Submitted to
Southern Indiana
Gas & Electric Company
dba Vectren Power
Supply, Inc. (SIGECO)
One Vectren Square
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Submitted by
AECOM
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April 17, 2018

CCR Certification:
Initial Inflow Design Flood Control System Plan
§257.82
for the
West Ash Pond
at the
F.B. Culley Generating Station
Revision 0

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Appendices

Executive Summary

This Coal Combustion Residuals (CCR) Initial Inflow Design Flood Control System Plan (Inflow Flood Control Plan) for the West Ash Pond at the Southern Indiana Gas & Electric Company, dba Vectren Power Supply, Inc. F.B. Culley Generating Station has been prepared in accordance with the requirements specified in the USEPA CCR Rule under 40 Code of Federal Regulations CFR §257.82 (e). These regulations require that the specified documentation, assessments and plans for an inactive CCR surface impoundment be prepared by April 17, 2018, in accordance with 40 CFR §257.100(e).

This Inflow Flood Control Plan meets the regulatory requirements as summarized in **Table ES-1.**

Table ES-1 – Certification Summary				
Report Section	**CCR Rule Reference**	**Requirement Summary**	**Requirement Met?**	**Comments**
Initial Inflow Design Flood Control System Plan				
4.1	§257.82 (a)(1)	*Adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood*	Yes	CCR unit has the storage capacity to handle the inflow design flood
4.2	§257.82 (a)(2)	*Adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood*	Yes	The pond has adequate capacity to contain 1,000-year 24-hour storm with or without operational outlet pumps.
4.3	§257.82 (a)(3)	*Required Inflow design flood for Significant Hazard Potential Impoundment*	Yes	Inflow design flood utilized was the 1,000-year event
4.4	§257.82 (b)	*Discharge handled in accordance with* §257.3 – 3	Yes	CCR unit discharges in accordance with the existing NPDES permit

The West Ash Pond is considered to be a significant hazard potential CCR surface impoundment, therefore per §257.82 (a)(3), the inflow design flood is the 1,000-year flood. In accordance with the requirements of §257.82 (a)(3), an Inflow Flood Control Plan was developed for the West Ash Pond. This was accomplished by evaluating the effects of a 24-hour duration design storm for the 1,000-year Inflow Design Flood (IDF) to evaluate the West Ash Pond's ability to collect and control the 1,000-year IDF of 10.2 inches, under existing operational and maintenance procedures. The West Ash Pond has one outlet, a 10-inch HDPE discharge pipe from the West Ash Pond pump station to the East Ash Pond, which ultimately discharges to the Ohio River through a permitted National Pollutant Discharge Elimination System (NPDES) outfall. The West Ash Pond pump station includes a network of two pumps, which at lower elevations are supported by a localized temporary sump pump containing a small trash pump, which works to keep the water elevation within the pond at elevation 370. To simulate the worst case scenario for certification, the analysis was completed with no localized pumps running in the West Ash Pond as if there was a malfunction or power outage rendering the pumps inactive. Therefore, the West Ash Pond would be required to collect and store the 1,000-year IDF. The results of the modeling for the West Ash Pond indicate that the CCR unit has sufficient storage capacity and outlet structures to adequately manage inflows and collect and control outflows during peak discharge conditions created by the 1,000-year IDF.

1 Introduction

1.1 Purpose of This Report

The purpose of the Initial Inflow Design Flood Control System Plan (Inflow Flood Control Plan) is to document that the requirements specified in 40 Code of Federal Regulations (CFR) §257.82 have been met to support the certification required under each of the applicable regulatory provisions for the F.B. Culley Generating Station (Culley) West Ash Pond. The West Ash Pond is an inactive Coal Combustion Residuals (CCR) surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that the Inflow Flood Control Plan for an inactive CCR surface impoundment be prepared by April 17, 2018.

The West Ash Pond has been evaluated to determine whether the inflow design flood control system requirements are met. The following table summarizes the documentation required within the CCR Rule and the sections that specifically respond to those requirements of this plan.

Table 1-1 – CCR Rule Cross Reference Table		
Report Section	**Title**	**CCR Rule Reference**
4.1	Inflow Analysis	§257.82 (a)(1)
4.2	Outflow Analysis	§257.82 (a)(2)
4.3	Inflow Design Flood	§257.82 (a)(3)
4.4	Discharge handled in accordance with *§257.3 – 3*	§257.82 (b)

Analyses completed for the hydrologic and hydraulic assessments of the West Ash Pond are described in this report. Data and analyses results in the following sections are based on aerial and topographic surveys and information about operational and maintenance procedures provided by Southern Indiana Gas & Electric Company, dba Vectren Power Supply, Inc. (SIGECO), and limited field measurements collected by AECOM. The analysis approach and results of the hydrologic and hydraulic analyses presented in the following sections were used by AECOM to confirm that the West Ash Pond meets the hydrologic and hydraulic capacity requirements of the rules referenced above for CCR surface impoundments.

1.2 Brief Description of Impoundment

The Culley station is located in Warrick County, Indiana, southeast of Newburgh, Indiana, and is owned and operated by Southern Indiana Gas and Electric Company, dba Vectren Power Supply Inc. (SIGECO). The Culley station is located along the north bank of the Ohio River and the west bank of the Little Pigeon Creek. Culley has two CCR surface impoundments, identified as the West Ash Pond and the East Ash Pond. The West Ash Pond is inactive and no longer receives CCR materials while the East Ash Pond actively receives CCR materials. This Closure Plan has been developed only for the West Ash Pond. The West Ash Pond is located west of the coal storage pile and is approximately 32 acres in size.

Original design plans indicate that this pond was constructed in the 1950's by placing fill along the south side (i.e., adjacent to the Ohio River) and the east side, and tying into existing high ground at the north and west sides. Bottom elevation of the pond was set approximately at 365' but followed the natural topography and gradually increased in elevation as the pond extended north. The Little Pigeon Creek originally coursed through the footprint of the West Ash Pond before being re-routed east of the Culley Station at the time of the original construction in the 1950's. As such, portions of the east and west embankments of the West Ash Pond extend to the bottom of the creek bed which is at an approximate elevation of 340'. The top of the embankment was constructed to an approximate elevation of 393' with a small portion in the northeast corner extending to an elevation of 402'. Interior side slopes of the pond vary, but original design documents indicate that the slopes are 2H:1V along the south embankment and 2.5H:1V on the east and west embankments. The original construction drawings indicated that the sub-base of the pond was composed of native soils.

Current conditions of the south embankment at the West Ash Pond indicate that the crest of the south embankment is approximately 40' wide and is covered with crushed stone that forms the existing gravel access road and is in good condition. The interior riprap lined slope is sparsely vegetated with brush and weeds and is relatively steep. The exterior slope is mostly covered with riprap and concrete rubble, with brush and trees encroaching upon the toe of the existing slope. Based upon topographic mapping provided, the exterior slope of the embankment varies between approximate slopes of 2.5H:1V to 1.9H:1V. The normal pool elevation in the West Ash Pond was previously maintained at an operating level of 390' by a pump station that conveys water from the West Ash Pond to the East Ash Pond. However, as of January, 2016, Vectren began passive dewatering measures in the West Ash Pond and has maintained the water level at approximately 370' since the fall of 2017 by using a localized sump in conjunction with the adjacent pump station and discharging all flow to the East Ash Pond. It is Vectren's stated intent that they plan on maintaining this lower water level until closure construction has been initiated.

A site Location Map showing the area surrounding the station is in **Figure 1** of **Appendix A**. **Figure 2** in **Appendix A** presents the F.B. Culley Generating Station Site Map.

1.2.1 Inflow from Plant Operations and Stormwater Runoff

While the West Ash Pond no longer receives CCR materials, during its active operation, it received a combination of fly ash and bottom ash that was generated at the FB Culley Generating Station. Current discharges to the West Ash Pond consist of stormwater runoff and contact stormwater flows. Stormwater runoff consists of runoff from the operating plant, parking areas and green spaces adjacent to the north area of the Culley Station. Contact stormwater flows consist of stormwater that has contacted non-CCR materials (e.g., coal pile) and associate areas and may contain trace levels of non-CCR contamination. Base flows into the West Ash Pond are approximately 0.144 million gallons per day (MGD), or 0.26 cubic feet per second (cfs). The water is discharged from the impoundment via pump station to the East Ash Pond and eventually to the Ohio River through NPDES permitted Outfall 001.

The total drainage area to the West Ash Pond impoundment is approximately 72.30 acres.

1.2.2 Outlet Structure

Water discharges from a localized temporary sump pump used to maintain the water level at approximately 370'. The temporary pump is a submersible drainage pump model J54, 880 gpm, manufactured by ABS that discharges to the existing pump station located on the south side of the West Ash Pond along the existing access road.

2 Hydrologic Analysis

The pond pump station consists of two, CS 3170-460-603 model 5,400 gpm submersible pumps manufactured by Flygt. The two pump station pumps connect to a single 10" HDPE discharge pipe that discharges to the East Ash Pond. The East Ash Pond, which collects process water and stormwater from throughout the Culley station in addition to flows from the West Ash Pond and pumps, discharges to an underground discharge tunnel in the Unit 2 building, which discharges to the Ohio River through NPDES permitted Outfall 001.

2.1 Design Storm

The West Ash Pond has been categorized as a *Significant* hazard potential CCR impoundment, which requires that the inflow design flood is the 1,000-year return frequency design storm event. The full analysis for this classification determination is included in the *Coal Ash Impoundment Site Assessment Report* by Kleinfelder (September 2010).

2.2 Rainfall Data

The rainfall information used in the analysis was based on the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3 which provides rainfall data for storm events with average recurrence intervals ranging from 1 to 1,000 years and durations ranging from 5 minutes to 60 days. The design storm rainfall depth, obtained from the NOAA website, is 10.2 inches for the 24-hour, 1,000-year storm. The Indiana Huff, Third Quartile rainfall distribution was used by AECOM and is appropriate to use for storms up to the 1,000-year, 24-hr flood at the project site.

2.3 Runoff Computations

The drainage areas for the West Ash Pond were estimated using a computer-aided design (CAD) analysis of survey information. Survey information was based on aerial surveys conducted by Three-I Engineering, Inc. in March, 2011 and subsequently updated in January, 2016. This information was further supplemented by the As-Built Aerial Survey performed by Lochmueller Group in December, 2016. Runoff from the operating plant, parking areas and green spaces adjacent to the north area of the Culley Station drain directly to the West Ash Pond. The total drainage area to the West Ash Pond is approximately 72.30 acres. See **Figure 3** of **Appendix A** for the Drainage Area Maps.

Runoff was calculated using the SCS Curve Number Method, where curve numbers (CN) were assigned to each subcatchment based on the type of land cover and soil type present. Using the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey, the soil type of the site was selected as hydrologic soil group B. CN values for the land cover were selected from the CN Table available in HydroCAD. This data was obtained from the SCS NRCS Technical Release-55 (TR-55) publication. Ash, Industrial Areas, Water Surface, 50-75% grass cover, and >75% grass covers that are located on site were estimated to have CN values of 88, 88, 98, 69 and 61 respectively. A composite CN was calculated for each subcatchment area wherever applicable by summing the products of each CN multiplied by its percentage of the total area.

The time of concentration is commonly defined as the time required for runoff to travel from the most hydrologically distant point to the point of collection. Calculations for the time of concentration for each sub-watershed were performed in HydroCAD and are included in **Appendix B**.

Stormwater runoff from the 1,000-year event into the impoundment has a peak inflow of 74.90 cfs and total inflow volume of 163.99 acre-feet. Refer to **Appendix B** for HydroCAD results.

3 Hydraulic Analyses

3.1 Process Flows

The West Ash Pond is currently inactive and does not receive any process water containing CCR Materials.

3.2 Contact Stormwater Flows

Contact Stormwater flows from the West Yard sump and the Coal Pile Runoff discharge into the West Ash Pond. Contact Stormwater flows do not contain CCR materials but may contain trace levels of contamination from non-CCR materials like coal from the coal pile and associated areas. The base flow into the West Ash Pond from the Coal Pile is 0.03452 MGD or 0.064 cfs. The total base flow into the West Ash Pond is 0.144 million gallons per day (MGD), or 0.26 cubic feet per second (cfs). A conservative base flow input of 0.5 cfs was used for the HydroCAD model for the purpose of this analysis.

3.3 Storage Capacity

The storage volume for the West Ash Pond was evaluated using a computer-aided design (CAD) analysis to estimate the volume of the pond under the present conditions. The lowest elevation within the dikes surrounding the pond was used as the overtopping elevation. The bottom of crest elevation along the northern edge of the pond embankment is at elevation 394.00 feet and was used as the overtopping elevation. The volume of storage was calculated by estimating the incremental storage volume present for each 1 foot elevation within the updated topographic surface supplied by SIGECO representatives in 2016. The incremental storage volume was then used to calculate a cumulative storage volume and was input into HydroCAD. The volume of storage available in the West Ash Pond from normal pool elevation of 370 feet to the base of the embankment located along the northern edge of the pond at an approximate elevation of 394.00 feet is approximately 625 acre-feet. Refer to **Appendix B** for further storage volumes details.

3.4 Discharge Analysis

A hydraulic model was created in HydroCAD 10.00 to assess the capacity of the pond to store and convey the storm flows. HydroCAD has the capability to evaluate each pond within the network, to respond to variable tailwater, pumping rates, permit flow loops, and reversing flows. HydroCAD routing calculations reevaluate the pond systems' discharge capability at each time increment, making the program an efficient and dynamic tool for this evaluation.

The analyzed scenario assumes the starting water surface elevation within the West Ash Pond is 370 feet, the normal operating level of the pond. For the purposes of this analysis, the West Ash Pond was analyzed as if neither pump within the pump station or the localized sump pump was operational. This represents a worst case scenario and the West Ash Pond must be capable of storing the design storm. As such, the facility would not cause a discharge of pollutants into waters of the United States that is in violation of the requirements of the NPDES under section 402 of the Clean Water Act.

4 Results

The hydrologic and hydraulic conditions of the West Ash Pond were modeled with the peak discharge of the 1,000-year storm event.

Regulatory Citation: 40 CFR §257.82 (a); The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section.

The Direct Final Rule applies the requirements of "existing surface impoundments" (§257.82) to ponds that had been previously declared "inactive" (such as the Culley West Ash Pond). As a result, owners and operators of inactive CCR surface impoundments must comply with all of the requirements for existing CCR surface impoundment as listed in 40 CFR §257.82 of the EPA's Final Rule.

4.1 Inflow Analysis

Regulatory Citation: 40 CFR §257.82 (a);

- *(1) The inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflows design flood specified in paragraph (3).*

Background and Assessment

The West Ash Pond collects stormwater runoff from a major portion of the Culley station site and this runoff drains to the pond through sheet flow, shallow concentrated flow, overland ditching, and culverts located on the north, east and southeast side of the pond. These runoff volumes, in addition to the rainfall falling within the pond itself, and the base flows, produce the total inflow to the West Ash Pond. Using the HydroCAD model, the total inflow was stored within the West Ash Pond to evaluate the resulting peak water surface elevation.

Table 4-1 summarizes the maximum water surface elevation of the ponds within the West Ash Pond prior to and after the inflow design flood.

Table 4-1 - Summary of Hydrologic and Hydraulic Analysis
1,000-Year, 24-Hour Storm

CCR Unit	Beginning WSE[1] (feet)	Peak WSE[2] (feet)	Overtopping Elevation (feet)	Freeboard Above Peak WSE (feet)
West Ash Pond	370	372.38	394.00	21.62

Notes:
1 WSE = Water Surface Elevation
2 Peak WSE was measured at the end of a 5-day period (120 hours) from the 1000-year, 24-hour storm initiation

Conclusion and Recommendation

As there is adequate storage within the West Ash Pond to manage the inflow design flood, there is no anticipated overtopping of the West Ash Pond embankment, which meets the requirements in §257.82 (a)(1).

4.2 Outflow Analysis

Regulatory Citation: 40 CFR §257.82 (a);

– *(2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (3) of this section.*

Background and Assessment

The West Ash Pond currently collects stormwater from the operating plant, parking areas and green spaces adjacent to the north area of the Culley Station routed through a series of ditches and culverts, as well as any rainfall that falls directly within the perimeter embankments of the pond. The rain falling within the pond, the stormwater runoff directly draining to the pond, and the base flows from the Coal Pile and the West Yard Sump combine to produce the total inflow to the West Ash Pond. The HydroCAD model was used to estimate the peak water surface elevation within the West Ash Pond during the design storm when the Ohio River is experiencing a 100-year flood.

Table 4-2 summarizes the peak flowrates and velocities through each of the outlet devices.

Table 4-2 - Summary of Outlet Devices
1,000-Year, 24-Hour Storm

Outlet Device	Type and Size	Invert Elevation (feet)	Peak Flowrate (cfs)	Velocity at Peak Flowrate (fps)
Temporary Sump Pump	1 pump – 880 GPM; ABS submersible drainage pump J54	370.00	N/A	N/A
Pump Station	2 pumps – 5400 GPM; FLYGT CS 3170-460-603	385.10	N/A	N/A
Base of Pond Embankment	Rectangular Weir	394.00	0.00	0.00

Conclusion and Recommendation

In the case where the West Ash Pond Temporary Floating Sump Pump is not operational, AECOM recommends the Culley station to make ready and prepare the Pump Station by ensuring that both the pumps are operational so as to provide pumping capacity if the Floating Sump Pump is not brought online within 5 days

As the West Ash Pond can store the design storm from the plant without utilizing its pump station and without the peak water surface elevation reaching the base of the crest along the embankments of the West Ash Pond, the pond meets the requirements in §257.82 (a)(2).

4.3 Inflow Design Flood

Regulatory Citation: 40 CFR §257.82 (a);

– *(3) The inflow design flood is:*

- *(i) For a high hazard potential CCR surface impoundment, as determined under §257.73(a)(2), the probable maximum flood;*
- *(ii) For a significant hazard potential CCR surface impoundment, as determined under §257.73(a)(2), the 1,000-year flood;*
- *(iii) For a low hazard potential CCR surface impoundment, as determined under §257.73(a)(2), the 100-year flood; or*
- *(iv) For an incised CCR surface impoundment, the 25-year flood.*

Background and Assessment

The calculations for the inflow design flood are based on the hazard potential given to the impoundment. The different classifications of the impoundment hazard potential are high, significant, and low.

Conclusion and Recommendation

As the impoundment was given a significant hazard potential, the 1,000 year design storm was utilized in the analysis, which meets the requirements in §257.82 (a)(3).

4.4 Discharge

Regulatory Citation: 40 CFR §257.82 (b); Discharge from the CCR unit must be handled in accordance with the surface water requirements under: §257.3 – 3.

Background and Assessment

The West Ash Pond was modeled without any working pump station to simulate a worst case scenario. As such, there is no discharge from the pond in this model scenario. However, during normal operating conditions the discharge from the West Ash Pond temporary sump pump is directed to the existing West Ash Pond pump station and then conveyed through a 10-inch HDPE pipe that discharges to the East Ash Pond. Upon discharging to the East Ash Pond, a pump station at that pond discharges to an underground discharge tunnel, which also collects discharge water from the cooling water system and various other clean discharge water sources located throughout the power plant. The underground discharge tunnel runs by the basement of Unit 2 within the power plant and discharges directly to the Ohio River through NPDES permitted Outfall 001. The Ohio River was modeled at the FEMA 100 year flood elevation of 383.5'. The discharge must meet the requirements of the NDPES under section 402 of the Clean Water Act to meet the CCR rule.

Conclusion and Recommendation

No modifications are necessary or recommended to this unit for compliance with the CCR Rule.

Runoff discharges from the site through a permitted NPDES outfall. As per the current NPDES permit, all discharged water is tested for pollutants to meet the minimum regulatory requirements of the permit, and thereby meets the requirements in §257.82 (b).

5 Conclusions

The Inflow Flood Control Plan of the West Ash Pond adequately manages flow into the CCR unit during and following the peak discharge of the 1,000-year frequency storm event inflow design flood. The inflow design flood control system of the West Ash Pond adequately manages flow from the CCR unit to collect and control the peak discharge resulting from the 1,000-year frequency storm event inflow design flood. Therefore, the West Ash Pond meets the requirements for certification.

