240.00	3.25	3.02	0.00
250.00	3.25	3.02	0.00
260.00	3.25	3.02	0.00
270.00	3.25	3.02	0.00
280.00	3.25	3.02	0.00
290.00	3.25	3.02	0.00
300.00	3.25	3.02	0.00
310.00	3.25	3.02	0.00
320.00	3.25	3.02	0.00
330.00	3.25	3.02	0.00
340.00	3.25	3.02	0.00
350.00	3.25	3.02	0.00
360.00	3.25	3.02	0.00
370.00	3.25	3.02	0.00
380.00	3.25	3.02	0.00
390.00	3.25	3.02	0.00
400.00	3.25	3.02	0.00
410.00	3.25	3.02	0.00
420.00	3.25	3.02	0.00
430.00	3.25	3.02	0.00
440.00	3.25	3.02	0.00
450.00	3.25	3.02	0.00
460.00	3.25	3.02	0.00
470.00	3.25	3.02	0.00
480.00	3.25	3.02	0.00
490.00	3.25	3.02	0.00
500.00	3.25	3.02	0.00

Summary for Subcatchment 9S: Ret Basin Surface

[49] Hint: Tc<2dt may require smaller dt

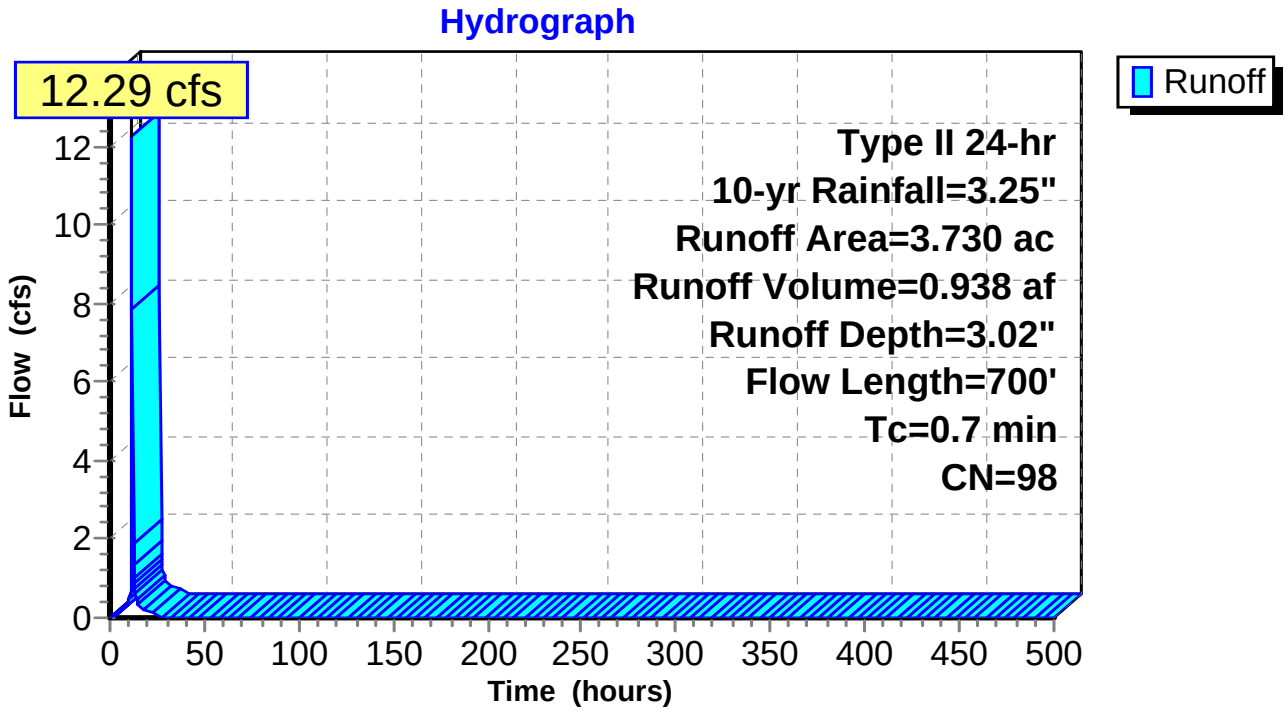
Runoff = 12.29 cfs @ 11.83 hrs, Volume= 0.938 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 10-yr Rainfall=3.25"

	Area (ac)	CN	Description
*	3.730	98	
	3.730		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	700		16.05		**Lake or Reservoir,** Mean Depth= 8.00'

Subcatchment 9S: Ret Basin Surface



Hydrograph for Subcatchment 9S: Ret Basin Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.59	0.40	**0.45**
20.00	**3.09**	**2.86**	**0.16**
30.00	**3.25**	**3.02**	0.00
40.00	3.25	3.02	0.00
50.00	3.25	3.02	0.00
60.00	3.25	3.02	0.00
70.00	3.25	3.02	0.00
80.00	3.25	3.02	0.00
90.00	3.25	3.02	0.00
100.00	3.25	3.02	0.00
110.00	3.25	3.02	0.00
120.00	3.25	3.02	0.00
130.00	3.25	3.02	0.00
140.00	3.25	3.02	0.00
150.00	3.25	3.02	0.00
160.00	3.25	3.02	0.00
170.00	3.25	3.02	0.00
180.00	3.25	3.02	0.00
190.00	3.25	3.02	0.00
200.00	3.25	3.02	0.00
210.00	3.25	3.02	0.00
220.00	3.25	3.02	0.00
230.00	3.25	3.02	0.00
240.00	3.25	3.02	0.00
250.00	3.25	3.02	0.00
260.00	3.25	3.02	0.00
270.00	3.25	3.02	0.00
280.00	3.25	3.02	0.00
290.00	3.25	3.02	0.00
300.00	3.25	3.02	0.00
310.00	3.25	3.02	0.00
320.00	3.25	3.02	0.00
330.00	3.25	3.02	0.00
340.00	3.25	3.02	0.00
350.00	3.25	3.02	0.00
360.00	3.25	3.02	0.00
370.00	3.25	3.02	0.00
380.00	3.25	3.02	0.00
390.00	3.25	3.02	0.00
400.00	3.25	3.02	0.00
410.00	3.25	3.02	0.00
420.00	3.25	3.02	0.00
430.00	3.25	3.02	0.00
440.00	3.25	3.02	0.00
450.00	3.25	3.02	0.00
460.00	3.25	3.02	0.00
470.00	3.25	3.02	0.00
480.00	3.25	3.02	0.00
490.00	3.25	3.02	0.00
500.00	3.25	3.02	0.00

Summary for Subcatchment 10S: Old Ash Pond Surface

[49] Hint: Tc<2dt may require smaller dt

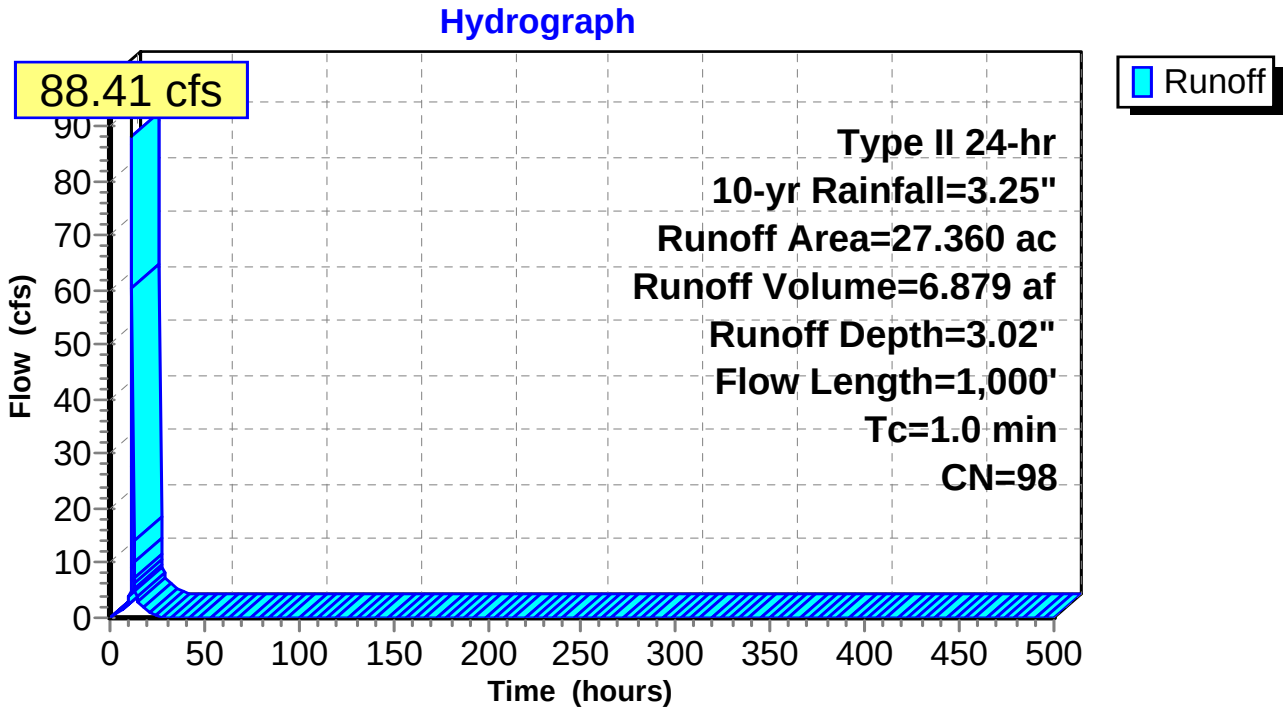
Runoff = 88.41 cfs @ 11.84 hrs, Volume= 6.879 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 10-yr Rainfall=3.25"

	Area (ac)	CN	Description
*	27.360	98	
	27.360		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1,000		16.05		**Lake or Reservoir, Lake** Mean Depth= 8.00'

Subcatchment 10S: Old Ash Pond Surface



Hydrograph for Subcatchment 10S: Old Ash Pond Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.59	0.40	**3.31**
20.00	**3.09**	**2.86**	**1.17**
30.00	**3.25**	**3.02**	0.00
40.00	3.25	3.02	0.00
50.00	3.25	3.02	0.00
60.00	3.25	3.02	0.00
70.00	3.25	3.02	0.00
80.00	3.25	3.02	0.00
90.00	3.25	3.02	0.00
100.00	3.25	3.02	0.00
110.00	3.25	3.02	0.00
120.00	3.25	3.02	0.00
130.00	3.25	3.02	0.00
140.00	3.25	3.02	0.00
150.00	3.25	3.02	0.00
160.00	3.25	3.02	0.00
170.00	3.25	3.02	0.00
180.00	3.25	3.02	0.00
190.00	3.25	3.02	0.00
200.00	3.25	3.02	0.00
210.00	3.25	3.02	0.00
220.00	3.25	3.02	0.00
230.00	3.25	3.02	0.00
240.00	3.25	3.02	0.00
250.00	3.25	3.02	0.00
260.00	3.25	3.02	0.00
270.00	3.25	3.02	0.00
280.00	3.25	3.02	0.00
290.00	3.25	3.02	0.00
300.00	3.25	3.02	0.00
310.00	3.25	3.02	0.00
320.00	3.25	3.02	0.00
330.00	3.25	3.02	0.00
340.00	3.25	3.02	0.00
350.00	3.25	3.02	0.00
360.00	3.25	3.02	0.00
370.00	3.25	3.02	0.00
380.00	3.25	3.02	0.00
390.00	3.25	3.02	0.00
400.00	3.25	3.02	0.00
410.00	3.25	3.02	0.00
420.00	3.25	3.02	0.00
430.00	3.25	3.02	0.00
440.00	3.25	3.02	0.00
450.00	3.25	3.02	0.00
460.00	3.25	3.02	0.00
470.00	3.25	3.02	0.00
480.00	3.25	3.02	0.00
490.00	3.25	3.02	0.00
500.00	3.25	3.02	0.00

Summary for Pond 7P: Forebay

Inflow Area = 29.000 ac, 10.34% Impervious, Inflow Depth > 101.96" for 10-yr event
Inflow = 15.94 cfs @ 11.83 hrs, Volume= 246.404 af, Incl. 5.90 cfs Base Flow
Outflow = 8.36 cfs @ 12.21 hrs, Volume= 244.913 af, Atten= 48%, Lag= 23.3 min
Primary = 8.36 cfs @ 12.21 hrs, Volume= 244.913 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Starting Elev= 882.50' Surf.Area= 0.000 ac Storage= 18.166 af
Peak Elev= 883.33' @ 12.21 hrs Surf.Area= 0.000 ac Storage= 19.961 af (1.795 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 21.445 af (3.278 af above start)

Plug-Flow detention time= 2,409.4 min calculated for 226.698 af (92% of inflow)
Center-of-Mass det. time= 90.6 min (14,950.7 - 14,860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	871.50'	21.445 af	**Custom Stage Data** Listed below

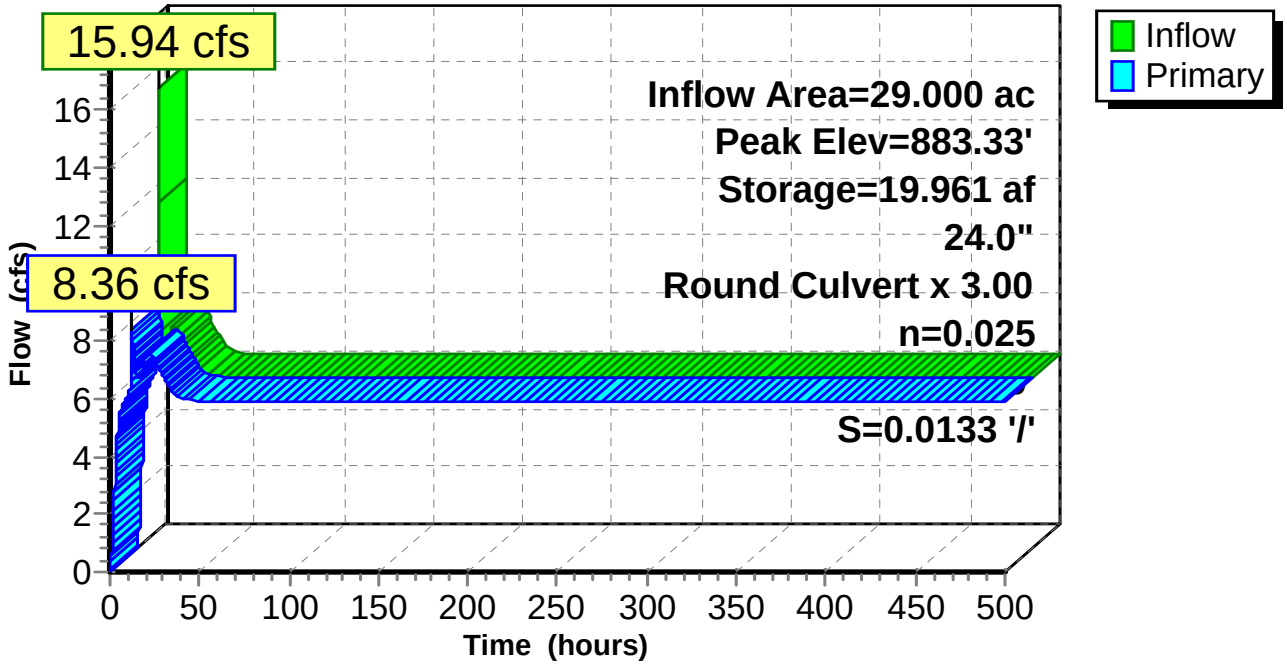
Elevation (feet)	Cum.Store (acre-feet)
871.50	0.000
872.00	0.320
873.00	1.660
874.00	3.065
875.00	4.544
876.00	6.099
877.00	7.732
878.00	9.443
879.00	11.234
880.00	13.107
881.00	15.063
882.00	17.103
883.00	19.230
884.00	21.445

Device	Routing	Invert	Outlet Devices
#1	Primary	882.50'	**24.0" Round Culvert X 3.00** L= 75.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 882.50' / 881.50' S= 0.0133 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf

Primary OutFlow Max=8.32 cfs @ 12.21 hrs HW=883.33' TW=881.16' (TW follows 2.17' below HW)
↑—**1=Culvert** (Barrel Controls 8.32 cfs @ 3.33 fps)

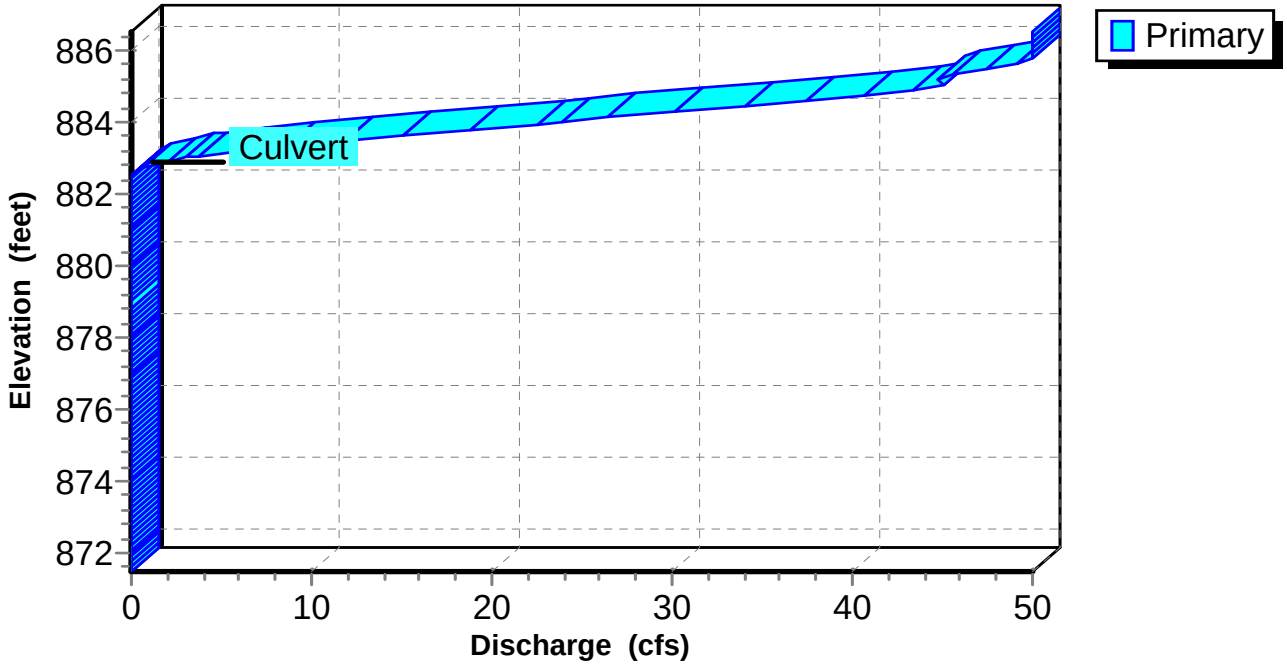
Pond 7P: Forebay

Hydrograph

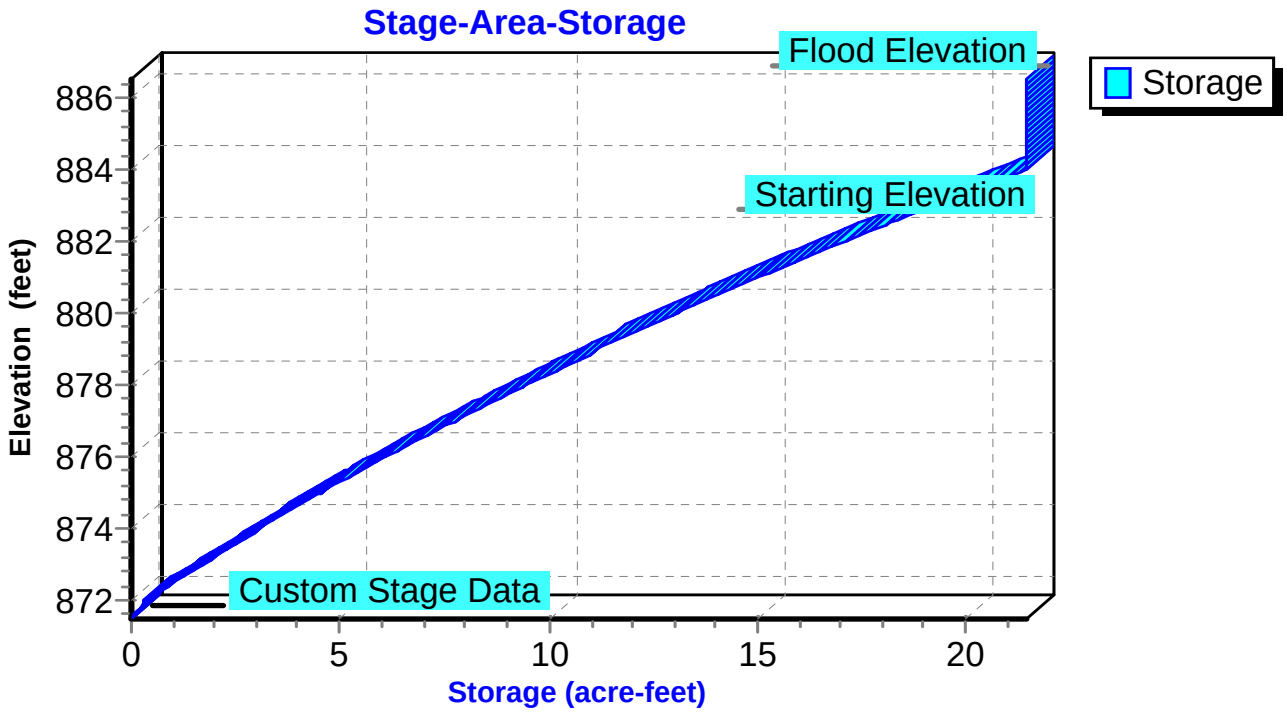


Pond 7P: Forebay

Stage-Discharge



Pond 7P: Forebay



Hydrograph for Pond 7P: Forebay

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	5.90	18.215	882.52	0.02
10.00	**6.26**	**19.684**	**883.21**	**6.10**
20.00	**7.65**	**19.843**	**883.28**	**7.39**
30.00	6.59	19.765	883.24	6.76
40.00	5.98	19.674	883.20	6.02
50.00	5.91	19.658	883.19	5.91
60.00	5.90	19.657	883.19	5.90
70.00	5.90	19.657	883.19	5.90
80.00	5.90	19.657	883.19	5.90
90.00	5.90	19.657	883.19	5.90
100.00	5.90	19.657	883.19	5.90
110.00	5.90	19.657	883.19	5.90
120.00	5.90	19.657	883.19	5.90
130.00	5.90	19.657	883.19	5.90
140.00	5.90	19.657	883.19	5.90
150.00	5.90	19.657	883.19	5.90
160.00	5.90	19.657	883.19	5.90
170.00	5.90	19.657	883.19	5.90
180.00	5.90	19.657	883.19	5.90
190.00	5.90	19.657	883.19	5.90
200.00	5.90	19.657	883.19	5.90
210.00	5.90	19.657	883.19	5.90
220.00	5.90	19.657	883.19	5.90
230.00	5.90	19.657	883.19	5.90
240.00	5.90	19.657	883.19	5.90
250.00	5.90	19.657	883.19	5.90
260.00	5.90	19.657	883.19	5.90
270.00	5.90	19.657	883.19	5.90
280.00	5.90	19.657	883.19	5.90
290.00	5.90	19.657	883.19	5.90
300.00	5.90	19.657	883.19	5.90
310.00	5.90	19.657	883.19	5.90
320.00	5.90	19.657	883.19	5.90
330.00	5.90	19.657	883.19	5.90
340.00	5.90	19.657	883.19	5.90
350.00	5.90	19.657	883.19	5.90
360.00	5.90	19.657	883.19	5.90
370.00	5.90	19.657	883.19	5.90
380.00	5.90	19.657	883.19	5.90
390.00	5.90	19.657	883.19	5.90
400.00	5.90	19.657	883.19	5.90
410.00	5.90	19.657	883.19	5.90
420.00	5.90	19.657	883.19	5.90
430.00	5.90	19.657	883.19	5.90
440.00	5.90	19.657	883.19	5.90
450.00	5.90	19.657	883.19	5.90
460.00	5.90	19.657	883.19	5.90
470.00	5.90	19.657	883.19	5.90
480.00	5.90	19.657	883.19	5.90
490.00	5.90	19.657	883.19	5.90
500.00	5.90	19.657	883.19	5.90

Stage-Discharge for Pond 7P: Forebay

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
871.50	0.00	879.45	0.00
871.65	0.00	879.60	0.00
871.80	0.00	879.75	0.00
871.95	0.00	879.90	0.00
872.10	0.00	880.05	0.00
872.25	0.00	880.20	0.00
872.40	0.00	880.35	0.00
872.55	0.00	880.50	0.00
872.70	0.00	880.65	0.00
872.85	0.00	880.80	0.00
873.00	0.00	880.95	0.00
873.15	0.00	881.10	0.00
873.30	0.00	881.25	0.00
873.45	0.00	881.40	0.00
873.60	0.00	881.55	0.00
873.75	0.00	881.70	0.00
873.90	0.00	881.85	0.00
874.05	0.00	882.00	0.00
874.20	0.00	882.15	0.00
874.35	0.00	882.30	0.00
874.50	0.00	882.45	0.00
874.65	0.00	882.60	0.11
874.80	0.00	882.75	0.74
874.95	0.00	882.90	1.96
875.10	0.00	883.05	3.74
875.25	0.00	883.20	6.01
875.40	0.00	883.35	8.72
875.55	0.00	883.50	11.79
875.70	0.00	883.65	15.17
875.85	0.00	883.80	18.79
876.00	0.00	883.95	22.56
876.15	0.00	884.10	26.41
876.30	0.00	884.25	30.26
876.45	0.00	884.40	34.01
876.60	0.00	884.55	37.55
876.75	0.00	884.70	40.73
876.90	0.00	884.85	43.37
877.05	0.00	885.00	45.11
877.20	0.00	885.15	44.80
877.35	0.00	885.30	45.58
877.50	0.00	885.45	47.44
877.65	0.00	885.60	**49.23**
877.80	0.00	885.75	**50.04**
877.95	0.00	885.90	50.04
878.10	0.00	886.05	50.04
878.25	0.00	886.20	50.04
878.40	0.00	886.35	50.04
878.55	0.00	886.50	50.04
878.70	0.00		
878.85	0.00		
879.00	0.00		
879.15	0.00		
879.30	0.00		

Stage-Area-Storage for Pond 7P: Forebay

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
871.50	0.000	879.45	12.077
871.65	0.096	879.60	12.358
871.80	0.192	879.75	12.639
871.95	0.288	879.90	12.920
872.10	0.454	880.05	13.205
872.25	0.655	880.20	13.498
872.40	0.856	880.35	13.792
872.55	1.057	880.50	14.085
872.70	1.258	880.65	14.378
872.85	1.459	880.80	14.672
873.00	1.660	880.95	14.965
873.15	1.871	881.10	15.267
873.30	2.081	881.25	15.573
873.45	2.292	881.40	15.879
873.60	2.503	881.55	16.185
873.75	2.714	881.70	16.491
873.90	2.924	881.85	16.797
874.05	3.139	882.00	17.103
874.20	3.361	882.15	17.422
874.35	3.583	882.30	17.741
874.50	3.805	882.45	18.060
874.65	4.026	882.60	18.379
874.80	4.248	882.75	18.698
874.95	4.470	882.90	19.017
875.10	4.700	883.05	19.341
875.25	4.933	883.20	19.673
875.40	5.166	883.35	20.005
875.55	5.399	883.50	20.337
875.70	5.633	883.65	20.670
875.85	5.866	883.80	21.002
876.00	6.099	883.95	**21.334**
876.15	6.344	884.10	**21.445**
876.30	6.589	884.25	21.445
876.45	6.834	884.40	21.445
876.60	7.079	884.55	21.445
876.75	7.324	884.70	21.445
876.90	7.569	884.85	21.445
877.05	7.818	885.00	21.445
877.20	8.074	885.15	21.445
877.35	8.331	885.30	21.445
877.50	8.587	885.45	21.445
877.65	8.844	885.60	21.445
877.80	9.101	885.75	21.445
877.95	9.357	885.90	21.445
878.10	9.622	886.05	21.445
878.25	9.891	886.20	21.445
878.40	10.159	886.35	21.445
878.55	10.428	886.50	21.445
878.70	10.697		
878.85	10.965		
879.00	11.234		
879.15	11.515		
879.30	11.796		

Summary for Pond 8P: Retention Basin

Inflow Area = 60.090 ac, 56.73% Impervious, Inflow Depth > 50.36" for 10-yr event
Inflow = 19.97 cfs @ 11.85 hrs, Volume= 252.170 af
Outflow = 10.17 cfs @ 12.39 hrs, Volume= 251.543 af, Atten= 49%, Lag= 32.5 min
Primary = 10.17 cfs @ 12.39 hrs, Volume= 251.543 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs / 2
Starting Elev= 880.33' Surf.Area= 0.000 ac Storage= 16.121 af
Peak Elev= 880.72' @ 12.39 hrs Surf.Area= 0.000 ac Storage= 17.176 af (1.055 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 26.709 af (10.588 af above start)

Plug-Flow detention time= 1,992.4 min calculated for 235.328 af (93% of inflow)
Center-of-Mass det. time= 37.9 min (14,753.6 - 14,715.7)

Volume	Invert	Avail.Storage	Storage Description
#1	871.50'	26.709 af	**Custom Stage Data** Listed below

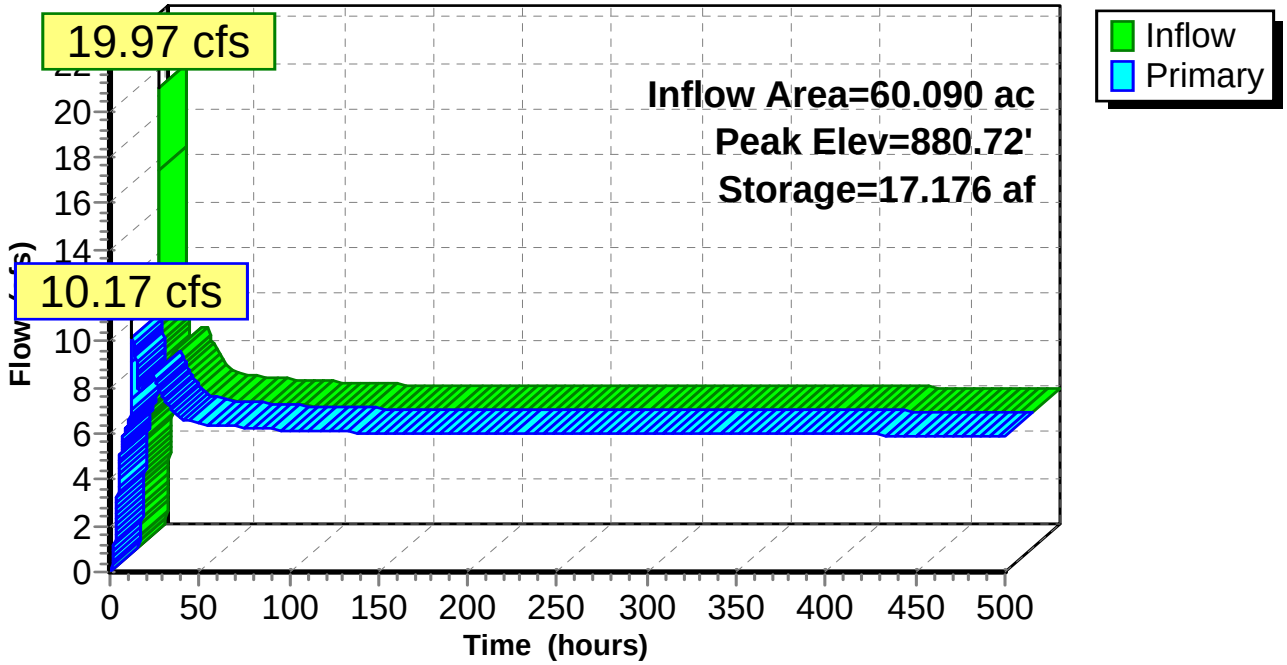
Elevation (feet)	Cum.Store (acre-feet)
871.50	0.000
872.00	0.463
873.00	1.970
874.00	3.561
875.00	5.235
876.00	6.996
877.00	8.445
878.00	10.783
879.00	12.736
880.00	15.226
881.00	17.938
882.00	20.756
883.00	23.679
884.00	26.709

Device	Routing	Invert	Outlet Devices
#1	Primary	874.00'	**Tube/Siphon/Float Valve** Discharges@874.00' 36.000" Diameter, C= 0.600 930.0' Long Tube, Hazen-Williams C= 130
#2	Device 1	880.33'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=11.18 cfs @ 12.39 hrs HW=880.72' TW=880.39' (TW follows 0.33' below HW)
↑—**1=Tube/Siphon/Float Valve** (Tube Controls 11.18 cfs @ 1.58 fps)
↑—**2=Orifice/Grate** (Passes 11.18 cfs of 12.18 cfs potential flow)

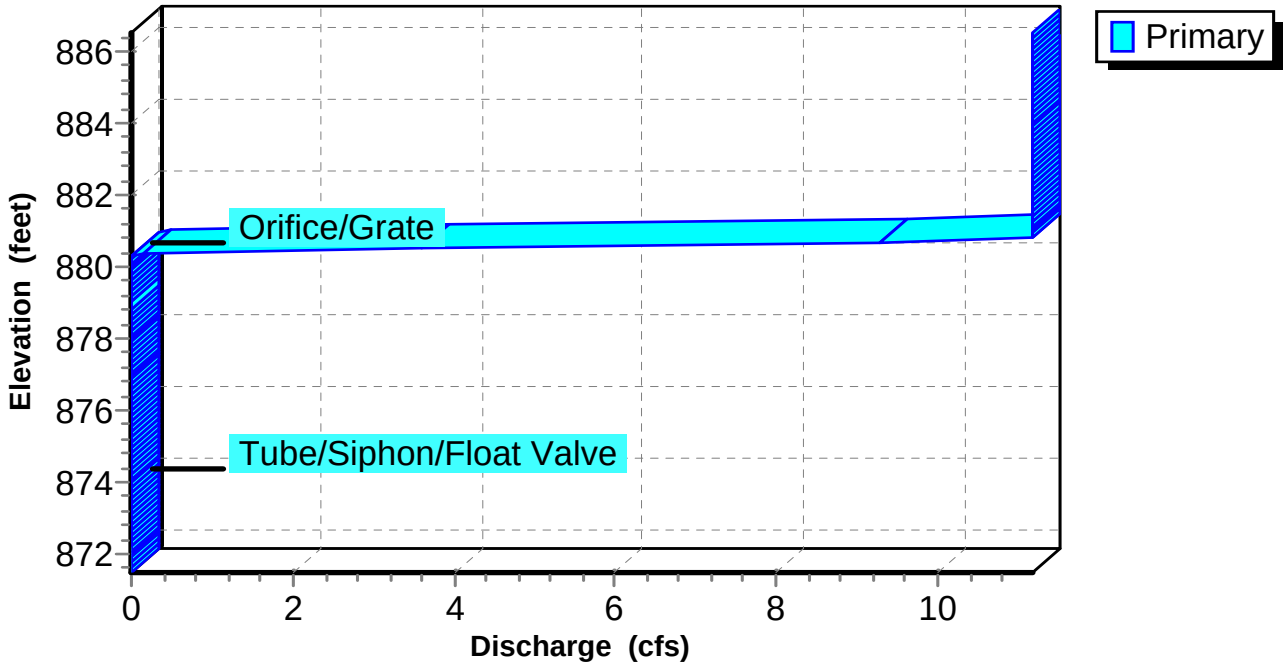
Pond 8P: Retention Basin

Hydrograph

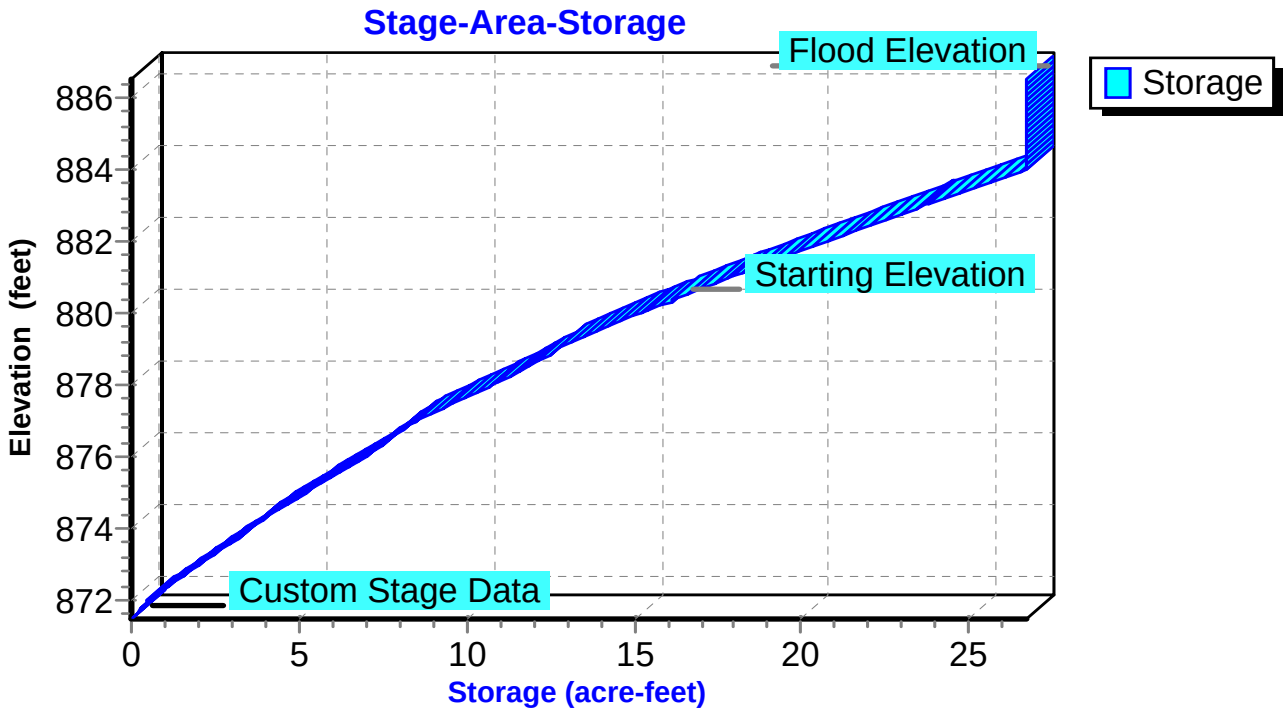


Pond 8P: Retention Basin

Stage-Discharge



Pond 8P: Retention Basin



Hydrograph for Pond 8P: Retention Basin

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.02	16.121	880.33	0.00
10.00	**6.60**	**16.782**	**880.57**	**6.40**
20.00	**8.36**	**16.911**	**880.62**	**8.21**
30.00	7.48	16.867	880.61	7.59
40.00	6.60	16.799	880.58	6.64
50.00	6.42	16.784	880.57	6.43
60.00	6.34	16.778	880.57	6.34
70.00	6.28	16.774	880.57	6.29
80.00	6.23	16.770	880.57	6.23
90.00	6.19	16.767	880.57	6.19
100.00	6.15	16.764	880.57	6.15
110.00	6.11	16.762	880.57	6.12
120.00	6.09	16.760	880.57	6.09
130.00	6.06	16.758	880.56	6.06
140.00	6.04	16.756	880.56	6.04
150.00	6.04	16.756	880.56	6.04
160.00	6.03	16.755	880.56	6.03
170.00	6.02	16.755	880.56	6.02
180.00	6.02	16.755	880.56	6.02
190.00	6.01	16.754	880.56	6.01
200.00	6.01	16.754	880.56	6.01
210.00	6.00	16.754	880.56	6.00
220.00	6.00	16.753	880.56	6.00
230.00	5.99	16.753	880.56	5.99
240.00	5.99	16.753	880.56	5.99
250.00	5.99	16.752	880.56	5.99
260.00	5.98	16.752	880.56	5.98
270.00	5.98	16.752	880.56	5.98
280.00	5.97	16.752	880.56	5.98
290.00	5.97	16.751	880.56	5.97
300.00	5.97	16.751	880.56	5.97
310.00	5.97	16.751	880.56	5.97
320.00	5.96	16.751	880.56	5.96
330.00	5.96	16.750	880.56	5.96
340.00	5.96	16.750	880.56	5.96
350.00	5.95	16.750	880.56	5.95
360.00	5.95	16.750	880.56	5.95
370.00	5.95	16.750	880.56	5.95
380.00	5.95	16.750	880.56	5.95
390.00	5.95	16.749	880.56	5.95
400.00	5.94	16.749	880.56	5.94
410.00	5.94	16.749	880.56	5.94
420.00	5.94	16.749	880.56	5.94
430.00	5.94	16.749	880.56	5.94
440.00	5.94	16.749	880.56	5.94
450.00	5.93	16.749	880.56	5.93
460.00	5.93	16.749	880.56	5.93
470.00	5.93	16.748	880.56	5.93
480.00	5.93	16.748	880.56	5.93
490.00	5.93	16.748	880.56	5.93
500.00	5.93	16.748	880.56	5.93