In the case where the West Ash Pond temporary sump pump is not operational, AECOM recommends that the Culley Generating Station make ready and prepare the Pump Station by ensuring that both the pumps are operational to provide pumping capacity if the Floating Sump Pump is not brought online within 5 days

The contents of this report, specifically **Sections 1** through **4**, represent the Initial Inflow Design Flood Control System Plan for this site.

6 Certification

This Certification Statement documents that the West Ash Pond at the F.B. Culley Generating Station meets the Initial Inflow Design Flood Control System Plan requirements specified in 40 CFR §257.82. The West Ash Pond is an inactive CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that the Initial Inflow Design Flood Control System Plan for an inactive CCR surface impoundment be prepared by April 17, 2018.

CCR Unit: Southern Indiana Gas & Electric Company; F.B. Culley Generating Station; West Ash Pond

I, Jay Mokotoff, being a Registered Professional Engineer in good standing in the State of Indiana, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above referenced CCR Unit, that the Initial Inflow Design Flood Control System Plan dated April 17, 2018 meets the requirements of 40 CFR § 257.82.

____Jay D. Mokotoff_______________
Printed Name

_____4-17-18___________________
Date

7 Limitations

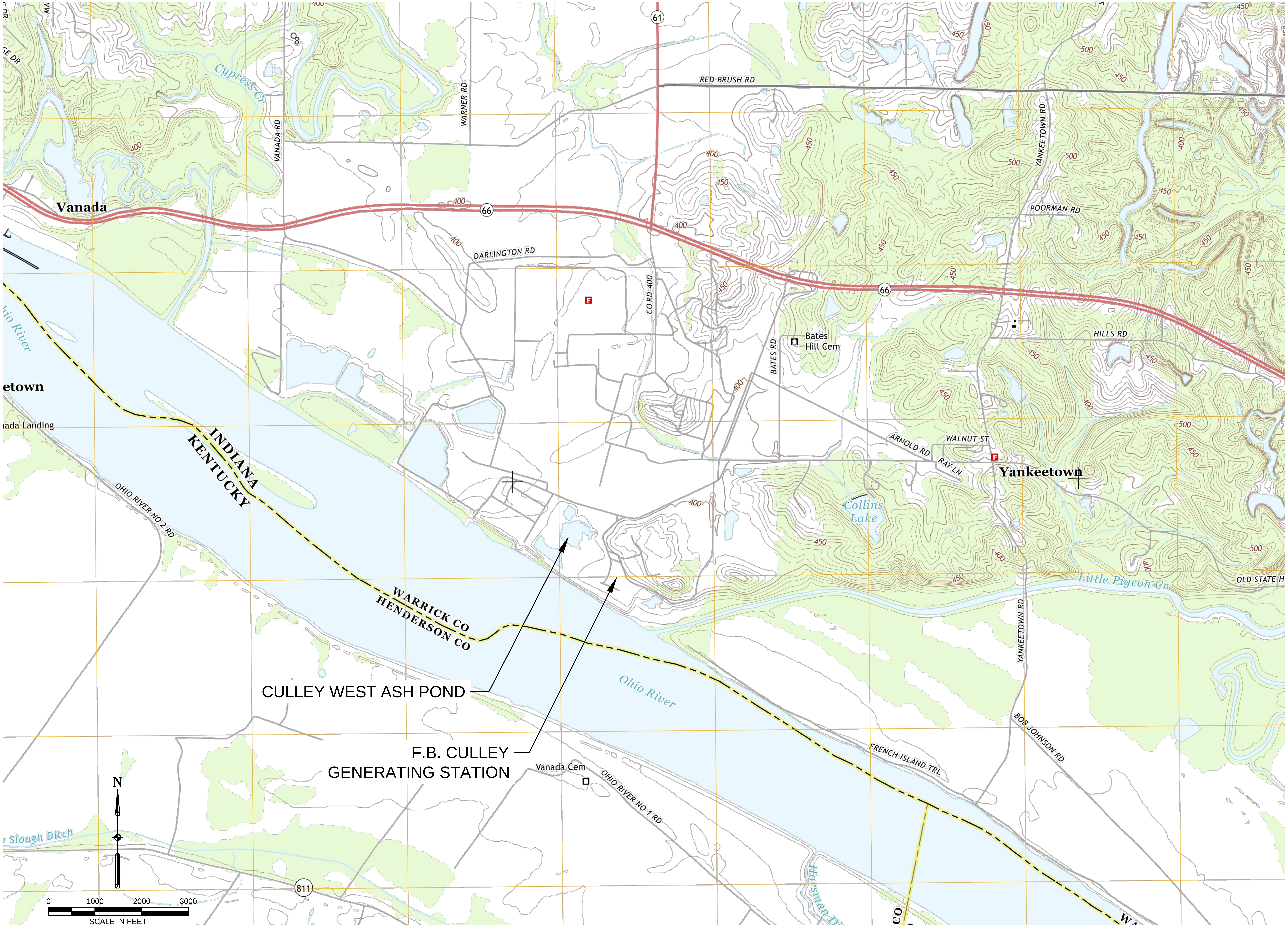
Background information, design basis, and other data which AECOM has used in preparing this report have been furnished to AECOM by SIGECO. AECOM has relied on this information as furnished, and is not responsible for the accuracy of this information. Our recommendations are based on available information from previous and current investigations. These recommendations may be updated as future investigations are performed.

The conclusions presented in this report are intended only for the purpose, site location, and project indicated. The recommendations presented in this report should not be used for other projects or purposes. Conclusions or recommendations made from these data by others are their responsibility. The conclusions and recommendations are based on AECOM's understanding of current plant operations, maintenance, stormwater handling, and ash handling procedures at the station, as provided by SIGECO. Changes in any of these operations or procedures may invalidate the findings in this report until AECOM has had the opportunity to review the findings, and revise the report if necessary.

This hydrologic and hydraulic analysis was performed in accordance with the standard of care commonly used as state-of-practice in our profession. Specifically, our services have been performed in accordance with accepted principles and practices of the engineering profession. The conclusions presented in this report are professional opinions based on the indicated project criteria and data available at the time this report was prepared. Our services were provided in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representation is intended.

While the CCR unit adequately manages the inflow design flood, SIGECO must perform routine maintenance on the CCR unit to continually manage flood events without failure. The pump station should be cleared of debris that could block or damage the device. The West Ash Pond should maintain an operating water surface elevation using the localized sump at or below 370'. Pipes, intake structures, and pumps should be monitored and repaired if deterioration or deformation occurs. All grass lined slopes should be examined for erosion and repaired if damaged. Rip rap lined channels should be inspected for stones that have shifted or bare spots that have formed. Replace rip rap as needed. Additionally, in the case where the West Ash Pond pump station is not working, SIGECO shall provide pumping capacity equal to the existing lift station pumps by means of providing supplemental pumps or bringing the existing lift station pumps online within 5 days.

Appendix A
Figures



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F.B. CULLEY
GENERATING STATION
NEWBURGH, INDIANA

HYBRID CLOSURE OF
WEST ASH POND

INITIAL IDF
CERTIFICATION

NOT FOR
CONSTRUCTION

ISSUED FOR BIDDING ____ DATE BY

ISSUED FOR CONSTRUCTION ____ DATE BY

REVISIONS

NO.	DESCRIPTION	DATE
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AECOM PROJECT NO:	60442676
DRAWN BY:	AG
DESIGNED BY:	AG
CHECKED BY:	JMM
DATE CREATED:	03/20/2017
PLOT DATE:	03/20/2017
SCALE:	1" = 1000'
ACAD VER:	2014

SHEET TITLE

LOCATION MAP

FIGURE 1

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AECOM

VECTREN
Live Smart

F.B. CULLEY
GENERATING STATION
NEWBURGH, INDIANA

HYBRID CLOSURE OF
WEST ASH POND

INITIAL IDF
CERTIFICATION

NOT FOR
CONSTRUCTION

REVISIONS

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03/20/2018
03/20/2018
1" = 200'
2014

SHEET TITLE

SITE MAP

FIGURE 2

SHEET OF 3

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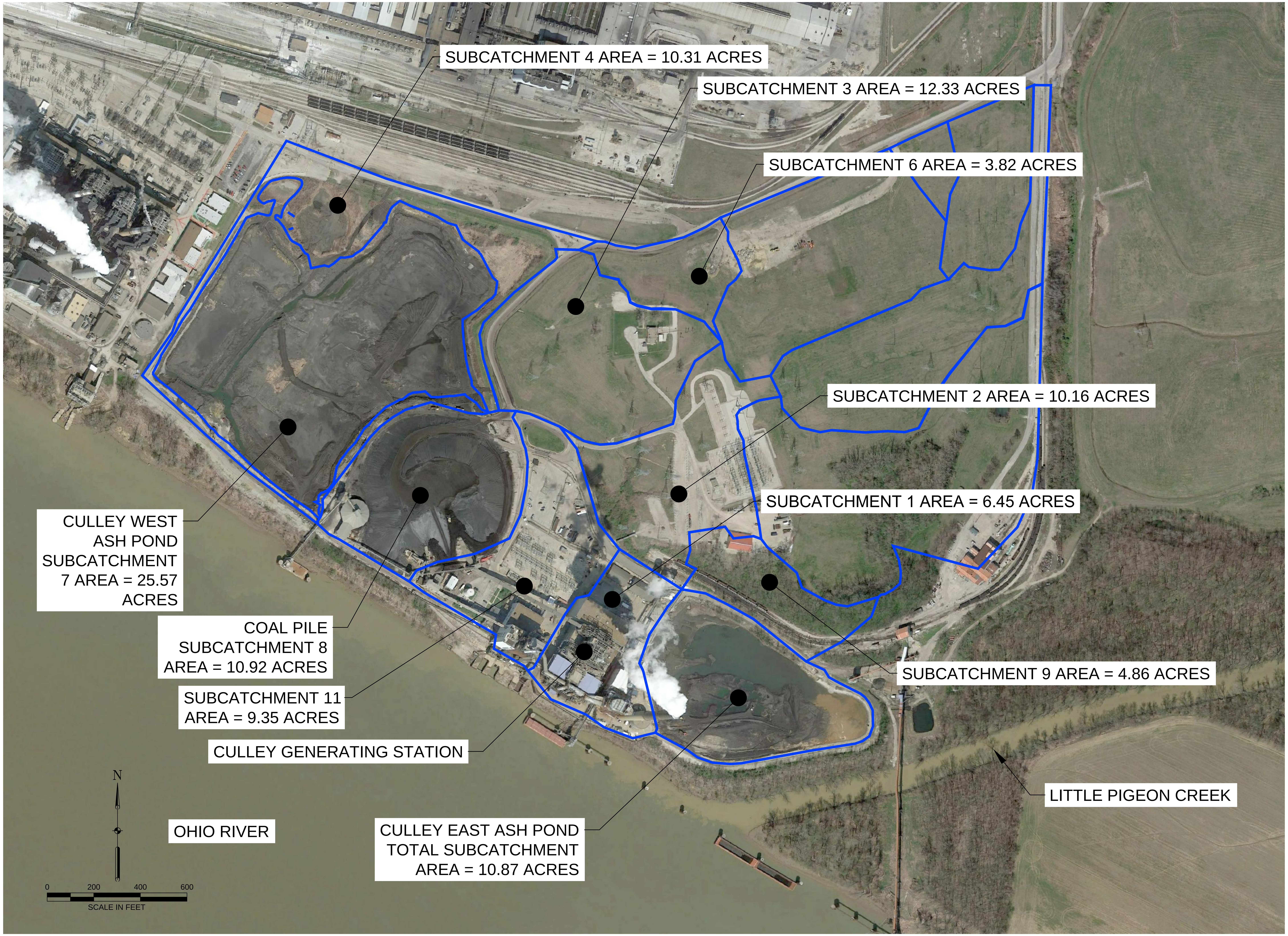

AECOM

VECTREN Live Smart

F.B. CULLEY GENERATING STATION
NEWBURGH, INDIANA

HYBRID CLOSURE OF WEST ASH POND

INITIAL IDF CERTIFICATION

NOT FOR CONSTRUCTION

REVISIONS

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1" = 200'
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SHEET TITLE

SITE DRAINAGE MAP

FIGURE 3

SHEET 3 OF 3

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Appendix B
Hydrologic and Hydraulic Calculations

NOAA Precipitation Data
Soils Data
Water Balance
HydroCAD Output

NOAA Precipitation Data

NOAA Atlas 14, Volume 2, Version 3
Location name: Newburgh, Indiana, US*
Latitude: 37.9163°, Longitude: -87.3369°
Elevation: 394 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.382 (0.347-0.418)	0.450 (0.411-0.494)	0.530 (0.483-0.581)	0.595 (0.541-0.652)	0.677 (0.612-0.740)	0.742 (0.668-0.810)	0.802 (0.718-0.875)	0.868 (0.774-0.948)	0.953 (0.843-1.04)	1.02 (0.896-1.12)
10-min	0.596 (0.542-0.653)	0.706 (0.644-0.775)	0.831 (0.758-0.911)	0.925 (0.840-1.01)	1.04 (0.945-1.14)	1.14 (1.02-1.24)	1.22 (1.10-1.33)	1.31 (1.17-1.44)	1.43 (1.26-1.56)	1.51 (1.33-1.65)
15-min	0.734 (0.668-0.805)	0.870 (0.793-0.954)	1.03 (0.937-1.13)	1.15 (1.04-1.26)	1.30 (1.18-1.42)	1.41 (1.27-1.54)	1.53 (1.37-1.67)	1.64 (1.46-1.79)	1.78 (1.58-1.95)	1.89 (1.66-2.07)
30-min	0.981 (0.892-1.07)	1.17 (1.07-1.29)	1.42 (1.29-1.56)	1.61 (1.46-1.76)	1.86 (1.68-2.03)	2.05 (1.84-2.24)	2.24 (2.00-2.44)	2.43 (2.17-2.66)	2.69 (2.38-2.94)	2.89 (2.54-3.16)
60-min	1.20 (1.09-1.32)	1.45 (1.32-1.59)	1.79 (1.63-1.96)	2.06 (1.87-2.26)	2.42 (2.19-2.65)	2.72 (2.45-2.97)	3.02 (2.70-3.29)	3.33 (2.96-3.63)	3.75 (3.32-4.10)	4.09 (3.60-4.48)
2-hr	1.45 (1.32-1.59)	1.75 (1.60-1.92)	2.19 (1.99-2.40)	2.54 (2.30-2.77)	3.01 (2.72-3.28)	3.39 (3.06-3.70)	3.79 (3.39-4.13)	4.20 (3.74-4.58)	4.77 (4.21-5.20)	5.22 (4.57-5.70)
3-hr	1.56 (1.42-1.71)	1.88 (1.71-2.07)	2.35 (2.13-2.58)	2.73 (2.47-2.99)	3.26 (2.94-3.57)	3.69 (3.31-4.04)	4.15 (3.70-4.53)	4.62 (4.10-5.04)	5.29 (4.64-5.78)	5.83 (5.07-6.38)
6-hr	1.91 (1.74-2.10)	2.30 (2.10-2.54)	2.87 (2.61-3.15)	3.34 (3.02-3.66)	3.99 (3.60-4.37)	4.53 (4.06-4.95)	5.10 (4.55-5.57)	5.71 (5.06-6.22)	6.56 (5.74-7.16)	7.25 (6.30-7.92)
12-hr	2.27 (2.07-2.50)	2.74 (2.50-3.01)	3.40 (3.09-3.73)	3.94 (3.57-4.32)	4.70 (4.24-5.14)	5.32 (4.78-5.81)	5.97 (5.34-6.52)	6.66 (5.92-7.28)	7.63 (6.72-8.34)	8.42 (7.34-9.21)
24-hr	2.72 (2.54-2.92)	3.28 (3.05-3.52)	4.08 (3.80-4.38)	4.73 (4.39-5.08)	5.65 (5.22-6.07)	6.41 (5.89-6.88)	7.20 (6.58-7.74)	8.04 (7.29-8.66)	9.21 (8.26-9.98)	10.2 (9.03-11.0)
2-day	3.25 (3.02-3.50)	3.91 (3.63-4.21)	4.87 (4.52-5.24)	5.66 (5.23-6.09)	6.80 (6.25-7.32)	7.75 (7.09-8.36)	8.76 (7.95-9.47)	9.85 (8.87-10.7)	11.4 (10.1-12.5)	12.7 (11.2-13.9)
3-day	3.47 (3.23-3.73)	4.16 (3.87-4.48)	5.17 (4.81-5.57)	6.01 (5.57-6.47)	7.23 (6.66-7.79)	8.25 (7.57-8.90)	9.34 (8.51-10.1)	10.5 (9.51-11.4)	12.2 (10.9-13.4)	13.6 (12.0-15.0)
4-day	3.68 (3.44-3.97)	4.41 (4.11-4.76)	5.47 (5.10-5.90)	6.36 (5.91-6.86)	7.66 (7.08-8.26)	8.75 (8.05-9.45)	9.93 (9.06-10.7)	11.2 (10.1-12.2)	13.0 (11.7-14.3)	14.6 (12.9-16.0)
7-day	4.29 (3.99-4.63)	5.14 (4.78-5.55)	6.38 (5.92-6.89)	7.42 (6.86-8.02)	8.94 (8.22-9.67)	10.2 (9.35-11.1)	11.6 (10.6-12.6)	13.2 (11.8-14.3)	15.4 (13.6-16.9)	17.2 (15.1-19.0)
10-day	4.84 (4.50-5.25)	5.79 (5.39-6.29)	7.17 (6.66-7.78)	8.32 (7.70-9.02)	10.0 (9.21-10.8)	11.4 (10.4-12.4)	12.9 (11.7-14.1)	14.6 (13.1-15.9)	16.9 (15.0-18.6)	18.9 (16.6-20.9)
20-day	6.66 (6.27-7.11)	7.91 (7.44-8.43)	9.50 (8.92-10.1)	10.8 (10.1-11.5)	12.6 (11.7-13.4)	14.0 (13.0-14.9)	15.4 (14.3-16.5)	16.9 (15.6-18.2)	19.0 (17.3-20.5)	20.6 (18.6-22.4)
30-day	8.21 (7.75-8.70)	9.70 (9.16-10.3)	11.5 (10.8-12.1)	12.9 (12.1-13.6)	14.8 (13.9-15.7)	16.3 (15.3-17.3)	17.9 (16.6-19.0)	19.4 (18.0-20.7)	21.6 (19.8-23.1)	23.2 (21.1-25.0)
45-day	10.3 (9.79-10.9)	12.1 (11.5-12.8)	14.2 (13.4-14.9)	15.8 (14.9-16.6)	17.9 (16.9-18.9)	19.6 (18.4-20.7)	21.2 (19.9-22.4)	22.9 (21.3-24.3)	25.1 (23.2-26.7)	26.7 (24.6-28.6)
60-day	12.3 (11.7-12.9)	14.5 (13.7-15.2)	16.8 (15.9-17.7)	18.5 (17.6-19.5)	20.9 (19.7-22.0)	22.6 (21.3-23.9)	24.3 (22.9-25.7)	26.0 (24.3-27.5)	28.1 (26.2-29.9)	29.7 (27.5-31.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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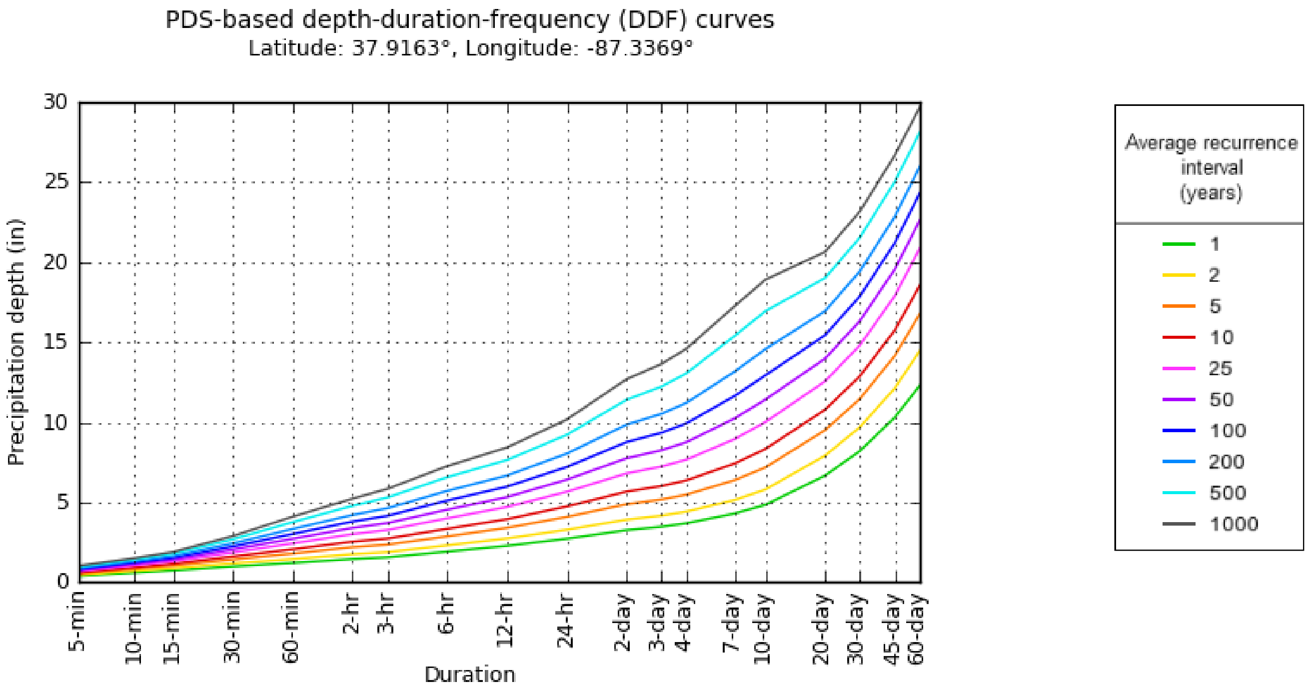
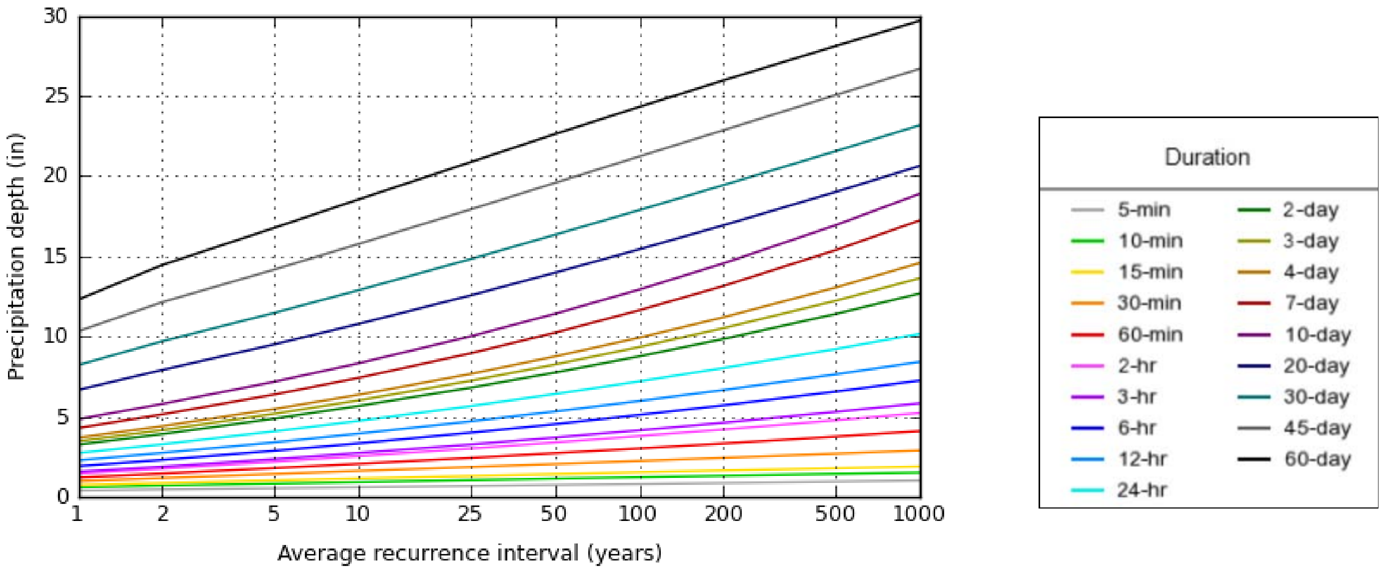
PF graphical





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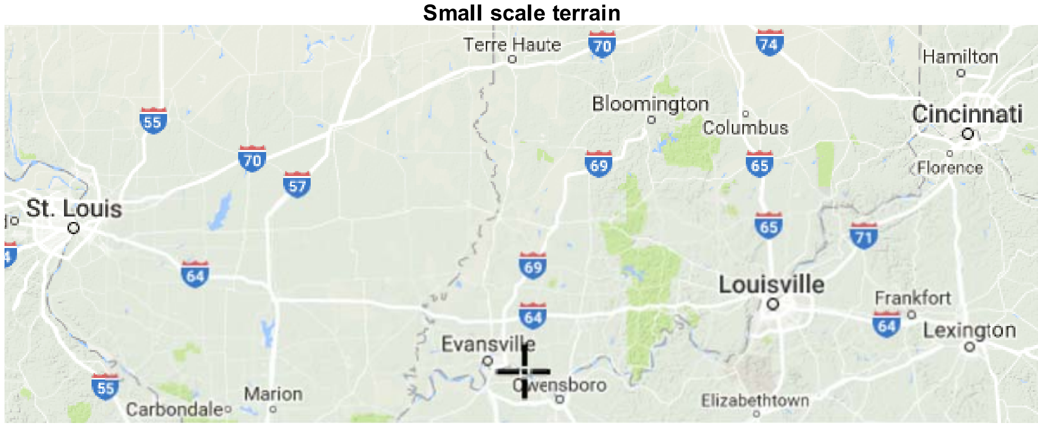
Maps & aerials

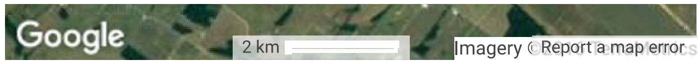
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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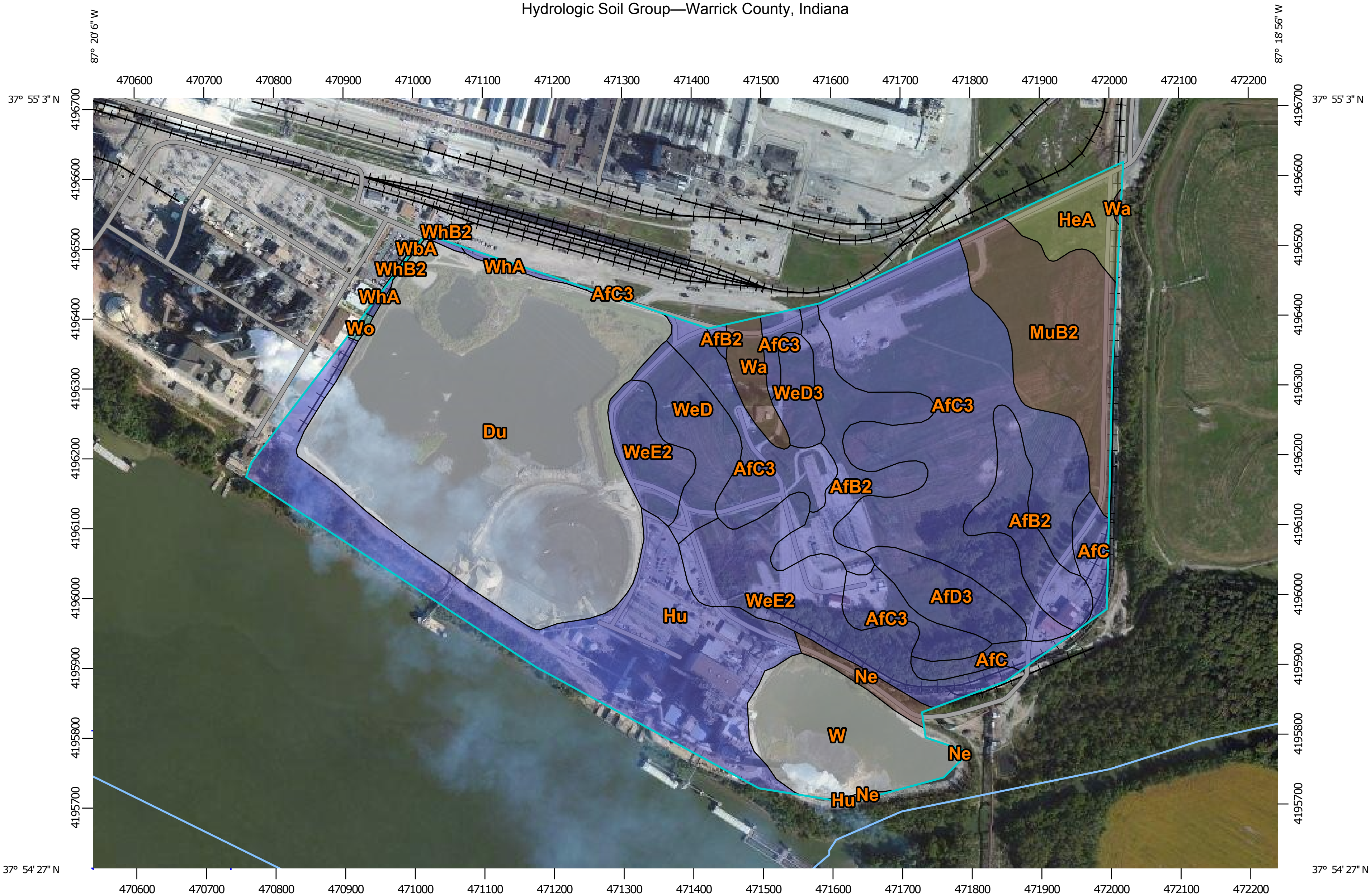
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Soils Data

Hydrologic Soil Group—Warrick County, Indiana



Map Scale: 1:7,780 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 350, 700, 1400, 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Warrick County, Indiana
Survey Area Data: Version 18, Sep 11, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 3, 2011—Oct 4, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Warrick County, Indiana (IN173)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AfB2	Alford silt loam, 2 to 6 percent slopes, eroded	B	11.4	6.6%
AfC	Alford silt loam, 6 to 12 percent slopes	B	3.1	1.8%
AfC3	Alford silt loam, 6 to 12 percent slopes, severely eroded	B	35.2	20.3%
AfD3	Alford silt loam, 12 to 18 percent slopes, severely eroded	B	3.7	2.1%
Du	Dumps, mine		46.4	26.8%
HeA	Henshaw silt loam, 0 to 2 percent slopes, rarely flooded	C/D	3.5	2.0%
Hu	Huntington silt loam, frequently flooded	B	23.6	13.6%
MuB2	Muren silt loam, 2 to 6 percent slopes, eroded	B/D	11.4	6.6%
Ne	Newark silty clay loam, frequently flooded	B/D	1.4	0.8%
W	Water		9.9	5.7%
Wa	Wakeland silt loam, frequently flooded	B/D	2.1	1.2%
WbA	Weinbach silt loam, 0 to 2 percent slopes	C/D	0.0	0.0%
WeD	Wellston silt loam, 12 to 18 percent slopes	B	4.9	2.8%
WeD3	Wellston silt loam, 12 to 18 percent slopes, severely eroded	B	2.1	1.2%
WeE2	Wellston silt loam, 18 to 25 percent slopes, eroded	B	13.9	8.0%
WhA	Wheeling silt loam, 0 to 2 percent slopes	B	0.5	0.3%
WhB2	Wheeling silt loam, 2 to 6 percent slopes, eroded	B	0.1	0.1%
Wo	Woodmere silty clay loam, occasionally flooded	C	0.2	0.1%
Totals for Area of Interest			**173.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

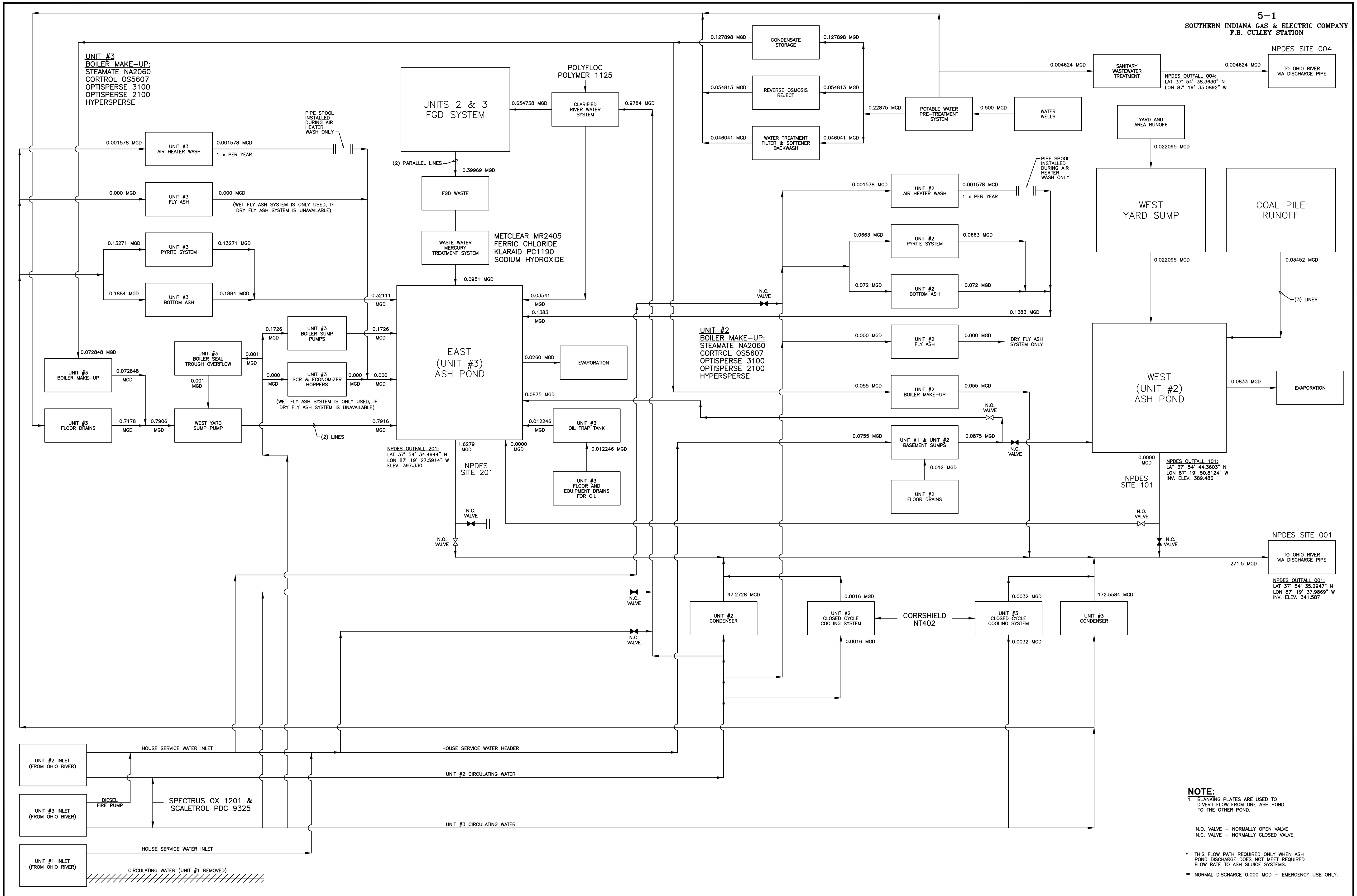
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Water Balance



VECTREN POWER SUPPLY
F. B. CULLEY GENERATING STATION
NEWBURGH, INDIANA

VECTREN

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REV.	DATE			BY	ITEM
0	10	11	11	3i	ISSUED FOR RECORD
1	5	10	12	3i	ADDED ASH POND EVAPORATION LOSSES PER VECTREN
2	8	4	14	3i	ADDED MERCURY TREATMENT SYSTEM
3	2	1	16	3i	UPDATED PER VECTREN RED-LINES
4	5	10	16	3i	UPDATED PER VECTREN RED-LINES

THREE i DESIGN
ENGINEERING + ARCHITECTURE
2425 W. INDIANA ST., EVANSVILLE, IN 47712
WWW.THREEIDESIGN.COM (812) 423-6800
THREE i DESIGN JOB NUMBER: 07354A

PLANT WATER BALANCE WITH GE BETZ TREATMENT

DRAWN BY: J.M.R.	DATE 10-11-11	SHEET NO:
CKD. BY: J.M.R.	SCALE: NONE	
DRAWING NO: F-3025.3		

Other Supporting Documentation

ABS submersible drainage pump J 54

Specification
Electric submersible pump.
Maximum submergence: 65 ft. • Protection class IP 68.
Max temperature of pumped medium at max power input and continuous duty 104°F.
Max medium density 0.0397 Lbs/inch³.
pH of the pumped medium 5-8.
Strainer hole 5/16" x 7/8". • Max number of starts 30/hour.

J 54 ND Medium head, 3-phase.
J 54 HD High head, 3-phase.
J 54 LD High flow, 3-phase.

Electric Motor
3-phase squirrel-cage induction motor, 60 Hz.
Service factor 1.1. Class F insulation.
Dual voltage stator 230/460 V (single voltage contactor coil)
Motor rating P_2: 9.0 Hp. Speed: 3400 rpm

Voltage, V	208	230/460	575
Nominal current, A	24	22.0/11.0	8.8

Starting method
D.O.L. start with built-in contactor.
D.O.L. start with built-in SoftDrive (400-460V).
When used with VFD, pump must be equipped with terminal block instead of contactor.

Power Cable
Heavy duty power cable for submersible pump applications
65 ft AWG 8/4 W (UL, CSA, MSHA), 208, 230, 460 V
65 ft AWG 12/4 SOOW (UL, CSA, MSHA), 575 V

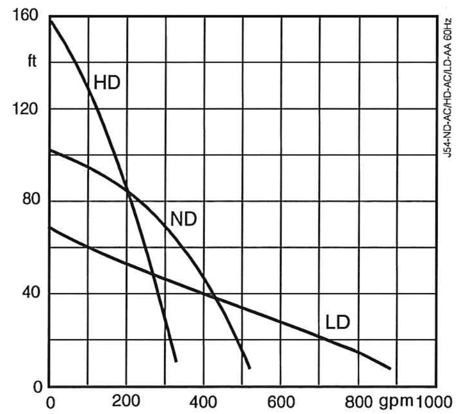
Motor Protection
Built-in thermal switches in the stator windings (284°F, ±5), connected to built-in contactor.

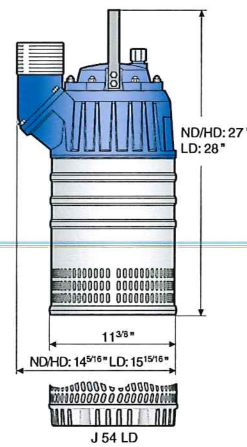
Shaft Seal
Double mechanical seal in oil bath.
Primary seal: Silicon carbide on silicon carbide.
Secondary seal: Stainless steel on antimony treated carbon.

Bearings
Upper bearing: Single-row deep groove ball bearing.
Lower bearing: Double angular contact ball bearing.

Discharge Connections
3", 4", 6" hose connections.
3"(standard HD), 4"(standard ND), 6"(standard LD)
NPT threaded connections.