Stage-Discharge for Pond 8P: Retention Basin

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
871.50	0.00	879.45	0.00
871.65	0.00	879.60	0.00
871.80	0.00	879.75	0.00
871.95	0.00	879.90	0.00
872.10	0.00	880.05	0.00
872.25	0.00	880.20	0.00
872.40	0.00	880.35	0.15
872.55	0.00	880.50	3.60
872.70	0.00	880.65	**9.30**
872.85	0.00	880.80	**11.18**
873.00	0.00	880.95	11.18
873.15	0.00	881.10	11.18
873.30	0.00	881.25	11.18
873.45	0.00	881.40	11.18
873.60	0.00	881.55	11.18
873.75	0.00	881.70	11.18
873.90	0.00	881.85	11.18
874.05	0.00	882.00	11.18
874.20	0.00	882.15	11.18
874.35	0.00	882.30	11.18
874.50	0.00	882.45	11.18
874.65	0.00	882.60	11.18
874.80	0.00	882.75	11.18
874.95	0.00	882.90	11.18
875.10	0.00	883.05	11.18
875.25	0.00	883.20	11.18
875.40	0.00	883.35	11.18
875.55	0.00	883.50	11.18
875.70	0.00	883.65	11.18
875.85	0.00	883.80	11.18
876.00	0.00	883.95	11.18
876.15	0.00	884.10	11.18
876.30	0.00	884.25	11.18
876.45	0.00	884.40	11.18
876.60	0.00	884.55	11.18
876.75	0.00	884.70	11.18
876.90	0.00	884.85	11.18
877.05	0.00	885.00	11.18
877.20	0.00	885.15	11.18
877.35	0.00	885.30	11.18
877.50	0.00	885.45	11.18
877.65	0.00	885.60	11.18
877.80	0.00	885.75	11.18
877.95	0.00	885.90	11.18
878.10	0.00	886.05	11.18
878.25	0.00	886.20	11.18
878.40	0.00	886.35	11.18
878.55	0.00	886.50	11.18
878.70	0.00		
878.85	0.00		
879.00	0.00		
879.15	0.00		
879.30	0.00		

Stage-Area-Storage for Pond 8P: Retention Basin

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
871.50	0.000	879.45	13.857
871.65	0.139	879.60	14.230
871.80	0.278	879.75	14.604
871.95	0.417	879.90	14.977
872.10	0.614	880.05	15.362
872.25	0.840	880.20	15.768
872.40	1.066	880.35	16.175
872.55	1.292	880.50	16.582
872.70	1.518	880.65	16.989
872.85	1.744	880.80	17.396
873.00	1.970	880.95	17.802
873.15	2.209	881.10	18.220
873.30	2.447	881.25	18.643
873.45	2.686	881.40	19.065
873.60	2.925	881.55	19.488
873.75	3.163	881.70	19.911
873.90	3.402	881.85	20.333
874.05	3.645	882.00	20.756
874.20	3.896	882.15	21.194
874.35	4.147	882.30	21.633
874.50	4.398	882.45	22.071
874.65	4.649	882.60	22.510
874.80	4.900	882.75	22.948
874.95	5.151	882.90	23.387
875.10	5.411	883.05	23.830
875.25	5.675	883.20	24.285
875.40	5.939	883.35	24.740
875.55	6.204	883.50	25.194
875.70	6.468	883.65	25.648
875.85	6.732	883.80	26.103
876.00	6.996	883.95	**26.558**
876.15	7.213	884.10	**26.709**
876.30	7.431	884.25	26.709
876.45	7.648	884.40	26.709
876.60	7.865	884.55	26.709
876.75	8.083	884.70	26.709
876.90	8.300	884.85	26.709
877.05	8.562	885.00	26.709
877.20	8.913	885.15	26.709
877.35	9.263	885.30	26.709
877.50	9.614	885.45	26.709
877.65	9.965	885.60	26.709
877.80	10.315	885.75	26.709
877.95	10.666	885.90	26.709
878.10	10.978	886.05	26.709
878.25	11.271	886.20	26.709
878.40	11.564	886.35	26.709
878.55	11.857	886.50	26.709
878.70	12.150		
878.85	12.443		
879.00	12.736		
879.15	13.109		
879.30	13.483		

Summary for Pond 9P: Old Ash Pond

Inflow Area = 27.360 ac,100.00% Impervious, Inflow Depth = 3.02" for 10-yr event
Inflow = 88.41 cfs @ 11.84 hrs, Volume= 6.879 af
Outflow = 0.83 cfs @ 23.86 hrs, Volume= 6.318 af, Atten= 99%, Lag= 721.1 min
Primary = 0.83 cfs @ 23.86 hrs, Volume= 6.318 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Starting Elev= 881.50' Surf.Area= 0.000 ac Storage= 118.482 af
Peak Elev= 881.94' @ 23.86 hrs Surf.Area= 0.000 ac Storage= 124.599 af (6.117 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 153.954 af (35.472 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 6,929.7 min (7,677.3 - 747.6)

Volume	Invert	Avail.Storage	Storage Description
#1	868.00'	153.954 af	**Custom Stage Data** Listed below

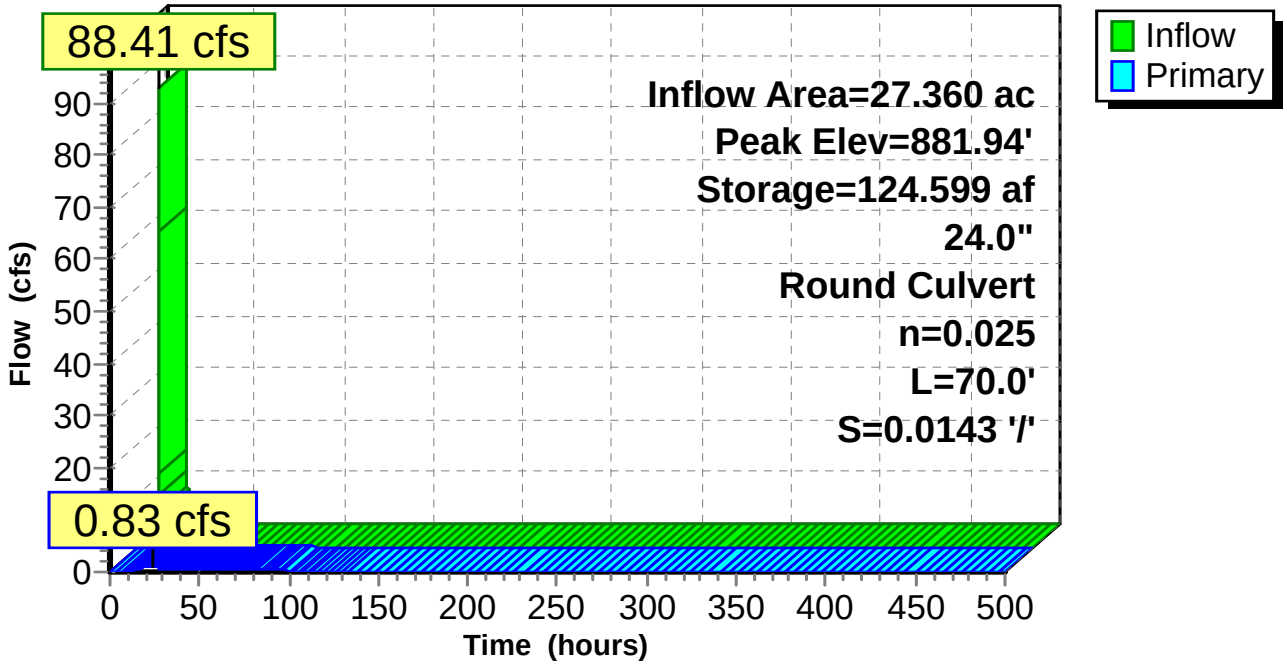
Elevation (feet)	Cum.Store (acre-feet)
868.00	0.000
869.00	0.912
870.00	1.089
871.00	5.537
872.00	13.143
873.00	22.784
874.00	34.019
875.00	46.023
876.00	58.522
877.00	71.294
878.00	84.273
879.00	96.397
880.00	97.727
881.00	111.501
882.00	125.463
883.00	139.613
884.00	153.954

Device	Routing	Invert	Outlet Devices
#1	Primary	881.50'	**24.0" Round Culvert** L= 70.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 881.50' / 880.50' S= 0.0143 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf

Primary OutFlow Max=0.81 cfs @ 23.86 hrs HW=881.94' TW=880.77' (TW follows 1.17' below HW)
↑—**1=Culvert** (Barrel Controls 0.81 cfs @ 2.41 fps)

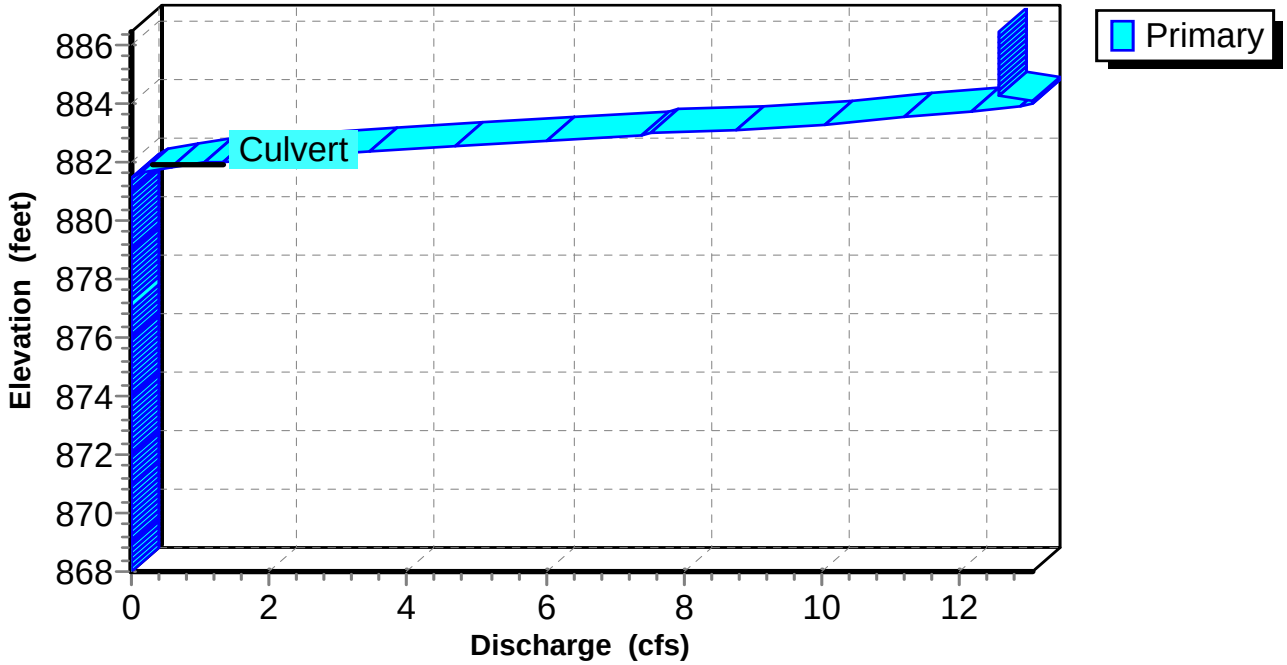
Pond 9P: Old Ash Pond

Hydrograph

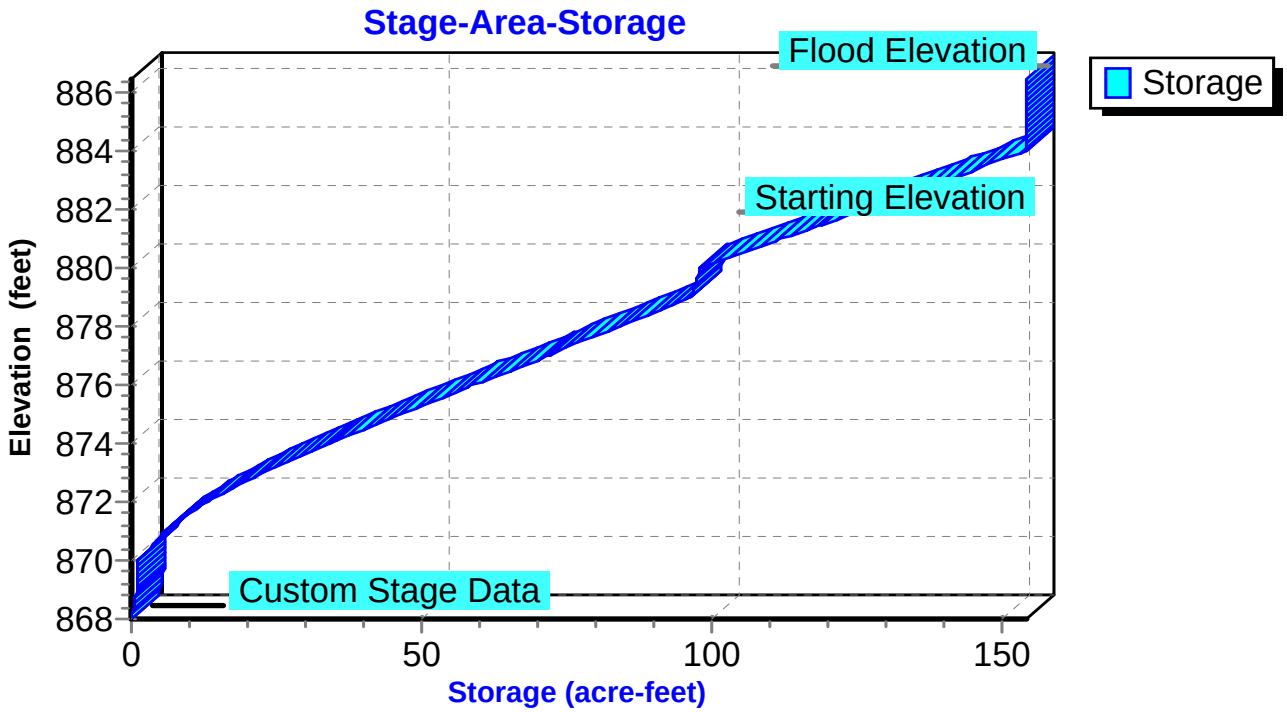


Pond 9P: Old Ash Pond

Stage-Discharge



Pond 9P: Old Ash Pond



Hydrograph for Pond 9P: Old Ash Pond

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	118.482	881.50	0.00
10.00	**3.31**	119.378	881.56	0.05
20.00	**1.17**	**124.517**	**881.93**	**0.81**
30.00	0.00	**124.217**	**881.91**	**0.73**
40.00	0.00	123.679	881.87	0.58
50.00	0.00	123.229	881.84	0.51
60.00	0.00	122.839	881.81	0.44
70.00	0.00	122.501	881.79	0.38
80.00	0.00	122.208	881.77	0.33
90.00	0.00	121.955	881.75	0.29
100.00	0.00	121.735	881.73	0.25
110.00	0.00	121.544	881.72	0.21
120.00	0.00	121.379	881.71	0.19
130.00	0.00	121.236	881.70	0.16
140.00	0.00	121.112	881.69	0.14
150.00	0.00	120.998	881.68	0.14
160.00	0.00	120.888	881.67	0.13
170.00	0.00	120.784	881.66	0.12
180.00	0.00	120.684	881.66	0.12
190.00	0.00	120.588	881.65	0.11
200.00	0.00	120.497	881.64	0.11
210.00	0.00	120.410	881.64	0.10
220.00	0.00	120.327	881.63	0.10
230.00	0.00	120.247	881.63	0.09
240.00	0.00	120.171	881.62	0.09
250.00	0.00	120.099	881.62	0.09
260.00	0.00	120.029	881.61	0.08
270.00	0.00	119.963	881.61	0.08
280.00	0.00	119.900	881.60	0.07
290.00	0.00	119.839	881.60	0.07
300.00	0.00	119.782	881.59	0.07
310.00	0.00	119.727	881.59	0.07
320.00	0.00	119.674	881.59	0.06
330.00	0.00	119.624	881.58	0.06
340.00	0.00	119.576	881.58	0.06
350.00	0.00	119.530	881.58	0.05
360.00	0.00	119.486	881.57	0.05
370.00	0.00	119.444	881.57	0.05
380.00	0.00	119.404	881.57	0.05
390.00	0.00	119.366	881.56	0.05
400.00	0.00	119.329	881.56	0.04
410.00	0.00	119.295	881.56	0.04
420.00	0.00	119.261	881.56	0.04
430.00	0.00	119.229	881.55	0.04
440.00	0.00	119.199	881.55	0.04
450.00	0.00	119.170	881.55	0.03
460.00	0.00	119.142	881.55	0.03
470.00	0.00	119.116	881.55	0.03
480.00	0.00	119.091	881.54	0.03
490.00	0.00	119.066	881.54	0.03
500.00	0.00	119.043	881.54	0.03

Stage-Discharge for Pond 9P: Old Ash Pond

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
868.00	0.00	878.60	0.00
868.20	0.00	878.80	0.00
868.40	0.00	879.00	0.00
868.60	0.00	879.20	0.00
868.80	0.00	879.40	0.00
869.00	0.00	879.60	0.00
869.20	0.00	879.80	0.00
869.40	0.00	880.00	0.00
869.60	0.00	880.20	0.00
869.80	0.00	880.40	0.00
870.00	0.00	880.60	0.00
870.20	0.00	880.80	0.00
870.40	0.00	881.00	0.00
870.60	0.00	881.20	0.00
870.80	0.00	881.40	0.00
871.00	0.00	881.60	0.04
871.20	0.00	881.80	0.37
871.40	0.00	882.00	1.06
871.60	0.00	882.20	2.06
871.80	0.00	882.40	3.25
872.00	0.00	882.60	4.59
872.20	0.00	882.80	6.03
872.40	0.00	883.00	7.50
872.60	0.00	883.20	8.95
872.80	0.00	883.40	10.32
873.00	0.00	883.60	11.54
873.20	0.00	883.80	12.50
873.40	0.00	884.00	**13.05**
873.60	0.00	884.20	**12.54**
873.80	0.00	884.40	12.54
874.00	0.00	884.60	12.54
874.20	0.00	884.80	12.54
874.40	0.00	885.00	12.54
874.60	0.00	885.20	12.54
874.80	0.00	885.40	12.54
875.00	0.00	885.60	12.54
875.20	0.00	885.80	12.54
875.40	0.00	886.00	12.54
875.60	0.00	886.20	12.54
875.80	0.00	886.40	12.54
876.00	0.00		
876.20	0.00		
876.40	0.00		
876.60	0.00		
876.80	0.00		
877.00	0.00		
877.20	0.00		
877.40	0.00		
877.60	0.00		
877.80	0.00		
878.00	0.00		
878.20	0.00		
878.40	0.00		

Stage-Area-Storage for Pond 9P: Old Ash Pond

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
868.00	0.000	878.60	91.547
868.20	0.182	878.80	93.972
868.40	0.365	879.00	96.397
868.60	0.547	879.20	96.663
868.80	0.730	879.40	96.929
869.00	0.912	879.60	97.195
869.20	0.947	879.80	97.461
869.40	0.983	880.00	97.727
869.60	1.018	880.20	100.482
869.80	1.054	880.40	103.237
870.00	1.089	880.60	105.991
870.20	1.979	880.80	108.746
870.40	2.868	881.00	111.501
870.60	3.758	881.20	114.293
870.80	4.647	881.40	117.086
871.00	5.537	881.60	119.878
871.20	7.058	881.80	122.671
871.40	8.579	882.00	125.463
871.60	10.101	882.20	128.293
871.80	11.622	882.40	131.123
872.00	13.143	882.60	133.953
872.20	15.071	882.80	136.783
872.40	16.999	883.00	139.613
872.60	18.928	883.20	142.481
872.80	20.856	883.40	145.349
873.00	22.784	883.60	148.218
873.20	25.031	883.80	151.086
873.40	27.278	884.00	**153.954**
873.60	29.525	884.20	153.954
873.80	31.772	884.40	153.954
874.00	34.019	884.60	153.954
874.20	36.420	884.80	153.954
874.40	38.821	885.00	153.954
874.60	41.221	885.20	153.954
874.80	43.622	885.40	153.954
875.00	46.023	885.60	153.954
875.20	48.523	885.80	153.954
875.40	51.023	886.00	153.954
875.60	53.522	886.20	153.954
875.80	56.022	886.40	153.954
876.00	58.522		
876.20	61.076		
876.40	63.631		
876.60	66.185		
876.80	68.740		
877.00	71.294		
877.20	73.890		
877.40	76.486		
877.60	79.081		
877.80	81.677		
878.00	84.273		
878.20	86.698		
878.40	89.123		

Time span=0.00-500.00 hrs, dt=0.20 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Coal Pile Runoff Area=26.000 ac 0.00% Impervious Runoff Depth=1.27"
Flow Length=1,780' Tc=629.8 min CN=69 Runoff=2.68 cfs 2.744 af

Subcatchment 2S: Roof Runoff Area=0.240 ac 100.00% Impervious Runoff Depth=3.77"
Flow Length=20' Slope=0.0010 '/' Tc=1.3 min CN=98 Runoff=0.94 cfs 0.075 af

Subcatchment 3S: Forebay Surface Runoff Area=2.760 ac 100.00% Impervious Runoff Depth=3.77"
Flow Length=350' Tc=0.4 min CN=98 Runoff=11.48 cfs 0.866 af

Subcatchment 9S: Ret Basin Surface Runoff Area=3.730 ac 100.00% Impervious Runoff Depth=3.77"
Flow Length=700' Tc=0.7 min CN=98 Runoff=15.20 cfs 1.170 af

Subcatchment 10S: Old Ash Pond Runoff Area=27.360 ac 100.00% Impervious Runoff Depth=3.77"
Flow Length=1,000' Tc=1.0 min CN=98 Runoff=109.37 cfs 8.584 af

Pond 7P: Forebay Peak Elev=883.36' Storage=20.033 af Inflow=18.32 cfs 247.585 af
24.0" Round Culvert x 3.00 n=0.025 L=75.0' S=0.0133 '/' Outflow=8.98 cfs 246.094 af

Pond 8P: Retention Basin Peak Elev=880.77' Storage=17.313 af Inflow=23.41 cfs 255.251 af
Outflow=10.80 cfs 254.624 af

Pond 9P: Old Ash Pond Peak Elev=882.03' Storage=125.927 af Inflow=109.37 cfs 8.584 af
24.0" Round Culvert n=0.025 L=70.0' S=0.0143 '/' Outflow=1.21 cfs 7.986 af

Total Runoff Area = 60.090 ac Runoff Volume = 13.440 af Average Runoff Depth = 2.68"
43.27% Pervious = 26.000 ac 56.73% Impervious = 34.090 ac

Summary for Subcatchment 1S: Coal Pile

Runoff = 2.68 cfs @ 20.77 hrs, Volume= 2.744 af, Depth= 1.27"

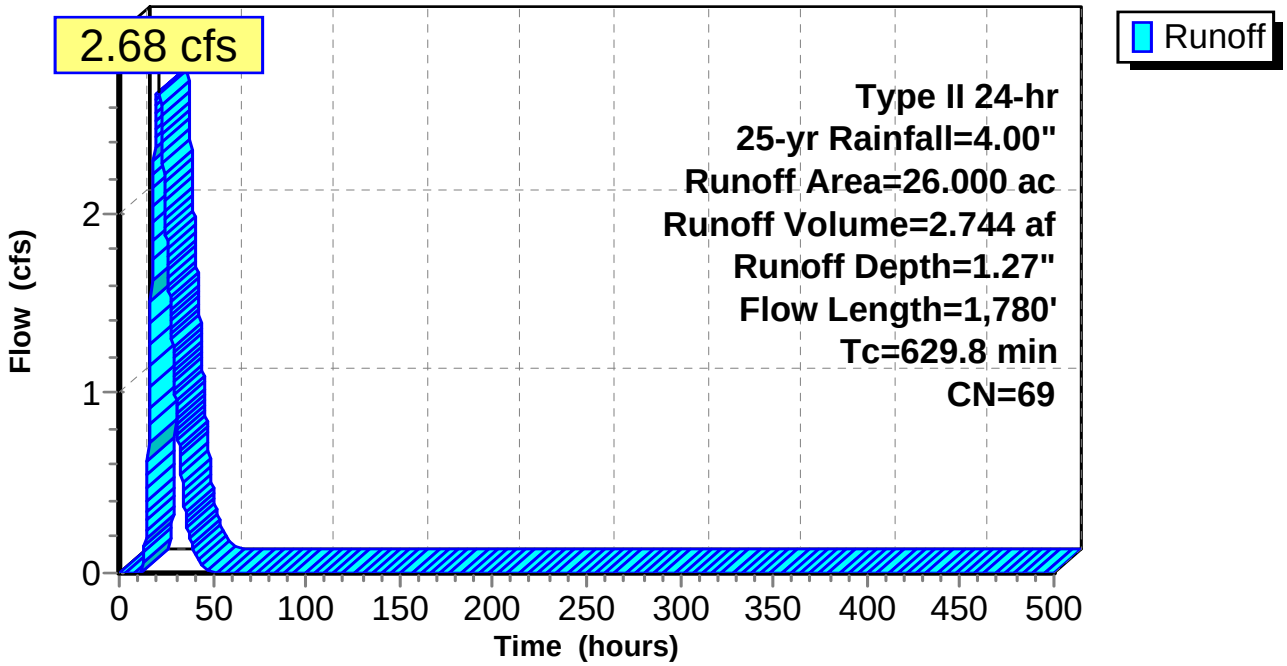
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr Rainfall=4.00"

	Area (ac)	CN	Description
*	15.000	56	Coal
*	11.000	86	Margins
	26.000	69	Weighted Average
	26.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	100	0.4000	4.03		**Sheet Flow, Coal** Smooth surfaces n= 0.011 P2= 2.50"
2.5	180	0.0300	1.21		**Shallow Concentrated Flow, Coal Margin** Short Grass Pasture Kv= 7.0 fps
626.9	1,500	0.0007	0.04	0.40	**Channel Flow, Drainage Ditch** Area= 10.0 sf Perim= 3,000.0' r= 0.00' n= 0.022 Earth, clean & straight
629.8	1,780	Total			

Subcatchment 1S: Coal Pile

Hydrograph



Hydrograph for Subcatchment 1S: Coal Pile

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.72	0.00	0.00
20.00	**3.81**	**1.14**	**2.63**
30.00	**4.00**	**1.27**	**1.02**
40.00	4.00	1.27	0.11
50.00	4.00	1.27	0.01
60.00	4.00	1.27	0.00
70.00	4.00	1.27	0.00
80.00	4.00	1.27	0.00
90.00	4.00	1.27	0.00
100.00	4.00	1.27	0.00
110.00	4.00	1.27	0.00
120.00	4.00	1.27	0.00
130.00	4.00	1.27	0.00
140.00	4.00	1.27	0.00
150.00	4.00	1.27	0.00
160.00	4.00	1.27	0.00
170.00	4.00	1.27	0.00
180.00	4.00	1.27	0.00
190.00	4.00	1.27	0.00
200.00	4.00	1.27	0.00
210.00	4.00	1.27	0.00
220.00	4.00	1.27	0.00
230.00	4.00	1.27	0.00
240.00	4.00	1.27	0.00
250.00	4.00	1.27	0.00
260.00	4.00	1.27	0.00
270.00	4.00	1.27	0.00
280.00	4.00	1.27	0.00
290.00	4.00	1.27	0.00
300.00	4.00	1.27	0.00
310.00	4.00	1.27	0.00
320.00	4.00	1.27	0.00
330.00	4.00	1.27	0.00
340.00	4.00	1.27	0.00
350.00	4.00	1.27	0.00
360.00	4.00	1.27	0.00
370.00	4.00	1.27	0.00
380.00	4.00	1.27	0.00
390.00	4.00	1.27	0.00
400.00	4.00	1.27	0.00
410.00	4.00	1.27	0.00
420.00	4.00	1.27	0.00
430.00	4.00	1.27	0.00
440.00	4.00	1.27	0.00
450.00	4.00	1.27	0.00
460.00	4.00	1.27	0.00
470.00	4.00	1.27	0.00
480.00	4.00	1.27	0.00
490.00	4.00	1.27	0.00
500.00	4.00	1.27	0.00

Summary for Subcatchment 2S: Roof

[49] Hint: Tc<2dt may require smaller dt

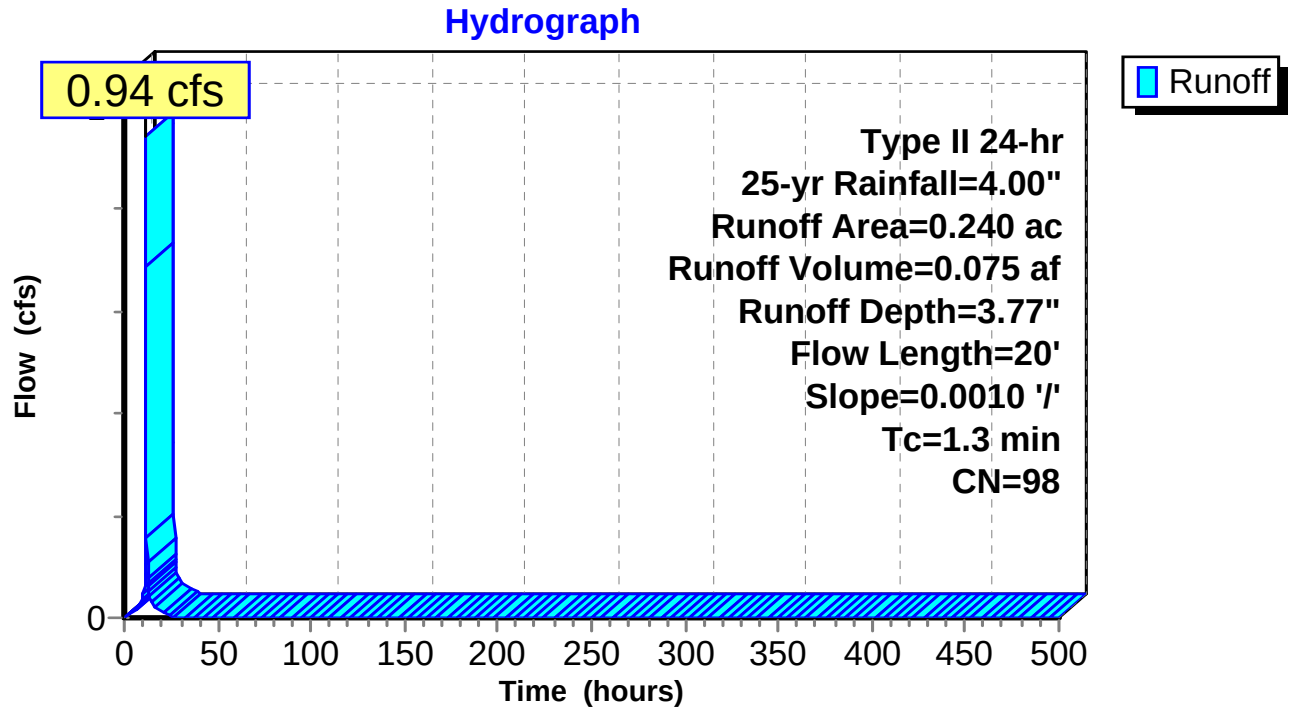
Runoff = 0.94 cfs @ 11.85 hrs, Volume= 0.075 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr Rainfall=4.00"

	Area (ac)	CN	Description
*	0.240	98	
	0.240		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	20	0.0010	0.27		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: Roof



Hydrograph for Subcatchment 2S: Roof

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.72	0.53	**0.04**
20.00	**3.81**	**3.57**	**0.01**
30.00	**4.00**	**3.77**	0.00
40.00	4.00	3.77	0.00
50.00	4.00	3.77	0.00
60.00	4.00	3.77	0.00
70.00	4.00	3.77	0.00
80.00	4.00	3.77	0.00
90.00	4.00	3.77	0.00
100.00	4.00	3.77	0.00
110.00	4.00	3.77	0.00
120.00	4.00	3.77	0.00
130.00	4.00	3.77	0.00
140.00	4.00	3.77	0.00
150.00	4.00	3.77	0.00
160.00	4.00	3.77	0.00
170.00	4.00	3.77	0.00
180.00	4.00	3.77	0.00
190.00	4.00	3.77	0.00
200.00	4.00	3.77	0.00
210.00	4.00	3.77	0.00
220.00	4.00	3.77	0.00
230.00	4.00	3.77	0.00
240.00	4.00	3.77	0.00
250.00	4.00	3.77	0.00
260.00	4.00	3.77	0.00
270.00	4.00	3.77	0.00
280.00	4.00	3.77	0.00
290.00	4.00	3.77	0.00
300.00	4.00	3.77	0.00
310.00	4.00	3.77	0.00
320.00	4.00	3.77	0.00
330.00	4.00	3.77	0.00
340.00	4.00	3.77	0.00
350.00	4.00	3.77	0.00
360.00	4.00	3.77	0.00
370.00	4.00	3.77	0.00
380.00	4.00	3.77	0.00
390.00	4.00	3.77	0.00
400.00	4.00	3.77	0.00
410.00	4.00	3.77	0.00
420.00	4.00	3.77	0.00
430.00	4.00	3.77	0.00
440.00	4.00	3.77	0.00
450.00	4.00	3.77	0.00
460.00	4.00	3.77	0.00
470.00	4.00	3.77	0.00
480.00	4.00	3.77	0.00
490.00	4.00	3.77	0.00
500.00	4.00	3.77	0.00

Summary for Subcatchment 3S: Forebay Surface

[49] Hint: Tc<2dt may require smaller dt

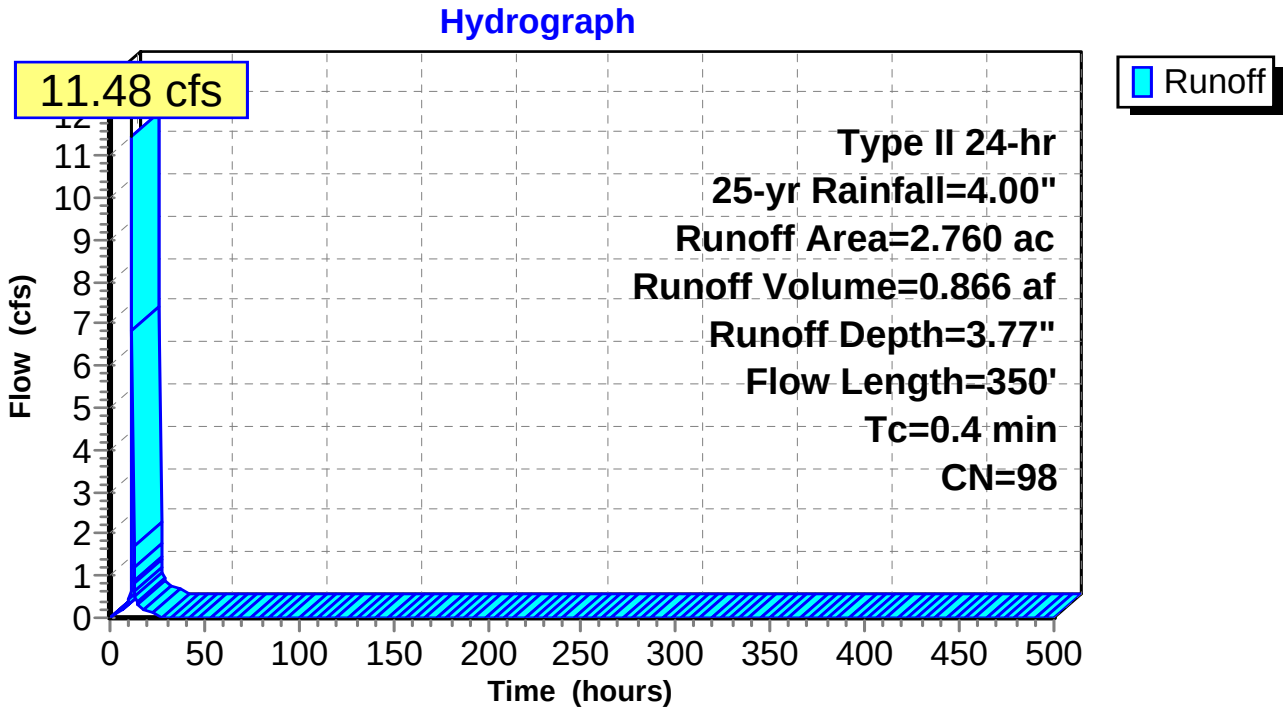
Runoff = 11.48 cfs @ 11.83 hrs, Volume= 0.866 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr Rainfall=4.00"

	Area (ac)	CN	Description
*	2.760	98	
	2.760		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	350		16.05		**Lake or Reservoir,** Mean Depth= 8.00'

Subcatchment 3S: Forebay Surface



Hydrograph for Subcatchment 3S: Forebay Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.72	0.53	**0.42**
20.00	**3.81**	**3.57**	**0.14**
30.00	**4.00**	**3.77**	0.00
40.00	4.00	3.77	0.00
50.00	4.00	3.77	0.00
60.00	4.00	3.77	0.00
70.00	4.00	3.77	0.00
80.00	4.00	3.77	0.00
90.00	4.00	3.77	0.00
100.00	4.00	3.77	0.00
110.00	4.00	3.77	0.00
120.00	4.00	3.77	0.00
130.00	4.00	3.77	0.00
140.00	4.00	3.77	0.00
150.00	4.00	3.77	0.00
160.00	4.00	3.77	0.00
170.00	4.00	3.77	0.00
180.00	4.00	3.77	0.00
190.00	4.00	3.77	0.00
200.00	4.00	3.77	0.00
210.00	4.00	3.77	0.00
220.00	4.00	3.77	0.00
230.00	4.00	3.77	0.00
240.00	4.00	3.77	0.00
250.00	4.00	3.77	0.00
260.00	4.00	3.77	0.00
270.00	4.00	3.77	0.00
280.00	4.00	3.77	0.00
290.00	4.00	3.77	0.00
300.00	4.00	3.77	0.00
310.00	4.00	3.77	0.00
320.00	4.00	3.77	0.00
330.00	4.00	3.77	0.00
340.00	4.00	3.77	0.00
350.00	4.00	3.77	0.00
360.00	4.00	3.77	0.00
370.00	4.00	3.77	0.00
380.00	4.00	3.77	0.00
390.00	4.00	3.77	0.00
400.00	4.00	3.77	0.00
410.00	4.00	3.77	0.00
420.00	4.00	3.77	0.00
430.00	4.00	3.77	0.00
440.00	4.00	3.77	0.00
450.00	4.00	3.77	0.00
460.00	4.00	3.77	0.00
470.00	4.00	3.77	0.00
480.00	4.00	3.77	0.00
490.00	4.00	3.77	0.00
500.00	4.00	3.77	0.00

Summary for Subcatchment 9S: Ret Basin Surface

[49] Hint: Tc<2dt may require smaller dt

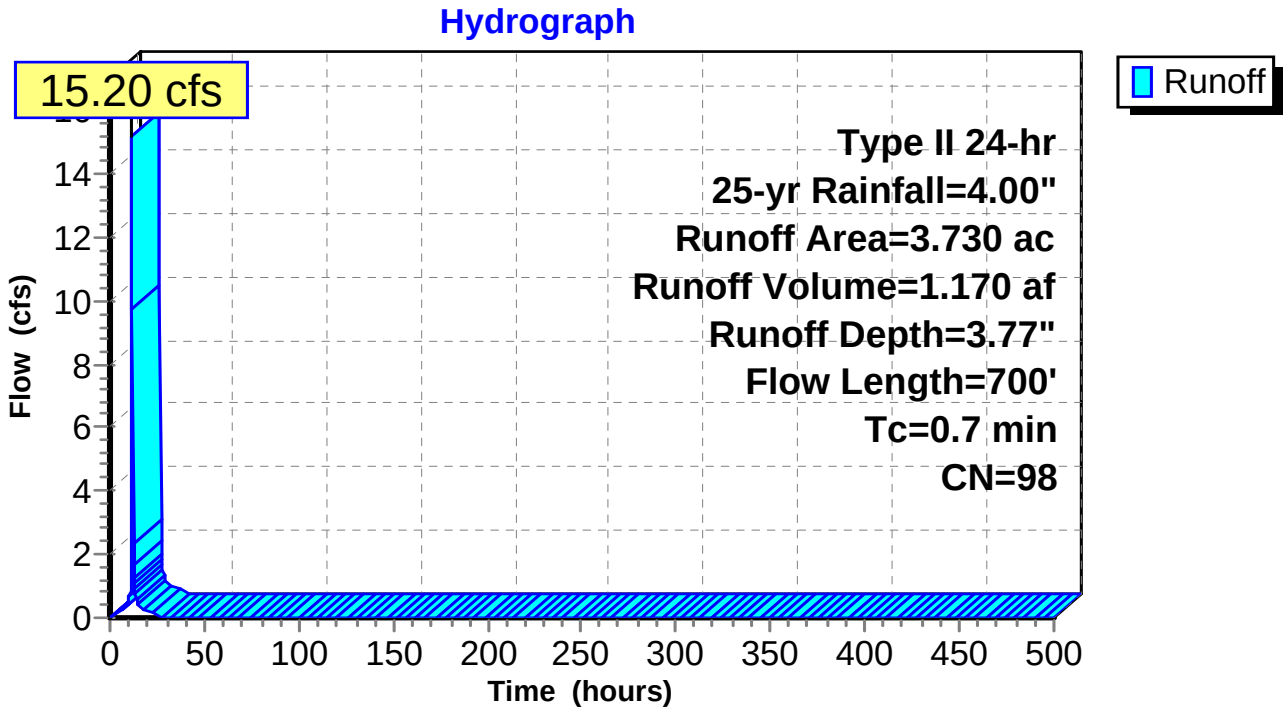
Runoff = 15.20 cfs @ 11.83 hrs, Volume= 1.170 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr Rainfall=4.00"

	Area (ac)	CN	Description
*	3.730	98	
	3.730		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	700		16.05		**Lake or Reservoir,** Mean Depth= 8.00'

Subcatchment 9S: Ret Basin Surface



Hydrograph for Subcatchment 9S: Ret Basin Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.72	0.53	**0.57**
20.00	**3.81**	**3.57**	**0.20**
30.00	**4.00**	**3.77**	0.00
40.00	4.00	3.77	0.00
50.00	4.00	3.77	0.00
60.00	4.00	3.77	0.00
70.00	4.00	3.77	0.00
80.00	4.00	3.77	0.00
90.00	4.00	3.77	0.00
100.00	4.00	3.77	0.00
110.00	4.00	3.77	0.00
120.00	4.00	3.77	0.00
130.00	4.00	3.77	0.00
140.00	4.00	3.77	0.00
150.00	4.00	3.77	0.00
160.00	4.00	3.77	0.00
170.00	4.00	3.77	0.00
180.00	4.00	3.77	0.00
190.00	4.00	3.77	0.00
200.00	4.00	3.77	0.00
210.00	4.00	3.77	0.00
220.00	4.00	3.77	0.00
230.00	4.00	3.77	0.00
240.00	4.00	3.77	0.00
250.00	4.00	3.77	0.00
260.00	4.00	3.77	0.00
270.00	4.00	3.77	0.00
280.00	4.00	3.77	0.00
290.00	4.00	3.77	0.00
300.00	4.00	3.77	0.00
310.00	4.00	3.77	0.00
320.00	4.00	3.77	0.00
330.00	4.00	3.77	0.00
340.00	4.00	3.77	0.00
350.00	4.00	3.77	0.00
360.00	4.00	3.77	0.00
370.00	4.00	3.77	0.00
380.00	4.00	3.77	0.00
390.00	4.00	3.77	0.00
400.00	4.00	3.77	0.00
410.00	4.00	3.77	0.00
420.00	4.00	3.77	0.00
430.00	4.00	3.77	0.00
440.00	4.00	3.77	0.00
450.00	4.00	3.77	0.00
460.00	4.00	3.77	0.00
470.00	4.00	3.77	0.00
480.00	4.00	3.77	0.00
490.00	4.00	3.77	0.00
500.00	4.00	3.77	0.00

Summary for Subcatchment 10S: Old Ash Pond Surface

[49] Hint: Tc<2dt may require smaller dt

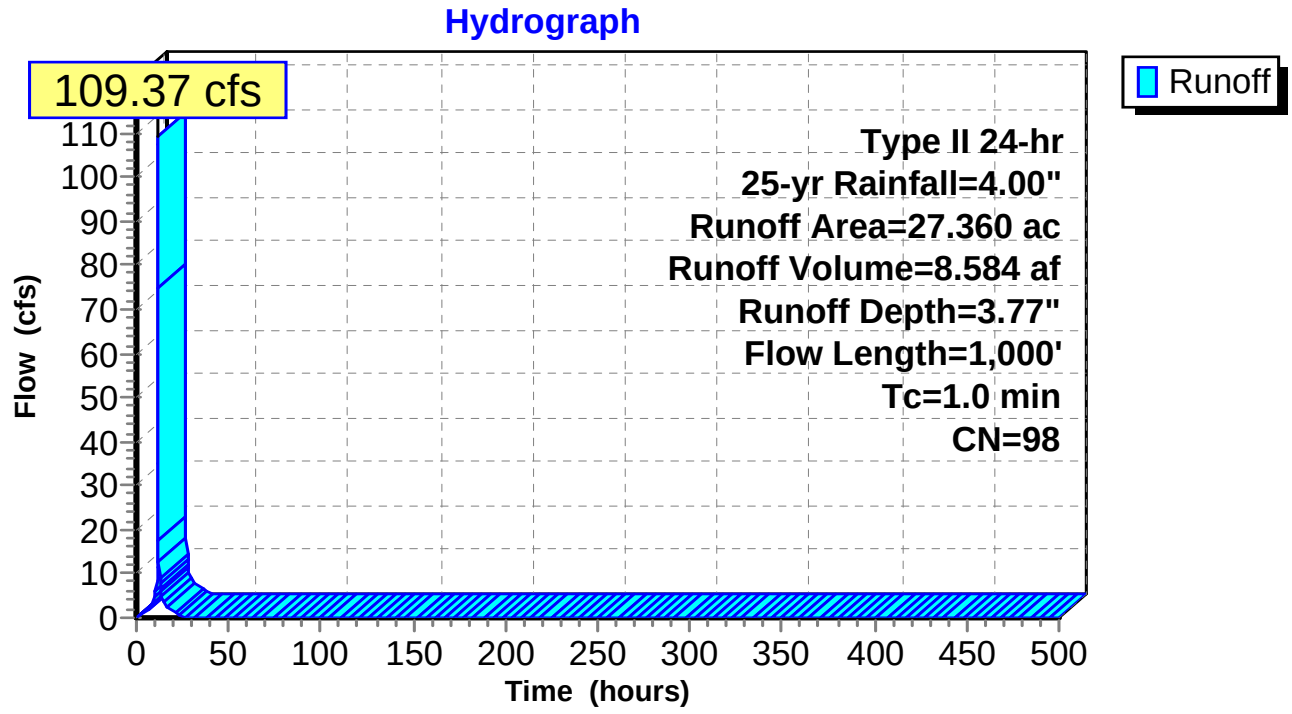
Runoff = 109.37 cfs @ 11.84 hrs, Volume= 8.584 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr Rainfall=4.00"

	Area (ac)	CN	Description
*	27.360	98	
	27.360		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1,000		16.05		**Lake or Reservoir, Lake** Mean Depth= 8.00'

Subcatchment 10S: Old Ash Pond Surface



Hydrograph for Subcatchment 10S: Old Ash Pond Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.72	0.53	**4.17**
20.00	**3.81**	**3.57**	**1.44**
30.00	**4.00**	**3.77**	0.00
40.00	4.00	3.77	0.00
50.00	4.00	3.77	0.00
60.00	4.00	3.77	0.00
70.00	4.00	3.77	0.00
80.00	4.00	3.77	0.00
90.00	4.00	3.77	0.00
100.00	4.00	3.77	0.00
110.00	4.00	3.77	0.00
120.00	4.00	3.77	0.00
130.00	4.00	3.77	0.00
140.00	4.00	3.77	0.00
150.00	4.00	3.77	0.00
160.00	4.00	3.77	0.00
170.00	4.00	3.77	0.00
180.00	4.00	3.77	0.00
190.00	4.00	3.77	0.00
200.00	4.00	3.77	0.00
210.00	4.00	3.77	0.00
220.00	4.00	3.77	0.00
230.00	4.00	3.77	0.00
240.00	4.00	3.77	0.00
250.00	4.00	3.77	0.00
260.00	4.00	3.77	0.00
270.00	4.00	3.77	0.00
280.00	4.00	3.77	0.00
290.00	4.00	3.77	0.00
300.00	4.00	3.77	0.00
310.00	4.00	3.77	0.00
320.00	4.00	3.77	0.00
330.00	4.00	3.77	0.00
340.00	4.00	3.77	0.00
350.00	4.00	3.77	0.00
360.00	4.00	3.77	0.00
370.00	4.00	3.77	0.00
380.00	4.00	3.77	0.00
390.00	4.00	3.77	0.00
400.00	4.00	3.77	0.00
410.00	4.00	3.77	0.00
420.00	4.00	3.77	0.00
430.00	4.00	3.77	0.00
440.00	4.00	3.77	0.00
450.00	4.00	3.77	0.00
460.00	4.00	3.77	0.00
470.00	4.00	3.77	0.00
480.00	4.00	3.77	0.00
490.00	4.00	3.77	0.00
500.00	4.00	3.77	0.00

Summary for Pond 7P: Forebay

Inflow Area = 29.000 ac, 10.34% Impervious, Inflow Depth > 102.45" for 25-yr event
Inflow = 18.32 cfs @ 11.83 hrs, Volume= 247.585 af, Incl. 5.90 cfs Base Flow
Outflow = 8.98 cfs @ 12.21 hrs, Volume= 246.094 af, Atten= 51%, Lag= 23.2 min
Primary = 8.98 cfs @ 12.21 hrs, Volume= 246.094 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Starting Elev= 882.50' Surf.Area= 0.000 ac Storage= 18.166 af
Peak Elev= 883.36' @ 12.21 hrs Surf.Area= 0.000 ac Storage= 20.033 af (1.867 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 21.445 af (3.278 af above start)

Plug-Flow detention time= 2,401.0 min calculated for 227.879 af (92% of inflow)
Center-of-Mass det. time= 90.2 min (14,885.7 - 14,795.5)

Volume	Invert	Avail.Storage	Storage Description
#1	871.50'	21.445 af	**Custom Stage Data** Listed below

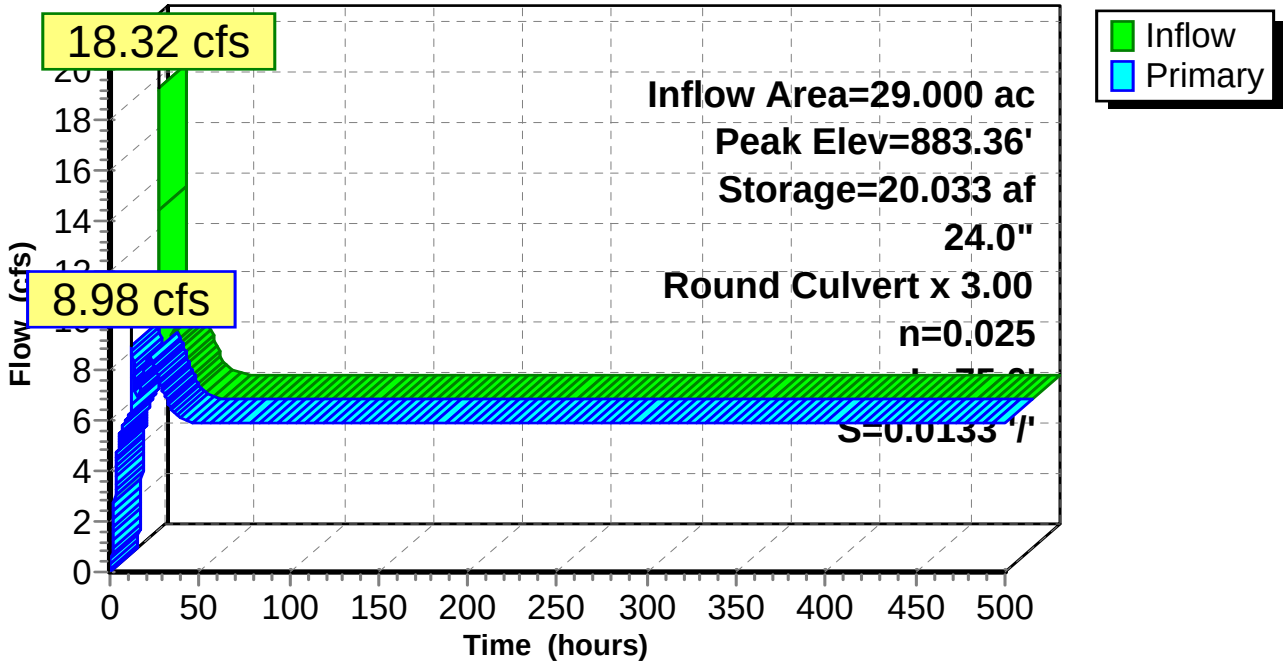
Elevation (feet)	Cum.Store (acre-feet)
871.50	0.000
872.00	0.320
873.00	1.660
874.00	3.065
875.00	4.544
876.00	6.099
877.00	7.732
878.00	9.443
879.00	11.234
880.00	13.107
881.00	15.063
882.00	17.103
883.00	19.230
884.00	21.445

Device	Routing	Invert	Outlet Devices
#1	Primary	882.50'	**24.0" Round Culvert X 3.00** L= 75.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 882.50' / 881.50' S= 0.0133 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf

Primary OutFlow Max=8.95 cfs @ 12.21 hrs HW=883.36' TW=881.19' (TW follows 2.17' below HW)
↑—**1=Culvert** (Barrel Controls 8.95 cfs @ 3.40 fps)

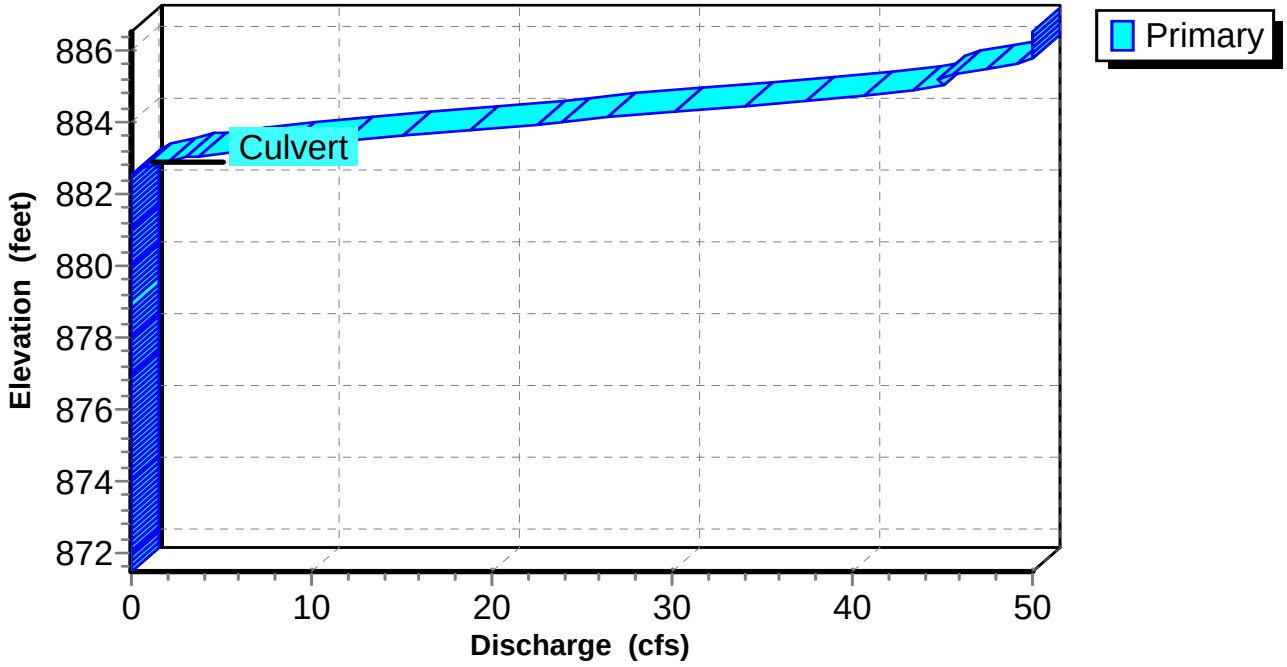
Pond 7P: Forebay

Hydrograph

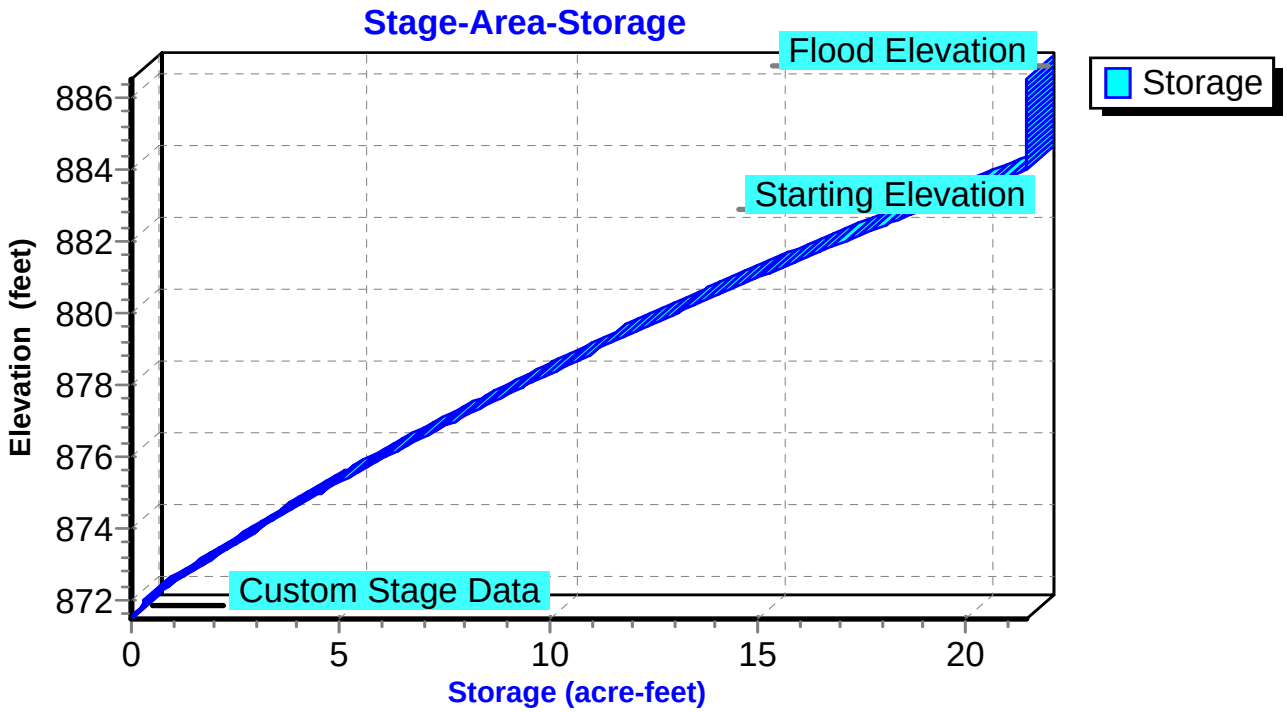


Pond 7P: Forebay

Stage-Discharge



Pond 7P: Forebay



Hydrograph for Pond 7P: Forebay

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	5.90	18.215	882.52	0.02
10.00	**6.36**	**19.693**	**883.21**	**6.17**
20.00	**8.69**	**19.951**	**883.33**	**8.28**
30.00	6.92	19.817	883.26	7.18
40.00	6.01	19.681	883.20	6.07
50.00	5.91	19.659	883.19	5.92
60.00	5.90	19.657	883.19	5.90
70.00	5.90	19.657	883.19	5.90
80.00	5.90	19.657	883.19	5.90
90.00	5.90	19.657	883.19	5.90
100.00	5.90	19.657	883.19	5.90
110.00	5.90	19.657	883.19	5.90
120.00	5.90	19.657	883.19	5.90
130.00	5.90	19.657	883.19	5.90
140.00	5.90	19.657	883.19	5.90
150.00	5.90	19.657	883.19	5.90
160.00	5.90	19.657	883.19	5.90
170.00	5.90	19.657	883.19	5.90
180.00	5.90	19.657	883.19	5.90
190.00	5.90	19.657	883.19	5.90
200.00	5.90	19.657	883.19	5.90
210.00	5.90	19.657	883.19	5.90
220.00	5.90	19.657	883.19	5.90
230.00	5.90	19.657	883.19	5.90
240.00	5.90	19.657	883.19	5.90
250.00	5.90	19.657	883.19	5.90
260.00	5.90	19.657	883.19	5.90
270.00	5.90	19.657	883.19	5.90
280.00	5.90	19.657	883.19	5.90
290.00	5.90	19.657	883.19	5.90
300.00	5.90	19.657	883.19	5.90
310.00	5.90	19.657	883.19	5.90
320.00	5.90	19.657	883.19	5.90
330.00	5.90	19.657	883.19	5.90
340.00	5.90	19.657	883.19	5.90
350.00	5.90	19.657	883.19	5.90
360.00	5.90	19.657	883.19	5.90
370.00	5.90	19.657	883.19	5.90
380.00	5.90	19.657	883.19	5.90
390.00	5.90	19.657	883.19	5.90
400.00	5.90	19.657	883.19	5.90
410.00	5.90	19.657	883.19	5.90
420.00	5.90	19.657	883.19	5.90
430.00	5.90	19.657	883.19	5.90
440.00	5.90	19.657	883.19	5.90
450.00	5.90	19.657	883.19	5.90
460.00	5.90	19.657	883.19	5.90
470.00	5.90	19.657	883.19	5.90
480.00	5.90	19.657	883.19	5.90
490.00	5.90	19.657	883.19	5.90
500.00	5.90	19.657	883.19	5.90

Stage-Discharge for Pond 7P: Forebay

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
871.50	0.00	879.45	0.00
871.65	0.00	879.60	0.00
871.80	0.00	879.75	0.00
871.95	0.00	879.90	0.00
872.10	0.00	880.05	0.00
872.25	0.00	880.20	0.00
872.40	0.00	880.35	0.00
872.55	0.00	880.50	0.00
872.70	0.00	880.65	0.00
872.85	0.00	880.80	0.00
873.00	0.00	880.95	0.00
873.15	0.00	881.10	0.00
873.30	0.00	881.25	0.00
873.45	0.00	881.40	0.00
873.60	0.00	881.55	0.00
873.75	0.00	881.70	0.00
873.90	0.00	881.85	0.00
874.05	0.00	882.00	0.00
874.20	0.00	882.15	0.00
874.35	0.00	882.30	0.00
874.50	0.00	882.45	0.00
874.65	0.00	882.60	0.11
874.80	0.00	882.75	0.74
874.95	0.00	882.90	1.96
875.10	0.00	883.05	3.74
875.25	0.00	883.20	6.01
875.40	0.00	883.35	8.72
875.55	0.00	883.50	11.79
875.70	0.00	883.65	15.17
875.85	0.00	883.80	18.79
876.00	0.00	883.95	22.56
876.15	0.00	884.10	26.41
876.30	0.00	884.25	30.26
876.45	0.00	884.40	34.01
876.60	0.00	884.55	37.55
876.75	0.00	884.70	40.73
876.90	0.00	884.85	43.37
877.05	0.00	885.00	45.11
877.20	0.00	885.15	44.80
877.35	0.00	885.30	45.58
877.50	0.00	885.45	47.44
877.65	0.00	885.60	**49.23**
877.80	0.00	885.75	**50.04**
877.95	0.00	885.90	50.04
878.10	0.00	886.05	50.04
878.25	0.00	886.20	50.04
878.40	0.00	886.35	50.04
878.55	0.00	886.50	50.04
878.70	0.00		
878.85	0.00		
879.00	0.00		
879.15	0.00		
879.30	0.00		

Stage-Area-Storage for Pond 7P: Forebay

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
871.50	0.000	879.45	12.077
871.65	0.096	879.60	12.358
871.80	0.192	879.75	12.639
871.95	0.288	879.90	12.920
872.10	0.454	880.05	13.205
872.25	0.655	880.20	13.498
872.40	0.856	880.35	13.792
872.55	1.057	880.50	14.085
872.70	1.258	880.65	14.378
872.85	1.459	880.80	14.672
873.00	1.660	880.95	14.965
873.15	1.871	881.10	15.267
873.30	2.081	881.25	15.573
873.45	2.292	881.40	15.879
873.60	2.503	881.55	16.185
873.75	2.714	881.70	16.491
873.90	2.924	881.85	16.797
874.05	3.139	882.00	17.103
874.20	3.361	882.15	17.422
874.35	3.583	882.30	17.741
874.50	3.805	882.45	18.060
874.65	4.026	882.60	18.379
874.80	4.248	882.75	18.698
874.95	4.470	882.90	19.017
875.10	4.700	883.05	19.341
875.25	4.933	883.20	19.673
875.40	5.166	883.35	20.005
875.55	5.399	883.50	20.337
875.70	5.633	883.65	20.670
875.85	5.866	883.80	21.002
876.00	6.099	883.95	**21.334**
876.15	6.344	884.10	**21.445**
876.30	6.589	884.25	21.445
876.45	6.834	884.40	21.445
876.60	7.079	884.55	21.445
876.75	7.324	884.70	21.445
876.90	7.569	884.85	21.445
877.05	7.818	885.00	21.445
877.20	8.074	885.15	21.445
877.35	8.331	885.30	21.445
877.50	8.587	885.45	21.445
877.65	8.844	885.60	21.445
877.80	9.101	885.75	21.445
877.95	9.357	885.90	21.445
878.10	9.622	886.05	21.445
878.25	9.891	886.20	21.445
878.40	10.159	886.35	21.445
878.55	10.428	886.50	21.445
878.70	10.697		
878.85	10.965		
879.00	11.234		
879.15	11.515		
879.30	11.796		

Summary for Pond 8P: Retention Basin

Inflow Area = 60.090 ac, 56.73% Impervious, Inflow Depth > 50.97" for 25-yr event
Inflow = 23.41 cfs @ 11.85 hrs, Volume= 255.251 af
Outflow = 10.80 cfs @ 12.56 hrs, Volume= 254.624 af, Atten= 54%, Lag= 42.6 min
Primary = 10.80 cfs @ 12.56 hrs, Volume= 254.624 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs / 2
Starting Elev= 880.33' Surf.Area= 0.000 ac Storage= 16.121 af
Peak Elev= 880.77' @ 12.56 hrs Surf.Area= 0.000 ac Storage= 17.313 af (1.193 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 26.709 af (10.588 af above start)

Plug-Flow detention time= 1,970.8 min calculated for 238.503 af (93% of inflow)
Center-of-Mass det. time= 37.9 min (14,611.0 - 14,573.1)

Volume	Invert	Avail.Storage	Storage Description
#1	871.50'	26.709 af	**Custom Stage Data** Listed below

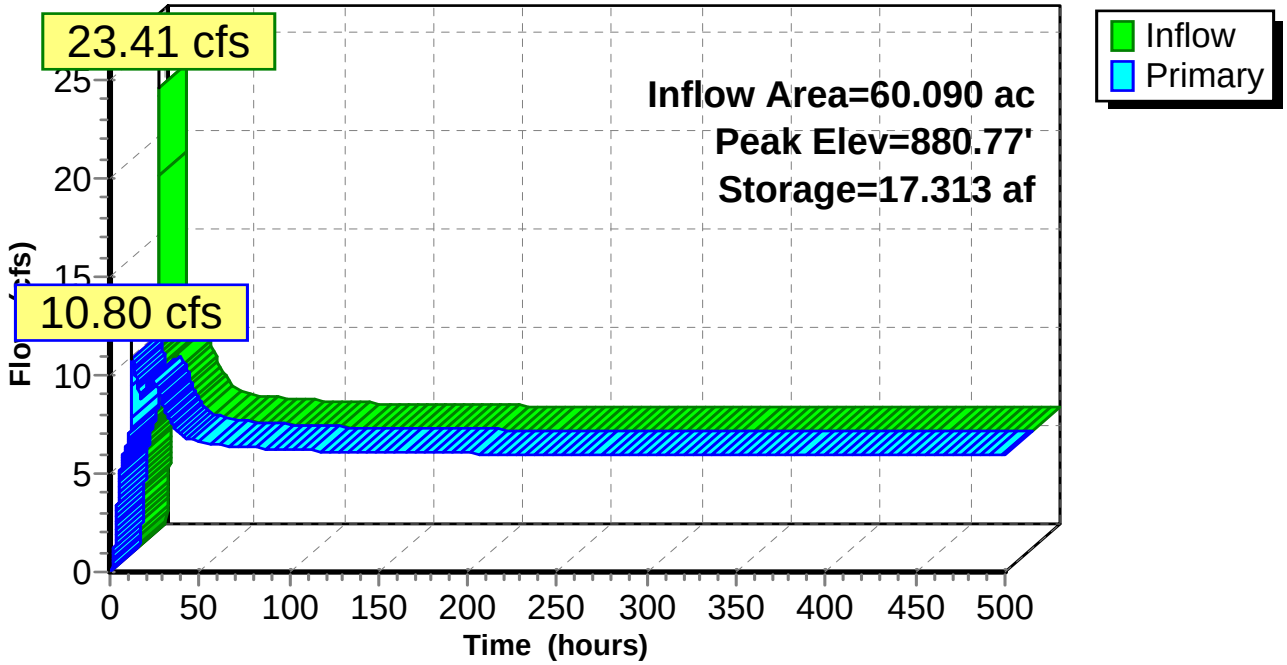
Elevation (feet)	Cum.Store (acre-feet)
871.50	0.000
872.00	0.463
873.00	1.970
874.00	3.561
875.00	5.235
876.00	6.996
877.00	8.445
878.00	10.783
879.00	12.736
880.00	15.226
881.00	17.938
882.00	20.756
883.00	23.679
884.00	26.709

Device	Routing	Invert	Outlet Devices
#1	Primary	874.00'	**Tube/Siphon/Float Valve** Discharges@874.00' 36.000" Diameter, C= 0.600 930.0' Long Tube, Hazen-Williams C= 130
#2	Device 1	880.33'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=11.18 cfs @ 12.56 hrs HW=880.77' TW=880.44' (TW follows 0.33' below HW)
↑—**1=Tube/Siphon/Float Valve** (Tube Controls 11.18 cfs @ 1.58 fps)
↑—**2=Orifice/Grate** (Passes 11.18 cfs of 14.22 cfs potential flow)

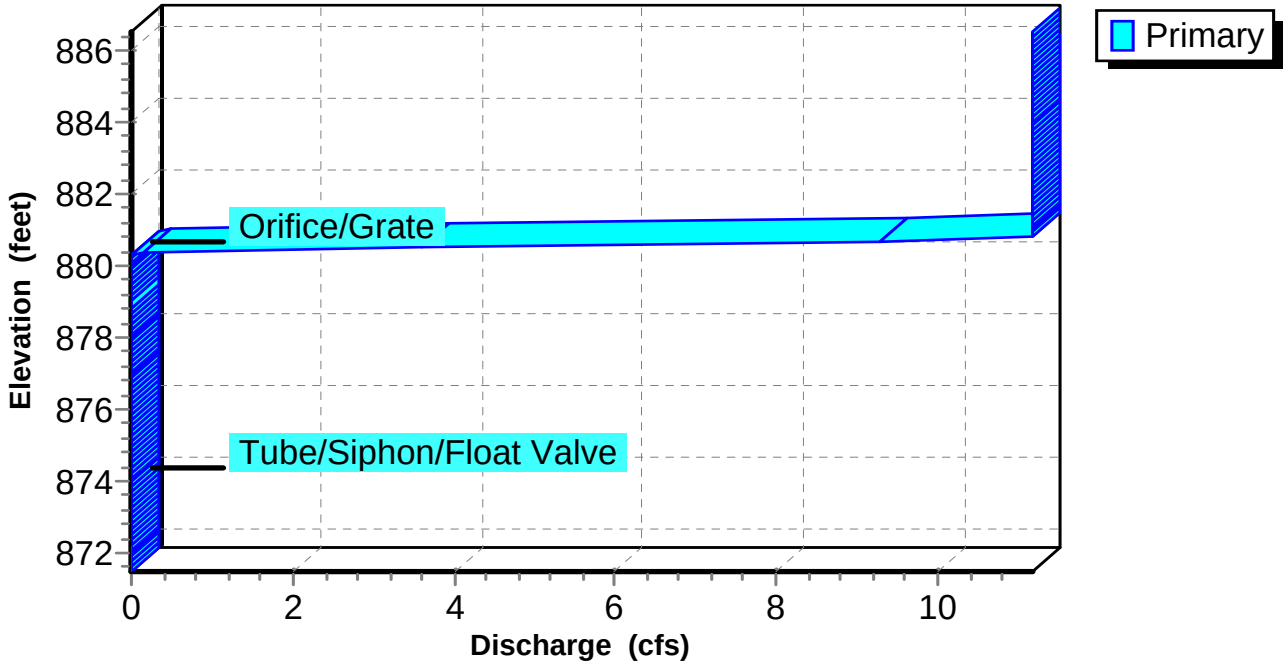
Pond 8P: Retention Basin

Hydrograph

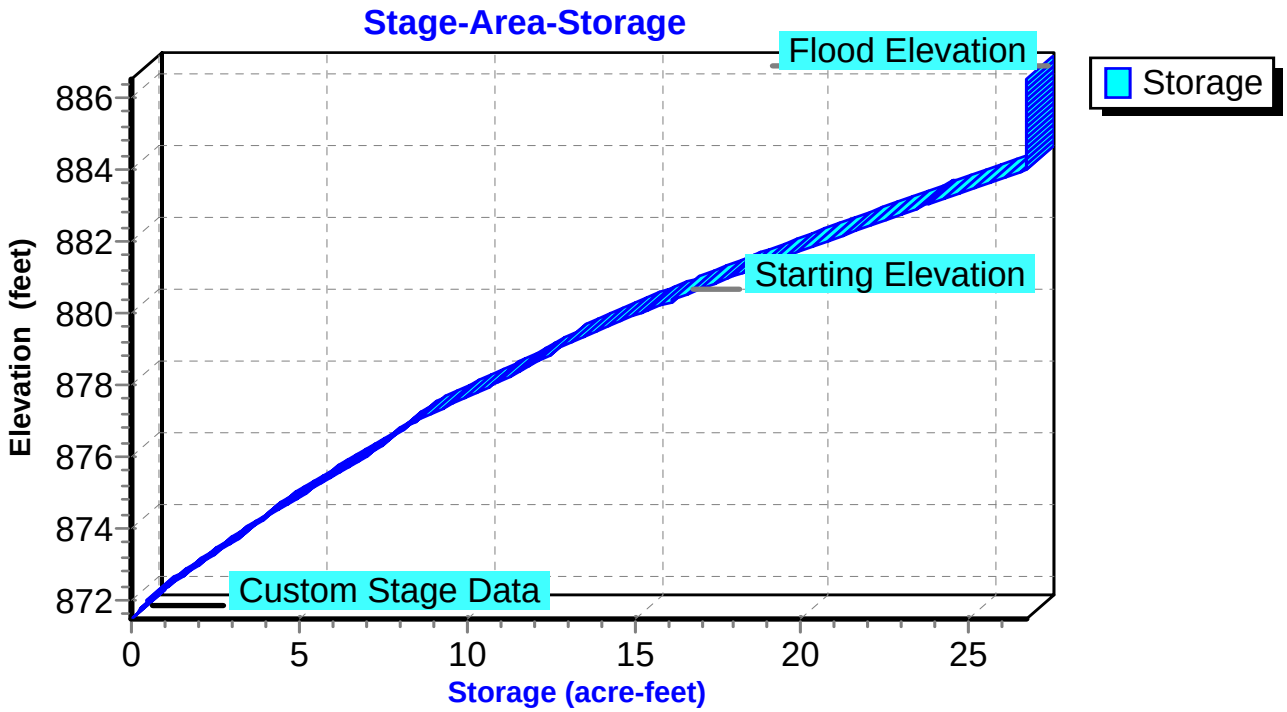


Pond 8P: Retention Basin

Stage-Discharge



Pond 8P: Retention Basin



Hydrograph for Pond 8P: Retention Basin

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.02	16.121	880.33	0.00
10.00	**6.81**	**16.794**	**880.58**	**6.56**
20.00	**9.67**	**16.998**	**880.65**	**9.34**
30.00	8.22	16.925	880.63	8.41
40.00	6.90	16.822	880.59	6.96
50.00	6.58	16.796	880.58	6.60
60.00	6.45	16.786	880.58	6.46
70.00	6.38	16.781	880.57	6.38
80.00	6.31	16.776	880.57	6.32
90.00	6.26	16.772	880.57	6.26
100.00	6.21	16.769	880.57	6.22
110.00	6.17	16.766	880.57	6.17
120.00	6.13	16.763	880.57	6.14
130.00	6.10	16.761	880.57	6.11
140.00	6.08	16.759	880.57	6.08
150.00	6.05	16.757	880.56	6.05
160.00	6.04	16.756	880.56	6.04
170.00	6.03	16.756	880.56	6.03
180.00	6.03	16.755	880.56	6.03
190.00	6.02	16.755	880.56	6.02
200.00	6.02	16.755	880.56	6.02
210.00	6.01	16.754	880.56	6.01
220.00	6.01	16.754	880.56	6.01
230.00	6.00	16.753	880.56	6.00
240.00	6.00	16.753	880.56	6.00
250.00	5.99	16.753	880.56	5.99
260.00	5.99	16.753	880.56	5.99
270.00	5.98	16.752	880.56	5.98
280.00	5.98	16.752	880.56	5.98
290.00	5.98	16.752	880.56	5.98
300.00	5.97	16.751	880.56	5.97
310.00	5.97	16.751	880.56	5.97
320.00	5.97	16.751	880.56	5.97
330.00	5.96	16.751	880.56	5.96
340.00	5.96	16.751	880.56	5.96
350.00	5.96	16.750	880.56	5.96
360.00	5.96	16.750	880.56	5.96
370.00	5.95	16.750	880.56	5.95
380.00	5.95	16.750	880.56	5.95
390.00	5.95	16.750	880.56	5.95
400.00	5.95	16.750	880.56	5.95
410.00	5.94	16.749	880.56	5.94
420.00	5.94	16.749	880.56	5.94
430.00	5.94	16.749	880.56	5.94
440.00	5.94	16.749	880.56	5.94
450.00	5.94	16.749	880.56	5.94
460.00	5.94	16.749	880.56	5.94
470.00	5.93	16.749	880.56	5.93
480.00	5.93	16.748	880.56	5.93
490.00	5.93	16.748	880.56	5.93
500.00	5.93	16.748	880.56	5.93