US 60 Hz





Weight (without cable)
110 lb

Options and accessories
Zinc anodes • Surface protection coating
Diffuser in polyurethane (ND+HD) • Electronic motor supervision
Series connection • Starter and control units
Automatic level control unit • Floatation ring • Repair kit
Discharge connection accessories and hose

Materials		ASTM
Castings	Aluminium	ASTM AlSi10mg
Casing / Handle / Fasteners	Stainless steel	AISI 304
Shaft	Stainless steel	AISI 420
Impeller LD	Hardened chrome steel	AISI 420
Impeller ND, HD:	High chrome alloy	ASTM A 532: Alloy III A
Wear parts / O-rings	Nitrile rubber	

We know how water works

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Rancho Cordova, CA 95742
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ABS Canada
1401 Meyerside Drive, Unit#2
Mississauga, Ontario L5T 1G8
Tel: (905) 670-4677
Fax:(905) 670-3709

ABS submersible drainage pump J 84

Specification
Electric submersible pump.
Maximum submergence: 65 ft. • Protection class IP 68.
Max temperature of pumped medium at max power input and continuous duty 104°F.
Max medium density 0.0397 Lbs/inch³.
pH of the pumped medium 5-8.
Strainer hole 5/16" x 7/8". • Max number of starts 30/hour.

J 84 ND Medium head, 3-phase.
J 84 HD High head, 3-phase.
J 84 LD High flow, 3-phase.

Electric Motor
3-phase squirrel-cage induction motor, 60 Hz.
Service factor 1.1. Class F insulation.
Dual voltage stator 230/460 V (single voltage contactor coil)
Motor rating P_2: 15.0 Hp. Speed: 3400 rpm

Voltage, V	208	230/460	575
Nominal current, A	37	34.0/17.0	13.5

Starting method
D.O.L. start with built-in contactor.
D.O.L. start with built-in SoftDrive (400-460V).
When used with VFD, pump must be equipped with terminal block instead of contactor.

Power Cable
Heavy duty power cable for submersible pump applications
65 ft AWG 8/4 W (UL, MSHA), 208, 230, 460 V
65 ft AWG 10/4 SOOW (UL, CSA, MSHA), 460 V
65 ft AWG 12/4 SOOW (UL, CSA, MSHA), 575 V

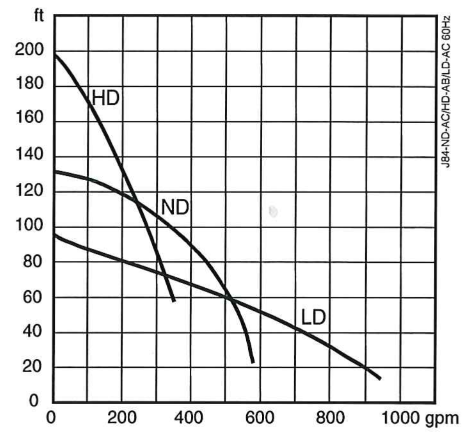
Motor Protection
Built-in thermal switches in the stator windings (284°F, ±5), connected to built-in contactor

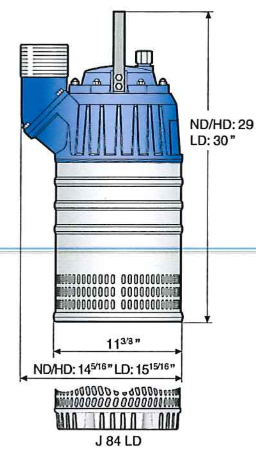
Shaft Seal
Double mechanical seal in oil bath.
Primary seal: Silicon carbide on silicon carbide.
Secondary seal: Stainless steel on antimony treated carbon.

Bearings
Upper bearing: Single-row deep groove ball bearing.
Lower bearing: Double angular contact ball bearing.

Discharge Connections
3", 4", 6" hose connections.
3"(standard HD), 4"(standard ND), 6"(standard LD)
NPT threaded connections.

US 60 Hz





Weight (without cable)
154 lb

Options and Accessories
Zinc anodes • Surface protection coating
Diffuser in polyurethane (ND+HD) • Electronic motor supervision
Series connection • Starter and control units
Automatic level control unit • Floatation system • Repair kit
Discharge connection accessories and hose

Materials		ASTM
Castings	Aluminium	ASTM AlSi10mg
Casing / Handle / Fasteners	Stainless steel	AISI 304
Shaft	Stainless steel	AISI 420
Impeller LD	Hardened chrome steel	AISI 420
Impeller ND, HD	High chrome alloy	ASTM A 532: Alloy III A
Wear parts / O-rings	Nitrile rubber	

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Mississauga, Ontario L5T 1G8
Tel: (905) 670-4677
Fax:(905) 670-3709

MRO Item 711712R

PUMP: SUBMERSIBLE, 25 HP, 460V, 3 PH, 1170 RPM, 10", 3200 GPM @ 17 FOOT HEAD, FLYGT #CS-3170-460-603

Item Definition

Item name:	PUMP: SUBMERSIBLE, 25 HP, 460V, 3 PH, 1170 RPM, 10", 3200 GPM @
Item type:	General Inventory
Stocking unit of measure:	ea
ABC usage:	B - Average Cost
Description:	FOR ASH POND DEWATERING

Options

Maintenance cost group to suggest on inventory transactions:	Material - Parts
Add item to entity parts list when item is used?	Yes
Suggested quantity to issue:	

Item Aliases

Alias Type	Description	Manufacturer
Manuf.		FLYGT

Categories

Category	Value
Item Parts Category	P- Pumps,05- Pump Assemblies
TEMPLATE NAME	AVANTIS_STOCK_ITEM_CREATE

Keywords

Keywords

Storerooms This Item Is Stocked In

Storeroom	Primary Location	Secondary Locat	Unit of Measure	On Hand Qty	Qty UOM
FB Culley Storeroom	FBC5.03.E.3		each	1.00	ea

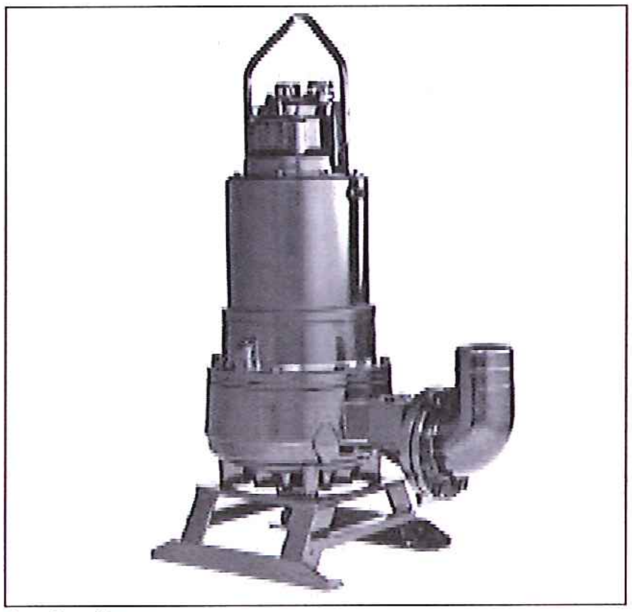
Item Replenishment Instructions

Group	Point	Quantity	Lead Time	Method
Repairable Spares	0.00 each	1.00 each	14.00 days	Purchase

CS-3170.180

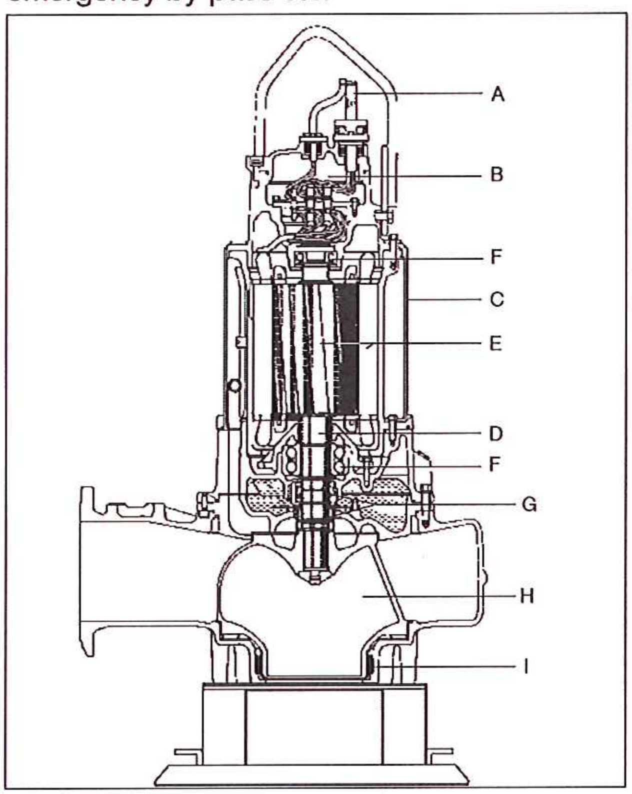
Large Solids Handling Pump

Capacity up to 5,000 GPM, heads up to 130 ft.



Applications:

CS-3170.180 is ideal for pumping trash, mud, industrial waste, sludge, raw sewage, emergency by-pass etc.



Specifications

A **Cable.** Standard 16 m (50 ft.) of SubCab cable. Other lengths available.

B **Junction Chamber.** Cable entry incorporates a strain relief and grommet controlled compression sealing. Between the junction box and stator housing a rubber gland provides additional seal protection of the motor.

C **Pump Housing.** High strength, cast iron ASTM A48 No. 35B body. Static seals are leakproof Nitrile rubber O rings in precision machined grooves, with controlled compression.

D **Shaft.** C1035 Carbon steel.

E **Motor.** Air filled, NEMA design B with class H (180°C) insulation. 4 pole, 1740 rpm or 6 pole, 1170 rpm. Shrink-fit to the motor housing. Allows at least 10 starts per hour. Built-in thermal sensors for additional motor overload protection.

F **Bearings.** Upper: single row ball bearing. Lower: two row angular ball bearing.

G **Shaft Seals.** Independent double face seals running in environmentally friendly, FDA approved (Standard #172.878) lubricant. Upper seal: tungsten carbide/tungsten carbide. Lower seal: tungsten carbide/tungsten carbide. Oil quantity: 7.9 quarts (7.5 l).

H **Impeller.** Non-clog closed type impeller. Material: cast iron ASTM A48 Class 35B. Maximum particle size: 4".

I **Wear ring.** Material: Nitrile rubber or Brass ASTM C 83 600.

Fasteners. Stainless steel AISI 304.

Approval:

CSA approved to UL Standard #778 and CSA C22.2 #108.

Controls (not shown).

Manual controls, magnetic starter type, providing short circuit and overload protection, housed in EEMAC3 enclosure. Other enclosure types (EEMAC4, EEMAC12) are optional.

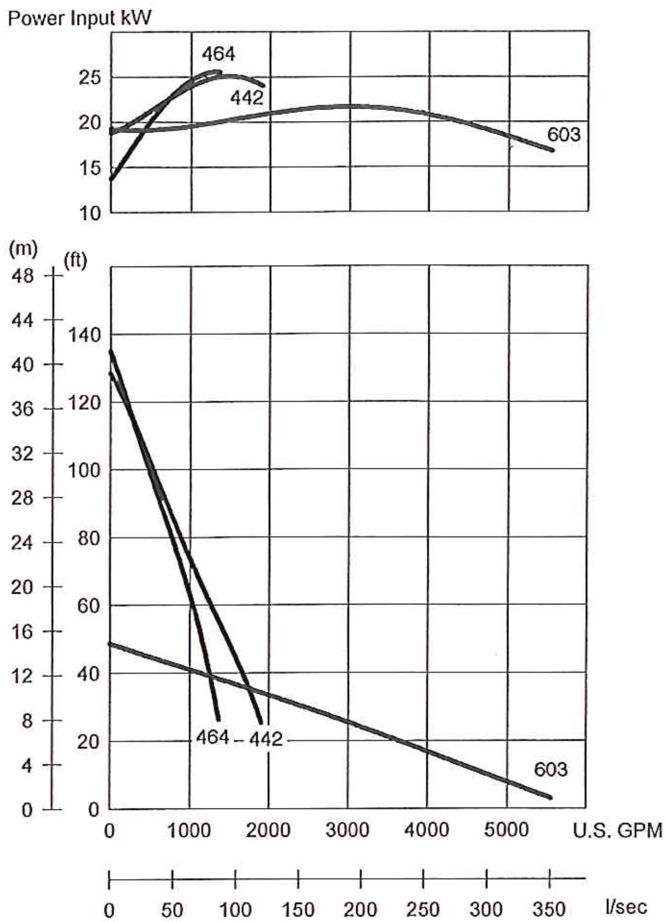
Options:

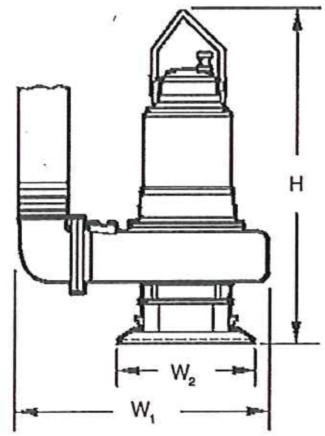
Explosionproof FM approved variants **CS 3170.090;**

Accessories.

Zinc anodes.

CS-3170.180
Performance Data





Dimensions

Discharge connection	W_1 inches	W_1 mm	W_2 inches	W_2 mm	H inches	H mm	Weight lbs.	kg
4" High Head	35	889	23 3/4	603	58 1/4	1480	1050	476
6" Standard	37 5/8	956	23 3/4	603	59 1/4	1505	1180	535
8" Standard	38 1/4	971	23 3/4	603	59 1/4	1505	1170	531
8" High Volume	44 5/8	1135	23 3/4	603	59 7/8	1520	1324	601
10" High Volume	43 3/4	1111	23 3/4	603	60	1524	1330	603

VERSION	IMP. CODE	HP	PHASE	VOLTS	FLA	STARTING CURRENT	CABLE SIZE AWG
High Head HT 4"	464	30	3	208	84	535	1/3-2-1-GC
				230	72	466	1/3-2-1-GC
				460	36	233	6/3-2-1-GC
				600	29	186	8/3-2-1-GC
Standard MT 6" or 8"	442	30	3	208	84	535	1/3-2-1-GC
				230	72	466	1/3-2-1-GC
				460	36	233	6/3-2-1-GC
				600	29	186	8/3-2-1-GC
High Vol. LT 8" or 10"	603	25	3	208	80	540	1/3-2-1-GC
				230	70	470	1/3-2-1-GC
				460	35	235	8/3-2-1-GC
				600	28	188	10/3-2-1-GC

Note: Other impellers available, please consult your ITT Flygt representative.

Flygt

ITT Industries

FLYGT

TEST REPORT

PRODUCT

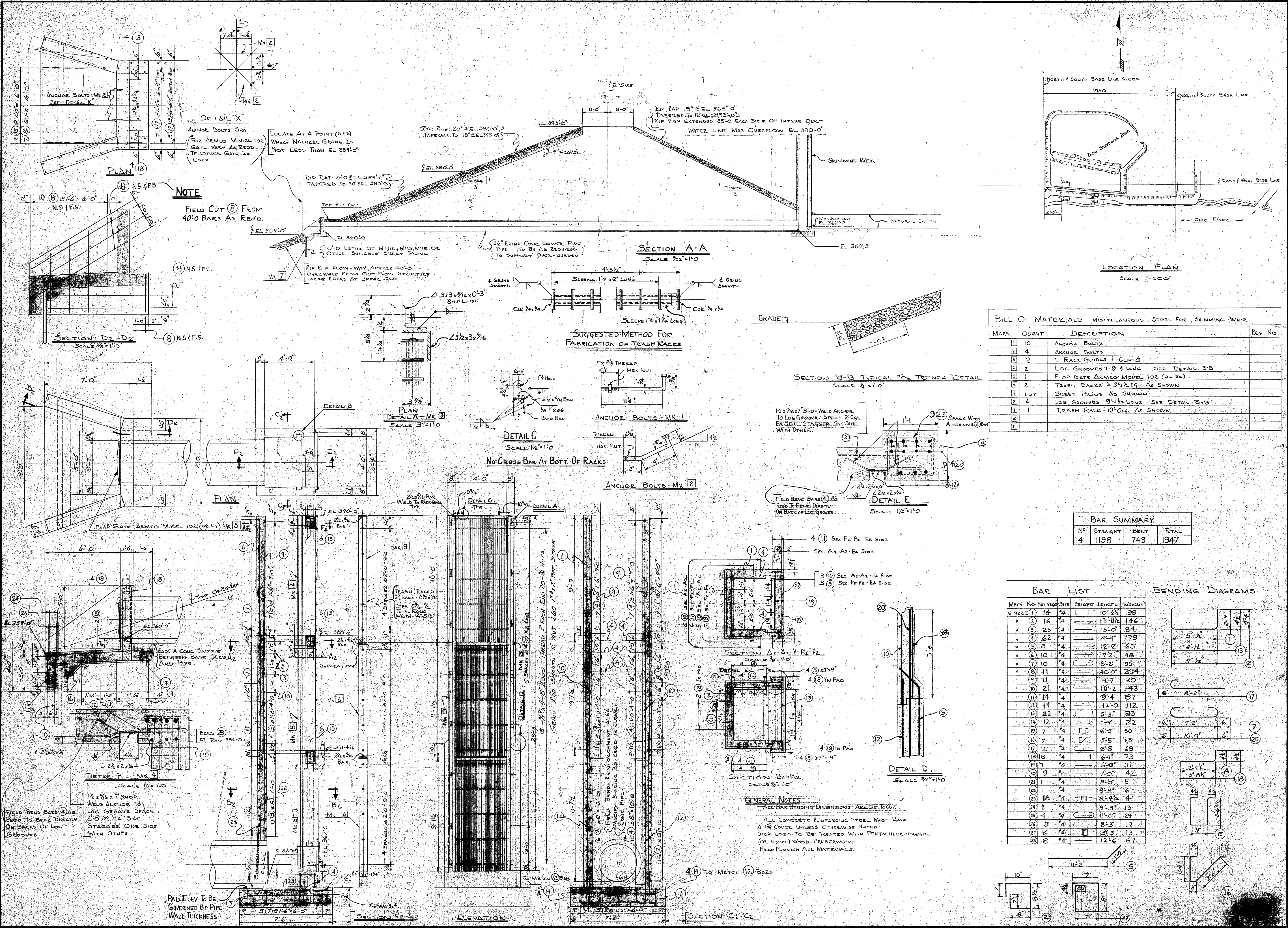
Serial No.		Performance curve No.		Motor module/type	Voltage (V)
3170.180 0370053		63- 603-00-5310		152	460
Base module	Impeller No.	Gear type	Gear ratio	Imp.diam/Blade angle	Water temp °C
012	601 63 10		-		15

TEST RESULTS

Pump total head H (ft)	Volume rate of flow Q (USGpm)	Motor input power P (kW)	Voltage U (V)	Current I (A)	Overall efficiency η (%)
47.78	120.6	19.37	462	30.6	5.61
42.92	800.8	19.10	462	30.4	33.95
37.58	1514.3	19.87	462	31.2	54.05
31.01	2318.7	21.13	462	32.7	64.19
24.77	3086.9	21.72	462	33.3	66.40
19.34	3714.0	21.14	462	32.7	64.12
13.87	4273.4	19.98	462	31.2	55.98

Accepted after	Test facility		Test date	Time	Chief tester 2050
HI	Lindas Sweden	Q1	03-11-10	14:19	

101640-1



General Notes

All Bar Bending Dimensions Are Out To Out.

All Concrete Reinforcing Steel Must Have A 1 1/2" Cover Unless Otherwise Noted. Stop Logs To Be Treated With Pentachlorophenol (or Equiv.) Wood Preservative. Field Furnish All Materials.

Bill Of Materials Miscellaneous Steel For Skimming Weir

Mark	Quant	Description	Req No
1	10	Anchor Bolts	
2	4	Anchor Bolts	
3	2	L Rack Guides & Clip Ls	
4	2	Log Grooves 9'-9 1/4 Long See Detail B-B	
5	1	Flap Gate Armco Model 102 (or Eq)	
6	2	Trash Racks 9'-1 1/2 Lg. - As Shown	
7	Lot	Sheet Piling As Shown	
8	4	Log Grooves 9'-1 1/2 Long - See Detail B-B	
9	1	Trash Rack - 10'-0 Lg. - As Shown	
10			
11			

Bar Summary

No	Straight	Bent	Total
4	1198	749	1947

Bar List

Mark	No	No Req'd	Size	Shape	Length	Weight
G1922-2	1	14	#4		10'-6 1/2"	98
"	2	16	#4		13'-8 1/2	146
"	3	25	#4		5'-0"	84
"	4	62	#4		4'-4"	179
"	5	8	#4		12'-2	65
"	6	10	#4		7'-2	48
"	7	10	#4		8'-2"	55
"	8	11	#4		40'-0"	294
"	9	11	#4		9'-7	70
"	10	21	#4		10'-2	143
"	11	14	#4		9'-4	87
"	12	14	#4		12'-0	112
"	13	22	#4		5'-8"	83
"	14	12	#4		2'-9"	22
"	15	7	#4		6'-5"	30
"	16	7	#4		5'-5"	25
"	17	12	#4		8'-8"	69
"	18	18	#4		6'-1"	73
"	19	7	#4		6'-8"	31
"	20	9	#4		7'-0"	42
"	21	1	#4		8'-0"	5
"	22	1	#4		8'-9"	6
"	23	18	#4		3'-4 1/2	41
"	24	2	#4		9'-9"	13
"	25	4	#4		11'-0"	29
	26	3	#4		8'-3'	17
	27	6	#4		3'-3	13
	28	8	#4		12'-6	67

Rev.	Date	Description	By	Approved
A	7-23-57	Lowered Inlet from 370'-0 to 362'-0	R.G.Dunn	R.F.R.

Design and Drafting: Gene Fletcher, Date July-5-57; R.G. Dunn & H.S. Fenwick, Date 7-16-57; H.S. Fenwick, Reg. P.E., Date 7-16-57
Approved: H.B. Schenking, Date 7-16-57

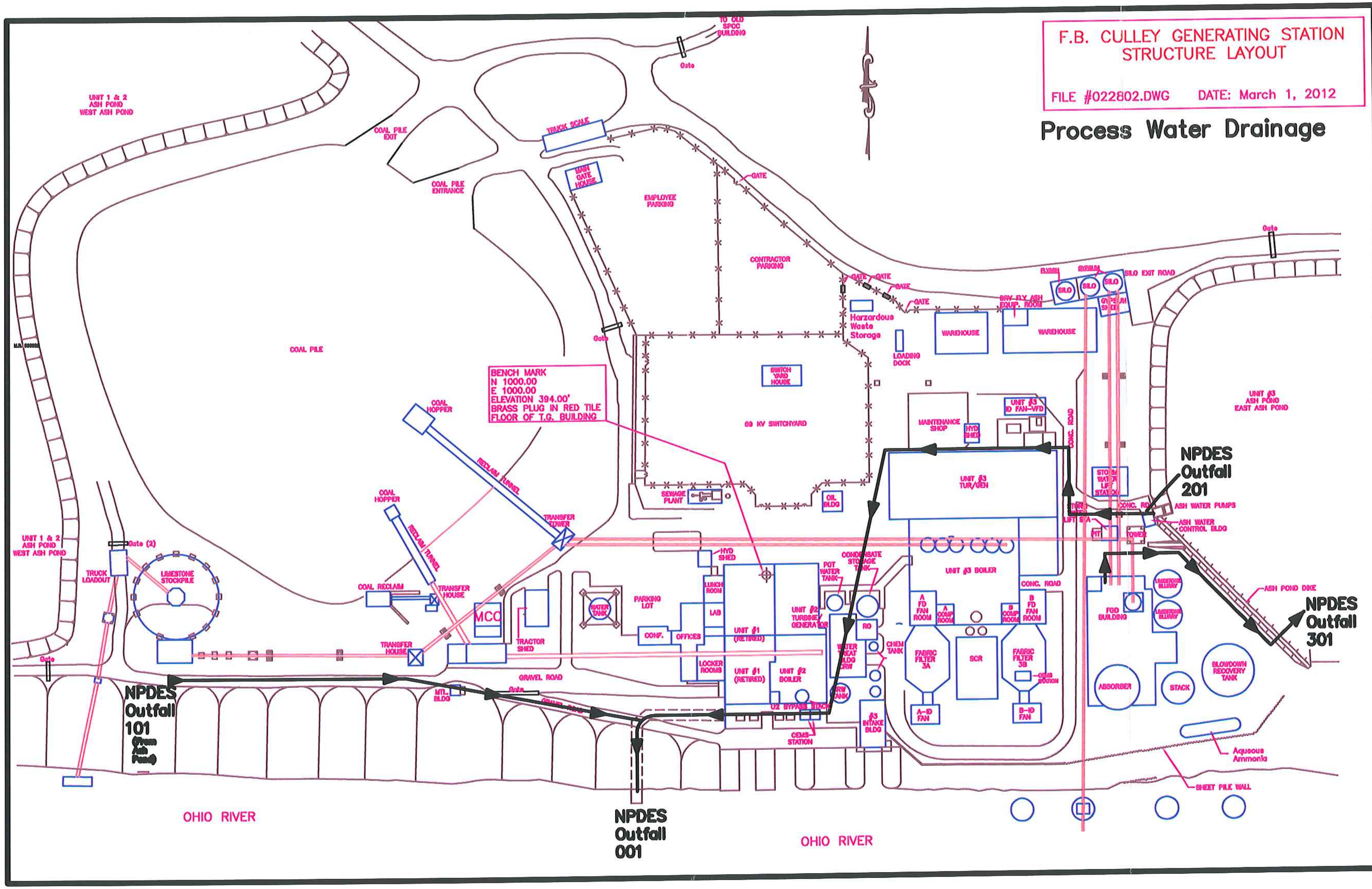
(Seal)

Prepared under responsible supervision of H.S. Fenwick, P.E.
Michigan Professional Registration No. 3954
Indiana Professional Registration No. 6950
At offices of Commonwealth Associates Inc.
209 E. Washington Ave., Jackson, Mich.

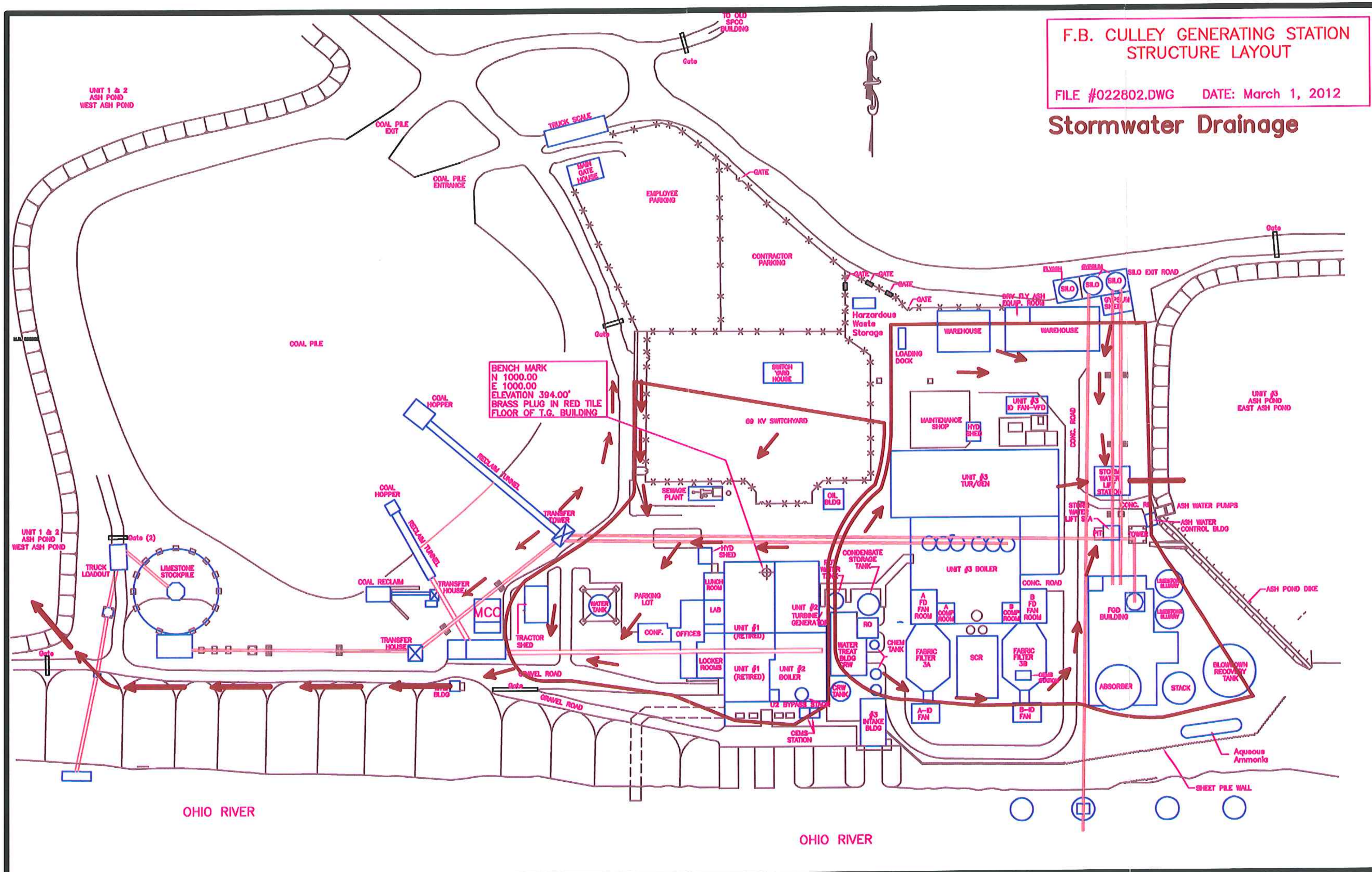
Owner and Location: F. Bayard Culley Station, Southern Indiana Gas & Electric Company, Evansville, Indiana

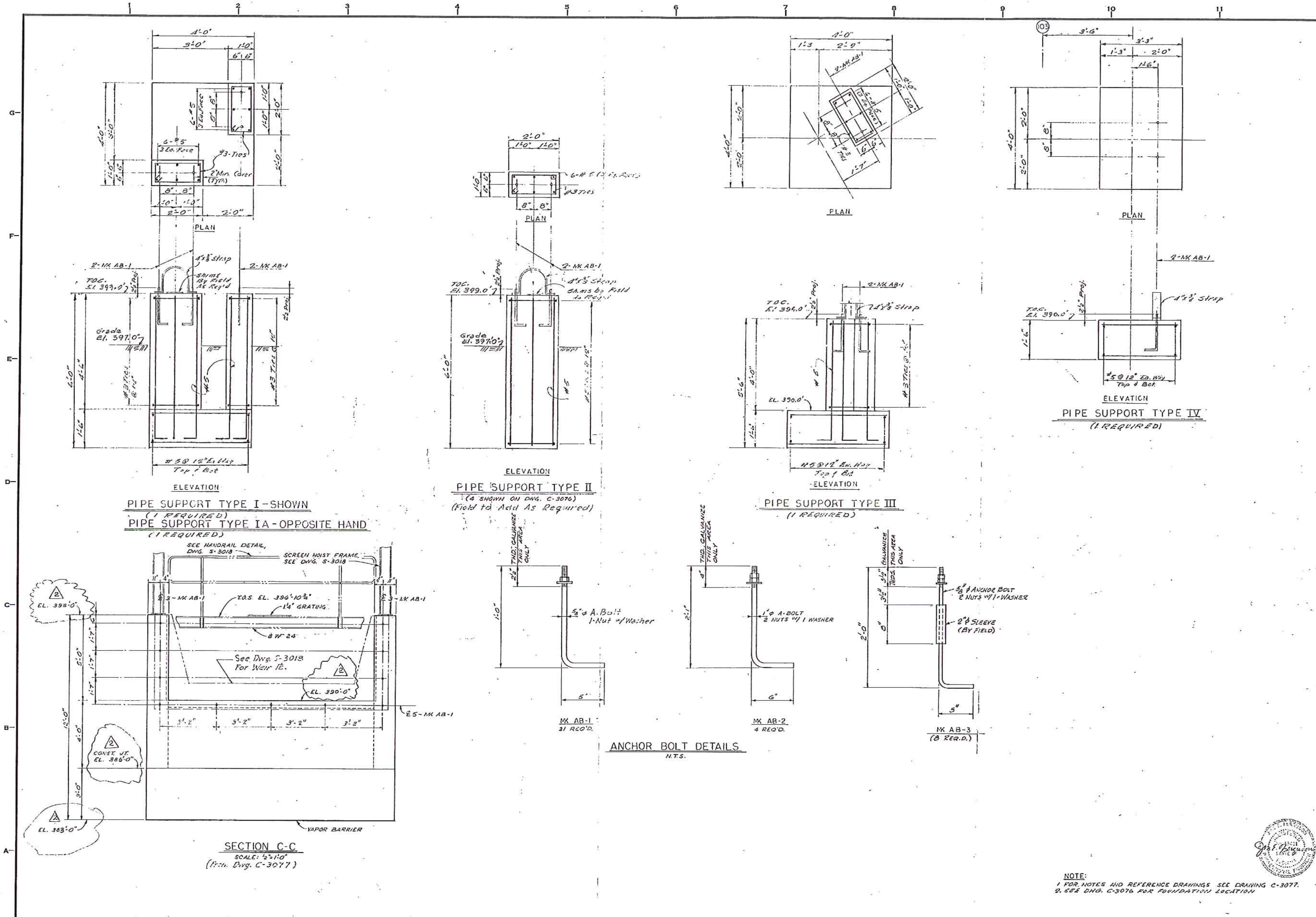
Title: Ash Disposal Dike & Skimming Weir, 1957 Installation

Scale: As Noted | 3-20-18-4 | 5100-G1922 | Rev. A | Sheet 2



F.B. CULLEY GENERATING STATION
STRUCTURE LAYOUT
FILE #022802.DWG
DATE: March 1, 2012
Process Water Drainage
UNIT 1 & 2 ASH POND WEST ASH POND
COAL PILE EXIT
COAL PILE ENTRANCE
TRUCK SCALE
MAIN GATE HOUSE
TO OLD SPCC BUILDING
Gate
GATE
EMPLOYEE PARKING
CONTRACTOR PARKING
COAL PILE
BENCH MARK
N 1000.00
E 1000.00
ELEVATION 394.00'
BRASS PLUG IN RED TILE
FLOOR OF T.G. BUILDING
COAL HOPPER
RECLAIM TUNNEL
TRANSFER TOWER
SWITCH YARD HOUSE
69 KV SWITCHYARD
Harzardous Waste Storage
LOADING DOCK
WAREHOUSE
SILO
SILO EXIT ROAD
UNIT #3 ASH POND EAST ASH POND
MAINTENANCE SHOP
HYD SHED
UNIT #3 ID FAN—VFD
CONC. ROAD
NPDES Outfall 201
STORM WATER LIFT STATION
ASH WATER PUMPS
ASH WATER CONTROL BLDG
UNIT #3 TUR/GEN
SEWAGE PLANT
OIL BLDG
UNIT 1 & 2 ASH POND WEST ASH POND
Gate (2)
TRUCK LOADOUT
LIMESTONE STOCKPILE
COAL RECLAIM
TRANSFER HOUSE
MCC
TRACTOR SHED
WATER TANK
PARKING LOT
CONF.
OFFICES
LAB
LUNCH ROOM
LOCKER ROOMS
UNIT #1 (RETIRED)
UNIT #2 TURBINE GENERATOR
UNIT #2 BOILER
U2 BYPASS STACK
CEMS STATION
POT WATER TANK
CONDENSATE STORAGE TANK
RO
CHEM TANK
UNIT #3 BOILER
A FD FAN ROOM
B FD FAN ROOM
FABRIC FILTER 3A
FABRIC FILTER 3B
SCR
A-ID FAN
B-ID FAN
#3 INTAKE BLDG
FGD BUILDING
ABSORBER
STACK
BLOWDOWN RECOVERY TANK
ASH POND DIKE
NPDES Outfall 301
Aqueous Ammonia
SHEET PILE WALL
GRAVEL ROAD
MTL. BLDG
NPDES Outfall 101
NPDES Outfall 001
OHIO RIVER
OHIO RIVER


F.B. CULLEY GENERATING STATION
STRUCTURE LAYOUT
FILE #022802.DWG
DATE: March 1, 2012
Stormwater Drainage
BENCH MARK
N 1000.00
E 1000.00
ELEVATION 394.00'
BRASS PLUG IN RED TILE
FLOOR OF T.G. BUILDING
COAL PILE
UNIT 1 & 2 ASH POND WEST ASH POND
UNIT #3 ASH POND EAST ASH POND
EMPLOYEE PARKING
CONTRACTOR PARKING
69 KV SWITCHYARD
Harzardous Waste Storage
WAREHOUSE
MAINTENANCE SHOP
UNIT #3 TUR/GEN
UNIT #3 BOILER
FGD BUILDING
ABSORBER
STACK
SCR
LIMESTONE STOCKPILE
TRUCK SCALE
COAL RECLAIM
TRANSFER HOUSE
TRANSFER TOWER
RECLAIM TUNNEL
COAL HOPPER
PARKING LOT
OFFICES
MCC
ASH POND DIKE
SHEET PILE WALL
Aqueous Ammonia
OHIO RIVER
OHIO RIVER



NO.	DATE	REVISION	BY	CHK.	APP.
2	7-8-73	Elev. Revision			
1		ADDED ANCHOR BOLT MK AB-3.			
		ISSUED FOR CONSTRUCTION (ER 0231-500)	JD		

DRAWN: DeVerona
CHECKED: E.J.A.
APPROVED
CUSTOMER APP.