Stage-Discharge for Pond 8P: Retention Basin

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
871.50	0.00	879.45	0.00
871.65	0.00	879.60	0.00
871.80	0.00	879.75	0.00
871.95	0.00	879.90	0.00
872.10	0.00	880.05	0.00
872.25	0.00	880.20	0.00
872.40	0.00	880.35	0.15
872.55	0.00	880.50	3.60
872.70	0.00	880.65	**9.30**
872.85	0.00	880.80	**11.18**
873.00	0.00	880.95	11.18
873.15	0.00	881.10	11.18
873.30	0.00	881.25	11.18
873.45	0.00	881.40	11.18
873.60	0.00	881.55	11.18
873.75	0.00	881.70	11.18
873.90	0.00	881.85	11.18
874.05	0.00	882.00	11.18
874.20	0.00	882.15	11.18
874.35	0.00	882.30	11.18
874.50	0.00	882.45	11.18
874.65	0.00	882.60	11.18
874.80	0.00	882.75	11.18
874.95	0.00	882.90	11.18
875.10	0.00	883.05	11.18
875.25	0.00	883.20	11.18
875.40	0.00	883.35	11.18
875.55	0.00	883.50	11.18
875.70	0.00	883.65	11.18
875.85	0.00	883.80	11.18
876.00	0.00	883.95	11.18
876.15	0.00	884.10	11.18
876.30	0.00	884.25	11.18
876.45	0.00	884.40	11.18
876.60	0.00	884.55	11.18
876.75	0.00	884.70	11.18
876.90	0.00	884.85	11.18
877.05	0.00	885.00	11.18
877.20	0.00	885.15	11.18
877.35	0.00	885.30	11.18
877.50	0.00	885.45	11.18
877.65	0.00	885.60	11.18
877.80	0.00	885.75	11.18
877.95	0.00	885.90	11.18
878.10	0.00	886.05	11.18
878.25	0.00	886.20	11.18
878.40	0.00	886.35	11.18
878.55	0.00	886.50	11.18
878.70	0.00		
878.85	0.00		
879.00	0.00		
879.15	0.00		
879.30	0.00		

Stage-Area-Storage for Pond 8P: Retention Basin

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
871.50	0.000	879.45	13.857
871.65	0.139	879.60	14.230
871.80	0.278	879.75	14.604
871.95	0.417	879.90	14.977
872.10	0.614	880.05	15.362
872.25	0.840	880.20	15.768
872.40	1.066	880.35	16.175
872.55	1.292	880.50	16.582
872.70	1.518	880.65	16.989
872.85	1.744	880.80	17.396
873.00	1.970	880.95	17.802
873.15	2.209	881.10	18.220
873.30	2.447	881.25	18.643
873.45	2.686	881.40	19.065
873.60	2.925	881.55	19.488
873.75	3.163	881.70	19.911
873.90	3.402	881.85	20.333
874.05	3.645	882.00	20.756
874.20	3.896	882.15	21.194
874.35	4.147	882.30	21.633
874.50	4.398	882.45	22.071
874.65	4.649	882.60	22.510
874.80	4.900	882.75	22.948
874.95	5.151	882.90	23.387
875.10	5.411	883.05	23.830
875.25	5.675	883.20	24.285
875.40	5.939	883.35	24.740
875.55	6.204	883.50	25.194
875.70	6.468	883.65	25.648
875.85	6.732	883.80	26.103
876.00	6.996	883.95	**26.558**
876.15	7.213	884.10	**26.709**
876.30	7.431	884.25	26.709
876.45	7.648	884.40	26.709
876.60	7.865	884.55	26.709
876.75	8.083	884.70	26.709
876.90	8.300	884.85	26.709
877.05	8.562	885.00	26.709
877.20	8.913	885.15	26.709
877.35	9.263	885.30	26.709
877.50	9.614	885.45	26.709
877.65	9.965	885.60	26.709
877.80	10.315	885.75	26.709
877.95	10.666	885.90	26.709
878.10	10.978	886.05	26.709
878.25	11.271	886.20	26.709
878.40	11.564	886.35	26.709
878.55	11.857	886.50	26.709
878.70	12.150		
878.85	12.443		
879.00	12.736		
879.15	13.109		
879.30	13.483		

Summary for Pond 9P: Old Ash Pond

Inflow Area = 27.360 ac,100.00% Impervious, Inflow Depth = 3.77" for 25-yr event
Inflow = 109.37 cfs @ 11.84 hrs, Volume= 8.584 af
Outflow = 1.21 cfs @ 23.80 hrs, Volume= 7.986 af, Atten= 99%, Lag= 717.7 min
Primary = 1.21 cfs @ 23.80 hrs, Volume= 7.986 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Starting Elev= 881.50' Surf.Area= 0.000 ac Storage= 118.482 af
Peak Elev= 882.03' @ 23.80 hrs Surf.Area= 0.000 ac Storage= 125.927 af (7.445 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 153.954 af (35.472 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 6,223.3 min (6,966.6 - 743.4)

Volume	Invert	Avail.Storage	Storage Description
#1	868.00'	153.954 af	**Custom Stage Data** Listed below

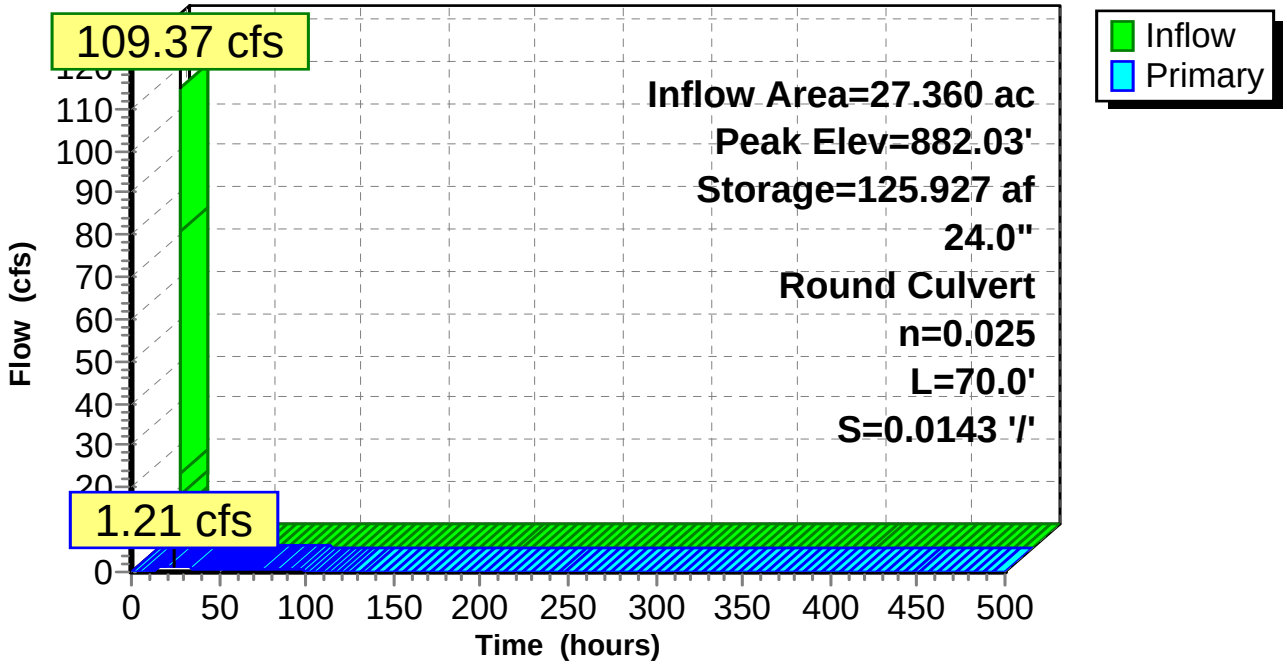
Elevation (feet)	Cum.Store (acre-feet)
868.00	0.000
869.00	0.912
870.00	1.089
871.00	5.537
872.00	13.143
873.00	22.784
874.00	34.019
875.00	46.023
876.00	58.522
877.00	71.294
878.00	84.273
879.00	96.397
880.00	97.727
881.00	111.501
882.00	125.463
883.00	139.613
884.00	153.954

Device	Routing	Invert	Outlet Devices
#1	Primary	881.50'	**24.0" Round Culvert** L= 70.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 881.50' / 880.50' S= 0.0143 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf

Primary OutFlow Max=1.20 cfs @ 23.80 hrs HW=882.03' TW=880.86' (TW follows 1.17' below HW)
↑—**1=Culvert** (Barrel Controls 1.20 cfs @ 2.70 fps)

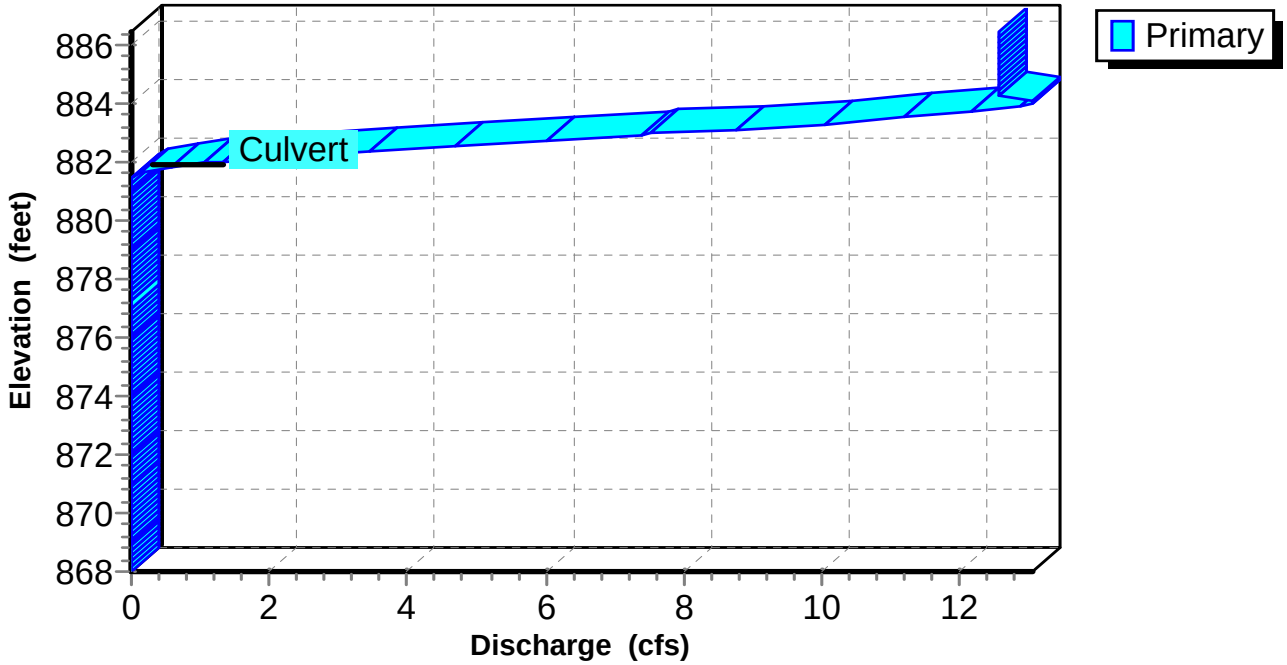
Pond 9P: Old Ash Pond

Hydrograph

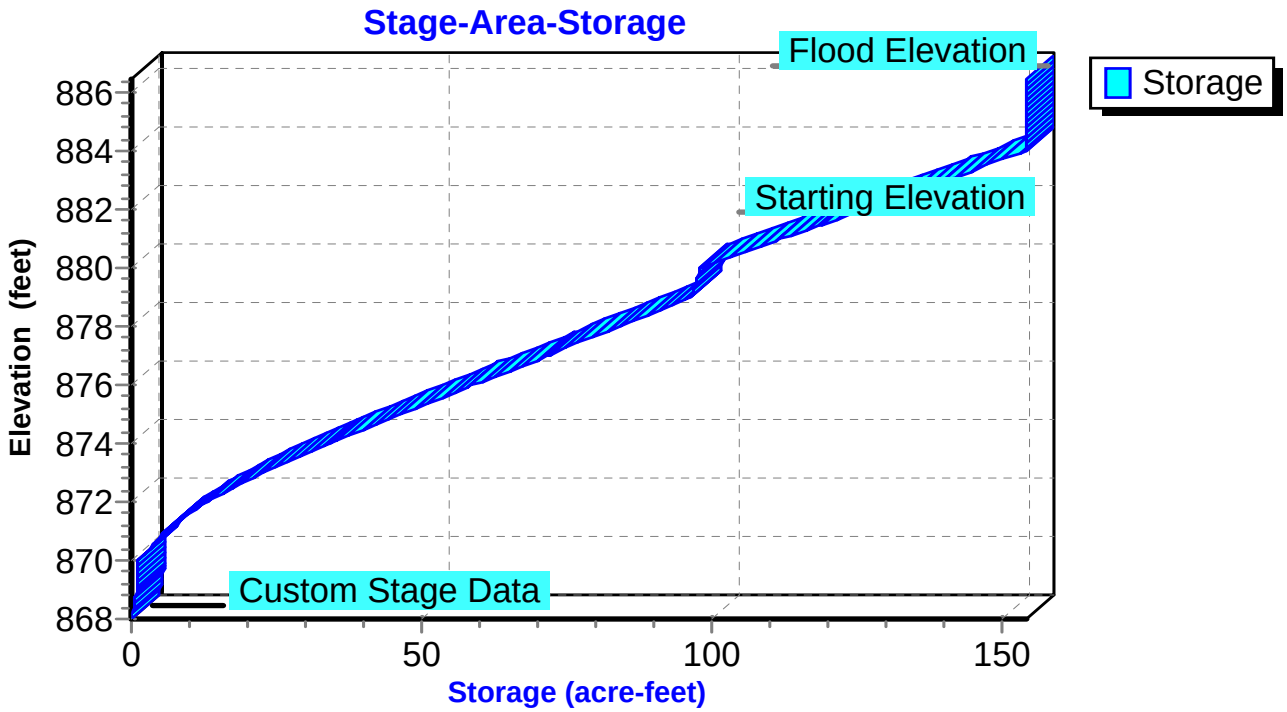


Pond 9P: Old Ash Pond

Stage-Discharge



Pond 9P: Old Ash Pond



Hydrograph for Pond 9P: Old Ash Pond

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	118.482	881.50	0.00
10.00	**4.17**	119.663	881.58	0.06
20.00	**1.44**	**125.888**	**882.03**	**1.20**
30.00	0.00	**125.374**	**881.99**	**1.04**
40.00	0.00	124.606	881.94	0.83
50.00	0.00	123.991	881.89	0.66
60.00	0.00	123.494	881.86	0.55
70.00	0.00	123.068	881.83	0.48
80.00	0.00	122.700	881.80	0.41
90.00	0.00	122.380	881.78	0.36
100.00	0.00	122.104	881.76	0.31
110.00	0.00	121.864	881.74	0.27
120.00	0.00	121.656	881.73	0.23
130.00	0.00	121.476	881.71	0.20
140.00	0.00	121.320	881.70	0.18
150.00	0.00	121.185	881.69	0.15
160.00	0.00	121.066	881.69	0.14
170.00	0.00	120.954	881.68	0.13
180.00	0.00	120.846	881.67	0.13
190.00	0.00	120.744	881.66	0.12
200.00	0.00	120.645	881.65	0.12
210.00	0.00	120.552	881.65	0.11
220.00	0.00	120.462	881.64	0.11
230.00	0.00	120.376	881.64	0.10
240.00	0.00	120.295	881.63	0.10
250.00	0.00	120.217	881.62	0.09
260.00	0.00	120.142	881.62	0.09
270.00	0.00	120.071	881.61	0.08
280.00	0.00	120.003	881.61	0.08
290.00	0.00	119.938	881.60	0.08
300.00	0.00	119.876	881.60	0.07
310.00	0.00	119.816	881.60	0.07
320.00	0.00	119.760	881.59	0.07
330.00	0.00	119.706	881.59	0.06
340.00	0.00	119.654	881.58	0.06
350.00	0.00	119.605	881.58	0.06
360.00	0.00	119.557	881.58	0.06
370.00	0.00	119.512	881.57	0.05
380.00	0.00	119.469	881.57	0.05
390.00	0.00	119.428	881.57	0.05
400.00	0.00	119.389	881.56	0.05
410.00	0.00	119.351	881.56	0.04
420.00	0.00	119.315	881.56	0.04
430.00	0.00	119.281	881.56	0.04
440.00	0.00	119.249	881.55	0.04
450.00	0.00	119.217	881.55	0.04
460.00	0.00	119.187	881.55	0.04
470.00	0.00	119.159	881.55	0.03
480.00	0.00	119.132	881.55	0.03
490.00	0.00	119.106	881.54	0.03
500.00	0.00	119.081	881.54	0.03

Stage-Discharge for Pond 9P: Old Ash Pond

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
868.00	0.00	878.60	0.00
868.20	0.00	878.80	0.00
868.40	0.00	879.00	0.00
868.60	0.00	879.20	0.00
868.80	0.00	879.40	0.00
869.00	0.00	879.60	0.00
869.20	0.00	879.80	0.00
869.40	0.00	880.00	0.00
869.60	0.00	880.20	0.00
869.80	0.00	880.40	0.00
870.00	0.00	880.60	0.00
870.20	0.00	880.80	0.00
870.40	0.00	881.00	0.00
870.60	0.00	881.20	0.00
870.80	0.00	881.40	0.00
871.00	0.00	881.60	0.04
871.20	0.00	881.80	0.37
871.40	0.00	882.00	1.06
871.60	0.00	882.20	2.06
871.80	0.00	882.40	3.25
872.00	0.00	882.60	4.59
872.20	0.00	882.80	6.03
872.40	0.00	883.00	7.50
872.60	0.00	883.20	8.95
872.80	0.00	883.40	10.32
873.00	0.00	883.60	11.54
873.20	0.00	883.80	12.50
873.40	0.00	884.00	**13.05**
873.60	0.00	884.20	**12.54**
873.80	0.00	884.40	12.54
874.00	0.00	884.60	12.54
874.20	0.00	884.80	12.54
874.40	0.00	885.00	12.54
874.60	0.00	885.20	12.54
874.80	0.00	885.40	12.54
875.00	0.00	885.60	12.54
875.20	0.00	885.80	12.54
875.40	0.00	886.00	12.54
875.60	0.00	886.20	12.54
875.80	0.00	886.40	12.54
876.00	0.00		
876.20	0.00		
876.40	0.00		
876.60	0.00		
876.80	0.00		
877.00	0.00		
877.20	0.00		
877.40	0.00		
877.60	0.00		
877.80	0.00		
878.00	0.00		
878.20	0.00		
878.40	0.00		

Stage-Area-Storage for Pond 9P: Old Ash Pond

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
868.00	0.000	878.60	91.547
868.20	0.182	878.80	93.972
868.40	0.365	879.00	96.397
868.60	0.547	879.20	96.663
868.80	0.730	879.40	96.929
869.00	0.912	879.60	97.195
869.20	0.947	879.80	97.461
869.40	0.983	880.00	97.727
869.60	1.018	880.20	100.482
869.80	1.054	880.40	103.237
870.00	1.089	880.60	105.991
870.20	1.979	880.80	108.746
870.40	2.868	881.00	111.501
870.60	3.758	881.20	114.293
870.80	4.647	881.40	117.086
871.00	5.537	881.60	119.878
871.20	7.058	881.80	122.671
871.40	8.579	882.00	125.463
871.60	10.101	882.20	128.293
871.80	11.622	882.40	131.123
872.00	13.143	882.60	133.953
872.20	15.071	882.80	136.783
872.40	16.999	883.00	139.613
872.60	18.928	883.20	142.481
872.80	20.856	883.40	145.349
873.00	22.784	883.60	148.218
873.20	25.031	883.80	151.086
873.40	27.278	884.00	**153.954**
873.60	29.525	884.20	153.954
873.80	31.772	884.40	153.954
874.00	34.019	884.60	153.954
874.20	36.420	884.80	153.954
874.40	38.821	885.00	153.954
874.60	41.221	885.20	153.954
874.80	43.622	885.40	153.954
875.00	46.023	885.60	153.954
875.20	48.523	885.80	153.954
875.40	51.023	886.00	153.954
875.60	53.522	886.20	153.954
875.80	56.022	886.40	153.954
876.00	58.522		
876.20	61.076		
876.40	63.631		
876.60	66.185		
876.80	68.740		
877.00	71.294		
877.20	73.890		
877.40	76.486		
877.60	79.081		
877.80	81.677		
878.00	84.273		
878.20	86.698		
878.40	89.123		

Time span=0.00-500.00 hrs, dt=0.20 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Coal Pile Runoff Area=26.000 ac 0.00% Impervious Runoff Depth=1.60"
Flow Length=1,780' Tc=629.8 min CN=69 Runoff=3.43 cfs 3.472 af

Subcatchment 2S: Roof Runoff Area=0.240 ac 100.00% Impervious Runoff Depth=4.26"
Flow Length=20' Slope=0.0010 '/' Tc=1.3 min CN=98 Runoff=1.06 cfs 0.085 af

Subcatchment 3S: Forebay Surface Runoff Area=2.760 ac 100.00% Impervious Runoff Depth=4.26"
Flow Length=350' Tc=0.4 min CN=98 Runoff=12.94 cfs 0.981 af

Subcatchment 9S: Ret Basin Surface Runoff Area=3.730 ac 100.00% Impervious Runoff Depth=4.26"
Flow Length=700' Tc=0.7 min CN=98 Runoff=17.14 cfs 1.325 af

Subcatchment 10S: Old Ash Pond Runoff Area=27.360 ac 100.00% Impervious Runoff Depth=4.26"
Flow Length=1,000' Tc=1.0 min CN=98 Runoff=123.30 cfs 9.722 af

Pond 7P: Forebay Peak Elev=883.38' Storage=20.080 af Inflow=19.90 cfs 248.437 af
24.0" Round Culvert x 3.00 n=0.025 L=75.0' S=0.0133 '/' Outflow=9.41 cfs 246.947 af

Pond 8P: Retention Basin Peak Elev=880.81' Storage=17.414 af Inflow=25.72 cfs 257.377 af
Outflow=11.18 cfs 256.748 af

Pond 9P: Old Ash Pond Peak Elev=882.09' Storage=126.783 af Inflow=123.30 cfs 9.722 af
24.0" Round Culvert n=0.025 L=70.0' S=0.0143 '/' Outflow=1.51 cfs 9.105 af

Total Runoff Area = 60.090 ac Runoff Volume = 15.585 af Average Runoff Depth = 3.11"
43.27% Pervious = 26.000 ac 56.73% Impervious = 34.090 ac

Summary for Subcatchment 1S: Coal Pile

Runoff = 3.43 cfs @ 20.47 hrs, Volume= 3.472 af, Depth= 1.60"

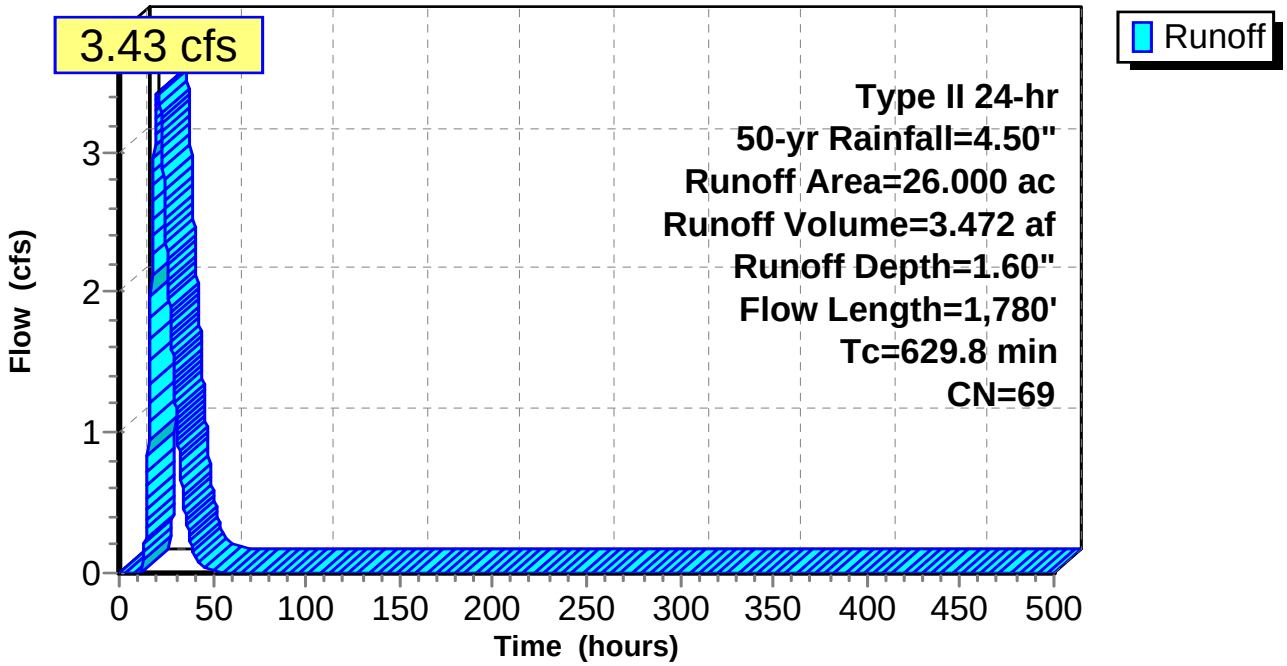
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 50-yr Rainfall=4.50"

	Area (ac)	CN	Description
*	15.000	56	Coal
*	11.000	86	Margins
	26.000	69	Weighted Average
	26.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	100	0.4000	4.03		**Sheet Flow, Coal** Smooth surfaces n= 0.011 P2= 2.50"
2.5	180	0.0300	1.21		**Shallow Concentrated Flow, Coal Margin** Short Grass Pasture Kv= 7.0 fps
626.9	1,500	0.0007	0.04	0.40	**Channel Flow, Drainage Ditch** Area= 10.0 sf Perim= 3,000.0' r= 0.00' n= 0.022 Earth, clean & straight
629.8	1,780	Total			

Subcatchment 1S: Coal Pile

Hydrograph



Hydrograph for Subcatchment 1S: Coal Pile

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.81	0.00	0.00
20.00	**4.28**	**1.45**	**3.38**
30.00	**4.50**	**1.60**	**1.26**
40.00	4.50	1.60	0.14
50.00	4.50	1.60	0.01
60.00	4.50	1.60	0.00
70.00	4.50	1.60	0.00
80.00	4.50	1.60	0.00
90.00	4.50	1.60	0.00
100.00	4.50	1.60	0.00
110.00	4.50	1.60	0.00
120.00	4.50	1.60	0.00
130.00	4.50	1.60	0.00
140.00	4.50	1.60	0.00
150.00	4.50	1.60	0.00
160.00	4.50	1.60	0.00
170.00	4.50	1.60	0.00
180.00	4.50	1.60	0.00
190.00	4.50	1.60	0.00
200.00	4.50	1.60	0.00
210.00	4.50	1.60	0.00
220.00	4.50	1.60	0.00
230.00	4.50	1.60	0.00
240.00	4.50	1.60	0.00
250.00	4.50	1.60	0.00
260.00	4.50	1.60	0.00
270.00	4.50	1.60	0.00
280.00	4.50	1.60	0.00
290.00	4.50	1.60	0.00
300.00	4.50	1.60	0.00
310.00	4.50	1.60	0.00
320.00	4.50	1.60	0.00
330.00	4.50	1.60	0.00
340.00	4.50	1.60	0.00
350.00	4.50	1.60	0.00
360.00	4.50	1.60	0.00
370.00	4.50	1.60	0.00
380.00	4.50	1.60	0.00
390.00	4.50	1.60	0.00
400.00	4.50	1.60	0.00
410.00	4.50	1.60	0.00
420.00	4.50	1.60	0.00
430.00	4.50	1.60	0.00
440.00	4.50	1.60	0.00
450.00	4.50	1.60	0.00
460.00	4.50	1.60	0.00
470.00	4.50	1.60	0.00
480.00	4.50	1.60	0.00
490.00	4.50	1.60	0.00
500.00	4.50	1.60	0.00

Summary for Subcatchment 2S: Roof

[49] Hint: Tc<2dt may require smaller dt

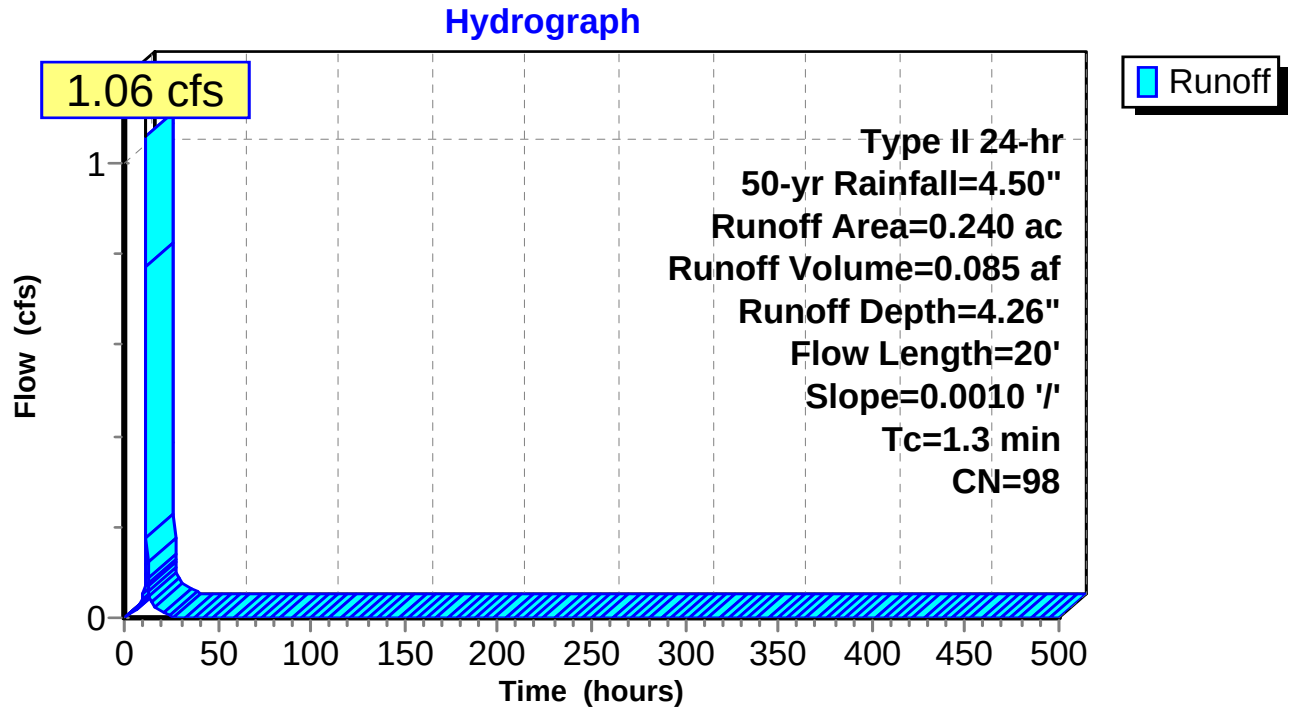
Runoff = 1.06 cfs @ 11.85 hrs, Volume= 0.085 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 50-yr Rainfall=4.50"

	Area (ac)	CN	Description
*	0.240	98	
	0.240		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	20	0.0010	0.27		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: Roof



Hydrograph for Subcatchment 2S: Roof

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.81	0.61	**0.04**
20.00	**4.28**	**4.05**	**0.01**
30.00	**4.50**	**4.26**	0.00
40.00	4.50	4.26	0.00
50.00	4.50	4.26	0.00
60.00	4.50	4.26	0.00
70.00	4.50	4.26	0.00
80.00	4.50	4.26	0.00
90.00	4.50	4.26	0.00
100.00	4.50	4.26	0.00
110.00	4.50	4.26	0.00
120.00	4.50	4.26	0.00
130.00	4.50	4.26	0.00
140.00	4.50	4.26	0.00
150.00	4.50	4.26	0.00
160.00	4.50	4.26	0.00
170.00	4.50	4.26	0.00
180.00	4.50	4.26	0.00
190.00	4.50	4.26	0.00
200.00	4.50	4.26	0.00
210.00	4.50	4.26	0.00
220.00	4.50	4.26	0.00
230.00	4.50	4.26	0.00
240.00	4.50	4.26	0.00
250.00	4.50	4.26	0.00
260.00	4.50	4.26	0.00
270.00	4.50	4.26	0.00
280.00	4.50	4.26	0.00
290.00	4.50	4.26	0.00
300.00	4.50	4.26	0.00
310.00	4.50	4.26	0.00
320.00	4.50	4.26	0.00
330.00	4.50	4.26	0.00
340.00	4.50	4.26	0.00
350.00	4.50	4.26	0.00
360.00	4.50	4.26	0.00
370.00	4.50	4.26	0.00
380.00	4.50	4.26	0.00
390.00	4.50	4.26	0.00
400.00	4.50	4.26	0.00
410.00	4.50	4.26	0.00
420.00	4.50	4.26	0.00
430.00	4.50	4.26	0.00
440.00	4.50	4.26	0.00
450.00	4.50	4.26	0.00
460.00	4.50	4.26	0.00
470.00	4.50	4.26	0.00
480.00	4.50	4.26	0.00
490.00	4.50	4.26	0.00
500.00	4.50	4.26	0.00

Summary for Subcatchment 3S: Forebay Surface

[49] Hint: Tc<2dt may require smaller dt

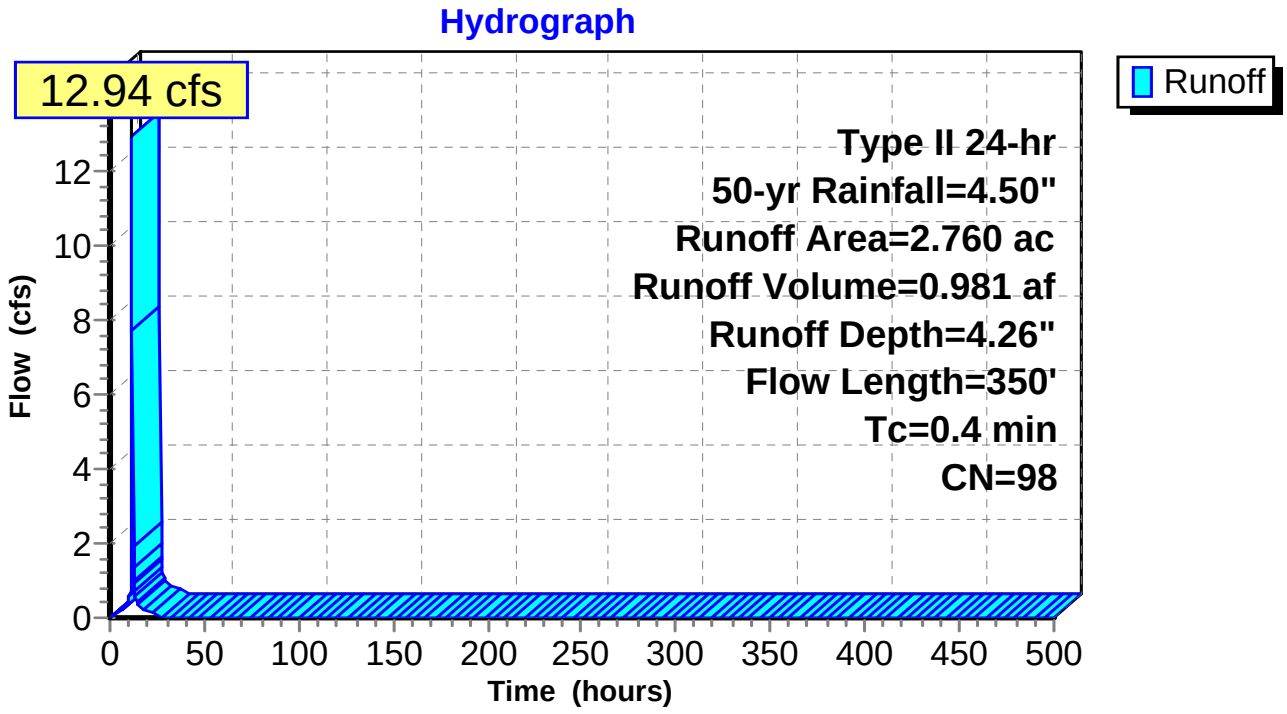
Runoff = 12.94 cfs @ 11.83 hrs, Volume= 0.981 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 50-yr Rainfall=4.50"

	Area (ac)	CN	Description
*	2.760	98	
	2.760		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	350		16.05		**Lake or Reservoir,** Mean Depth= 8.00'

Subcatchment 3S: Forebay Surface



Hydrograph for Subcatchment 3S: Forebay Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.81	0.61	**0.48**
20.00	**4.28**	**4.05**	**0.16**
30.00	**4.50**	**4.26**	0.00
40.00	4.50	4.26	0.00
50.00	4.50	4.26	0.00
60.00	4.50	4.26	0.00
70.00	4.50	4.26	0.00
80.00	4.50	4.26	0.00
90.00	4.50	4.26	0.00
100.00	4.50	4.26	0.00
110.00	4.50	4.26	0.00
120.00	4.50	4.26	0.00
130.00	4.50	4.26	0.00
140.00	4.50	4.26	0.00
150.00	4.50	4.26	0.00
160.00	4.50	4.26	0.00
170.00	4.50	4.26	0.00
180.00	4.50	4.26	0.00
190.00	4.50	4.26	0.00
200.00	4.50	4.26	0.00
210.00	4.50	4.26	0.00
220.00	4.50	4.26	0.00
230.00	4.50	4.26	0.00
240.00	4.50	4.26	0.00
250.00	4.50	4.26	0.00
260.00	4.50	4.26	0.00
270.00	4.50	4.26	0.00
280.00	4.50	4.26	0.00
290.00	4.50	4.26	0.00
300.00	4.50	4.26	0.00
310.00	4.50	4.26	0.00
320.00	4.50	4.26	0.00
330.00	4.50	4.26	0.00
340.00	4.50	4.26	0.00
350.00	4.50	4.26	0.00
360.00	4.50	4.26	0.00
370.00	4.50	4.26	0.00
380.00	4.50	4.26	0.00
390.00	4.50	4.26	0.00
400.00	4.50	4.26	0.00
410.00	4.50	4.26	0.00
420.00	4.50	4.26	0.00
430.00	4.50	4.26	0.00
440.00	4.50	4.26	0.00
450.00	4.50	4.26	0.00
460.00	4.50	4.26	0.00
470.00	4.50	4.26	0.00
480.00	4.50	4.26	0.00
490.00	4.50	4.26	0.00
500.00	4.50	4.26	0.00

Summary for Subcatchment 9S: Ret Basin Surface

[49] Hint: Tc<2dt may require smaller dt

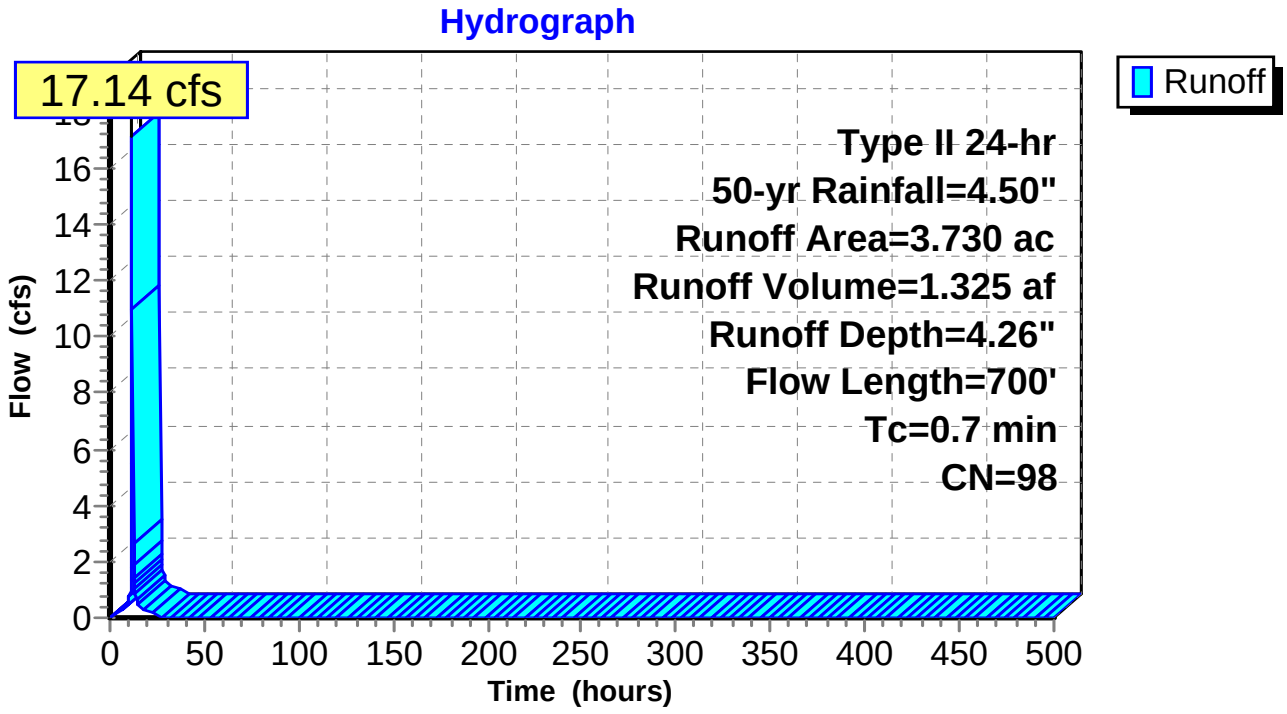
Runoff = 17.14 cfs @ 11.83 hrs, Volume= 1.325 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 50-yr Rainfall=4.50"

	Area (ac)	CN	Description
*	3.730	98	
	3.730		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	700		16.05		**Lake or Reservoir,** Mean Depth= 8.00'

Subcatchment 9S: Ret Basin Surface



Hydrograph for Subcatchment 9S: Ret Basin Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.81	0.61	**0.65**
20.00	**4.28**	**4.05**	**0.22**
30.00	**4.50**	**4.26**	0.00
40.00	4.50	4.26	0.00
50.00	4.50	4.26	0.00
60.00	4.50	4.26	0.00
70.00	4.50	4.26	0.00
80.00	4.50	4.26	0.00
90.00	4.50	4.26	0.00
100.00	4.50	4.26	0.00
110.00	4.50	4.26	0.00
120.00	4.50	4.26	0.00
130.00	4.50	4.26	0.00
140.00	4.50	4.26	0.00
150.00	4.50	4.26	0.00
160.00	4.50	4.26	0.00
170.00	4.50	4.26	0.00
180.00	4.50	4.26	0.00
190.00	4.50	4.26	0.00
200.00	4.50	4.26	0.00
210.00	4.50	4.26	0.00
220.00	4.50	4.26	0.00
230.00	4.50	4.26	0.00
240.00	4.50	4.26	0.00
250.00	4.50	4.26	0.00
260.00	4.50	4.26	0.00
270.00	4.50	4.26	0.00
280.00	4.50	4.26	0.00
290.00	4.50	4.26	0.00
300.00	4.50	4.26	0.00
310.00	4.50	4.26	0.00
320.00	4.50	4.26	0.00
330.00	4.50	4.26	0.00
340.00	4.50	4.26	0.00
350.00	4.50	4.26	0.00
360.00	4.50	4.26	0.00
370.00	4.50	4.26	0.00
380.00	4.50	4.26	0.00
390.00	4.50	4.26	0.00
400.00	4.50	4.26	0.00
410.00	4.50	4.26	0.00
420.00	4.50	4.26	0.00
430.00	4.50	4.26	0.00
440.00	4.50	4.26	0.00
450.00	4.50	4.26	0.00
460.00	4.50	4.26	0.00
470.00	4.50	4.26	0.00
480.00	4.50	4.26	0.00
490.00	4.50	4.26	0.00
500.00	4.50	4.26	0.00

Summary for Subcatchment 10S: Old Ash Pond Surface

[49] Hint: Tc<2dt may require smaller dt

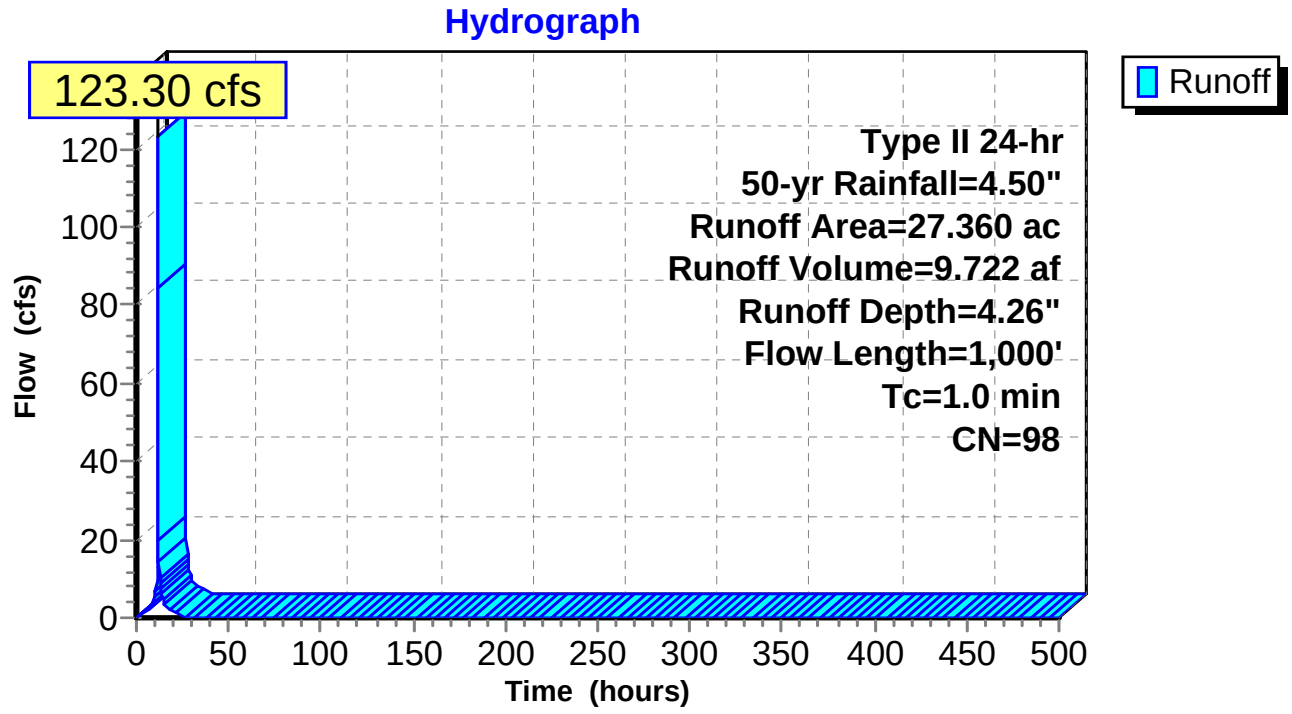
Runoff = 123.30 cfs @ 11.84 hrs, Volume= 9.722 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 50-yr Rainfall=4.50"

	Area (ac)	CN	Description
*	27.360	98	
	27.360		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1,000		16.05		**Lake or Reservoir, Lake** Mean Depth= 8.00'

Subcatchment 10S: Old Ash Pond Surface



Hydrograph for Subcatchment 10S: Old Ash Pond Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.81	0.61	**4.74**
20.00	**4.28**	**4.05**	**1.62**
30.00	**4.50**	**4.26**	0.00
40.00	4.50	4.26	0.00
50.00	4.50	4.26	0.00
60.00	4.50	4.26	0.00
70.00	4.50	4.26	0.00
80.00	4.50	4.26	0.00
90.00	4.50	4.26	0.00
100.00	4.50	4.26	0.00
110.00	4.50	4.26	0.00
120.00	4.50	4.26	0.00
130.00	4.50	4.26	0.00
140.00	4.50	4.26	0.00
150.00	4.50	4.26	0.00
160.00	4.50	4.26	0.00
170.00	4.50	4.26	0.00
180.00	4.50	4.26	0.00
190.00	4.50	4.26	0.00
200.00	4.50	4.26	0.00
210.00	4.50	4.26	0.00
220.00	4.50	4.26	0.00
230.00	4.50	4.26	0.00
240.00	4.50	4.26	0.00
250.00	4.50	4.26	0.00
260.00	4.50	4.26	0.00
270.00	4.50	4.26	0.00
280.00	4.50	4.26	0.00
290.00	4.50	4.26	0.00
300.00	4.50	4.26	0.00
310.00	4.50	4.26	0.00
320.00	4.50	4.26	0.00
330.00	4.50	4.26	0.00
340.00	4.50	4.26	0.00
350.00	4.50	4.26	0.00
360.00	4.50	4.26	0.00
370.00	4.50	4.26	0.00
380.00	4.50	4.26	0.00
390.00	4.50	4.26	0.00
400.00	4.50	4.26	0.00
410.00	4.50	4.26	0.00
420.00	4.50	4.26	0.00
430.00	4.50	4.26	0.00
440.00	4.50	4.26	0.00
450.00	4.50	4.26	0.00
460.00	4.50	4.26	0.00
470.00	4.50	4.26	0.00
480.00	4.50	4.26	0.00
490.00	4.50	4.26	0.00
500.00	4.50	4.26	0.00

Summary for Pond 7P: Forebay

Inflow Area = 29.000 ac, 10.34% Impervious, Inflow Depth > 102.80" for 50-yr event
Inflow = 19.90 cfs @ 11.83 hrs, Volume= 248.437 af, Incl. 5.90 cfs Base Flow
Outflow = 9.41 cfs @ 12.21 hrs, Volume= 246.947 af, Atten= 53%, Lag= 23.0 min
Primary = 9.41 cfs @ 12.21 hrs, Volume= 246.947 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Starting Elev= 882.50' Surf.Area= 0.000 ac Storage= 18.166 af
Peak Elev= 883.38' @ 12.21 hrs Surf.Area= 0.000 ac Storage= 20.080 af (1.914 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 21.445 af (3.278 af above start)

Plug-Flow detention time= 2,394.5 min calculated for 228.640 af (92% of inflow)
Center-of-Mass det. time= 89.9 min (14,839.1 - 14,749.2)

Volume	Invert	Avail.Storage	Storage Description
#1	871.50'	21.445 af	**Custom Stage Data** Listed below

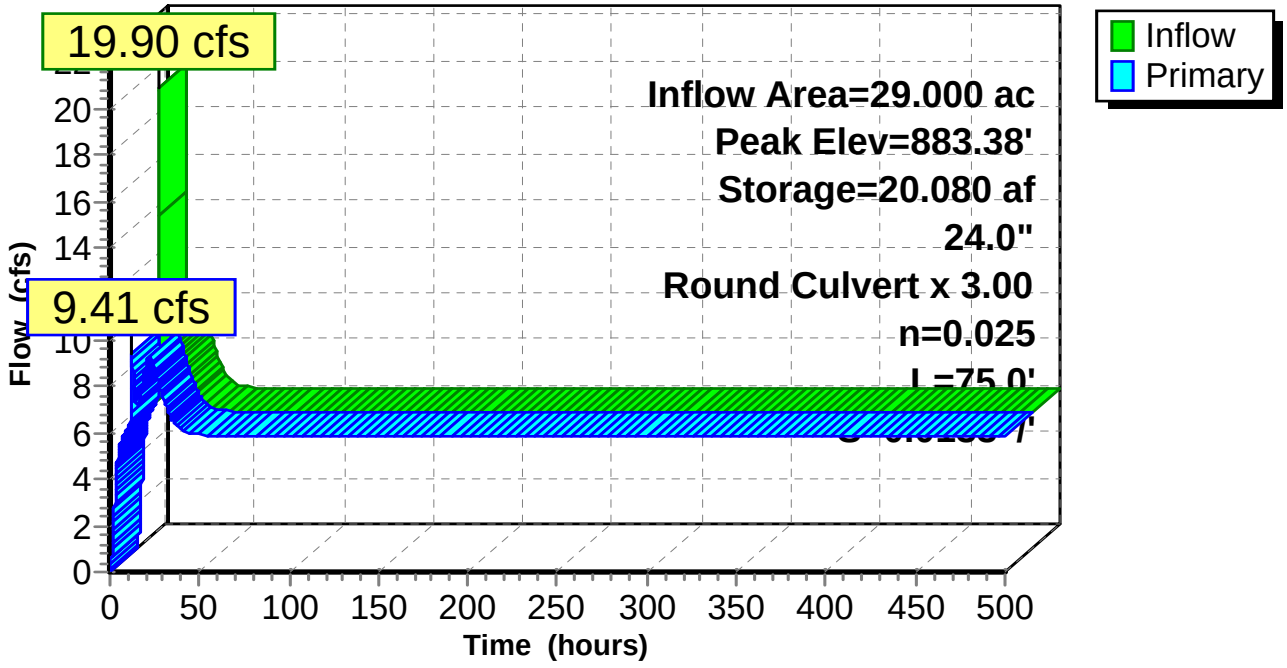
Elevation (feet)	Cum.Store (acre-feet)
871.50	0.000
872.00	0.320
873.00	1.660
874.00	3.065
875.00	4.544
876.00	6.099
877.00	7.732
878.00	9.443
879.00	11.234
880.00	13.107
881.00	15.063
882.00	17.103
883.00	19.230
884.00	21.445

Device	Routing	Invert	Outlet Devices
#1	Primary	882.50'	**24.0" Round Culvert X 3.00** L= 75.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 882.50' / 881.50' S= 0.0133 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf

Primary OutFlow Max=9.37 cfs @ 12.21 hrs HW=883.38' TW=881.21' (TW follows 2.17' below HW)
↑—**1=Culvert** (Barrel Controls 9.37 cfs @ 3.44 fps)

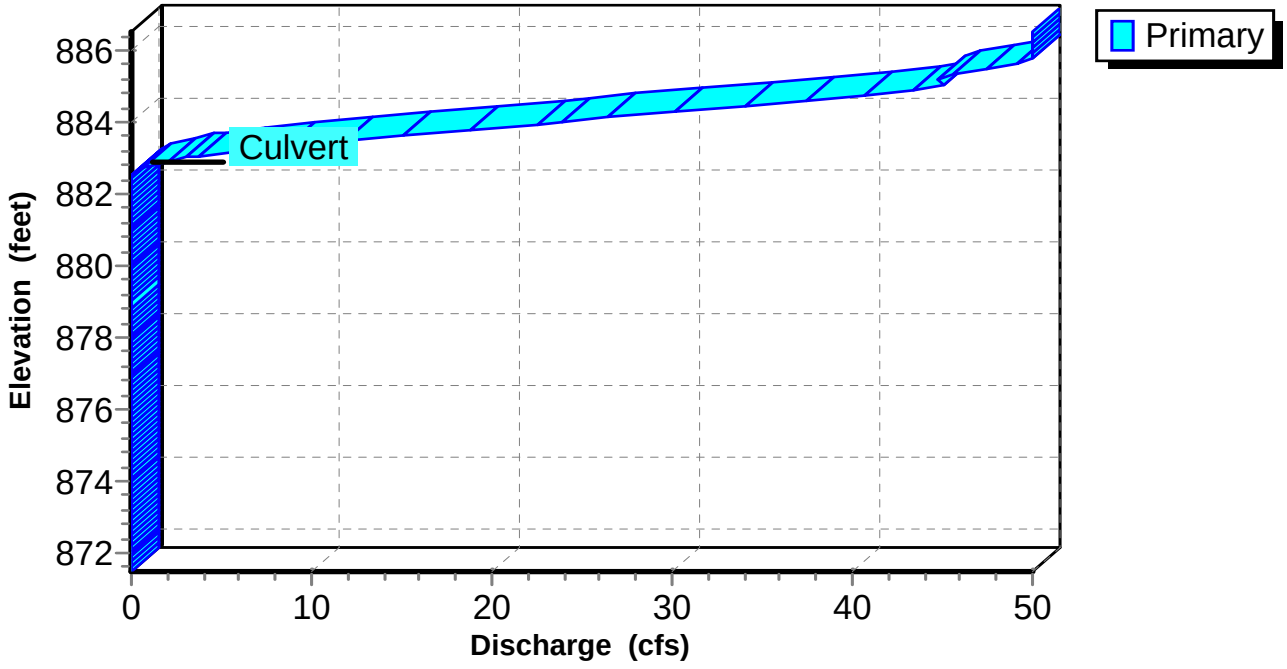
Pond 7P: Forebay

Hydrograph

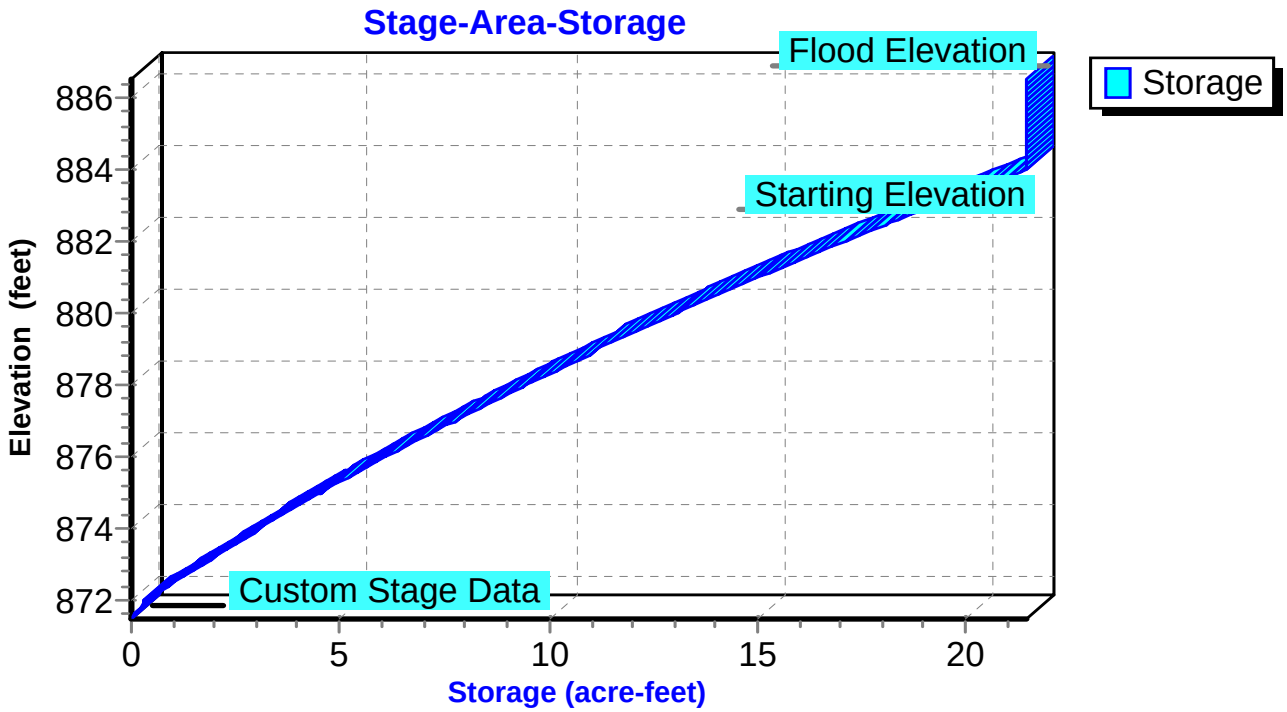


Pond 7P: Forebay

Stage-Discharge



Pond 7P: Forebay



Hydrograph for Pond 7P: Forebay

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	5.90	18.215	882.52	0.02
10.00	**6.42**	**19.699**	**883.21**	**6.22**
20.00	**9.45**	**20.032**	**883.36**	**8.96**
30.00	7.16	19.854	883.28	7.48
40.00	6.04	19.686	883.21	6.11
50.00	5.91	19.660	883.19	5.92
60.00	5.90	19.657	883.19	5.90
70.00	5.90	19.657	883.19	5.90
80.00	5.90	19.657	883.19	5.90
90.00	5.90	19.657	883.19	5.90
100.00	5.90	19.657	883.19	5.90
110.00	5.90	19.657	883.19	5.90
120.00	5.90	19.657	883.19	5.90
130.00	5.90	19.657	883.19	5.90
140.00	5.90	19.657	883.19	5.90
150.00	5.90	19.657	883.19	5.90
160.00	5.90	19.657	883.19	5.90
170.00	5.90	19.657	883.19	5.90
180.00	5.90	19.657	883.19	5.90
190.00	5.90	19.657	883.19	5.90
200.00	5.90	19.657	883.19	5.90
210.00	5.90	19.657	883.19	5.90
220.00	5.90	19.657	883.19	5.90
230.00	5.90	19.657	883.19	5.90
240.00	5.90	19.657	883.19	5.90
250.00	5.90	19.657	883.19	5.90
260.00	5.90	19.657	883.19	5.90
270.00	5.90	19.657	883.19	5.90
280.00	5.90	19.657	883.19	5.90
290.00	5.90	19.657	883.19	5.90
300.00	5.90	19.657	883.19	5.90
310.00	5.90	19.657	883.19	5.90
320.00	5.90	19.657	883.19	5.90
330.00	5.90	19.657	883.19	5.90
340.00	5.90	19.657	883.19	5.90
350.00	5.90	19.657	883.19	5.90
360.00	5.90	19.657	883.19	5.90
370.00	5.90	19.657	883.19	5.90
380.00	5.90	19.657	883.19	5.90
390.00	5.90	19.657	883.19	5.90
400.00	5.90	19.657	883.19	5.90
410.00	5.90	19.657	883.19	5.90
420.00	5.90	19.657	883.19	5.90
430.00	5.90	19.657	883.19	5.90
440.00	5.90	19.657	883.19	5.90
450.00	5.90	19.657	883.19	5.90
460.00	5.90	19.657	883.19	5.90
470.00	5.90	19.657	883.19	5.90
480.00	5.90	19.657	883.19	5.90
490.00	5.90	19.657	883.19	5.90
500.00	5.90	19.657	883.19	5.90

Stage-Discharge for Pond 7P: Forebay

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
871.50	0.00	879.45	0.00
871.65	0.00	879.60	0.00
871.80	0.00	879.75	0.00
871.95	0.00	879.90	0.00
872.10	0.00	880.05	0.00
872.25	0.00	880.20	0.00
872.40	0.00	880.35	0.00
872.55	0.00	880.50	0.00
872.70	0.00	880.65	0.00
872.85	0.00	880.80	0.00
873.00	0.00	880.95	0.00
873.15	0.00	881.10	0.00
873.30	0.00	881.25	0.00
873.45	0.00	881.40	0.00
873.60	0.00	881.55	0.00
873.75	0.00	881.70	0.00
873.90	0.00	881.85	0.00
874.05	0.00	882.00	0.00
874.20	0.00	882.15	0.00
874.35	0.00	882.30	0.00
874.50	0.00	882.45	0.00
874.65	0.00	882.60	0.11
874.80	0.00	882.75	0.74
874.95	0.00	882.90	1.96
875.10	0.00	883.05	3.74
875.25	0.00	883.20	6.01
875.40	0.00	883.35	8.72
875.55	0.00	883.50	11.79
875.70	0.00	883.65	15.17
875.85	0.00	883.80	18.79
876.00	0.00	883.95	22.56
876.15	0.00	884.10	26.41
876.30	0.00	884.25	30.26
876.45	0.00	884.40	34.01
876.60	0.00	884.55	37.55
876.75	0.00	884.70	40.73
876.90	0.00	884.85	43.37
877.05	0.00	885.00	45.11
877.20	0.00	885.15	44.80
877.35	0.00	885.30	45.58
877.50	0.00	885.45	47.44
877.65	0.00	885.60	**49.23**
877.80	0.00	885.75	**50.04**
877.95	0.00	885.90	50.04
878.10	0.00	886.05	50.04
878.25	0.00	886.20	50.04
878.40	0.00	886.35	50.04
878.55	0.00	886.50	50.04
878.70	0.00		
878.85	0.00		
879.00	0.00		
879.15	0.00		
879.30	0.00		

Stage-Area-Storage for Pond 7P: Forebay

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
871.50	0.000	879.45	12.077
871.65	0.096	879.60	12.358
871.80	0.192	879.75	12.639
871.95	0.288	879.90	12.920
872.10	0.454	880.05	13.205
872.25	0.655	880.20	13.498
872.40	0.856	880.35	13.792
872.55	1.057	880.50	14.085
872.70	1.258	880.65	14.378
872.85	1.459	880.80	14.672
873.00	1.660	880.95	14.965
873.15	1.871	881.10	15.267
873.30	2.081	881.25	15.573
873.45	2.292	881.40	15.879
873.60	2.503	881.55	16.185
873.75	2.714	881.70	16.491
873.90	2.924	881.85	16.797
874.05	3.139	882.00	17.103
874.20	3.361	882.15	17.422
874.35	3.583	882.30	17.741
874.50	3.805	882.45	18.060
874.65	4.026	882.60	18.379
874.80	4.248	882.75	18.698
874.95	4.470	882.90	19.017
875.10	4.700	883.05	19.341
875.25	4.933	883.20	19.673
875.40	5.166	883.35	20.005
875.55	5.399	883.50	20.337
875.70	5.633	883.65	20.670
875.85	5.866	883.80	21.002
876.00	6.099	883.95	**21.334**
876.15	6.344	884.10	**21.445**
876.30	6.589	884.25	21.445
876.45	6.834	884.40	21.445
876.60	7.079	884.55	21.445
876.75	7.324	884.70	21.445
876.90	7.569	884.85	21.445
877.05	7.818	885.00	21.445
877.20	8.074	885.15	21.445
877.35	8.331	885.30	21.445
877.50	8.587	885.45	21.445
877.65	8.844	885.60	21.445
877.80	9.101	885.75	21.445
877.95	9.357	885.90	21.445
878.10	9.622	886.05	21.445
878.25	9.891	886.20	21.445
878.40	10.159	886.35	21.445
878.55	10.428	886.50	21.445
878.70	10.697		
878.85	10.965		
879.00	11.234		
879.15	11.515		
879.30	11.796		

Summary for Pond 8P: Retention Basin

Inflow Area = 60.090 ac, 56.73% Impervious, Inflow Depth > 51.40" for 50-yr event
Inflow = 25.72 cfs @ 11.85 hrs, Volume= 257.377 af
Outflow = 11.18 cfs @ 12.40 hrs, Volume= 256.748 af, Atten= 57%, Lag= 33.1 min
Primary = 11.18 cfs @ 12.40 hrs, Volume= 256.748 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs / 2
Starting Elev= 880.33' Surf.Area= 0.000 ac Storage= 16.121 af
Peak Elev= 880.81' @ 12.69 hrs Surf.Area= 0.000 ac Storage= 17.414 af (1.293 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 26.709 af (10.588 af above start)

Plug-Flow detention time= 1,956.1 min calculated for 240.627 af (93% of inflow)
Center-of-Mass det. time= 38.2 min (14,512.6 - 14,474.3)

Volume	Invert	Avail.Storage	Storage Description
#1	871.50'	26.709 af	**Custom Stage Data** Listed below

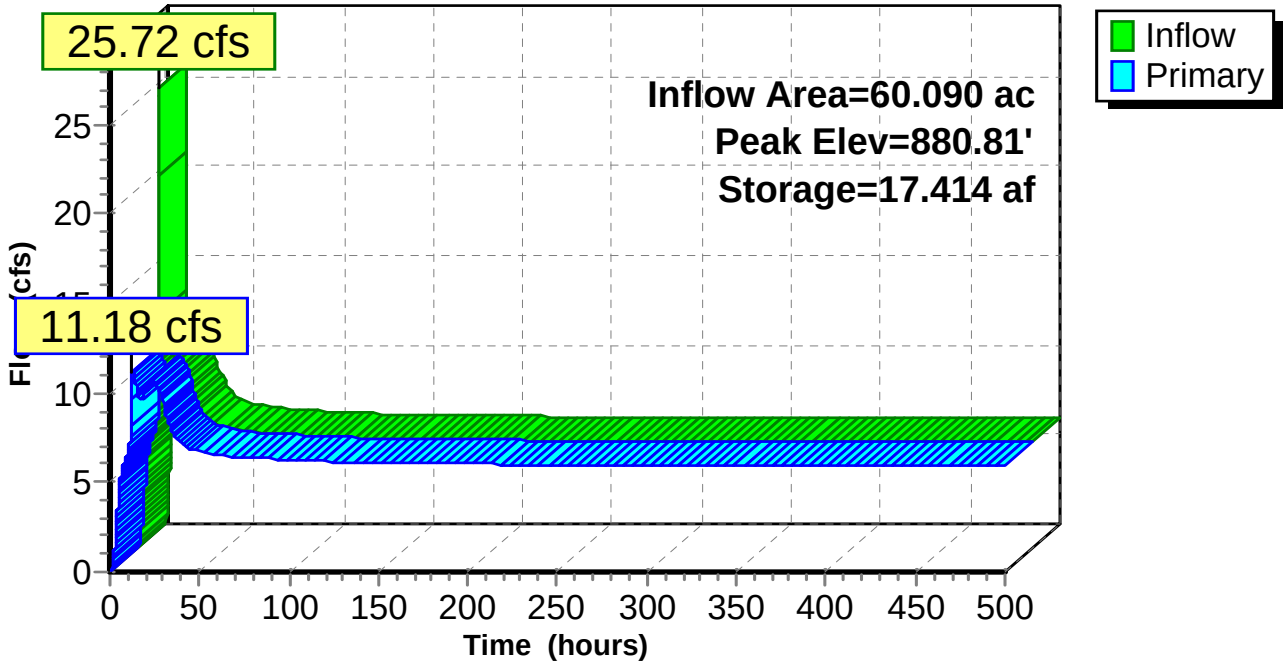
Elevation (feet)	Cum.Store (acre-feet)
871.50	0.000
872.00	0.463
873.00	1.970
874.00	3.561
875.00	5.235
876.00	6.996
877.00	8.445
878.00	10.783
879.00	12.736
880.00	15.226
881.00	17.938
882.00	20.756
883.00	23.679
884.00	26.709

Device	Routing	Invert	Outlet Devices
#1	Primary	874.00'	**Tube/Siphon/Float Valve** Discharges@874.00' 36.000" Diameter, C= 0.600 930.0' Long Tube, Hazen-Williams C= 130
#2	Device 1	880.33'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=11.18 cfs @ 12.40 hrs HW=880.80' TW=880.47' (TW follows 0.33' below HW)
↑—**1=Tube/Siphon/Float Valve** (Tube Controls 11.18 cfs @ 1.58 fps)
↑—**2=Orifice/Grate** (Passes 11.18 cfs of 15.59 cfs potential flow)