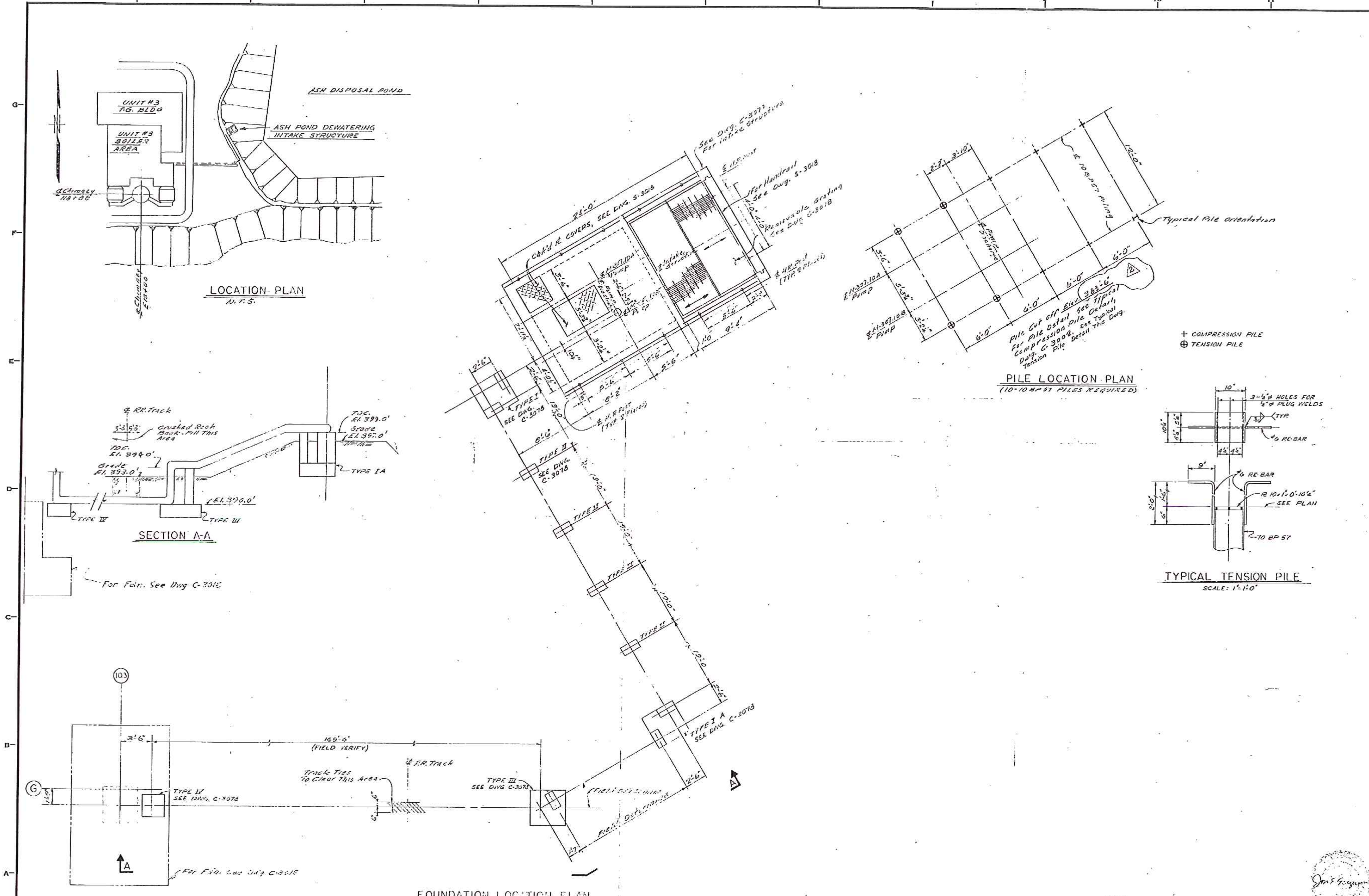
BROWN & ROOT, INC.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

SOUTHERN INDIANA GAS & ELECTRIC CO.
EVANSVILLE, INDIANA

CULLEY STATION
UNIT NO. 3

DRAWING TITLE
CONCRETE
ASH POND DEWATERING SYSTEM
FOUNDATION PLAN, SECTIONS & DETAILS
SHEET 2

CONTRACT NO. ER-0231
DATE: 11-03-72
SCALE: ½"=1'-0" U.N.O.
B & R DRAWING NO. C-3078-2



NOTE:
1. FOR NOTES AND REFERENCE DRAWINGS SEE DRAWING C-3077
2. PILING TO BE DRIVEN TO REFUSAL

NO.	DATE	REVISION	BY	CHK.	APP.
2					
1		MOVED PUMP M-307.10B			
0	2-1-73	ISSUED FOR CONSTRUCTION (ER-C [illegible])	BL		

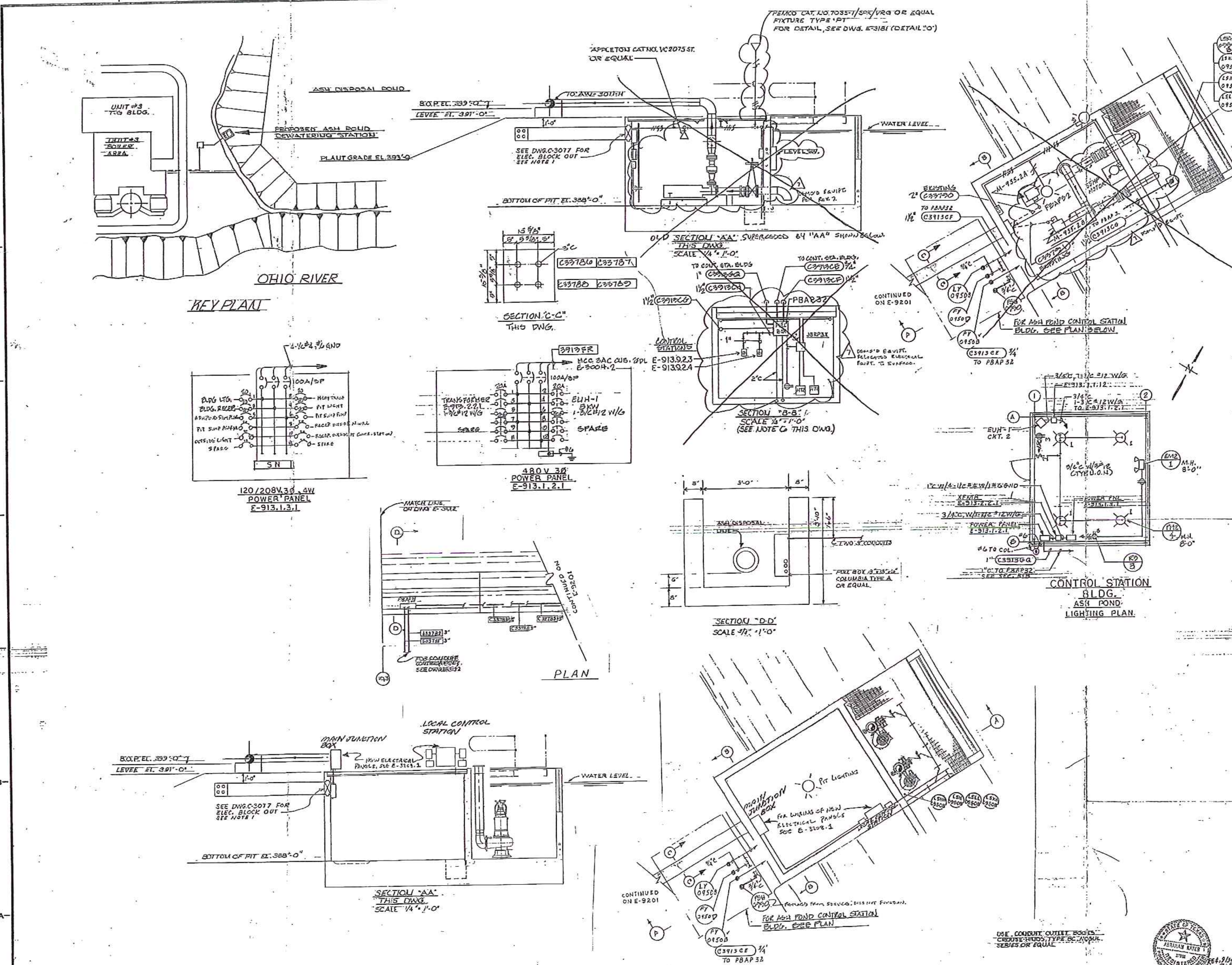
DRAWN: De Varona
CHECKED: E.J.B.
APPROVED
CUSTOMER APP.

BROWN & ROOT, INC.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

SOUTHERN INDIANA GAS & ELECTRIC CO.
EVANSVILLE, INDIANA
CULLEY STATION
UNIT NO. 3

DRAWING TITLE
CONCRETE
ASH POND DEWATERING SYSTEM
PILING & FOUNDATION LOCATION PLAN

CONTRACT NO. ER-0231
DATE: 11-01-72
SCALE: 1/4"=1'-0" U.N.
B & R DRAWING NO. C-3076-2



NOTES

1. MAKE TRANSITION TO RIGID CONDUIT. USING DUCT REDUCING ADAPTER AND CONDUIT REDUCER AS REQUIRED. DRILL 3½" HOLES THRU 8" CONCRETE WALL & GROUT IN. AFTER CONDUIT IS IN PLACE.
2. 3" Ø DUCT BENDS ARE 36" RADIUS
3. ONE (1) JUNCTION BOX (JB-AP3X) FOR BOTH PUMPS WITH TWO (2) 12-POINTS TERMINAL BLOCKS.
4. ALL CONTROL CIRCUIT CABLES: 2/C #19/25 CU. POLYETHYLENE PVC.
5. LIGHTING CIRCUIT WIRE SIZE: #12 AWG. CU. THW. EXCEPT AS NOTED.
6. THE SIZE OF CONDUITS IN PUMPING STATION IS 3/4 INCH EXCEPT AS NOTED.
7. SPACE HEATERS (2) ARE 1000 WATTS EA. EACH HEATER HAS INTEGRAL THERMOSTAT.
8. VENT FAN MOTOR IS 1/4 H.P.-120V-1-60. FAN CONTROLLED BY LINE VOLTAGE THERMOSTAT. LOCATED ON WALL 5 FT. FROM FIN. FLR.
9. FOR GROUNDING NOTES & DETAILS SEE DWG. E-3203.

HEATING & VENTILATING EQUIPMENT

FAN-FILTER UNIT: FURNISH ONE BUFFALO FORGE CO. STYLE "H" SKYVENT, SIZE 18", 1/4 H.P., 120 VOLT-SINGLE PHASE. FURNISH WITH FILTER HEADS, 4-16"X20"X2" HY-2 FILTERS, GRAVITY SUPPLY SHUTTER, SENTINEL SWITCH, HONEYWELL TG316 AIRSWITCH CONTROLLER. FAN CAPACITY SHALL BE 2300 CFM AT 1/8" S.P. W.G.

SPACE HEATERS: FURNISH TWO CHROMALOX UTILITY AND PUMP HOUSE HEATERS MODEL HVT-2411, 120 VOLT-SINGLE PHASE, 1000 WATT W/ INTEGRAL THERMOSTAT.

RONALD J. GIBBS REGISTERED PROFESSIONAL ENGINEER

Oct. 1, 1992

REFERENCES:

1. BILL OF MATERIAL E-3215 SHT. 1 THRU 6 (ER-0231-500)
2. CONDUIT SCHEDULE E-3218 SHT. 214, 222, 223, 224, 235, 239 (ER-0231). SHT. 240 (ER-0231-500)
3. CABLE SCHEDULE E-3217 SHT. 312 (ER-0231-500)
4. E-3004, E-3026.3, E-3027.4, E-3035, E-3047, E-3111, E-3132., E-9201
5. E-91356, SCHEMATIC WIRING DIAGRAM FGD M/U WATER TRANSFER PUMP.
6. E-9130 BILL OF MATERIALS, FGD PROJECT

STATE OF TEXAS ABRAHAM KATES REGISTERED PROFESSIONAL ENGINEER

Abraham Kates PE 39391 REV. 4, 9/13/93 REV. 3 8/2/93 REV. 2 7/7/93

NO.	DATE	REVISION	BY	CHK.	APP.
7	2-6-07	REPLACED PUMPS WITH SUBMERSIBLES AND REVISED ELECTRICAL SYSTEM AS SHOWN.	JO		
6	5-25-94	AS BUILT	NN		
5	10-13-93	REVISED CONDUIT SIZE - ME1 PKG.	AN		
4	9-13-93	ISSUED FOR CONSTRUCTION - ME-1 PKG	NN		
3	8-2-93	DELETED EUH, ESTAIN REV. 2 SCOPE - REISSUED ME-1 BID	GO		
2	6-23-93	ISSUED FOR BID & CLIENT REVIEW - MVE-1 PACKAGE	JL		
1	9-30-92	ISSUED FOR CONSTRUCTION MVI JOB No. EF-0611	RG		
	4-3-74	AS BUILT REVISION - NO CHANGE	R.YEN		
0	4-21-72	ISSUED FOR CONSTRUCTION	DV	BJO	HB

DRAWN D. V.
CHECKED B. J. Oh
APPROVED
CUSTOMER APP.

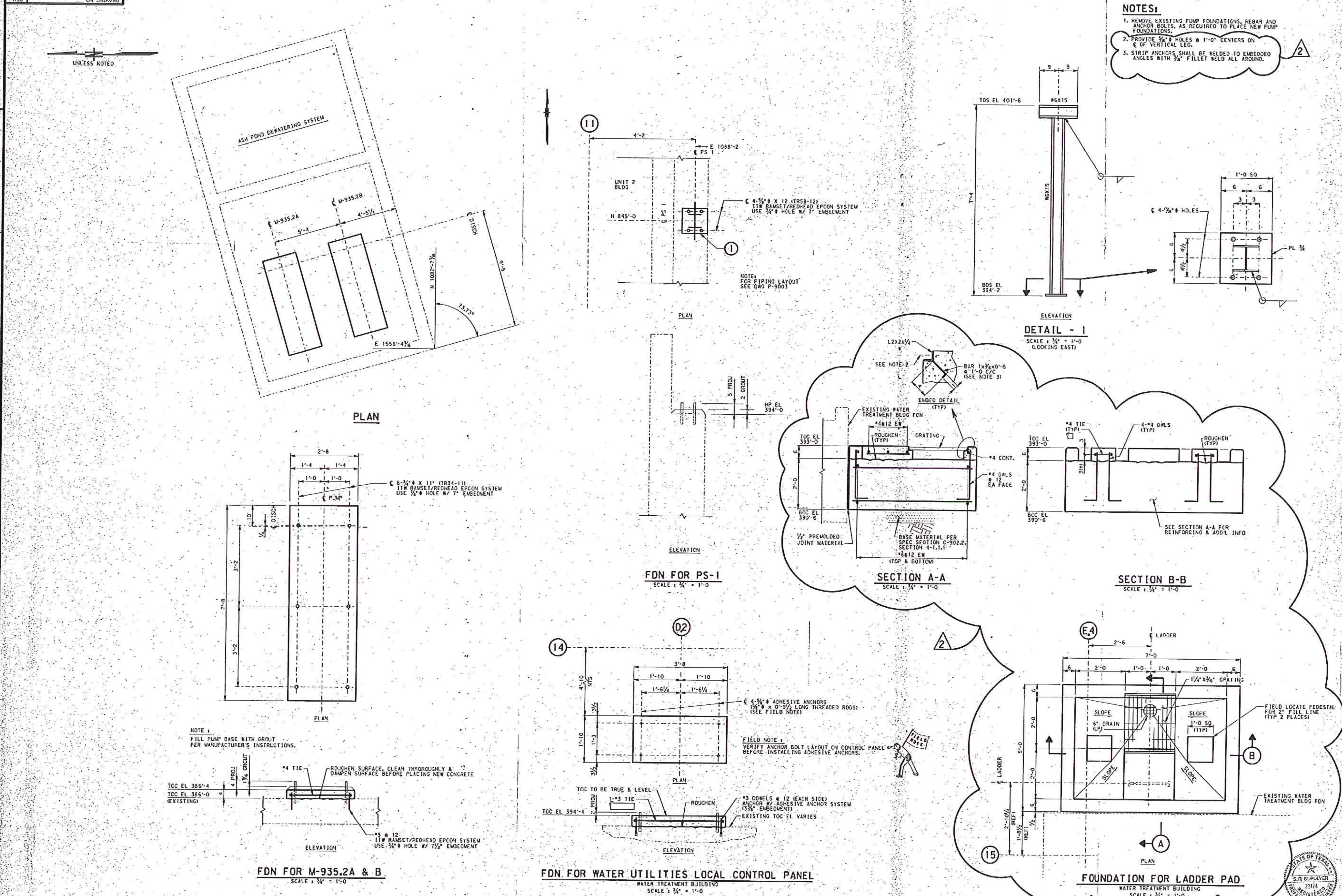
BROWN & ROOT, INC.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

SOUTHERN INDIANA GAS & ELECTRIC CO.
EVANSVILLE, INDIANA

CULLEY STATION
UNIT NO. 3

DRAWING TITLE
ELECTRICAL
SCHEMATIC AND LAYOUT DIAGRAM
ASH POND DEWATERING PUMPS "A" & "B"

CONTRACT NO. ER-0231 -500
DATE: 11-20-72
SCALE: AS NOTED
B & R DRAWING NO. E-3208
REV. 7



NO.	DATE	REVISIONS	BY	CHK'D	APP'D
A	07-07-93	ISSUED FOR OFFICE CHECK	RLS	KL	-
B	07-12-93	ISSUED FOR BID AND CLIENT REVIEW	RLS	KL	GLF
C	08-04-93	DELETED CONTROL STA & SECT A-A/ADDENDUM 2 FOR BID	AKP	SGM	JLM
0	10-22-93	ISSUED FOR CONSTRUCTION	AKP	KB	JLM
1	12-03-93	ADDED FOUNDATION FOR CONTROL PANEL	AKP	PCL	JLM
2	07-14-94	ADDED LADDER PAD FDN DETAIL WITH SECTS A-A & B-B	AKP	PCL	JLK

REFERENCES
C-3077 - ASH POND DEWATERING SYSTEM
C-9490 - CONCRETE GENERAL NOTES

NO.	RELEASED FOR	BY	DATE

DRAWN BY RLS DATE 06-09-93
CHECKED BY KL DATE 07-07-93
COST/SCHED-AREA
SCALE 3/4" = 1'-0

Mid-Valley, Inc.
ENGINEERS • CONSTRUCTORS

SOUTHERN INDIANA GAS & ELECTRIC CO.
F. B. CULLEY STATION
FLUE GAS DESULFURIZATION SYSTEM PROJECT

CONCRETE
ASH POND DEWATERING SYSTEM
FNDS FOR M-935.2A/B, PS-1, PANEL & LADDER

CONTRACT NO. EF-0611
OWNER NO.
APPROVED BY G. L. FISHER DATE 07-07-93
APPROVED BY DATE
DRAWING NO. C-9480
REV. 2

HydroCAD Output Report

The West Ash Pond was constructed by placing fill along the south side (i.e., adjacent to the Ohio River) and the east side, and tying into existing high ground at the north and west sides. Bottom elevation of the pond was set approximately at 365' but followed the natural topography and gradually increased in elevation as the pond extended north. The Little Pigeon Creek originally coursed through the footprint of the West Ash Pond before being re-routed east of the Culley Station at the time of the original construction in the 1950's. As such, the east and west embankments of the West Ash Pond extend to the bottom of the creek bed which is at an approximate elevation of 340'. The top of the embankment was constructed to an approximate elevation of 393' with a small portion in the northeast corner extending to an elevation of 402'. Interior side slopes of the pond vary, but original design documents indicate that the slopes are 2H:1V along the south embankment and 2.5H:1V on the east and west embankments. The surface area of the impoundment is approximately 9.8 acres. The Culley West Ash Pond measures approximately 1400' by 1150' and is approximately 32 acres in size.

The diagram below depicts the Culley West Pond as it was setup in the HydroCAD model and analyzed for the certification.

The subcatchments for each pond were measured using a computer-aided design (CAD) analysis to calculate the area of drainage to each pond based on the most recent topographic survey. The runoff computations were completed the SCS Curve Number Method, where curve numbers (CN) were assigned to each subcatchment based on the type of land cover and soil type present. Using the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey, the soil type of the site was selected as hydrologic soil group B. CN values for the land cover were selected from the CN Table available in HydroCAD. For all subcatchments that were located within the confines of an impoundment, a CN value of 98 was specified as 'water surface'. This provides the most conservative runoff values.

The storage capacity for each pond was evaluated using CAD to estimate the volume of the ponds under the conditions presented in the latest topographic survey dated November 30th, 2016. The volume of storage was calculated by estimating the incremental storage volume present for each 1 foot elevation within the updated topographic surface. The incremental storage volume was then used to calculate a cumulative storage volume and was input into HydroCAD. This volume was determined with the assumption that the pond will be maintained with an operating water surface elevation at or below 370 feet.

A hydraulic model was created in HydroCAD 10.00 to assess the capacity of the pond to store and convey the storm flows. HydroCAD has the capability to evaluate each pond within the network, to respond to variable tailwater, pumping rates, permit flow loops, and reversing flows. HydroCAD routing calculations reevaluate the pond's systems discharge capability at each time increment, making the program an efficient and dynamic tool for this evaluation.

The West Ash Pond pump station is the only discharge point for the West Ash Pond. The pump station discharges via single 10" HDPE pipe to the East Ash Pond. The East Ash Pond discharges to an underground discharge tunnel in the Unit 2 building, which discharges to the Ohio River through NPDES permitted Outfall 001.

For the purposes of this analysis, the West Ash Pond was analyzed as if neither pump within the pump station was operational. This represents a worst case scenario. As such, the West Ash Pond must store the design storm. The detailed output from the HydroCAD model is presented in the following pages.

Routing Diagram for Culley West 2018 Certifying FINAL Conditions_NO PUMPS
Prepared by AECOM, Printed 3/22/2018
HydroCAD® 10.00-20 s/n 05502 © 2017 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Subcatchment 1

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for class B soils and urban industrial was 88.

Time of concentration data was determined using LIDAR data from 2012 and measuring lengths in AutoCAD.

To complete time of concentration, a method of sheet flow, shallow flow, or channel flow is needed. These are estimated using LIDAR data. Other things that are needed include a surface description, length of flow, manning's number, land slope, and P2 are needed. The program then computes a Tc.

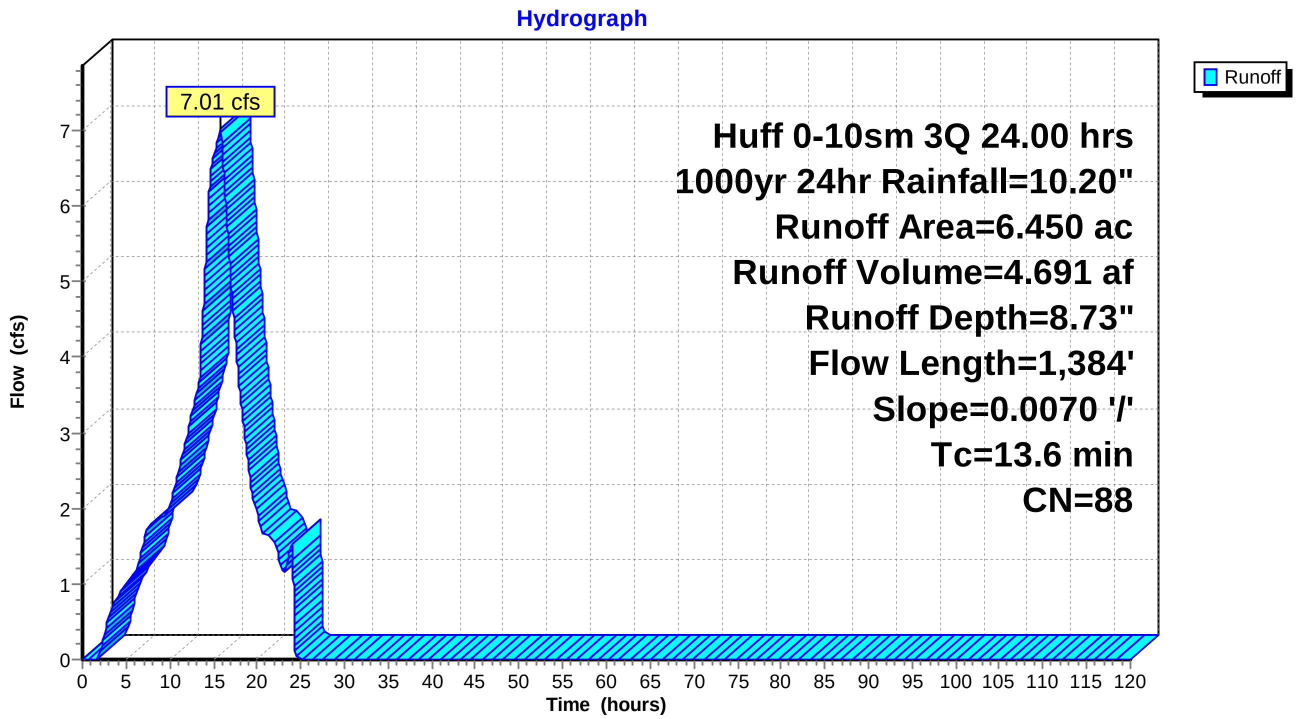
Runoff = 7.01 cfs @ 15.73 hrs, Volume= 4.691 af, Depth= 8.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
6.450	88	Urban industrial, 72% imp, HSG B
1.806		28.00% Pervious Area
4.644		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	1,384	0.0070	1.70		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps

Subcatchment 1S: Subcatchment 1



Summary for Subcatchment 2S: Subcatchment 2

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for grass cover over 75% for class B soils is 61 and a CN of 88 was used for urban industrial. Each CN was used for half of the site.

Time of concentration data was determined using LIDAR data from 2012 and measuring lengths in AutoCAD.

To complete time of concentration, a method of sheet flow, shallow flow, or channel flow is needed. These are estimated using LIDAR data. Other things that are needed include a surface description, length of flow, manning's number, land slope, and P2 are needed. The program then computes a Tc.

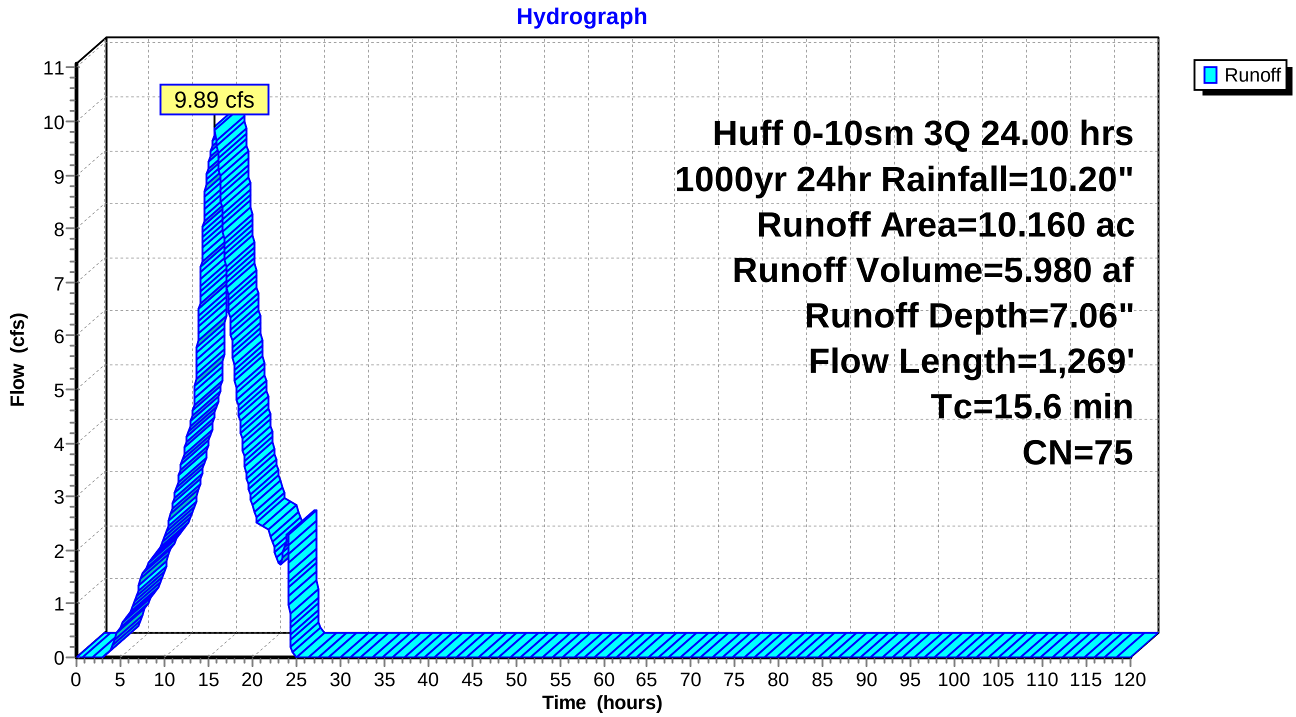
Runoff = 9.89 cfs @ 15.79 hrs, Volume= 5.980 af, Depth= 7.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
5.080	61	>75% Grass cover, Good, HSG B
5.080	88	Urban industrial, 72% imp, HSG B
10.160	75	Weighted Average
6.502		64.00% Pervious Area
3.658		36.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	104	0.0379	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.28"
5.4	600	0.0083	1.85		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	565	0.0619	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
15.6	1,269	Total			

Subcatchment 2S: Subcatchment 2



Summary for Subcatchment 3S: Subcatchment 3

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for grass cover between 50-75% for class B soils of 69 was used.

Time of concentration data was determined using LIDAR data from 2012 and measuring lengths in AutoCAD.

To complete time of concentration, a method of sheet flow, shallow flow, or channel flow is needed. These are estimated using LIDAR data. Other things that are needed include a surface description, length of flow, manning's number, land slope, and P2 are needed. The program then computes a Tc.

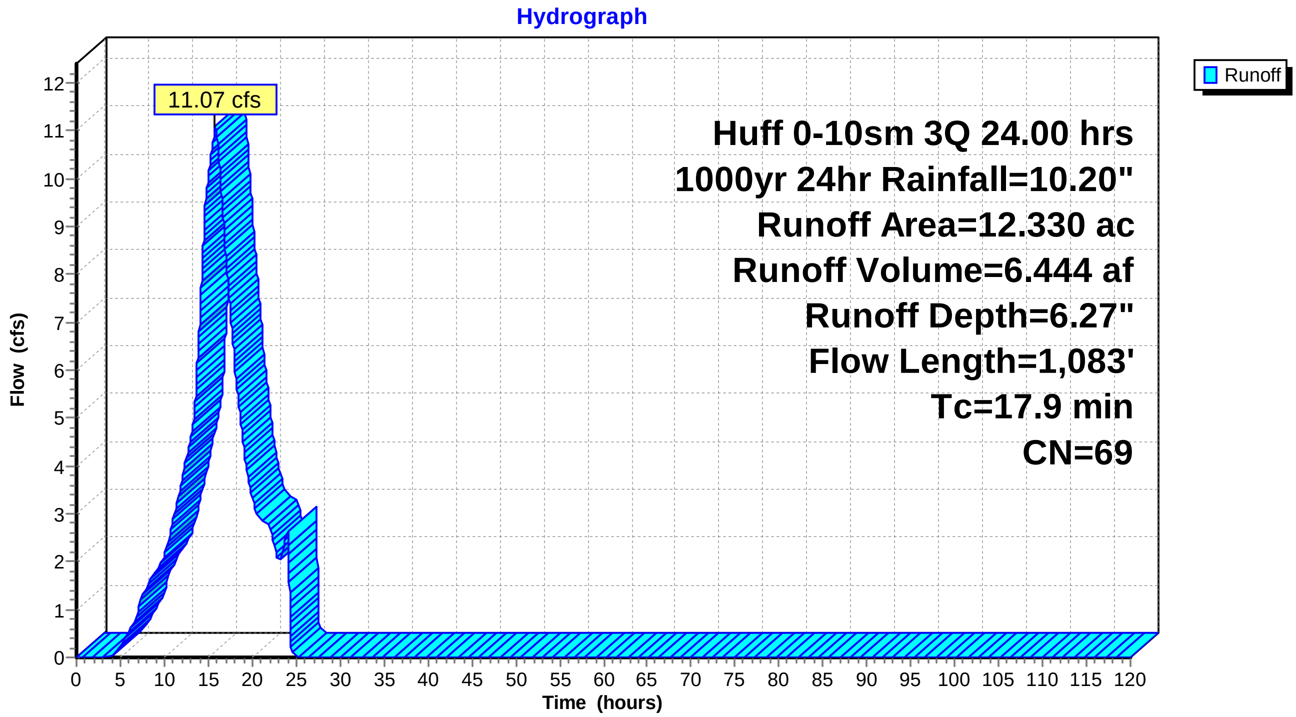
Runoff = 11.07 cfs @ 15.81 hrs, Volume= 6.444 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
12.330	69	50-75% Grass cover, Fair, HSG B
12.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	802	0.0370	2.89		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.3	281	0.0711	0.35		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.28"
17.9	1,083	Total			

Subcatchment 3S: Subcatchment 3



Summary for Subcatchment 4S: Subcatchment 4

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN for class B soils and water surface was 98.

Time of concentration data was determined using LIDAR data from 2012 and measuring lengths in AutoCAD.

To complete time of concentration, a method of sheet flow, shallow flow, or channel flow is needed. These are estimated using LIDAR data. Other things that are needed include a surface description, length of flow, manning's number, land slope, and P2 are needed. The program then computes a Tc.

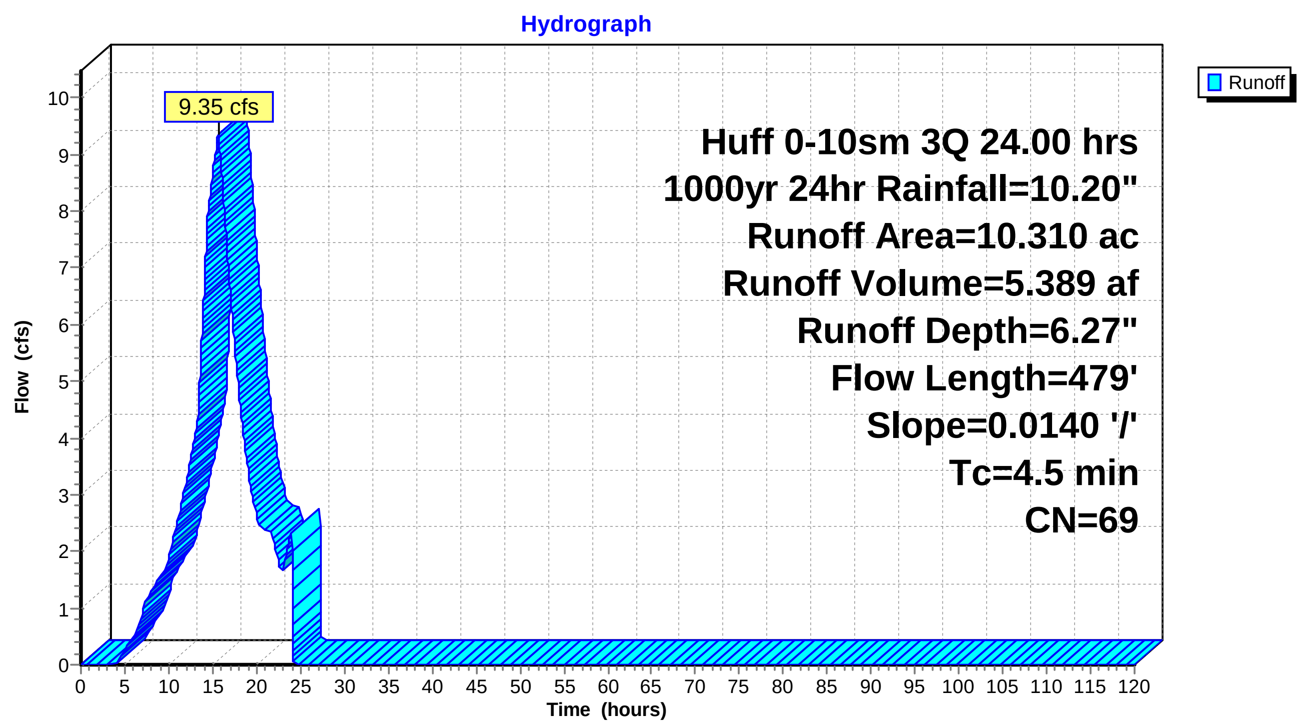
Runoff = 9.35 cfs @ 15.65 hrs, Volume= 5.389 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
10.310	69	50-75% Grass cover, Fair, HSG B
10.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	479	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps

Subcatchment 4S: Subcatchment 4



Summary for Subcatchment 6S: Subcatchment 6

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for grass cover between 50-75% for class B soils of 69 was used.

Time of concentration data was determined using LIDAR data from 2012 and measuring lengths in AutoCAD.

To complete time of concentration, a method of sheet flow, shallow flow, or channel flow is needed. These are estimated using LIDAR data. Other things that are needed include a surface description, length of flow, manning's number, land slope, and P2 are needed. The program then computes a Tc.

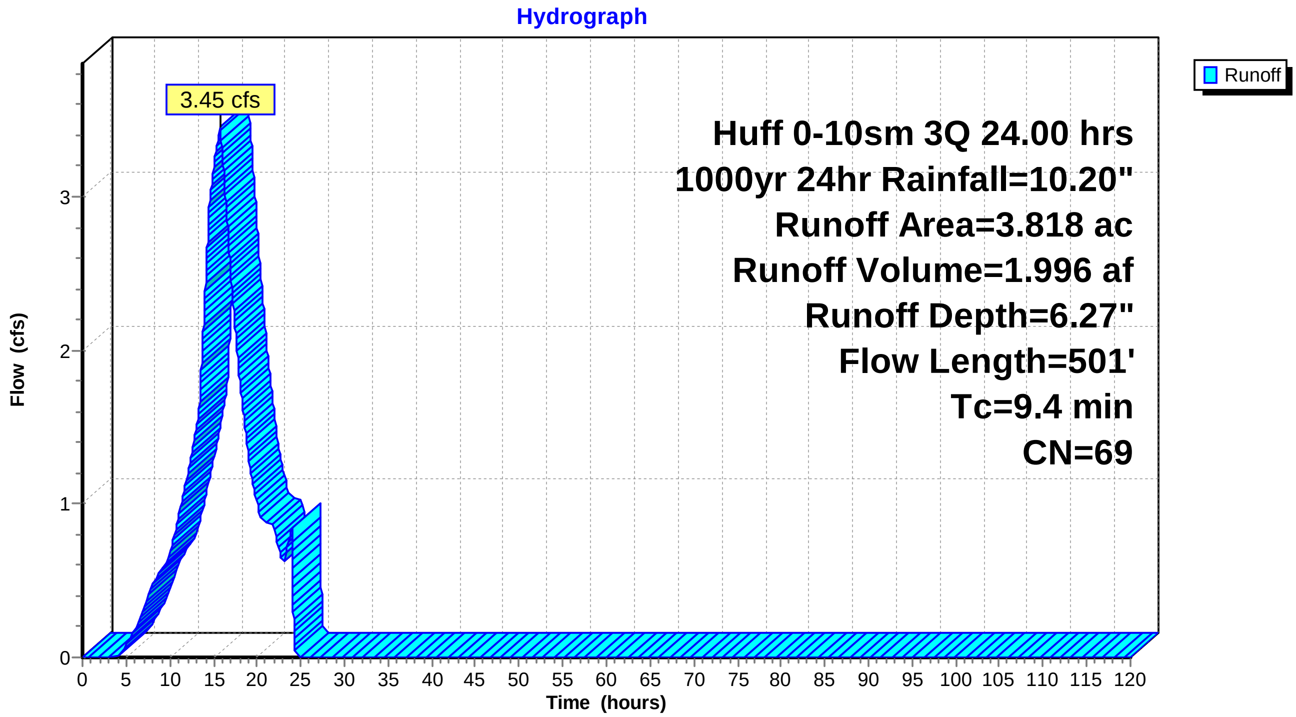
Runoff = 3.45 cfs @ 15.72 hrs, Volume= 1.996 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
3.818	69	50-75% Grass cover, Fair, HSG B
3.818		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	150	0.0670	0.30		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.28"
1.1	351	0.1225	5.25		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.4	501	Total			

Subcatchment 6S: Subcatchment 6



Summary for Subcatchment 7S: Subcatchment 7

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for Ponded Area was Water Surface.

Time of concentration was input as zero since ponded area has direct runoff to the Pond.