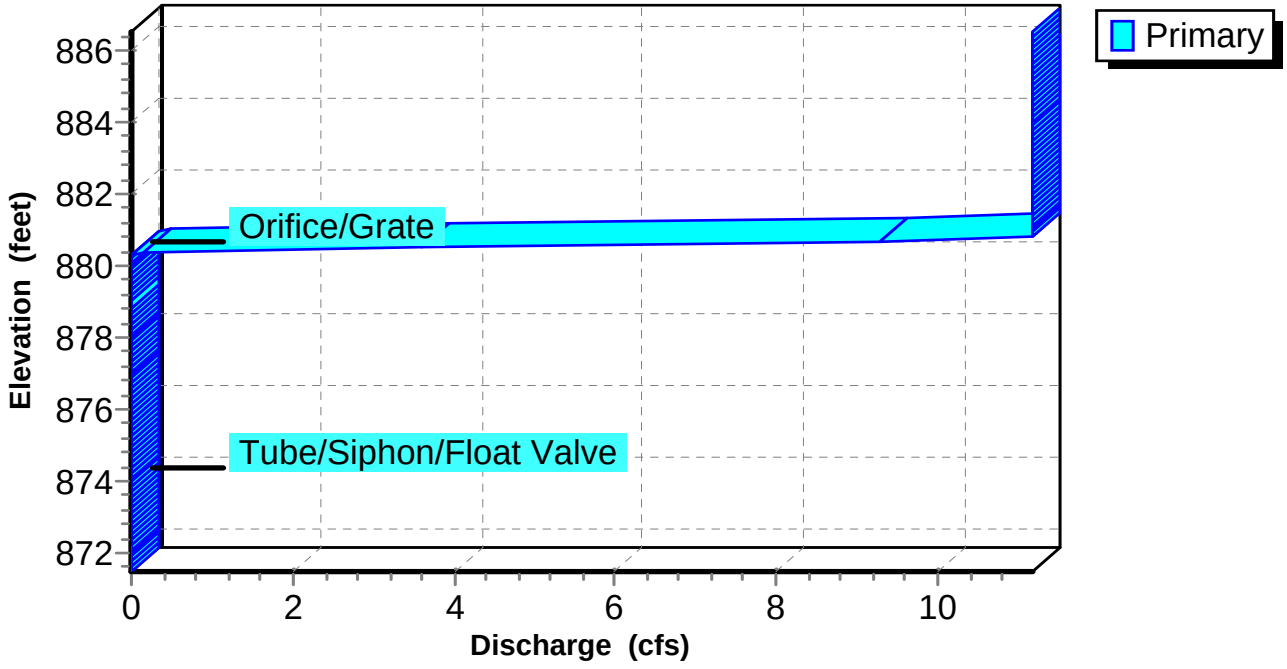
Pond 8P: Retention Basin

Hydrograph

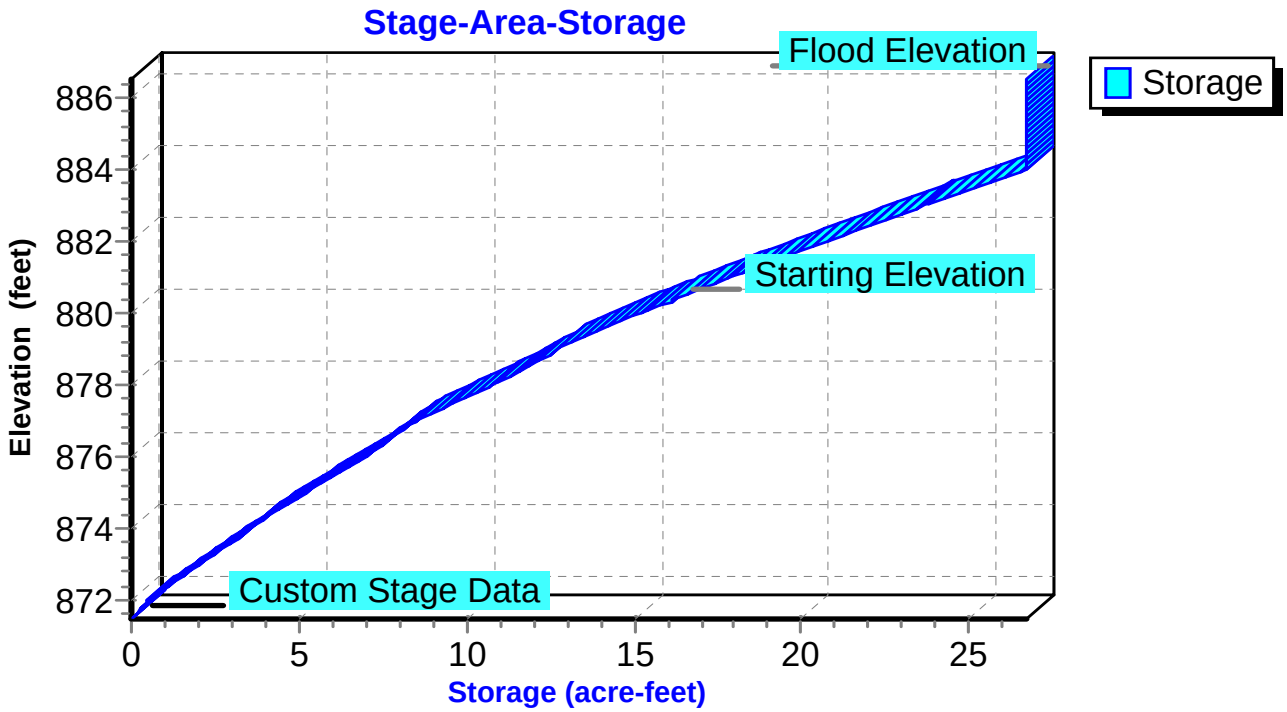


Pond 8P: Retention Basin

Stage-Discharge



Pond 8P: Retention Basin



Hydrograph for Pond 8P: Retention Basin

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.02	16.121	880.33	0.00
10.00	**6.94**	**16.801**	**880.58**	**6.67**
20.00	**10.68**	**17.138**	**880.71**	**9.99**
30.00	8.74	17.016	880.66	9.42
40.00	7.10	16.837	880.59	7.17
50.00	6.71	16.805	880.58	6.73
60.00	6.53	16.792	880.58	6.54
70.00	6.43	16.785	880.57	6.44
80.00	6.36	16.780	880.57	6.37
90.00	6.30	16.775	880.57	6.31
100.00	6.25	16.771	880.57	6.25
110.00	6.20	16.768	880.57	6.20
120.00	6.16	16.765	880.57	6.16
130.00	6.13	16.763	880.57	6.13
140.00	6.10	16.760	880.57	6.10
150.00	6.07	16.758	880.57	6.07
160.00	6.05	16.757	880.56	6.05
170.00	6.04	16.756	880.56	6.04
180.00	6.03	16.756	880.56	6.03
190.00	6.03	16.755	880.56	6.03
200.00	6.02	16.755	880.56	6.02
210.00	6.01	16.754	880.56	6.02
220.00	6.01	16.754	880.56	6.01
230.00	6.00	16.754	880.56	6.01
240.00	6.00	16.753	880.56	6.00
250.00	6.00	16.753	880.56	6.00
260.00	5.99	16.753	880.56	5.99
270.00	5.99	16.752	880.56	5.99
280.00	5.98	16.752	880.56	5.98
290.00	5.98	16.752	880.56	5.98
300.00	5.98	16.752	880.56	5.98
310.00	5.97	16.751	880.56	5.97
320.00	5.97	16.751	880.56	5.97
330.00	5.97	16.751	880.56	5.97
340.00	5.96	16.751	880.56	5.96
350.00	5.96	16.751	880.56	5.96
360.00	5.96	16.750	880.56	5.96
370.00	5.96	16.750	880.56	5.96
380.00	5.95	16.750	880.56	5.95
390.00	5.95	16.750	880.56	5.95
400.00	5.95	16.750	880.56	5.95
410.00	5.95	16.749	880.56	5.95
420.00	5.94	16.749	880.56	5.94
430.00	5.94	16.749	880.56	5.94
440.00	5.94	16.749	880.56	5.94
450.00	5.94	16.749	880.56	5.94
460.00	5.94	16.749	880.56	5.94
470.00	5.93	16.749	880.56	5.94
480.00	5.93	16.749	880.56	5.93
490.00	5.93	16.748	880.56	5.93
500.00	5.93	16.748	880.56	5.93

Stage-Discharge for Pond 8P: Retention Basin

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
871.50	0.00	879.45	0.00
871.65	0.00	879.60	0.00
871.80	0.00	879.75	0.00
871.95	0.00	879.90	0.00
872.10	0.00	880.05	0.00
872.25	0.00	880.20	0.00
872.40	0.00	880.35	0.15
872.55	0.00	880.50	3.60
872.70	0.00	880.65	**9.30**
872.85	0.00	880.80	**11.18**
873.00	0.00	880.95	11.18
873.15	0.00	881.10	11.18
873.30	0.00	881.25	11.18
873.45	0.00	881.40	11.18
873.60	0.00	881.55	11.18
873.75	0.00	881.70	11.18
873.90	0.00	881.85	11.18
874.05	0.00	882.00	11.18
874.20	0.00	882.15	11.18
874.35	0.00	882.30	11.18
874.50	0.00	882.45	11.18
874.65	0.00	882.60	11.18
874.80	0.00	882.75	11.18
874.95	0.00	882.90	11.18
875.10	0.00	883.05	11.18
875.25	0.00	883.20	11.18
875.40	0.00	883.35	11.18
875.55	0.00	883.50	11.18
875.70	0.00	883.65	11.18
875.85	0.00	883.80	11.18
876.00	0.00	883.95	11.18
876.15	0.00	884.10	11.18
876.30	0.00	884.25	11.18
876.45	0.00	884.40	11.18
876.60	0.00	884.55	11.18
876.75	0.00	884.70	11.18
876.90	0.00	884.85	11.18
877.05	0.00	885.00	11.18
877.20	0.00	885.15	11.18
877.35	0.00	885.30	11.18
877.50	0.00	885.45	11.18
877.65	0.00	885.60	11.18
877.80	0.00	885.75	11.18
877.95	0.00	885.90	11.18
878.10	0.00	886.05	11.18
878.25	0.00	886.20	11.18
878.40	0.00	886.35	11.18
878.55	0.00	886.50	11.18
878.70	0.00		
878.85	0.00		
879.00	0.00		
879.15	0.00		
879.30	0.00		

Stage-Area-Storage for Pond 8P: Retention Basin

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
871.50	0.000	879.45	13.857
871.65	0.139	879.60	14.230
871.80	0.278	879.75	14.604
871.95	0.417	879.90	14.977
872.10	0.614	880.05	15.362
872.25	0.840	880.20	15.768
872.40	1.066	880.35	16.175
872.55	1.292	880.50	16.582
872.70	1.518	880.65	16.989
872.85	1.744	880.80	17.396
873.00	1.970	880.95	17.802
873.15	2.209	881.10	18.220
873.30	2.447	881.25	18.643
873.45	2.686	881.40	19.065
873.60	2.925	881.55	19.488
873.75	3.163	881.70	19.911
873.90	3.402	881.85	20.333
874.05	3.645	882.00	20.756
874.20	3.896	882.15	21.194
874.35	4.147	882.30	21.633
874.50	4.398	882.45	22.071
874.65	4.649	882.60	22.510
874.80	4.900	882.75	22.948
874.95	5.151	882.90	23.387
875.10	5.411	883.05	23.830
875.25	5.675	883.20	24.285
875.40	5.939	883.35	24.740
875.55	6.204	883.50	25.194
875.70	6.468	883.65	25.648
875.85	6.732	883.80	26.103
876.00	6.996	883.95	**26.558**
876.15	7.213	884.10	**26.709**
876.30	7.431	884.25	26.709
876.45	7.648	884.40	26.709
876.60	7.865	884.55	26.709
876.75	8.083	884.70	26.709
876.90	8.300	884.85	26.709
877.05	8.562	885.00	26.709
877.20	8.913	885.15	26.709
877.35	9.263	885.30	26.709
877.50	9.614	885.45	26.709
877.65	9.965	885.60	26.709
877.80	10.315	885.75	26.709
877.95	10.666	885.90	26.709
878.10	10.978	886.05	26.709
878.25	11.271	886.20	26.709
878.40	11.564	886.35	26.709
878.55	11.857	886.50	26.709
878.70	12.150		
878.85	12.443		
879.00	12.736		
879.15	13.109		
879.30	13.483		

Summary for Pond 9P: Old Ash Pond

Inflow Area = 27.360 ac,100.00% Impervious, Inflow Depth = 4.26" for 50-yr event
Inflow = 123.30 cfs @ 11.84 hrs, Volume= 9.722 af
Outflow = 1.51 cfs @ 21.71 hrs, Volume= 9.105 af, Atten= 99%, Lag= 592.3 min
Primary = 1.51 cfs @ 21.71 hrs, Volume= 9.105 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Starting Elev= 881.50' Surf.Area= 0.000 ac Storage= 118.482 af
Peak Elev= 882.09' @ 21.71 hrs Surf.Area= 0.000 ac Storage= 126.783 af (8.301 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 153.954 af (35.472 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 5,838.1 min (6,579.3 - 741.2)

Volume	Invert	Avail.Storage	Storage Description
#1	868.00'	153.954 af	**Custom Stage Data** Listed below

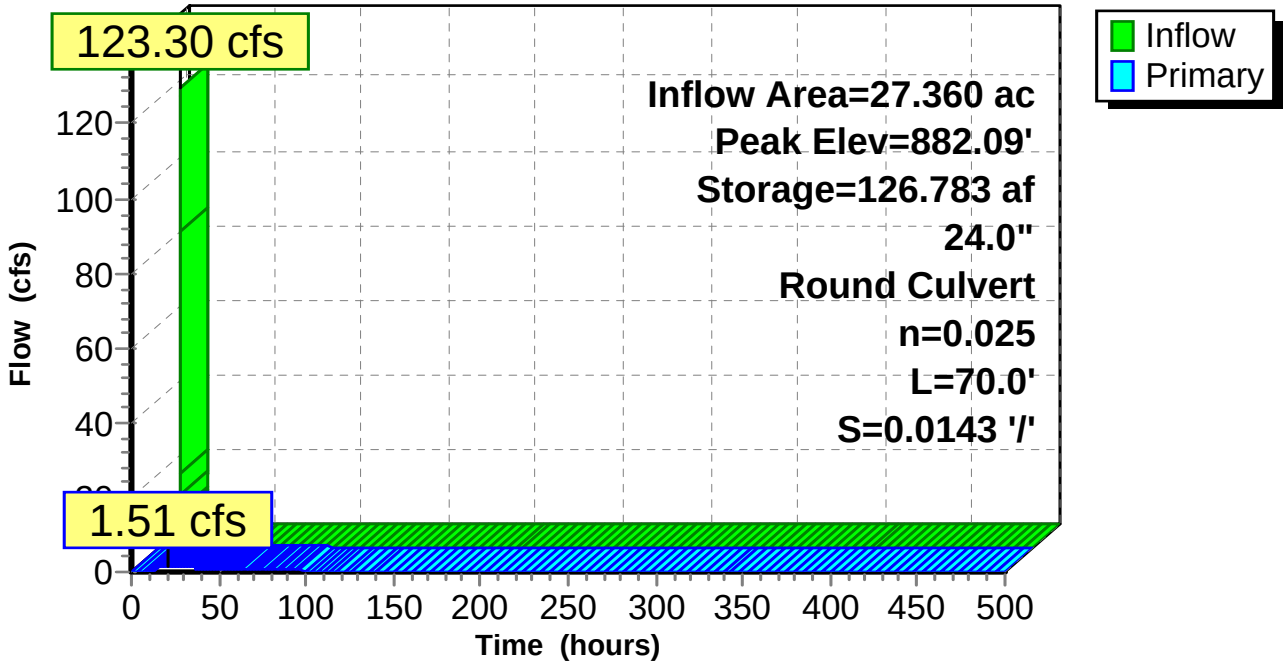
Elevation (feet)	Cum.Store (acre-feet)
868.00	0.000
869.00	0.912
870.00	1.089
871.00	5.537
872.00	13.143
873.00	22.784
874.00	34.019
875.00	46.023
876.00	58.522
877.00	71.294
878.00	84.273
879.00	96.397
880.00	97.727
881.00	111.501
882.00	125.463
883.00	139.613
884.00	153.954

Device	Routing	Invert	Outlet Devices
#1	Primary	881.50'	**24.0" Round Culvert** L= 70.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 881.50' / 880.50' S= 0.0143 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf

Primary OutFlow Max=1.49 cfs @ 21.71 hrs HW=882.09' TW=880.92' (TW follows 1.17' below HW)
↑—**1=Culvert** (Barrel Controls 1.49 cfs @ 2.86 fps)

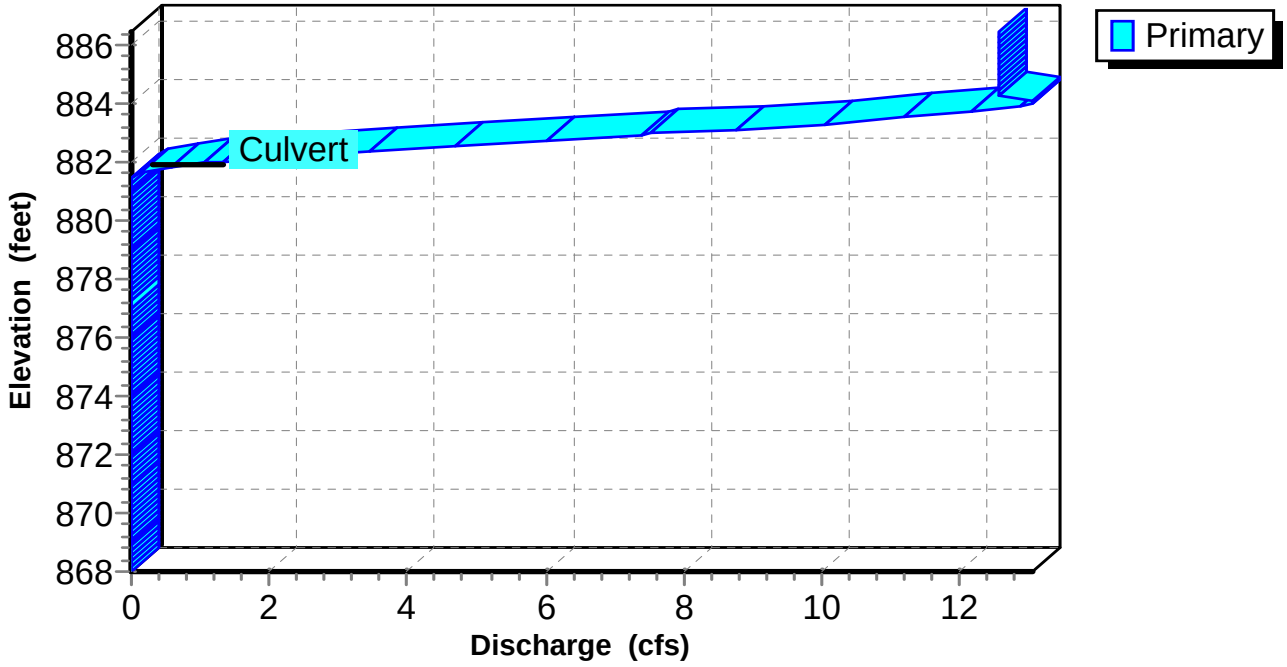
Pond 9P: Old Ash Pond

Hydrograph

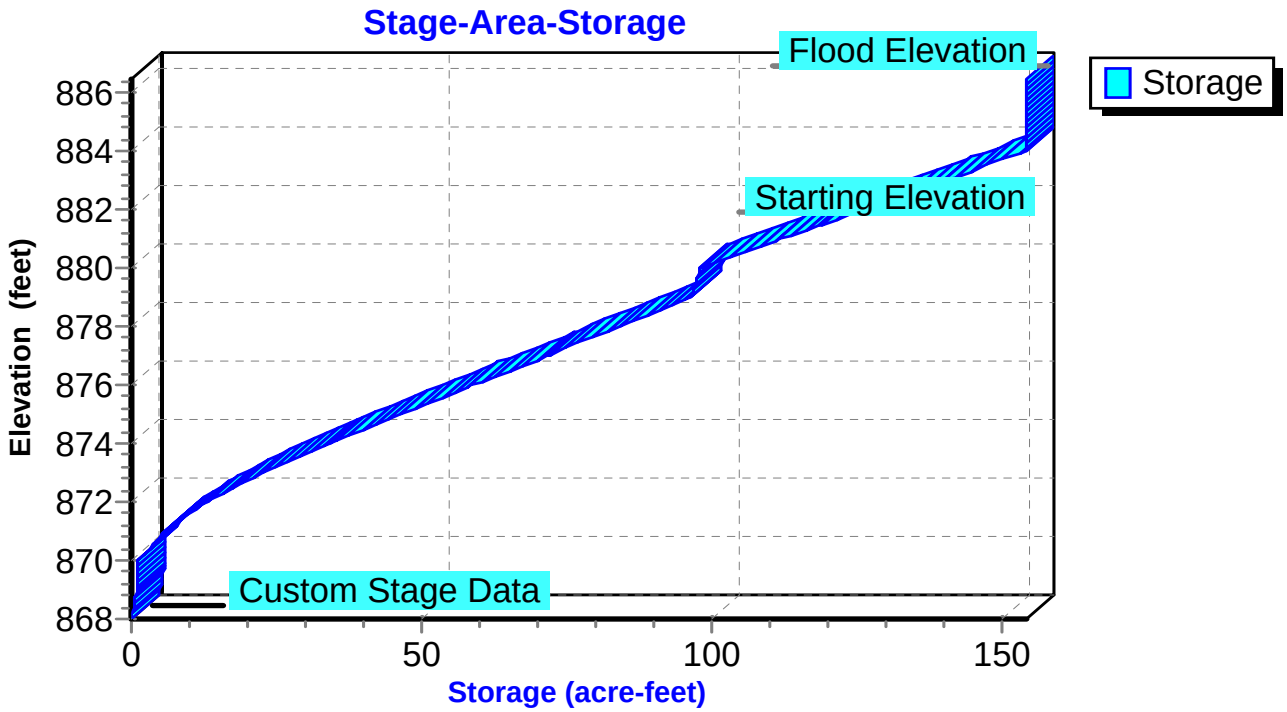


Pond 9P: Old Ash Pond

Stage-Discharge



Pond 9P: Old Ash Pond



Hydrograph for Pond 9P: Old Ash Pond

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	118.482	881.50	0.00
10.00	**4.74**	119.856	881.60	0.07
20.00	**1.62**	**126.775**	**882.09**	**1.50**
30.00	0.00	**126.091**	**882.04**	**1.26**
40.00	0.00	125.173	881.98	0.98
50.00	0.00	124.445	881.93	0.79
60.00	0.00	123.862	881.89	0.63
70.00	0.00	123.386	881.85	0.53
80.00	0.00	122.975	881.82	0.46
90.00	0.00	122.619	881.80	0.40
100.00	0.00	122.310	881.77	0.35
110.00	0.00	122.043	881.76	0.30
120.00	0.00	121.811	881.74	0.26
130.00	0.00	121.611	881.72	0.23
140.00	0.00	121.437	881.71	0.20
150.00	0.00	121.286	881.70	0.17
160.00	0.00	121.156	881.69	0.15
170.00	0.00	121.039	881.68	0.14
180.00	0.00	120.927	881.68	0.13
190.00	0.00	120.821	881.67	0.13
200.00	0.00	120.719	881.66	0.12
210.00	0.00	120.622	881.65	0.11
220.00	0.00	120.530	881.65	0.11
230.00	0.00	120.441	881.64	0.10
240.00	0.00	120.356	881.63	0.10
250.00	0.00	120.276	881.63	0.10
260.00	0.00	120.198	881.62	0.09
270.00	0.00	120.125	881.62	0.09
280.00	0.00	120.054	881.61	0.08
290.00	0.00	119.987	881.61	0.08
300.00	0.00	119.923	881.60	0.08
310.00	0.00	119.861	881.60	0.07
320.00	0.00	119.802	881.59	0.07
330.00	0.00	119.746	881.59	0.07
340.00	0.00	119.693	881.59	0.06
350.00	0.00	119.642	881.58	0.06
360.00	0.00	119.593	881.58	0.06
370.00	0.00	119.546	881.58	0.06
380.00	0.00	119.502	881.57	0.05
390.00	0.00	119.459	881.57	0.05
400.00	0.00	119.418	881.57	0.05
410.00	0.00	119.380	881.56	0.05
420.00	0.00	119.343	881.56	0.04
430.00	0.00	119.307	881.56	0.04
440.00	0.00	119.273	881.56	0.04
450.00	0.00	119.241	881.55	0.04
460.00	0.00	119.210	881.55	0.04
470.00	0.00	119.180	881.55	0.03
480.00	0.00	119.152	881.55	0.03
490.00	0.00	119.125	881.55	0.03
500.00	0.00	119.100	881.54	0.03

Stage-Discharge for Pond 9P: Old Ash Pond

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
868.00	0.00	878.60	0.00
868.20	0.00	878.80	0.00
868.40	0.00	879.00	0.00
868.60	0.00	879.20	0.00
868.80	0.00	879.40	0.00
869.00	0.00	879.60	0.00
869.20	0.00	879.80	0.00
869.40	0.00	880.00	0.00
869.60	0.00	880.20	0.00
869.80	0.00	880.40	0.00
870.00	0.00	880.60	0.00
870.20	0.00	880.80	0.00
870.40	0.00	881.00	0.00
870.60	0.00	881.20	0.00
870.80	0.00	881.40	0.00
871.00	0.00	881.60	0.04
871.20	0.00	881.80	0.37
871.40	0.00	882.00	1.06
871.60	0.00	882.20	2.06
871.80	0.00	882.40	3.25
872.00	0.00	882.60	4.59
872.20	0.00	882.80	6.03
872.40	0.00	883.00	7.50
872.60	0.00	883.20	8.95
872.80	0.00	883.40	10.32
873.00	0.00	883.60	11.54
873.20	0.00	883.80	12.50
873.40	0.00	884.00	**13.05**
873.60	0.00	884.20	**12.54**
873.80	0.00	884.40	12.54
874.00	0.00	884.60	12.54
874.20	0.00	884.80	12.54
874.40	0.00	885.00	12.54
874.60	0.00	885.20	12.54
874.80	0.00	885.40	12.54
875.00	0.00	885.60	12.54
875.20	0.00	885.80	12.54
875.40	0.00	886.00	12.54
875.60	0.00	886.20	12.54
875.80	0.00	886.40	12.54
876.00	0.00		
876.20	0.00		
876.40	0.00		
876.60	0.00		
876.80	0.00		
877.00	0.00		
877.20	0.00		
877.40	0.00		
877.60	0.00		
877.80	0.00		
878.00	0.00		
878.20	0.00		
878.40	0.00		

Stage-Area-Storage for Pond 9P: Old Ash Pond

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
868.00	0.000	878.60	91.547
868.20	0.182	878.80	93.972
868.40	0.365	879.00	96.397
868.60	0.547	879.20	96.663
868.80	0.730	879.40	96.929
869.00	0.912	879.60	97.195
869.20	0.947	879.80	97.461
869.40	0.983	880.00	97.727
869.60	1.018	880.20	100.482
869.80	1.054	880.40	103.237
870.00	1.089	880.60	105.991
870.20	1.979	880.80	108.746
870.40	2.868	881.00	111.501
870.60	3.758	881.20	114.293
870.80	4.647	881.40	117.086
871.00	5.537	881.60	119.878
871.20	7.058	881.80	122.671
871.40	8.579	882.00	125.463
871.60	10.101	882.20	128.293
871.80	11.622	882.40	131.123
872.00	13.143	882.60	133.953
872.20	15.071	882.80	136.783
872.40	16.999	883.00	139.613
872.60	18.928	883.20	142.481
872.80	20.856	883.40	145.349
873.00	22.784	883.60	148.218
873.20	25.031	883.80	151.086
873.40	27.278	884.00	**153.954**
873.60	29.525	884.20	153.954
873.80	31.772	884.40	153.954
874.00	34.019	884.60	153.954
874.20	36.420	884.80	153.954
874.40	38.821	885.00	153.954
874.60	41.221	885.20	153.954
874.80	43.622	885.40	153.954
875.00	46.023	885.60	153.954
875.20	48.523	885.80	153.954
875.40	51.023	886.00	153.954
875.60	53.522	886.20	153.954
875.80	56.022	886.40	153.954
876.00	58.522		
876.20	61.076		
876.40	63.631		
876.60	66.185		
876.80	68.740		
877.00	71.294		
877.20	73.890		
877.40	76.486		
877.60	79.081		
877.80	81.677		
878.00	84.273		
878.20	86.698		
878.40	89.123		

Time span=0.00-500.00 hrs, dt=0.20 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Coal Pile Runoff Area=26.000 ac 0.00% Impervious Runoff Depth=1.96"
Flow Length=1,780' Tc=629.8 min CN=69 Runoff=4.24 cfs 4.241 af

Subcatchment 2S: Roof Runoff Area=0.240 ac 100.00% Impervious Runoff Depth=4.76"
Flow Length=20' Slope=0.0010 '/' Tc=1.3 min CN=98 Runoff=1.18 cfs 0.095 af

Subcatchment 3S: Forebay Surface Runoff Area=2.760 ac 100.00% Impervious Runoff Depth=4.76"
Flow Length=350' Tc=0.4 min CN=98 Runoff=14.40 cfs 1.096 af

Subcatchment 9S: Ret Basin Surface Runoff Area=3.730 ac 100.00% Impervious Runoff Depth=4.76"
Flow Length=700' Tc=0.7 min CN=98 Runoff=19.07 cfs 1.481 af

Subcatchment 10S: Old Ash Pond Runoff Area=27.360 ac 100.00% Impervious Runoff Depth=4.76"
Flow Length=1,000' Tc=1.0 min CN=98 Runoff=137.22 cfs 10.860 af

Pond 7P: Forebay Peak Elev=883.42' Storage=20.159 af Inflow=21.48 cfs 249.331 af
24.0" Round Culvert x 3.00 n=0.025 L=75.0' S=0.0133 '/' Outflow=10.14 cfs 247.840 af

Pond 8P: Retention Basin Peak Elev=880.89' Storage=17.644 af Inflow=28.02 cfs 259.548 af
Outflow=11.18 cfs 258.919 af

Pond 9P: Old Ash Pond Peak Elev=882.15' Storage=127.641 af Inflow=137.22 cfs 10.860 af
24.0" Round Culvert n=0.025 L=70.0' S=0.0143 '/' Outflow=1.83 cfs 10.227 af

Total Runoff Area = 60.090 ac Runoff Volume = 17.772 af Average Runoff Depth = 3.55"
43.27% Pervious = 26.000 ac 56.73% Impervious = 34.090 ac

Summary for Subcatchment 1S: Coal Pile

Runoff = 4.24 cfs @ 20.44 hrs, Volume= 4.241 af, Depth= 1.96"

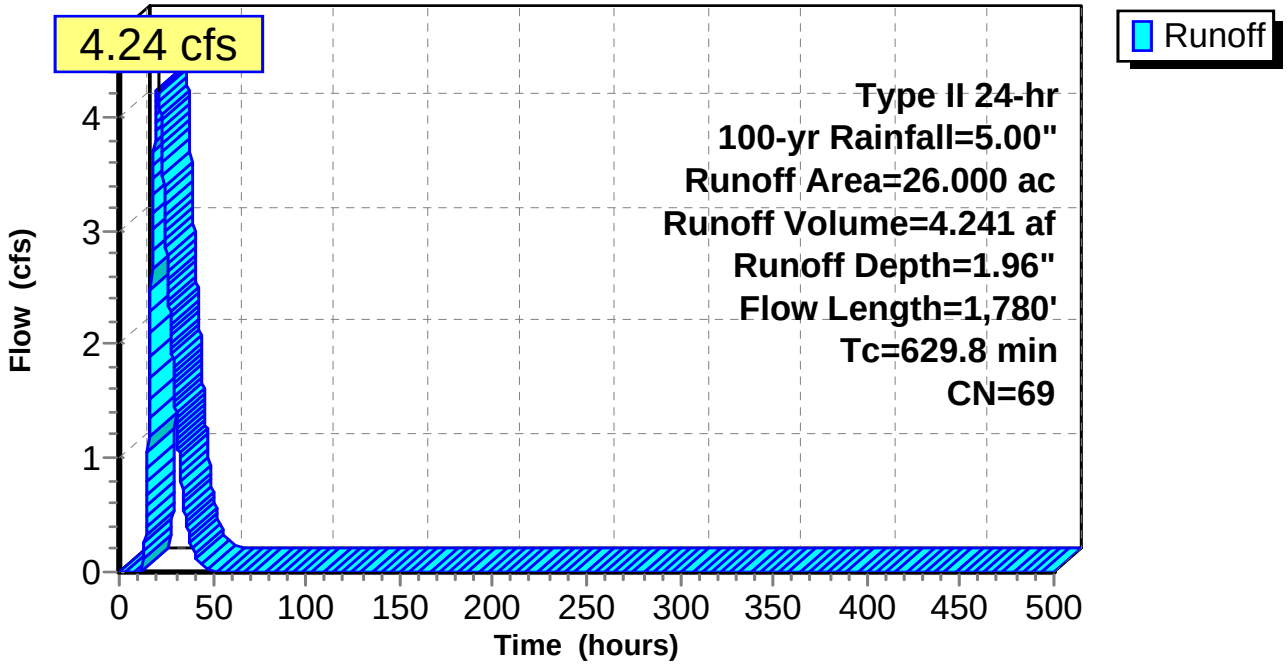
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 100-yr Rainfall=5.00"

	Area (ac)	CN	Description
*	15.000	56	Coal
*	11.000	86	Margins
	26.000	69	Weighted Average
	26.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	100	0.4000	4.03		**Sheet Flow, Coal** Smooth surfaces n= 0.011 P2= 2.50"
2.5	180	0.0300	1.21		**Shallow Concentrated Flow, Coal Margin** Short Grass Pasture Kv= 7.0 fps
626.9	1,500	0.0007	0.04	0.40	**Channel Flow, Drainage Ditch** Area= 10.0 sf Perim= 3,000.0' r= 0.00' n= 0.022 Earth, clean & straight
629.8	1,780	Total			

Subcatchment 1S: Coal Pile

Hydrograph



Hydrograph for Subcatchment 1S: Coal Pile

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.91	0.00	0.00
20.00	**4.76**	**1.78**	**4.18**
30.00	**5.00**	**1.96**	**1.50**
40.00	5.00	1.96	0.17
50.00	5.00	1.96	0.01
60.00	5.00	1.96	0.00
70.00	5.00	1.96	0.00
80.00	5.00	1.96	0.00
90.00	5.00	1.96	0.00
100.00	5.00	1.96	0.00
110.00	5.00	1.96	0.00
120.00	5.00	1.96	0.00
130.00	5.00	1.96	0.00
140.00	5.00	1.96	0.00
150.00	5.00	1.96	0.00
160.00	5.00	1.96	0.00
170.00	5.00	1.96	0.00
180.00	5.00	1.96	0.00
190.00	5.00	1.96	0.00
200.00	5.00	1.96	0.00
210.00	5.00	1.96	0.00
220.00	5.00	1.96	0.00
230.00	5.00	1.96	0.00
240.00	5.00	1.96	0.00
250.00	5.00	1.96	0.00
260.00	5.00	1.96	0.00
270.00	5.00	1.96	0.00
280.00	5.00	1.96	0.00
290.00	5.00	1.96	0.00
300.00	5.00	1.96	0.00
310.00	5.00	1.96	0.00
320.00	5.00	1.96	0.00
330.00	5.00	1.96	0.00
340.00	5.00	1.96	0.00
350.00	5.00	1.96	0.00
360.00	5.00	1.96	0.00
370.00	5.00	1.96	0.00
380.00	5.00	1.96	0.00
390.00	5.00	1.96	0.00
400.00	5.00	1.96	0.00
410.00	5.00	1.96	0.00
420.00	5.00	1.96	0.00
430.00	5.00	1.96	0.00
440.00	5.00	1.96	0.00
450.00	5.00	1.96	0.00
460.00	5.00	1.96	0.00
470.00	5.00	1.96	0.00
480.00	5.00	1.96	0.00
490.00	5.00	1.96	0.00
500.00	5.00	1.96	0.00

Summary for Subcatchment 2S: Roof

[49] Hint: Tc<2dt may require smaller dt

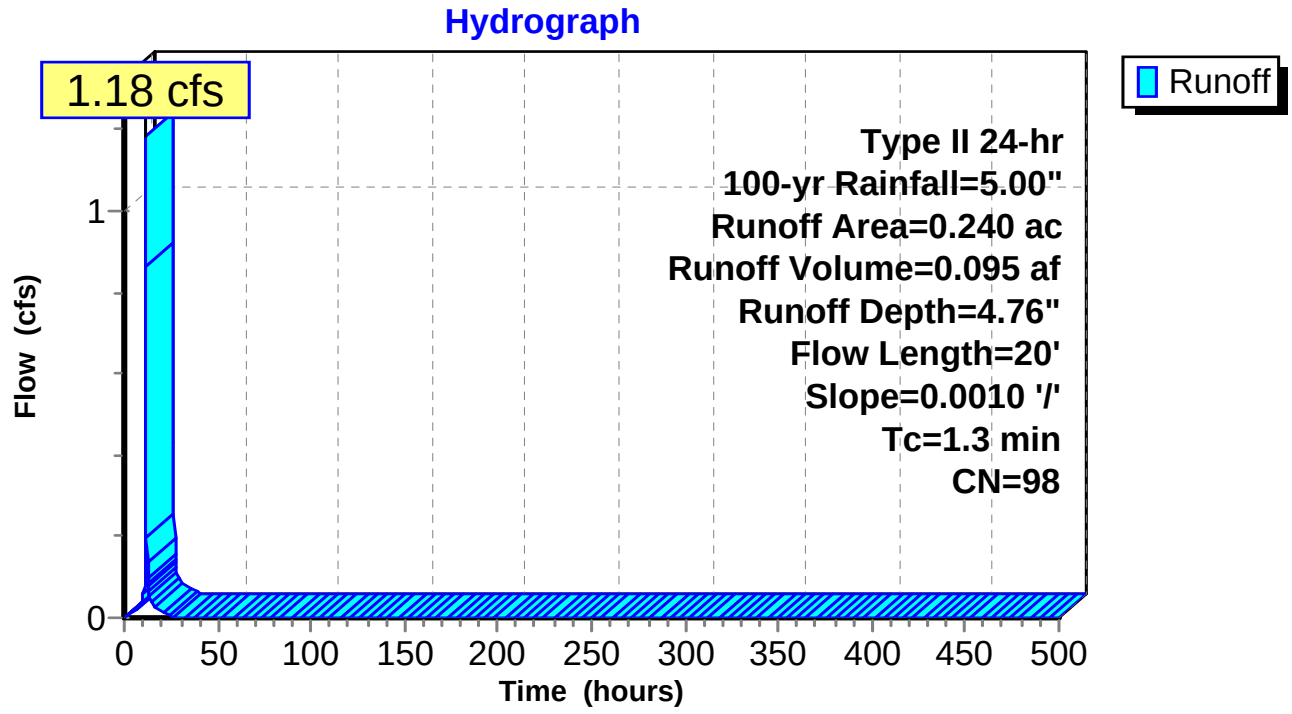
Runoff = 1.18 cfs @ 11.85 hrs, Volume= 0.095 af, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 100-yr Rainfall=5.00"

	Area (ac)	CN	Description
*	0.240	98	
	0.240		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	20	0.0010	0.27		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: Roof



Hydrograph for Subcatchment 2S: Roof

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.91	0.70	**0.05**
20.00	**4.76**	**4.52**	**0.02**
30.00	**5.00**	**4.76**	0.00
40.00	5.00	4.76	0.00
50.00	5.00	4.76	0.00
60.00	5.00	4.76	0.00
70.00	5.00	4.76	0.00
80.00	5.00	4.76	0.00
90.00	5.00	4.76	0.00
100.00	5.00	4.76	0.00
110.00	5.00	4.76	0.00
120.00	5.00	4.76	0.00
130.00	5.00	4.76	0.00
140.00	5.00	4.76	0.00
150.00	5.00	4.76	0.00
160.00	5.00	4.76	0.00
170.00	5.00	4.76	0.00
180.00	5.00	4.76	0.00
190.00	5.00	4.76	0.00
200.00	5.00	4.76	0.00
210.00	5.00	4.76	0.00
220.00	5.00	4.76	0.00
230.00	5.00	4.76	0.00
240.00	5.00	4.76	0.00
250.00	5.00	4.76	0.00
260.00	5.00	4.76	0.00
270.00	5.00	4.76	0.00
280.00	5.00	4.76	0.00
290.00	5.00	4.76	0.00
300.00	5.00	4.76	0.00
310.00	5.00	4.76	0.00
320.00	5.00	4.76	0.00
330.00	5.00	4.76	0.00
340.00	5.00	4.76	0.00
350.00	5.00	4.76	0.00
360.00	5.00	4.76	0.00
370.00	5.00	4.76	0.00
380.00	5.00	4.76	0.00
390.00	5.00	4.76	0.00
400.00	5.00	4.76	0.00
410.00	5.00	4.76	0.00
420.00	5.00	4.76	0.00
430.00	5.00	4.76	0.00
440.00	5.00	4.76	0.00
450.00	5.00	4.76	0.00
460.00	5.00	4.76	0.00
470.00	5.00	4.76	0.00
480.00	5.00	4.76	0.00
490.00	5.00	4.76	0.00
500.00	5.00	4.76	0.00

Summary for Subcatchment 3S: Forebay Surface

[49] Hint: Tc<2dt may require smaller dt

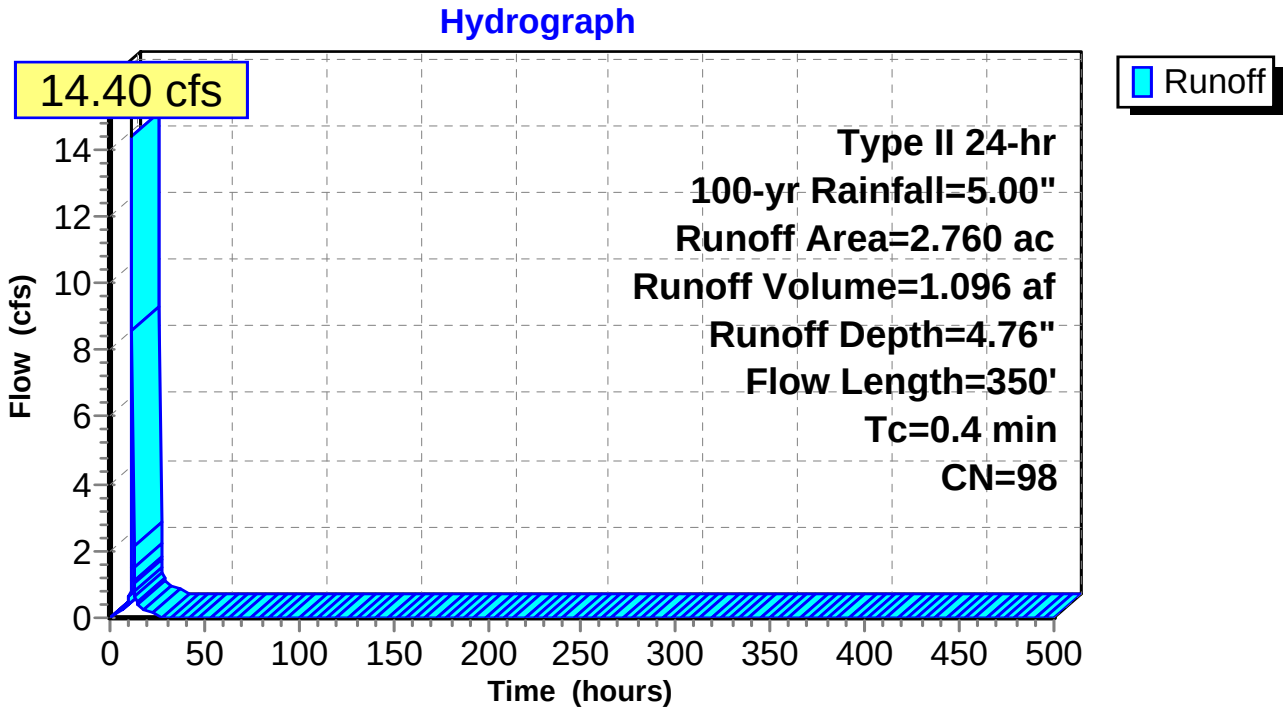
Runoff = 14.40 cfs @ 11.83 hrs, Volume= 1.096 af, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 100-yr Rainfall=5.00"

	Area (ac)	CN	Description
*	2.760	98	
	2.760		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	350		16.05		**Lake or Reservoir,** Mean Depth= 8.00'

Subcatchment 3S: Forebay Surface



Hydrograph for Subcatchment 3S: Forebay Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.91	0.70	**0.54**
20.00	**4.76**	**4.52**	**0.18**
30.00	**5.00**	**4.76**	0.00
40.00	5.00	4.76	0.00
50.00	5.00	4.76	0.00
60.00	5.00	4.76	0.00
70.00	5.00	4.76	0.00
80.00	5.00	4.76	0.00
90.00	5.00	4.76	0.00
100.00	5.00	4.76	0.00
110.00	5.00	4.76	0.00
120.00	5.00	4.76	0.00
130.00	5.00	4.76	0.00
140.00	5.00	4.76	0.00
150.00	5.00	4.76	0.00
160.00	5.00	4.76	0.00
170.00	5.00	4.76	0.00
180.00	5.00	4.76	0.00
190.00	5.00	4.76	0.00
200.00	5.00	4.76	0.00
210.00	5.00	4.76	0.00
220.00	5.00	4.76	0.00
230.00	5.00	4.76	0.00
240.00	5.00	4.76	0.00
250.00	5.00	4.76	0.00
260.00	5.00	4.76	0.00
270.00	5.00	4.76	0.00
280.00	5.00	4.76	0.00
290.00	5.00	4.76	0.00
300.00	5.00	4.76	0.00
310.00	5.00	4.76	0.00
320.00	5.00	4.76	0.00
330.00	5.00	4.76	0.00
340.00	5.00	4.76	0.00
350.00	5.00	4.76	0.00
360.00	5.00	4.76	0.00
370.00	5.00	4.76	0.00
380.00	5.00	4.76	0.00
390.00	5.00	4.76	0.00
400.00	5.00	4.76	0.00
410.00	5.00	4.76	0.00
420.00	5.00	4.76	0.00
430.00	5.00	4.76	0.00
440.00	5.00	4.76	0.00
450.00	5.00	4.76	0.00
460.00	5.00	4.76	0.00
470.00	5.00	4.76	0.00
480.00	5.00	4.76	0.00
490.00	5.00	4.76	0.00
500.00	5.00	4.76	0.00

Summary for Subcatchment 9S: Ret Basin Surface

[49] Hint: Tc<2dt may require smaller dt

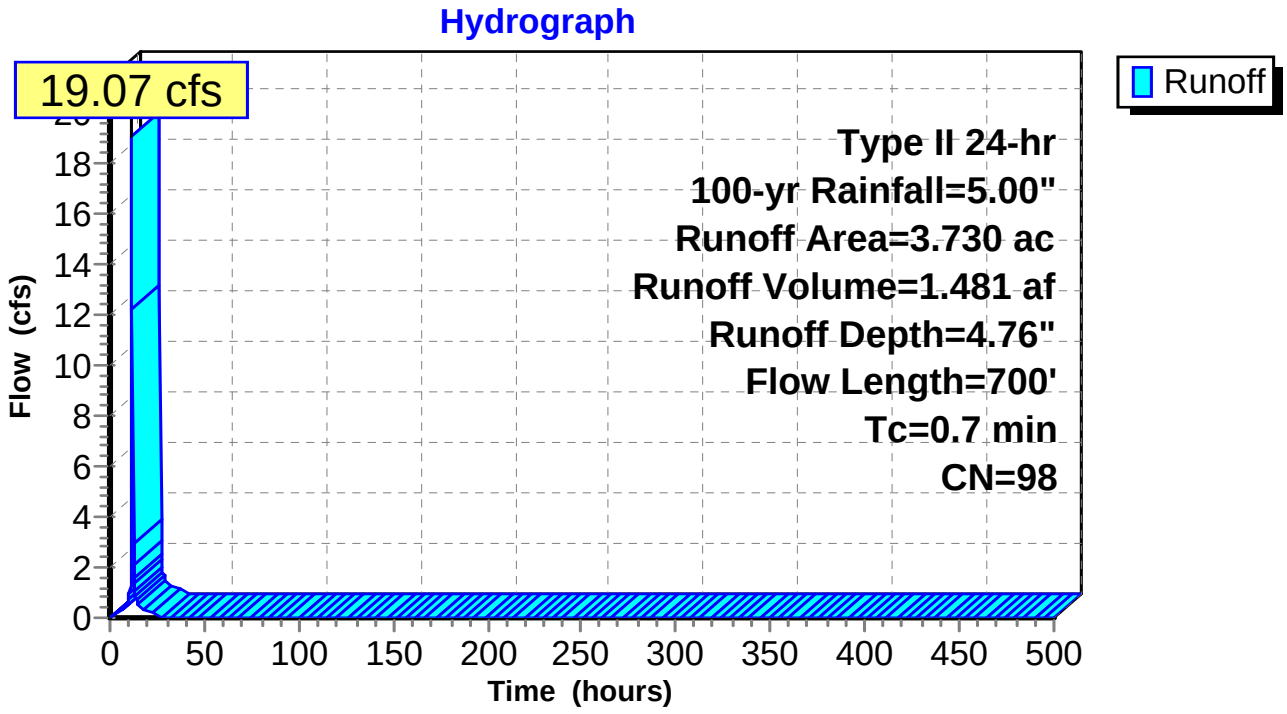
Runoff = 19.07 cfs @ 11.83 hrs, Volume= 1.481 af, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 100-yr Rainfall=5.00"

	Area (ac)	CN	Description
*	3.730	98	
	3.730		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	700		16.05		**Lake or Reservoir,** Mean Depth= 8.00'

Subcatchment 9S: Ret Basin Surface



Hydrograph for Subcatchment 9S: Ret Basin Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.91	0.70	**0.72**
20.00	**4.76**	**4.52**	**0.25**
30.00	**5.00**	**4.76**	0.00
40.00	5.00	4.76	0.00
50.00	5.00	4.76	0.00
60.00	5.00	4.76	0.00
70.00	5.00	4.76	0.00
80.00	5.00	4.76	0.00
90.00	5.00	4.76	0.00
100.00	5.00	4.76	0.00
110.00	5.00	4.76	0.00
120.00	5.00	4.76	0.00
130.00	5.00	4.76	0.00
140.00	5.00	4.76	0.00
150.00	5.00	4.76	0.00
160.00	5.00	4.76	0.00
170.00	5.00	4.76	0.00
180.00	5.00	4.76	0.00
190.00	5.00	4.76	0.00
200.00	5.00	4.76	0.00
210.00	5.00	4.76	0.00
220.00	5.00	4.76	0.00
230.00	5.00	4.76	0.00
240.00	5.00	4.76	0.00
250.00	5.00	4.76	0.00
260.00	5.00	4.76	0.00
270.00	5.00	4.76	0.00
280.00	5.00	4.76	0.00
290.00	5.00	4.76	0.00
300.00	5.00	4.76	0.00
310.00	5.00	4.76	0.00
320.00	5.00	4.76	0.00
330.00	5.00	4.76	0.00
340.00	5.00	4.76	0.00
350.00	5.00	4.76	0.00
360.00	5.00	4.76	0.00
370.00	5.00	4.76	0.00
380.00	5.00	4.76	0.00
390.00	5.00	4.76	0.00
400.00	5.00	4.76	0.00
410.00	5.00	4.76	0.00
420.00	5.00	4.76	0.00
430.00	5.00	4.76	0.00
440.00	5.00	4.76	0.00
450.00	5.00	4.76	0.00
460.00	5.00	4.76	0.00
470.00	5.00	4.76	0.00
480.00	5.00	4.76	0.00
490.00	5.00	4.76	0.00
500.00	5.00	4.76	0.00

Summary for Subcatchment 10S: Old Ash Pond Surface

[49] Hint: Tc<2dt may require smaller dt

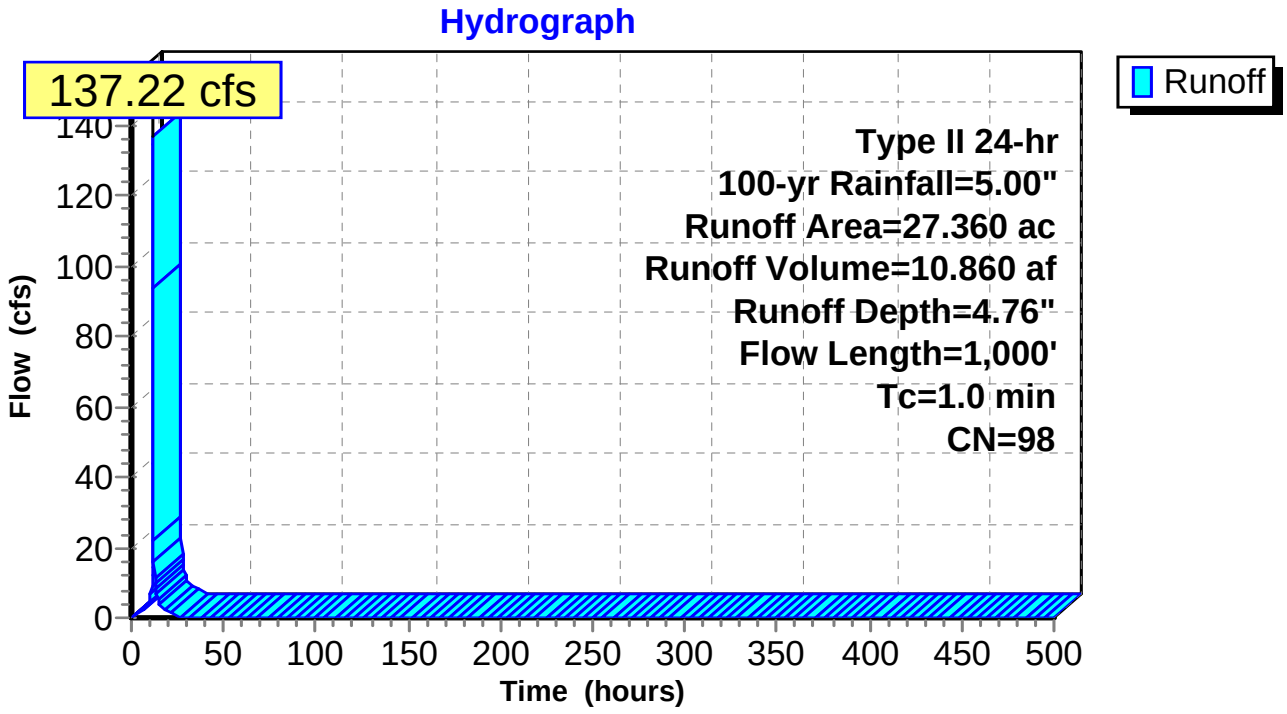
Runoff = 137.22 cfs @ 11.84 hrs, Volume= 10.860 af, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Type II 24-hr 100-yr Rainfall=5.00"

	Area (ac)	CN	Description
*	27.360	98	
	27.360		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1,000		16.05		**Lake or Reservoir, Lake** Mean Depth= 8.00'

Subcatchment 10S: Old Ash Pond Surface



Hydrograph for Subcatchment 10S: Old Ash Pond Surface

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
10.00	0.91	0.70	**5.30**
20.00	**4.76**	**4.52**	**1.80**
30.00	**5.00**	**4.76**	0.00
40.00	5.00	4.76	0.00
50.00	5.00	4.76	0.00
60.00	5.00	4.76	0.00
70.00	5.00	4.76	0.00
80.00	5.00	4.76	0.00
90.00	5.00	4.76	0.00
100.00	5.00	4.76	0.00
110.00	5.00	4.76	0.00
120.00	5.00	4.76	0.00
130.00	5.00	4.76	0.00
140.00	5.00	4.76	0.00
150.00	5.00	4.76	0.00
160.00	5.00	4.76	0.00
170.00	5.00	4.76	0.00
180.00	5.00	4.76	0.00
190.00	5.00	4.76	0.00
200.00	5.00	4.76	0.00
210.00	5.00	4.76	0.00
220.00	5.00	4.76	0.00
230.00	5.00	4.76	0.00
240.00	5.00	4.76	0.00
250.00	5.00	4.76	0.00
260.00	5.00	4.76	0.00
270.00	5.00	4.76	0.00
280.00	5.00	4.76	0.00
290.00	5.00	4.76	0.00
300.00	5.00	4.76	0.00
310.00	5.00	4.76	0.00
320.00	5.00	4.76	0.00
330.00	5.00	4.76	0.00
340.00	5.00	4.76	0.00
350.00	5.00	4.76	0.00
360.00	5.00	4.76	0.00
370.00	5.00	4.76	0.00
380.00	5.00	4.76	0.00
390.00	5.00	4.76	0.00
400.00	5.00	4.76	0.00
410.00	5.00	4.76	0.00
420.00	5.00	4.76	0.00
430.00	5.00	4.76	0.00
440.00	5.00	4.76	0.00
450.00	5.00	4.76	0.00
460.00	5.00	4.76	0.00
470.00	5.00	4.76	0.00
480.00	5.00	4.76	0.00
490.00	5.00	4.76	0.00
500.00	5.00	4.76	0.00

Summary for Pond 7P: Forebay

Inflow Area = 29.000 ac, 10.34% Impervious, Inflow Depth > 103.17" for 100-yr event
Inflow = 21.48 cfs @ 11.83 hrs, Volume= 249.331 af, Incl. 5.90 cfs Base Flow
Outflow = 10.14 cfs @ 22.05 hrs, Volume= 247.840 af, Atten= 53%, Lag= 613.2 min
Primary = 10.14 cfs @ 22.05 hrs, Volume= 247.840 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Starting Elev= 882.50' Surf.Area= 0.000 ac Storage= 18.166 af
Peak Elev= 883.42' @ 22.05 hrs Surf.Area= 0.000 ac Storage= 20.159 af (1.992 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 21.445 af (3.278 af above start)

Plug-Flow detention time= 2,387.6 min calculated for 229.625 af (92% of inflow)
Center-of-Mass det. time= 89.6 min (14,790.6 - 14,701.0)

Volume	Invert	Avail.Storage	Storage Description
#1	871.50'	21.445 af	**Custom Stage Data** Listed below

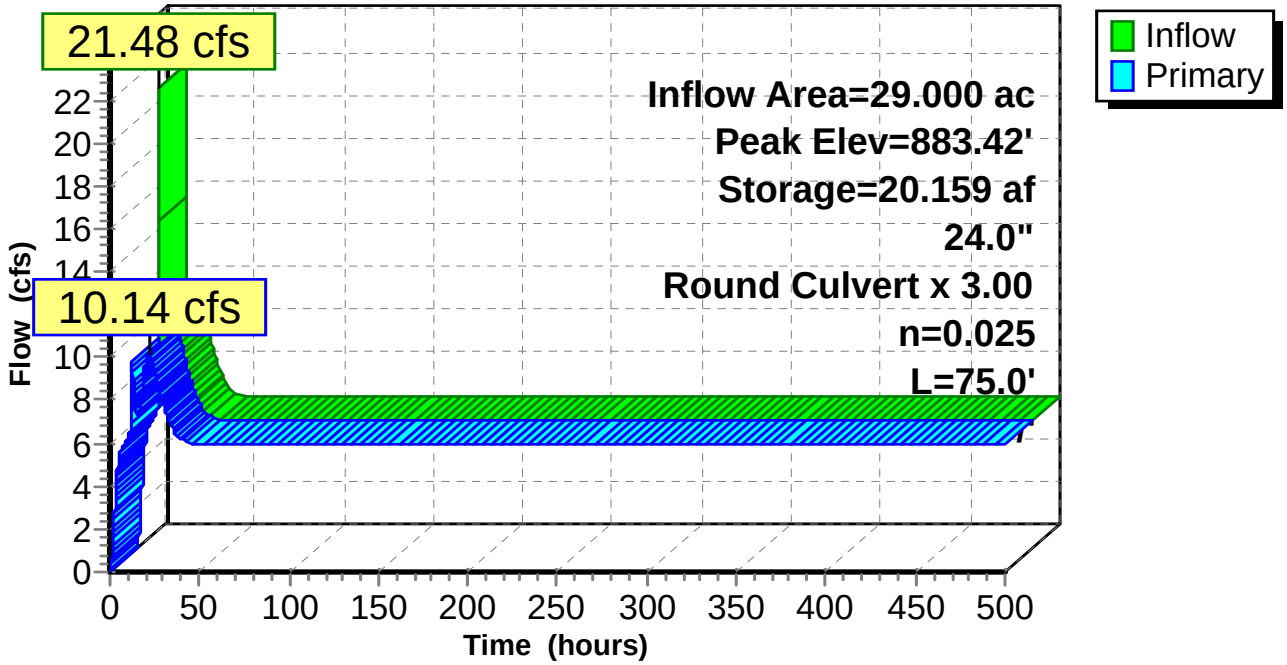
Elevation (feet)	Cum.Store (acre-feet)
871.50	0.000
872.00	0.320
873.00	1.660
874.00	3.065
875.00	4.544
876.00	6.099
877.00	7.732
878.00	9.443
879.00	11.234
880.00	13.107
881.00	15.063
882.00	17.103
883.00	19.230
884.00	21.445

Device	Routing	Invert	Outlet Devices
#1	Primary	882.50'	**24.0" Round Culvert X 3.00** L= 75.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 882.50' / 881.50' S= 0.0133 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf

Primary OutFlow Max=10.09 cfs @ 22.05 hrs HW=883.42' TW=881.25' (TW follows 2.17' below HW)
↑—**1=Culvert** (Barrel Controls 10.09 cfs @ 3.51 fps)

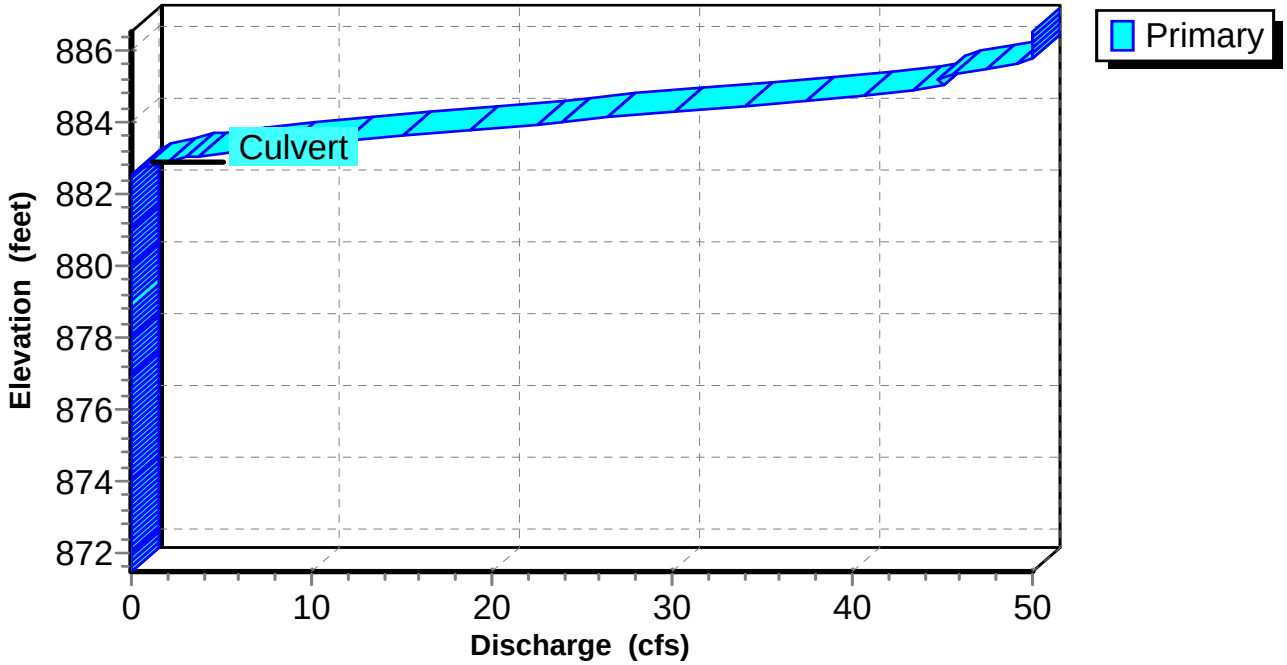
Pond 7P: Forebay

Hydrograph

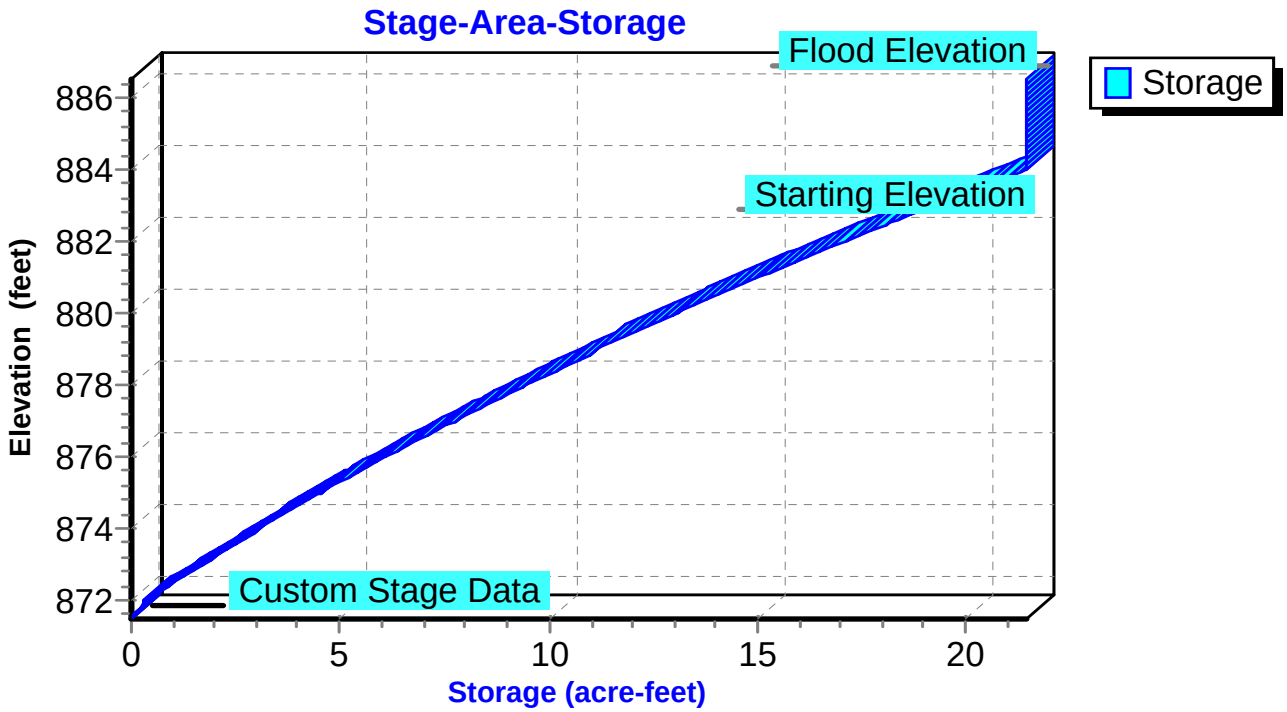


Pond 7P: Forebay

Stage-Discharge



Pond 7P: Forebay



Hydrograph for Pond 7P: Forebay

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	5.90	18.215	882.52	0.02
10.00	**6.48**	19.705	883.21	6.27
20.00	**10.27**	**20.112**	**883.40**	**9.71**
30.00	7.40	**19.892**	**883.30**	**7.79**
40.00	6.07	19.691	883.21	6.15
50.00	5.91	19.660	883.19	5.92
60.00	5.90	19.657	883.19	5.90
70.00	5.90	19.657	883.19	5.90
80.00	5.90	19.657	883.19	5.90
90.00	5.90	19.657	883.19	5.90
100.00	5.90	19.657	883.19	5.90
110.00	5.90	19.657	883.19	5.90
120.00	5.90	19.657	883.19	5.90
130.00	5.90	19.657	883.19	5.90
140.00	5.90	19.657	883.19	5.90
150.00	5.90	19.657	883.19	5.90
160.00	5.90	19.657	883.19	5.90
170.00	5.90	19.657	883.19	5.90
180.00	5.90	19.657	883.19	5.90
190.00	5.90	19.657	883.19	5.90
200.00	5.90	19.657	883.19	5.90
210.00	5.90	19.657	883.19	5.90
220.00	5.90	19.657	883.19	5.90
230.00	5.90	19.657	883.19	5.90
240.00	5.90	19.657	883.19	5.90
250.00	5.90	19.657	883.19	5.90
260.00	5.90	19.657	883.19	5.90
270.00	5.90	19.657	883.19	5.90
280.00	5.90	19.657	883.19	5.90
290.00	5.90	19.657	883.19	5.90
300.00	5.90	19.657	883.19	5.90
310.00	5.90	19.657	883.19	5.90
320.00	5.90	19.657	883.19	5.90
330.00	5.90	19.657	883.19	5.90
340.00	5.90	19.657	883.19	5.90
350.00	5.90	19.657	883.19	5.90
360.00	5.90	19.657	883.19	5.90
370.00	5.90	19.657	883.19	5.90
380.00	5.90	19.657	883.19	5.90
390.00	5.90	19.657	883.19	5.90
400.00	5.90	19.657	883.19	5.90
410.00	5.90	19.657	883.19	5.90
420.00	5.90	19.657	883.19	5.90
430.00	5.90	19.657	883.19	5.90
440.00	5.90	19.657	883.19	5.90
450.00	5.90	19.657	883.19	5.90
460.00	5.90	19.657	883.19	5.90
470.00	5.90	19.657	883.19	5.90
480.00	5.90	19.657	883.19	5.90
490.00	5.90	19.657	883.19	5.90
500.00	5.90	19.657	883.19	5.90

Stage-Discharge for Pond 7P: Forebay

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
871.50	0.00	879.45	0.00
871.65	0.00	879.60	0.00
871.80	0.00	879.75	0.00
871.95	0.00	879.90	0.00
872.10	0.00	880.05	0.00
872.25	0.00	880.20	0.00
872.40	0.00	880.35	0.00
872.55	0.00	880.50	0.00
872.70	0.00	880.65	0.00
872.85	0.00	880.80	0.00
873.00	0.00	880.95	0.00
873.15	0.00	881.10	0.00
873.30	0.00	881.25	0.00
873.45	0.00	881.40	0.00
873.60	0.00	881.55	0.00
873.75	0.00	881.70	0.00
873.90	0.00	881.85	0.00
874.05	0.00	882.00	0.00
874.20	0.00	882.15	0.00
874.35	0.00	882.30	0.00
874.50	0.00	882.45	0.00
874.65	0.00	882.60	0.11
874.80	0.00	882.75	0.74
874.95	0.00	882.90	1.96
875.10	0.00	883.05	3.74
875.25	0.00	883.20	6.01
875.40	0.00	883.35	8.72
875.55	0.00	883.50	11.79
875.70	0.00	883.65	15.17
875.85	0.00	883.80	18.79
876.00	0.00	883.95	22.56
876.15	0.00	884.10	26.41
876.30	0.00	884.25	30.26
876.45	0.00	884.40	34.01
876.60	0.00	884.55	37.55
876.75	0.00	884.70	40.73
876.90	0.00	884.85	43.37
877.05	0.00	885.00	45.11
877.20	0.00	885.15	44.80
877.35	0.00	885.30	45.58
877.50	0.00	885.45	47.44
877.65	0.00	885.60	**49.23**
877.80	0.00	885.75	**50.04**
877.95	0.00	885.90	50.04
878.10	0.00	886.05	50.04
878.25	0.00	886.20	50.04
878.40	0.00	886.35	50.04
878.55	0.00	886.50	50.04
878.70	0.00		
878.85	0.00		
879.00	0.00		
879.15	0.00		
879.30	0.00		

Stage-Area-Storage for Pond 7P: Forebay

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
871.50	0.000	879.45	12.077
871.65	0.096	879.60	12.358
871.80	0.192	879.75	12.639
871.95	0.288	879.90	12.920
872.10	0.454	880.05	13.205
872.25	0.655	880.20	13.498
872.40	0.856	880.35	13.792
872.55	1.057	880.50	14.085
872.70	1.258	880.65	14.378
872.85	1.459	880.80	14.672
873.00	1.660	880.95	14.965
873.15	1.871	881.10	15.267
873.30	2.081	881.25	15.573
873.45	2.292	881.40	15.879
873.60	2.503	881.55	16.185
873.75	2.714	881.70	16.491
873.90	2.924	881.85	16.797
874.05	3.139	882.00	17.103
874.20	3.361	882.15	17.422
874.35	3.583	882.30	17.741
874.50	3.805	882.45	18.060
874.65	4.026	882.60	18.379
874.80	4.248	882.75	18.698
874.95	4.470	882.90	19.017
875.10	4.700	883.05	19.341
875.25	4.933	883.20	19.673
875.40	5.166	883.35	20.005
875.55	5.399	883.50	20.337
875.70	5.633	883.65	20.670
875.85	5.866	883.80	21.002
876.00	6.099	883.95	**21.334**
876.15	6.344	884.10	**21.445**
876.30	6.589	884.25	21.445
876.45	6.834	884.40	21.445
876.60	7.079	884.55	21.445
876.75	7.324	884.70	21.445
876.90	7.569	884.85	21.445
877.05	7.818	885.00	21.445
877.20	8.074	885.15	21.445
877.35	8.331	885.30	21.445
877.50	8.587	885.45	21.445
877.65	8.844	885.60	21.445
877.80	9.101	885.75	21.445
877.95	9.357	885.90	21.445
878.10	9.622	886.05	21.445
878.25	9.891	886.20	21.445
878.40	10.159	886.35	21.445
878.55	10.428	886.50	21.445
878.70	10.697		
878.85	10.965		
879.00	11.234		
879.15	11.515		
879.30	11.796		

Summary for Pond 8P: Retention Basin

Inflow Area = 60.090 ac, 56.73% Impervious, Inflow Depth > 51.83" for 100-yr event
Inflow = 28.02 cfs @ 11.85 hrs, Volume= 259.548 af
Outflow = 11.18 cfs @ 12.20 hrs, Volume= 258.919 af, Atten= 60%, Lag= 21.1 min
Primary = 11.18 cfs @ 12.20 hrs, Volume= 258.919 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs / 2
Starting Elev= 880.33' Surf.Area= 0.000 ac Storage= 16.121 af
Peak Elev= 880.89' @ 24.86 hrs Surf.Area= 0.000 ac Storage= 17.644 af (1.523 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 26.709 af (10.588 af above start)

Plug-Flow detention time= 1,941.3 min calculated for 242.798 af (94% of inflow)
Center-of-Mass det. time= 39.0 min (14,412.7 - 14,373.7)

Volume	Invert	Avail.Storage	Storage Description
#1	871.50'	26.709 af	**Custom Stage Data** Listed below

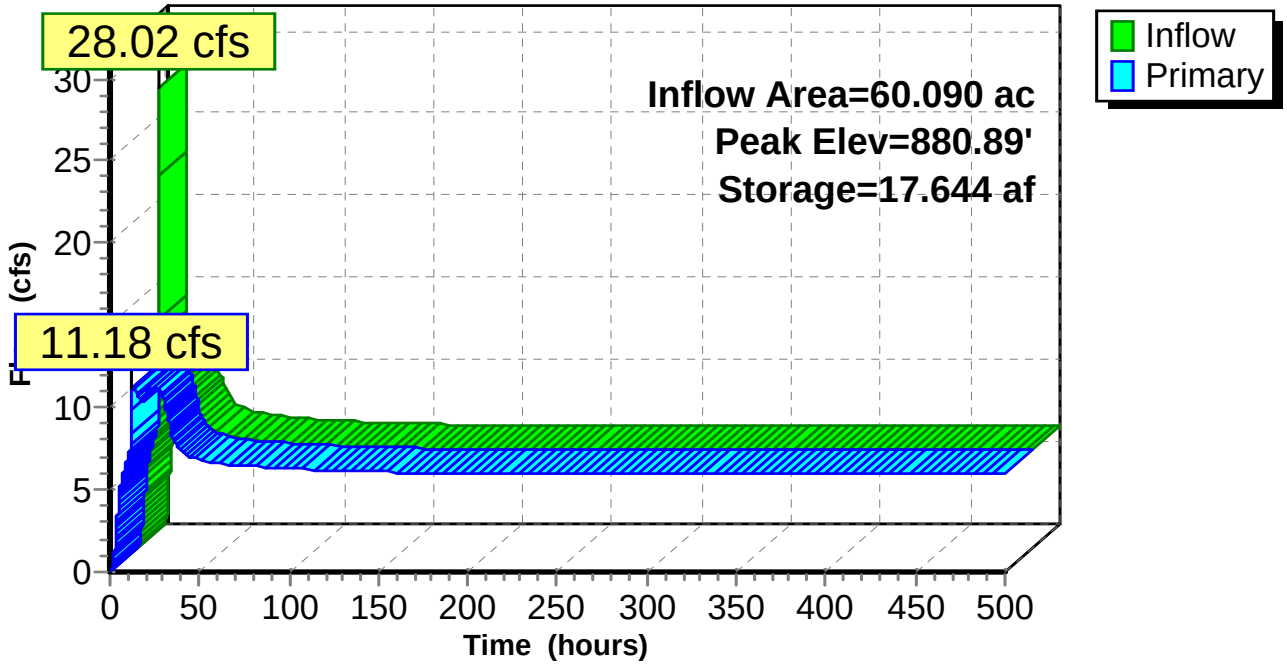
Elevation (feet)	Cum.Store (acre-feet)
871.50	0.000
872.00	0.463
873.00	1.970
874.00	3.561
875.00	5.235
876.00	6.996
877.00	8.445
878.00	10.783
879.00	12.736
880.00	15.226
881.00	17.938
882.00	20.756
883.00	23.679
884.00	26.709

Device	Routing	Invert	Outlet Devices
#1	Primary	874.00'	**Tube/Siphon/Float Valve** Discharges@874.00' 36.000" Diameter, C= 0.600 930.0' Long Tube, Hazen-Williams C= 130
#2	Device 1	880.33'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=11.18 cfs @ 12.20 hrs HW=880.83' TW=880.50' (TW follows 0.33' below HW)
↑—**1=Tube/Siphon/Float Valve** (Tube Controls 11.18 cfs @ 1.58 fps)
↑—**2=Orifice/Grate** (Passes 11.18 cfs of 16.58 cfs potential flow)

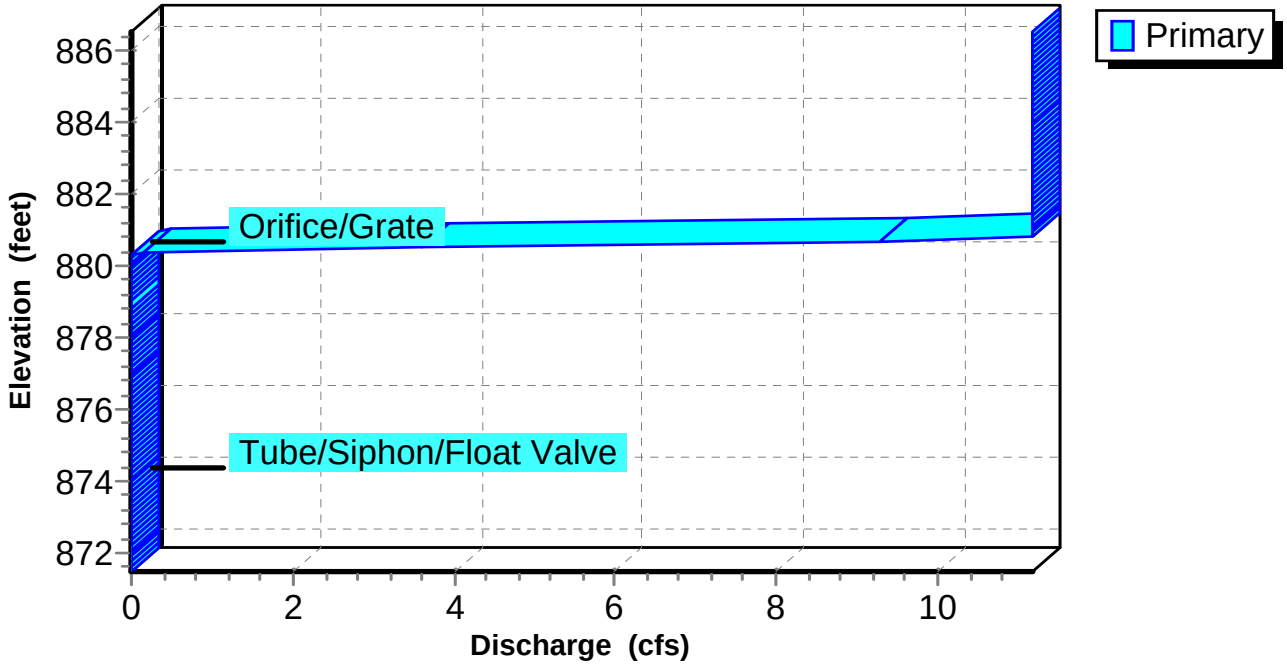
Pond 8P: Retention Basin

Hydrograph

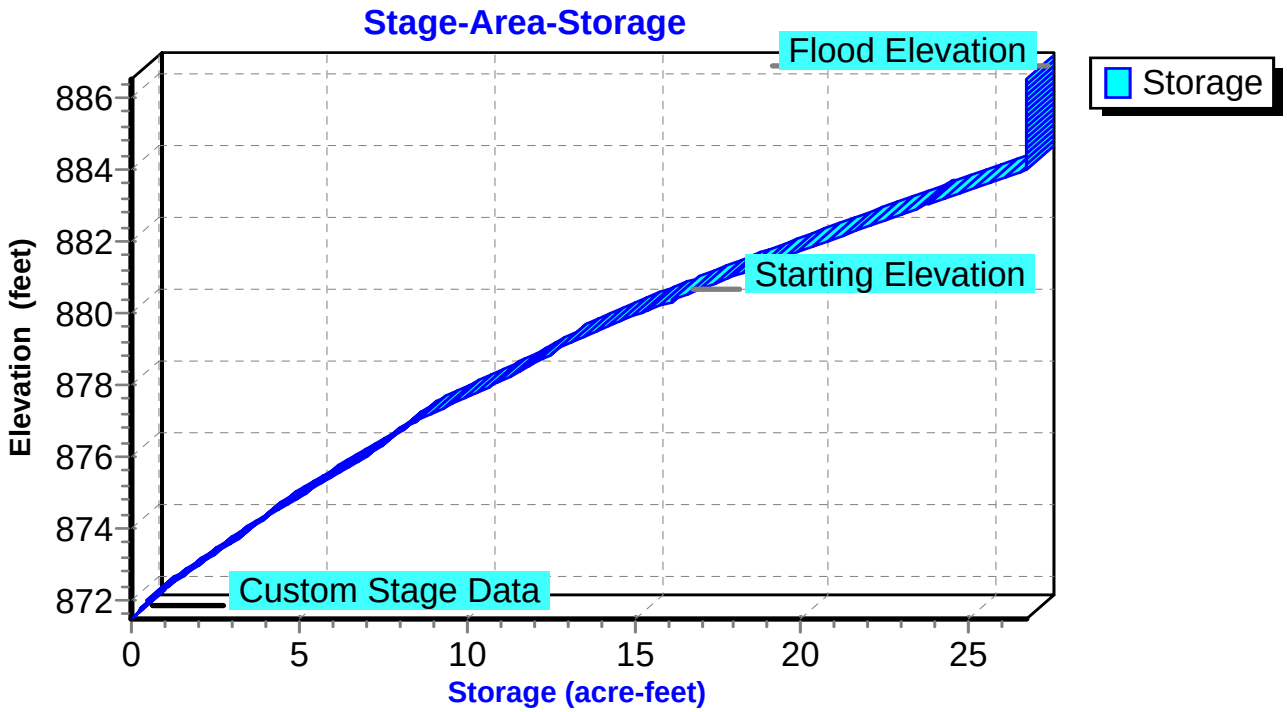


Pond 8P: Retention Basin

Stage-Discharge



Pond 8P: Retention Basin



Hydrograph for Pond 8P: Retention Basin

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.02	16.121	880.33	0.00
10.00	**7.08**	16.809	880.58	**6.79**
20.00	**11.78**	**17.329**	**880.78**	**10.87**
30.00	9.29	**17.249**	**880.75**	10.50
40.00	7.29	16.852	880.60	7.38
50.00	6.82	16.814	880.59	6.85
60.00	6.62	16.799	880.58	6.63
70.00	6.48	16.788	880.58	6.49
80.00	6.40	16.783	880.57	6.41
90.00	6.34	16.778	880.57	6.34
100.00	6.28	16.774	880.57	6.28
110.00	6.23	16.770	880.57	6.23
120.00	6.18	16.767	880.57	6.19
130.00	6.15	16.764	880.57	6.15
140.00	6.11	16.762	880.57	6.12
150.00	6.08	16.760	880.57	6.09
160.00	6.06	16.758	880.56	6.06
170.00	6.04	16.756	880.56	6.04
180.00	6.04	16.756	880.56	6.04
190.00	6.03	16.755	880.56	6.03
200.00	6.02	16.755	880.56	6.02
210.00	6.02	16.755	880.56	6.02
220.00	6.01	16.754	880.56	6.01
230.00	6.01	16.754	880.56	6.01
240.00	6.00	16.754	880.56	6.00
250.00	6.00	16.753	880.56	6.00
260.00	5.99	16.753	880.56	5.99
270.00	5.99	16.753	880.56	5.99
280.00	5.99	16.752	880.56	5.99
290.00	5.98	16.752	880.56	5.98
300.00	5.98	16.752	880.56	5.98
310.00	5.97	16.752	880.56	5.97
320.00	5.97	16.751	880.56	5.97
330.00	5.97	16.751	880.56	5.97
340.00	5.97	16.751	880.56	5.97
350.00	5.96	16.751	880.56	5.96
360.00	5.96	16.750	880.56	5.96
370.00	5.96	16.750	880.56	5.96
380.00	5.95	16.750	880.56	5.95
390.00	5.95	16.750	880.56	5.95
400.00	5.95	16.750	880.56	5.95
410.00	5.95	16.750	880.56	5.95
420.00	5.95	16.749	880.56	5.95
430.00	5.94	16.749	880.56	5.94
440.00	5.94	16.749	880.56	5.94
450.00	5.94	16.749	880.56	5.94
460.00	5.94	16.749	880.56	5.94
470.00	5.94	16.749	880.56	5.94
480.00	5.93	16.749	880.56	5.93
490.00	5.93	16.749	880.56	5.93
500.00	5.93	16.748	880.56	5.93

Stage-Discharge for Pond 8P: Retention Basin

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
871.50	0.00	879.45	0.00
871.65	0.00	879.60	0.00
871.80	0.00	879.75	0.00
871.95	0.00	879.90	0.00
872.10	0.00	880.05	0.00
872.25	0.00	880.20	0.00
872.40	0.00	880.35	0.15
872.55	0.00	880.50	3.60
872.70	0.00	880.65	**9.30**
872.85	0.00	880.80	**11.18**
873.00	0.00	880.95	11.18
873.15	0.00	881.10	11.18
873.30	0.00	881.25	11.18
873.45	0.00	881.40	11.18
873.60	0.00	881.55	11.18
873.75	0.00	881.70	11.18
873.90	0.00	881.85	11.18
874.05	0.00	882.00	11.18
874.20	0.00	882.15	11.18
874.35	0.00	882.30	11.18
874.50	0.00	882.45	11.18
874.65	0.00	882.60	11.18
874.80	0.00	882.75	11.18
874.95	0.00	882.90	11.18
875.10	0.00	883.05	11.18
875.25	0.00	883.20	11.18
875.40	0.00	883.35	11.18
875.55	0.00	883.50	11.18
875.70	0.00	883.65	11.18
875.85	0.00	883.80	11.18
876.00	0.00	883.95	11.18
876.15	0.00	884.10	11.18
876.30	0.00	884.25	11.18
876.45	0.00	884.40	11.18
876.60	0.00	884.55	11.18
876.75	0.00	884.70	11.18
876.90	0.00	884.85	11.18
877.05	0.00	885.00	11.18
877.20	0.00	885.15	11.18
877.35	0.00	885.30	11.18
877.50	0.00	885.45	11.18
877.65	0.00	885.60	11.18
877.80	0.00	885.75	11.18
877.95	0.00	885.90	11.18
878.10	0.00	886.05	11.18
878.25	0.00	886.20	11.18
878.40	0.00	886.35	11.18
878.55	0.00	886.50	11.18
878.70	0.00		
878.85	0.00		
879.00	0.00		
879.15	0.00		
879.30	0.00		

Stage-Area-Storage for Pond 8P: Retention Basin

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
871.50	0.000	879.45	13.857
871.65	0.139	879.60	14.230
871.80	0.278	879.75	14.604
871.95	0.417	879.90	14.977
872.10	0.614	880.05	15.362
872.25	0.840	880.20	15.768
872.40	1.066	880.35	16.175
872.55	1.292	880.50	16.582
872.70	1.518	880.65	16.989
872.85	1.744	880.80	17.396
873.00	1.970	880.95	17.802
873.15	2.209	881.10	18.220
873.30	2.447	881.25	18.643
873.45	2.686	881.40	19.065
873.60	2.925	881.55	19.488
873.75	3.163	881.70	19.911
873.90	3.402	881.85	20.333
874.05	3.645	882.00	20.756
874.20	3.896	882.15	21.194
874.35	4.147	882.30	21.633
874.50	4.398	882.45	22.071
874.65	4.649	882.60	22.510
874.80	4.900	882.75	22.948
874.95	5.151	882.90	23.387
875.10	5.411	883.05	23.830
875.25	5.675	883.20	24.285
875.40	5.939	883.35	24.740
875.55	6.204	883.50	25.194
875.70	6.468	883.65	25.648
875.85	6.732	883.80	26.103
876.00	6.996	883.95	**26.558**
876.15	7.213	884.10	**26.709**
876.30	7.431	884.25	26.709
876.45	7.648	884.40	26.709
876.60	7.865	884.55	26.709
876.75	8.083	884.70	26.709
876.90	8.300	884.85	26.709
877.05	8.562	885.00	26.709
877.20	8.913	885.15	26.709
877.35	9.263	885.30	26.709
877.50	9.614	885.45	26.709
877.65	9.965	885.60	26.709
877.80	10.315	885.75	26.709
877.95	10.666	885.90	26.709
878.10	10.978	886.05	26.709
878.25	11.271	886.20	26.709
878.40	11.564	886.35	26.709
878.55	11.857	886.50	26.709
878.70	12.150		
878.85	12.443		
879.00	12.736		
879.15	13.109		
879.30	13.483		

Summary for Pond 9P: Old Ash Pond

Inflow Area = 27.360 ac,100.00% Impervious, Inflow Depth = 4.76" for 100-yr event
Inflow = 137.22 cfs @ 11.84 hrs, Volume= 10.860 af
Outflow = 1.83 cfs @ 19.93 hrs, Volume= 10.227 af, Atten= 99%, Lag= 485.5 min
Primary = 1.83 cfs @ 19.93 hrs, Volume= 10.227 af

Routing by Stor-Ind method, Time Span= 0.00-500.00 hrs, dt= 0.20 hrs
Starting Elev= 881.50' Surf.Area= 0.000 ac Storage= 118.482 af
Peak Elev= 882.15' @ 19.93 hrs Surf.Area= 0.000 ac Storage= 127.641 af (9.159 af above start)
Flood Elev= 886.50' Surf.Area= 0.000 ac Storage= 153.954 af (35.472 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 5,504.9 min (6,244.3 - 739.3)

Volume	Invert	Avail.Storage	Storage Description
#1	868.00'	153.954 af	**Custom Stage Data** Listed below

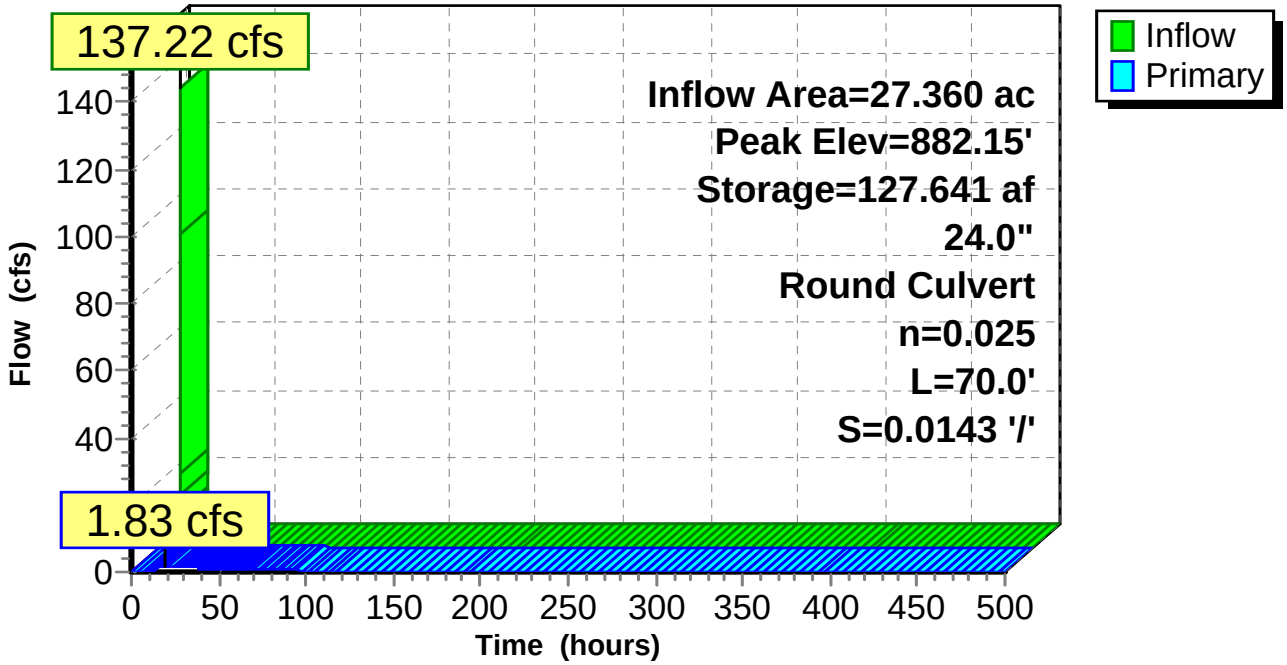
Elevation (feet)	Cum.Store (acre-feet)
868.00	0.000
869.00	0.912
870.00	1.089
871.00	5.537
872.00	13.143
873.00	22.784
874.00	34.019
875.00	46.023
876.00	58.522
877.00	71.294
878.00	84.273
879.00	96.397
880.00	97.727
881.00	111.501
882.00	125.463
883.00	139.613
884.00	153.954

Device	Routing	Invert	Outlet Devices
#1	Primary	881.50'	**24.0" Round Culvert** L= 70.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 881.50' / 880.50' S= 0.0143 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf

Primary OutFlow Max=1.80 cfs @ 19.93 hrs HW=882.15' TW=880.98' (TW follows 1.17' below HW)
↑—**1=Culvert** (Barrel Controls 1.80 cfs @ 3.02 fps)

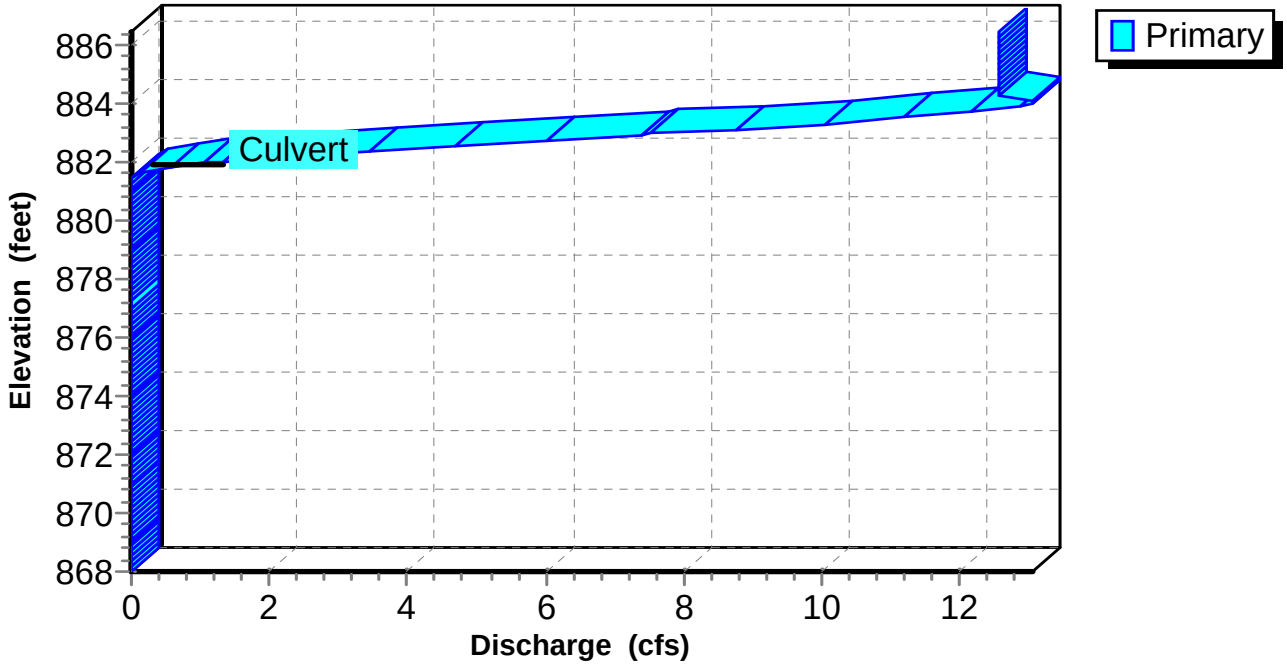
Pond 9P: Old Ash Pond

Hydrograph

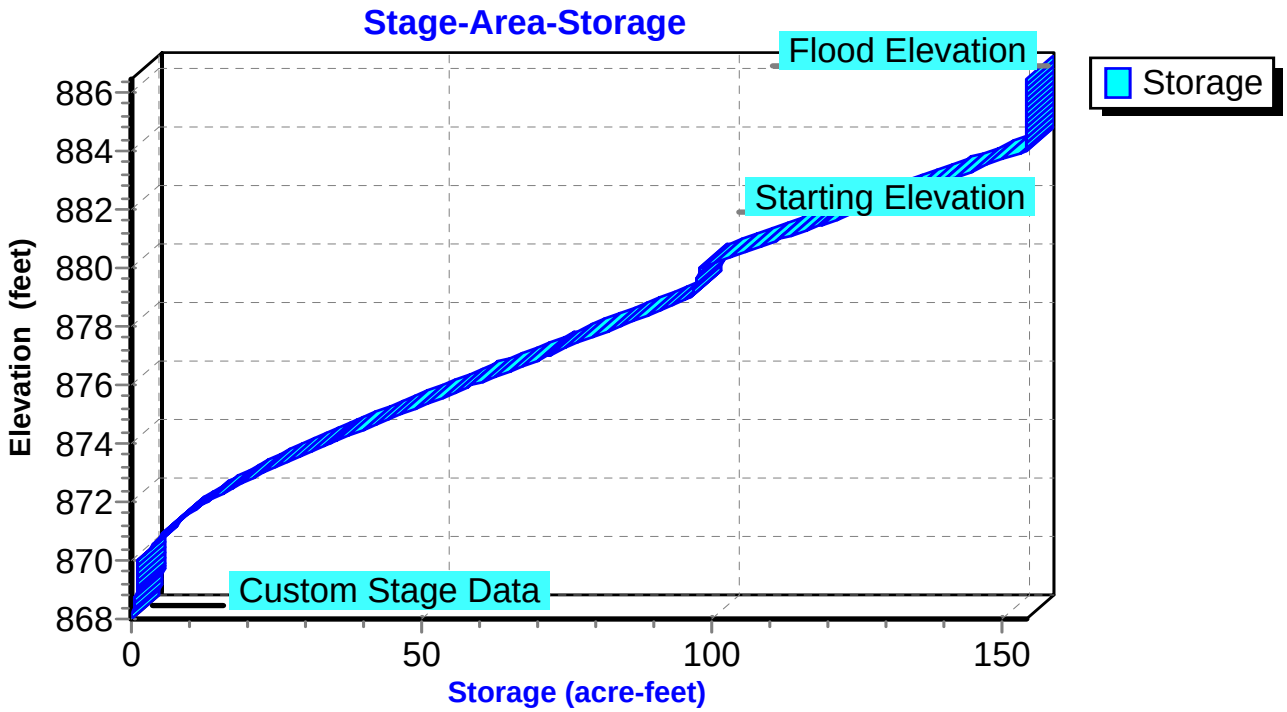


Pond 9P: Old Ash Pond

Stage-Discharge



Pond 9P: Old Ash Pond



Hydrograph for Pond 9P: Old Ash Pond

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	118.482	881.50	0.00
10.00	**5.30**	120.051	881.61	0.08
20.00	**1.80**	**127.641**	**882.15**	**1.83**
30.00	0.00	126.771	882.09	1.50
40.00	0.00	125.695	882.02	1.13
50.00	0.00	124.862	881.96	0.90
60.00	0.00	124.195	881.91	0.72
70.00	0.00	123.662	881.87	0.58
80.00	0.00	123.214	881.84	0.50
90.00	0.00	122.826	881.81	0.44
100.00	0.00	122.490	881.79	0.38
110.00	0.00	122.198	881.77	0.33
120.00	0.00	121.946	881.75	0.28
130.00	0.00	121.727	881.73	0.25
140.00	0.00	121.538	881.72	0.21
150.00	0.00	121.374	881.71	0.18
160.00	0.00	121.232	881.70	0.16
170.00	0.00	121.108	881.69	0.14
180.00	0.00	120.994	881.68	0.14
190.00	0.00	120.884	881.67	0.13
200.00	0.00	120.780	881.66	0.12
210.00	0.00	120.680	881.66	0.12
220.00	0.00	120.585	881.65	0.11
230.00	0.00	120.494	881.64	0.11
240.00	0.00	120.407	881.64	0.10
250.00	0.00	120.324	881.63	0.10
260.00	0.00	120.244	881.63	0.09
270.00	0.00	120.168	881.62	0.09
280.00	0.00	120.096	881.62	0.09
290.00	0.00	120.027	881.61	0.08
300.00	0.00	119.961	881.61	0.08
310.00	0.00	119.898	881.60	0.07
320.00	0.00	119.837	881.60	0.07
330.00	0.00	119.780	881.59	0.07
340.00	0.00	119.725	881.59	0.07
350.00	0.00	119.672	881.59	0.06
360.00	0.00	119.622	881.58	0.06
370.00	0.00	119.574	881.58	0.06
380.00	0.00	119.528	881.57	0.05
390.00	0.00	119.484	881.57	0.05
400.00	0.00	119.443	881.57	0.05
410.00	0.00	119.403	881.57	0.05
420.00	0.00	119.365	881.56	0.05
430.00	0.00	119.328	881.56	0.04
440.00	0.00	119.293	881.56	0.04
450.00	0.00	119.260	881.56	0.04
460.00	0.00	119.228	881.55	0.04
470.00	0.00	119.198	881.55	0.04
480.00	0.00	119.169	881.55	0.03
490.00	0.00	119.141	881.55	0.03
500.00	0.00	119.115	881.55	0.03

Stage-Discharge for Pond 9P: Old Ash Pond

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
868.00	0.00	878.60	0.00
868.20	0.00	878.80	0.00
868.40	0.00	879.00	0.00
868.60	0.00	879.20	0.00
868.80	0.00	879.40	0.00
869.00	0.00	879.60	0.00
869.20	0.00	879.80	0.00
869.40	0.00	880.00	0.00
869.60	0.00	880.20	0.00
869.80	0.00	880.40	0.00
870.00	0.00	880.60	0.00
870.20	0.00	880.80	0.00
870.40	0.00	881.00	0.00
870.60	0.00	881.20	0.00
870.80	0.00	881.40	0.00
871.00	0.00	881.60	0.04
871.20	0.00	881.80	0.37
871.40	0.00	882.00	1.06
871.60	0.00	882.20	2.06
871.80	0.00	882.40	3.25
872.00	0.00	882.60	4.59
872.20	0.00	882.80	6.03
872.40	0.00	883.00	7.50
872.60	0.00	883.20	8.95
872.80	0.00	883.40	10.32
873.00	0.00	883.60	11.54
873.20	0.00	883.80	12.50
873.40	0.00	884.00	**13.05**
873.60	0.00	884.20	**12.54**
873.80	0.00	884.40	12.54
874.00	0.00	884.60	12.54
874.20	0.00	884.80	12.54
874.40	0.00	885.00	12.54
874.60	0.00	885.20	12.54
874.80	0.00	885.40	12.54
875.00	0.00	885.60	12.54
875.20	0.00	885.80	12.54
875.40	0.00	886.00	12.54
875.60	0.00	886.20	12.54
875.80	0.00	886.40	12.54
876.00	0.00		
876.20	0.00		
876.40	0.00		
876.60	0.00		
876.80	0.00		
877.00	0.00		
877.20	0.00		
877.40	0.00		
877.60	0.00		
877.80	0.00		
878.00	0.00		
878.20	0.00		
878.40	0.00		

Stage-Area-Storage for Pond 9P: Old Ash Pond

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
868.00	0.000	878.60	91.547
868.20	0.182	878.80	93.972
868.40	0.365	879.00	96.397
868.60	0.547	879.20	96.663
868.80	0.730	879.40	96.929
869.00	0.912	879.60	97.195
869.20	0.947	879.80	97.461
869.40	0.983	880.00	97.727
869.60	1.018	880.20	100.482
869.80	1.054	880.40	103.237
870.00	1.089	880.60	105.991
870.20	1.979	880.80	108.746
870.40	2.868	881.00	111.501
870.60	3.758	881.20	114.293
870.80	4.647	881.40	117.086
871.00	5.537	881.60	119.878
871.20	7.058	881.80	122.671
871.40	8.579	882.00	125.463
871.60	10.101	882.20	128.293
871.80	11.622	882.40	131.123
872.00	13.143	882.60	133.953
872.20	15.071	882.80	136.783
872.40	16.999	883.00	139.613
872.60	18.928	883.20	142.481
872.80	20.856	883.40	145.349
873.00	22.784	883.60	148.218
873.20	25.031	883.80	151.086
873.40	27.278	884.00	**153.954**
873.60	29.525	884.20	153.954
873.80	31.772	884.40	153.954
874.00	34.019	884.60	153.954
874.20	36.420	884.80	153.954
874.40	38.821	885.00	153.954
874.60	41.221	885.20	153.954
874.80	43.622	885.40	153.954
875.00	46.023	885.60	153.954
875.20	48.523	885.80	153.954
875.40	51.023	886.00	153.954
875.60	53.522	886.20	153.954
875.80	56.022	886.40	153.954
876.00	58.522		
876.20	61.076		
876.40	63.631		
876.60	66.185		
876.80	68.740		
877.00	71.294		
877.20	73.890		
877.40	76.486		
877.60	79.081		
877.80	81.677		
878.00	84.273		
878.20	86.698		
878.40	89.123		

ATTACHMENT 6
CONSTRUCTION SPECIFICATIONS

LANSING BOARD OF WATER & LIGHT
ERICKSON STATION ASH POND RECONFIGURATION

Foundation Preparation

1.0 Scope

1.1 The work consists of the preparation of a level foundation for the construction of the reconfigured ash pond (POND).

1.2 Earthfill is composed of natural earth materials that can be placed and compacted by construction equipment operated in a conventional manner.

1.3 Earth backfill is composed of natural arth material placed and compacted in confined spaces or adjacent to structures (including pipes) by hand tamping, manually directed power tampers or vibrating plates, o their equivalent.

2.0 Material

2.1 All fill material shall be obtain d from pre-approved borrow sources. The selection, ble ding, routing, and disposition of material in the arious fills shall be subject to approval by the SITE ENGINEER.

2.2 Fill materials shall contain no frozen soil, sod, brush, roots, or other erishable material. Rock particles larger than the maximum size specified for each type of fill shall be removed prior to compa tion of the fill.

2.3 The types of material used in the various fills shall be as listed and described in the specifications and drawings.

3.0 Pre-Construction Operations

3.1 Dewater the foundation area for the reconfigured ash pond (POND) depicted on Sheets 1 and 2:

3.1.1 Furnish, install, operate and remove dewatering equipment necessary to drain and keep POND foundation area and associated excavations free of water under all circumstances.

3.1.2 Prevent surface water from flowing into excavations and promptly remove any accumulated water.

3.1.3 Where appropriate, dewatering equipment shall remain in-place until construction work below the ground water table is complete.

3.2 Relocate the temporary ash pond to area designated on Sheet

3.2 Re-route the plant sump effluent piping to connect with existing Hydro-Bin temporary discharge piping.

3.2.1 To facilitate the connection to the Hydro-Bin effluent piping, the plant sump effluent plumbing must be re-directed to the northeast along the north side of the access road, as depicted on Sheet 1.

3.2.2 The sump piping is to penetrate the road/pond embankment at the appr ximate location identified on Sheet 1. The pipe penetration shall consist of a trench 4-6 feet deep and at least 36 inches wide. Compacted sand shall be placed ver the trench base to a depth of at least 6 inches. pe shall be placed over compacted sand base layer. Compacted sand shall be placed to a minimum pth of 6 inches above top of pipe. Earthfill deemed uitable by the engineer shall be backfilled compacted to the surface elevation of the embankment.

4.0 Pond Foundation Preparation

4.1 Except as ot erwise specified, the POND foundation area designated on Sheet 2 shall be graded to remove surface irregularities and to establish a level elevation of 871.5 feet NGVD.

4.1.1 The foundation area shall be stripped to remove vegetation, coal ash and other unsuitable material. Strip topsoil, vegetation and other objectionable material to a minimum depth of 6 inches. Dispose residual ash. Stockpile clean topsoil in areas designated on Sheet 1 for potential use for subsequent construction activities.

4.1.2 Excavate soil in the Cut areas identified on Sheet 3 to an elevation of 871.5 feet NGVD.

4.1.3 Scrape 6 inches of pond footprint in the Fill areas identified on Sheet 3 areas to remove residual ash, verify foundation conditions and scarify ground surface to facilitate bond for backfill. Dispose residual ash. Stockpile excavated soil in areas designated on Sheet 1.

4.1.4 The SITE ENGINEER shall inspect and approve the structural competence of the exposed Cut and Fill surfaces prior to scarification or placement of any backfill.

4.1.5 Upon approval by SITE ENGINEER, Cut and Fill areas that are deemed competent to support compaction equipment shall be scarified to a depth of 2 inches and compacted to within 95% of the maximum dry density of the foundation soils, as determined by the SITE ENGINEER.

4.1.6 Place backfill in the Fill areas designated on Sheet 3 to achieve a level surface elevation of 871.5 feet NGVD. Initial lifts of backfill shall be shall be placed within Fill areas of lowest elevations. Backfill lifts shall be no greater than 8 inches in thickness uncompacted and must be parallel to the target foundation surface. Backfill shall be compacted to within 95% of the maximum dry density of the backfill, as determined by the SITE ENGINEER. Backfill layers shall be continuously manipulated to provide uniform layers approximately parallel to the finished grade.

4.1.7 After stripping and cut and fill operations have resulted in a contiguous level surface, the foundation shall be scarified parallel to the axis of the placement of fill material or otherwise acceptably scored and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the backfill, and the surface material of the foundation shall be compacted and bonded with the first layer of backfill to within 95% of the maximum dry density of the backfill, as determined by the SITE ENGINEER.

4.1.8 Excavate cut-off trenches along the alignments and to the specifications designated on Sheet 2. Stockpile acceptable excavated materials in areas designated on Sheet 1.

4.1.9 Ensure that cut-off trenches are adequately dewatered to facilitate placement and compaction of designated backfill to within 95% of the maximum dry density of the material, as determined by SITE ENGINEER.

ATTACHMENT 7
TYPICAL BWL WEEKLY INSPECTION REPORT

LBWL - WEEKLY INSPECTION REPORT - CCR SURFACE IMPOUNDMENT SYSTEM

Name:	ROBERT L. ALLEN	**Weather:**	SUNNY 43°
Date & Time:	3-5-20 1210	**Site Conditions:**	

If you answer "Yes" to any of the following questions, describe and call Environmental Services.

I. SURFACE IMPOUNDMENT

Description	Forebay Yes	Forebay No	Forebay Not Visible	Retention Basin Yes	Retention Basin No	Retention Basin Not Visible	Clearwater Pond Yes	Clearwater Pond No	Clearwater Pond Not Visible
1. Is there any erosion around the impoundment?		X				X		X	
2. Is there excessive CCR (ash) build-up above the water surface?		X				X		X	

II. CREST

Forebay	Retention Basin	Clearwater Pond
1. Describe vegetation on the crest: ☒ Sparse ☐ Good cover ☐ Overgrown (taller than 6-inches) ☐ Rip Rap ☐ Gravel ☐ Other (describe):	1. Describe vegetation on the crest: ☒ Sparse ☐ Good cover ☐ Overgrown (taller than 6-inches) ☐ Rip Rap ☐ Gravel ☐ Other (describe):	1. Describe vegetation on the crest: ☒ Sparse ☐ Good cover ☐ Overgrown (taller than 6-inches) ☐ Rip Rap ☐ Gravel ☐ Other (describe):

Description	Forebay Yes	Forebay No	Forebay Not Visible	Retention Basin Yes	Retention Basin No	Retention Basin Not Visible	Clearwater Pond Yes	Clearwater Pond No	Clearwater Pond Not Visible
2. Any trees or undesired vegetation on crest?		X				X		X	
3. Any depressions, cracks, animal burrows, ruts, or holes on crest?		X				X		X	

III. SLOPES – ABOVE THE WATER LEVEL

Forebay	Retention Basin	Clearwater Pond
1. Describe vegetation on the slope: ☒ Sparse ☐ Good cover ☐ Overgrown (taller than 6-inches) ☐ Rip Rap ☐ Gravel ☐ Other (describe):	1. Describe vegetation on the slope: ☒ Sparse ☐ Good cover ☐ Overgrown (taller than 6-inches) ☐ Rip Rap ☐ Gravel ☐ Other (describe):	1. Describe vegetation on the slope: ☒ Sparse ☐ Good cover ☐ Overgrown (taller than 6-inches) ☐ Rip Rap ☐ Gravel ☐ Other (describe):

Description	Forebay Yes	Forebay No	Forebay Not Visible	Retention Basin Yes	Retention Basin No	Retention Basin Not Visible	Clearwater Pond Yes	Clearwater Pond No	Clearwater Pond Not Visible
2. Any depressions, cracks, animal burrows, ruts, or holes?		X				X		X	
3. Above the water level, are there any cracks, evidence of erosion, sloughs or indication of slope distress?		X				X		X	

IV. EXTERIOR SLOPES

Forebay	Retention Basin	Clearwater Pond
1. Describe vegetation on the slope: ☒ Sparse ☐ Good cover ☐ Overgrown (taller than 6-inches) ☐ Rip Rap ☐ Gravel ☐ Other (describe):	1. Describe vegetation on the slope: ☒ Sparse ☐ Good cover ☐ Overgrown (taller than 6-inches) ☐ Rip Rap ☐ Gravel ☐ Other (describe):	1. Describe vegetation on the slope: ☒ Sparse ☐ Good cover ☐ Overgrown (taller than 6-inches) ☐ Rip Rap ☐ Gravel ☐ Other (describe):

Description	Forebay Yes	Forebay No	Forebay Not Visible	Retention Basin Yes	Retention Basin No	Retention Basin Not Visible	Clearwater Pond Yes	Clearwater Pond No	Clearwater Pond Not Visible
2. Any areas of water-loving, (ex. cattails, grasses, etc.) vegetation?		X				X		X	
3. Any depressions, bulges, holes, animal burrows, or erosion on slope?		X				X		X	

4. Are there any cracks, sloughs or indication of slope distress?		X			X			X			
5. Do any wet areas indicate potential seepage through the dike?		X			X			X			
6. Are there any active seeps (flowing water) from the **slope or toe** of the dike? If yes, describe area, location, flow quantity, color etc.		X			X			X			

V. INLET AND OUTLET STRUCTURES

1. What is the ESTIMATED free water level in the surface impoundment today?

Forebay	Retention Basin	Clearwater Pond
Design Water Level: 100.5 ft gauge / 882.5 ft. X At Design Water Level ___ Above Design Water Level ___ Below Design Water Level	Design Water Level: 99.5 ft gauge/880.5 ft. X At Design Water Level ___ Above Design Water Level ___ Below Design Water Level	Design Water Level: 99 ft gauge / 880.0 ft. X At Design Water Level ___ Above Design Water Level ___ Below Design Water Level
2. How would you describe the overall condition of the inlet structures? ☒ Functioning Normally ☐ Not Functional ☐ Deteriorated ☐ Damaged ☐ Not Visible ☐ Other (describe):	2. How would you describe the overall condition of the inlet structures? ☒ Functioning Normally ☐ Not Functional ☐ Deteriorated ☐ Damaged ☐ Not Visible ☐ Other (describe):	2. How would you describe the overall condition of the inlet structures? ☒ Functioning Normally ☐ Not Functional ☐ Deteriorated ☐ Damaged ☐ Not Visible ☐ Other (describe):
3. How would you describe the overall condition of the outlet structures? ☒ Functioning Normally ☐ Not Functional ☐ Deteriorated ☐ Damaged ☐ Not Visible ☐ Other (describe):	3. How would you describe the overall condition of the outlet structures? ☒ Functioning Normally ☐ Not Functional ☐ Deteriorated ☐ Damaged ☐ Not Visible ☐ Other (describe):	3. How would you describe the overall condition of the outlet structures? ☐ Functioning Normally ☐ Not Functional ☐ Deteriorated ☐ Damaged ☒ Not Visible ☐ Other (describe):
4. If observable, describe any discharge from the outlet structure (turbidity, depth, etc.):	4. If observable, describe any discharge from the outlet structure (turbidity, depth, etc.):	4. If observable, describe any discharge from the outlet structure (turbidity, depth, etc.):
5. Is there evidence of damage, erosion, or obstruction around the **INLET** and **OUTLET** structures? If yes, describe: ☐ Yes ☒ No ☐ Not Visible	5. Is there evidence of damage, erosion, or obstruction around the **INLET** and **OUTLET** structures? If yes, describe: ☐ Yes ☐ No ☐ Not Visible	5. Is there evidence of damage, erosion, or obstruction around the **INLET** and **OUTLET** structures? If yes, describe: ■ Yes ■ No ■ Not Visible

VI. NOTES

ITEM	Description/Location

✓ RLA

VII. PHOTOGRAPHS – HAS ENVIRONMENTAL SERVICES TAKEN PHOTOGRAPHS DURING THE QUARTER? (AT A MINIMUM ON A QUARTERLY BASIS AND WHENEVER NEEDED TO DOCUMENT ISSUES)

At a minimum, photographs should be taken of the crest, interior and exterior slopes, and any other notable features.