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

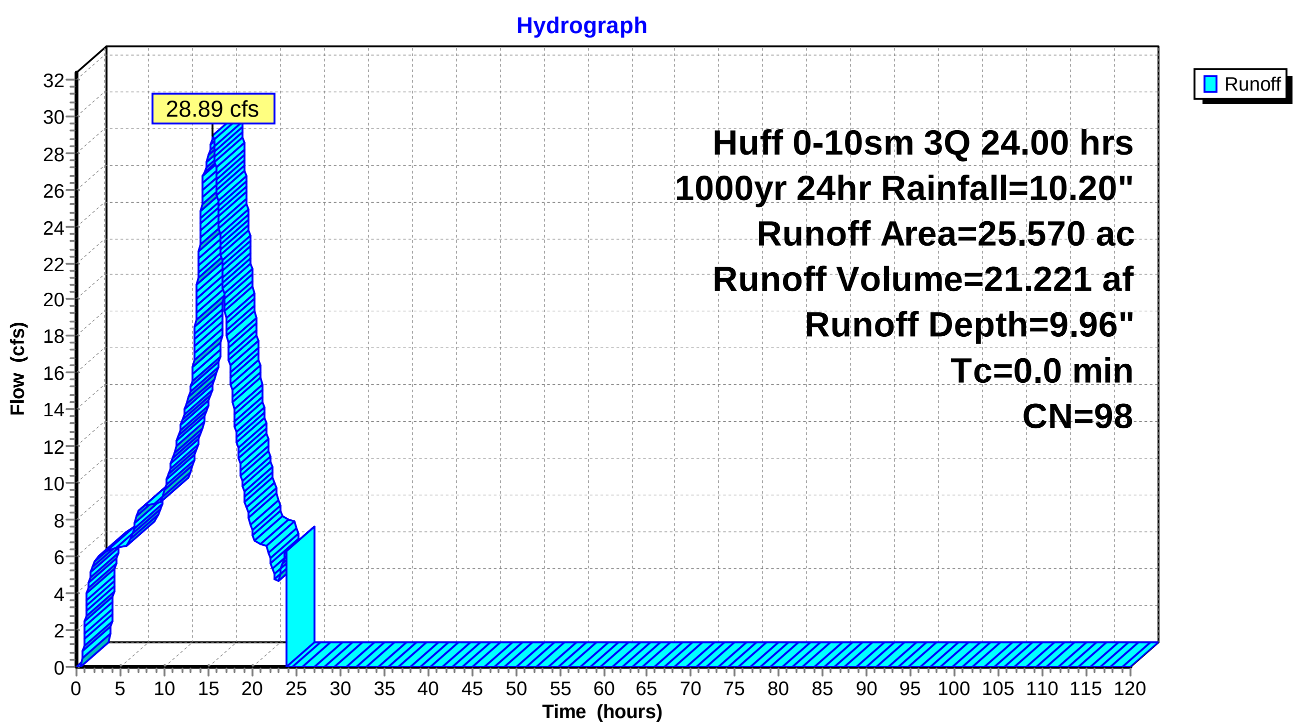
Runoff = 28.89 cfs @ 15.60 hrs, Volume= 21.221 af, Depth= 9.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
25.570	98	Water Surface, HSG B
25.570		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry,**

Subcatchment 7S: Subcatchment 7



Summary for Subcatchment 8S: Subcatchment 8

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for class B soils and urban industrial was 88.

Time of concentration data was determined using LIDAR data from 2012 and measuring lengths in AutoCAD.

To complete time of concentration, a method of sheet flow, shallow flow, or channel flow is needed. These are estimated using LIDAR data. Other things that are needed include a surface description, length of flow, manning's number, land slope, and P2 are needed. The program then computes a Tc.

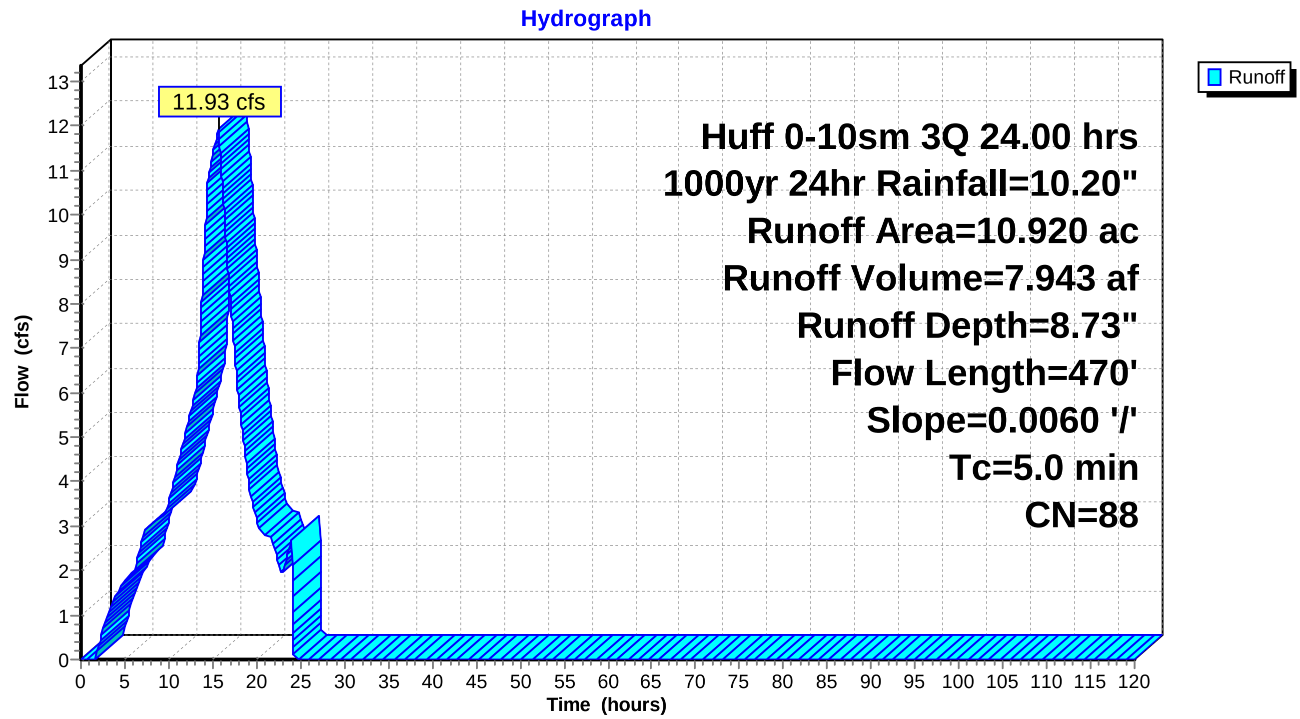
Runoff = 11.93 cfs @ 15.65 hrs, Volume= 7.943 af, Depth= 8.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
10.920	88	Urban industrial, 72% imp, HSG B
3.058		28.00% Pervious Area
7.862		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	470	0.0060	1.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps

Subcatchment 8S: Subcatchment 8



Summary for Subcatchment 9S: Subcatchment 9

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for class B soils and grass 50 - 75% was used .

Time of concentration data was determined using LIDAR data from 2012 and measuring lengths in AutoCAD.

To complete time of concentration, a method of sheet flow, shallow flow, or channel flow is needed. These are estimated using LIDAR data. Other things that are needed include a surface description, length of flow, manning's number, land slope, and P2 are needed. The program then computes a Tc.

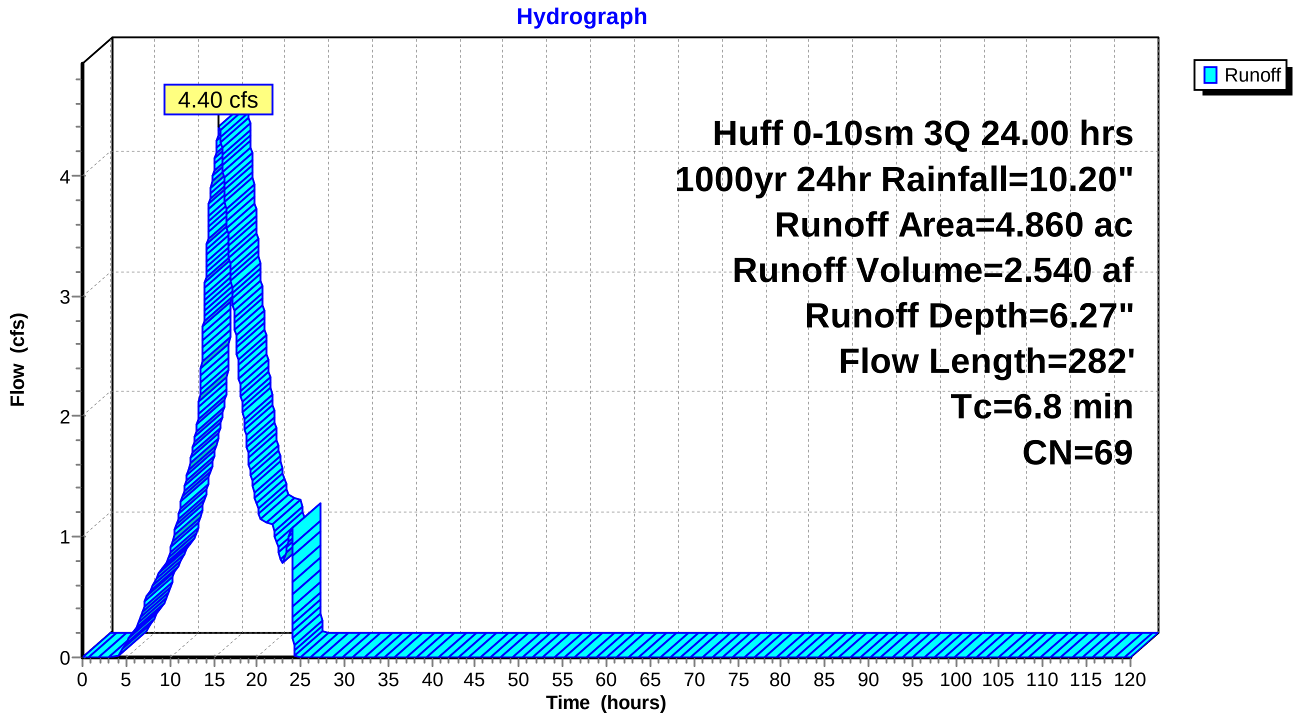
Runoff = 4.40 cfs @ 15.68 hrs, Volume= 2.540 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
4.860	69	50-75% Grass cover, Fair, HSG B
4.860		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	127	0.2360	0.33		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.28"
0.4	155	0.1900	6.54		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
6.8	282	Total			

Subcatchment 9S: Subcatchment 9



Summary for Subcatchment 11S: Subcatchment 1

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for class B soils and urban industrial was 88.

Time of concentration data was determined using LIDAR data from 2012 and measuring lengths in AutoCAD.

To complete time of concentration, a method of sheet flow, shallow flow, or channel flow is needed. These are estimated using LIDAR data. Other things that are needed include a surface description, length of flow, manning's number, land slope, and P2 are needed. The program then computes a Tc.

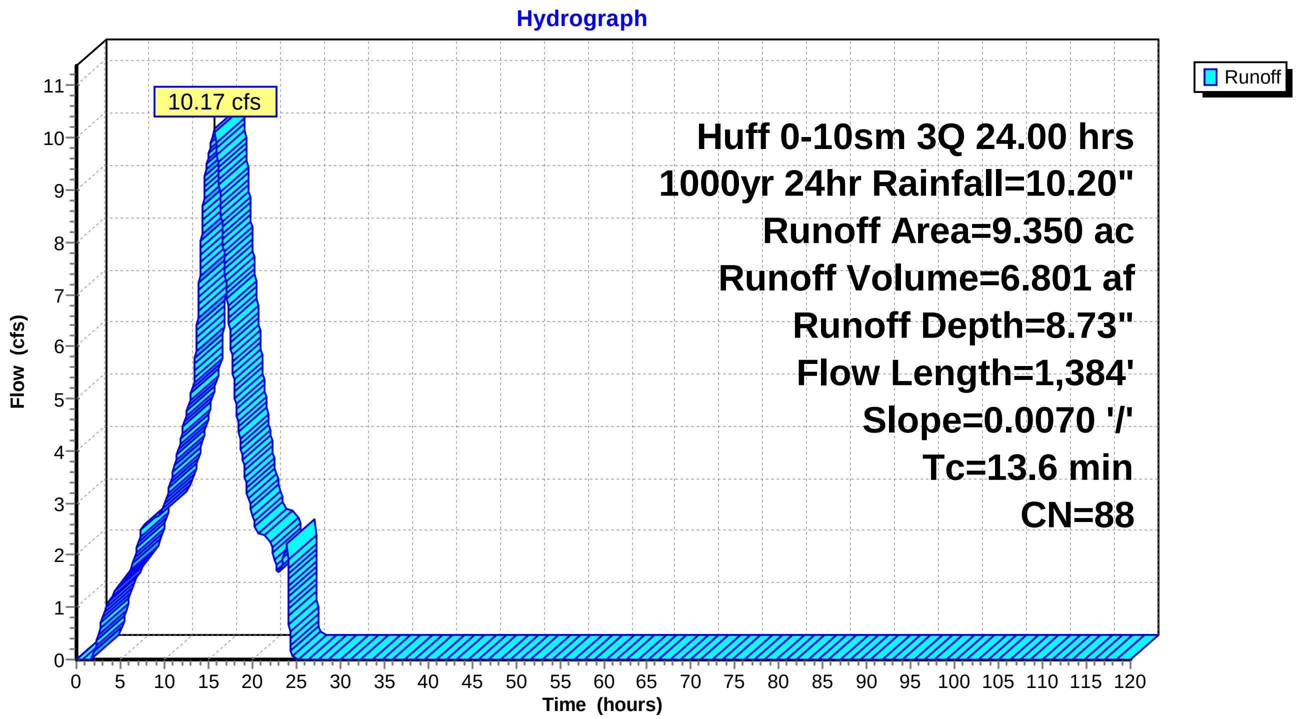
Runoff = 10.17 cfs @ 15.73 hrs, Volume= 6.801 af, Depth= 8.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
9.350	88	Urban industrial, 72% imp, HSG B
2.618		28.00% Pervious Area
6.732		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	1,384	0.0070	1.70		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps

Subcatchment 11S: Subcatchment 1



Summary for Subcatchment 13S: Gypsum Pond Drainage Area

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for Ponded Area was Water Surface.

Time of concentration was input as zero since ponded area has direct runoff to the Pond.

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

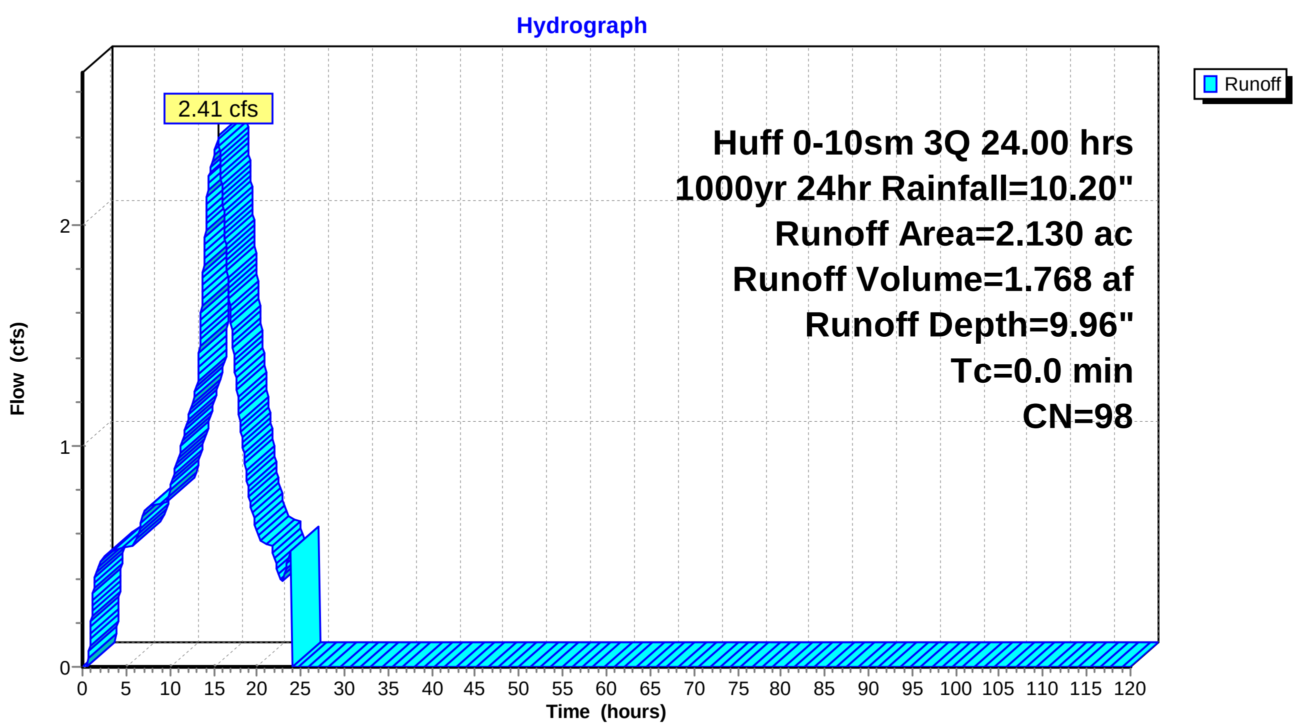
Runoff = 2.41 cfs @ 15.60 hrs, Volume= 1.768 af, Depth= 9.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
2.130	98	Water Surface, HSG B
2.130		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, 0**

Subcatchment 13S: Gypsum Pond Drainage Area



Summary for Subcatchment 17S: Main Treatment Pond Drainage Area

Acre number found using LIDAR data from 2012 and measuring areas in AutoCAD. CN used for Ponded Area was Water Surface.

Time of concentration was input as zero since ponded area has direct runoff to the Pond.

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

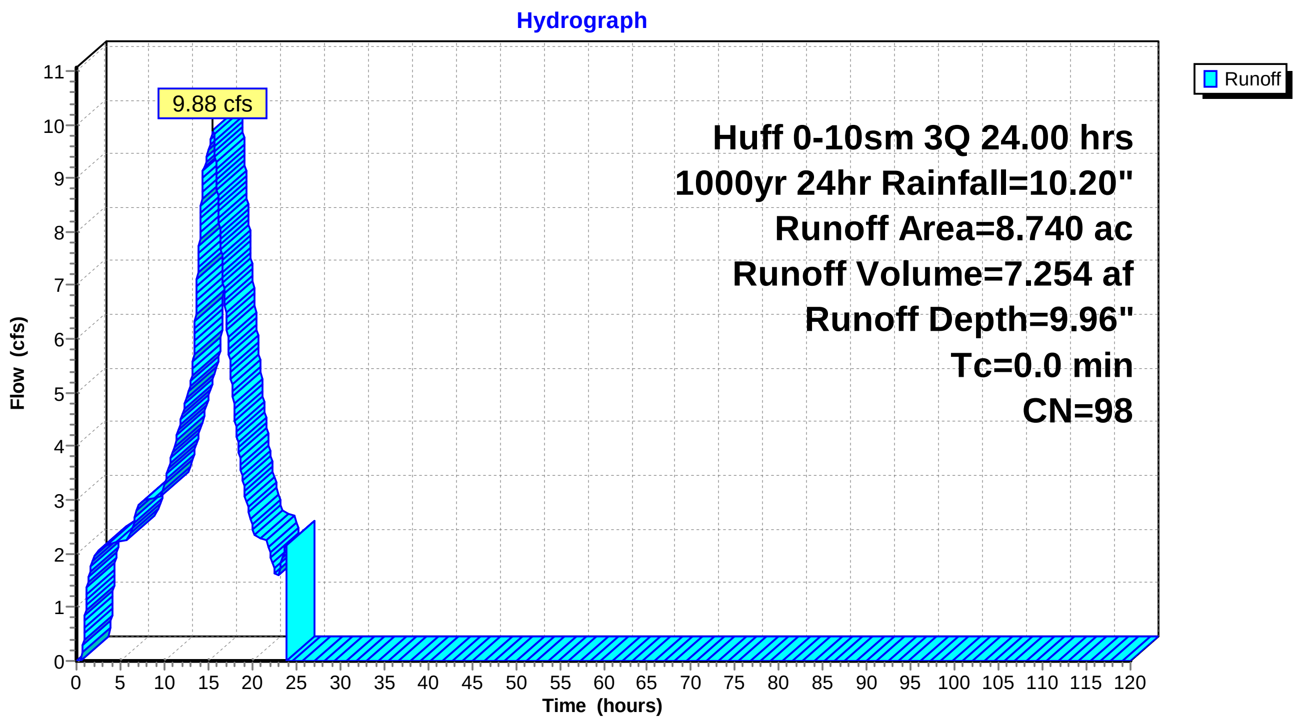
Runoff = 9.88 cfs @ 15.60 hrs, Volume= 7.254 af, Depth= 9.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr 24hr Rainfall=10.20"

Area (ac)	CN	Description
8.740	98	Water Surface, HSG B
8.740		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry,**

Subcatchment 17S: Main Treatment Pond Drainage Area



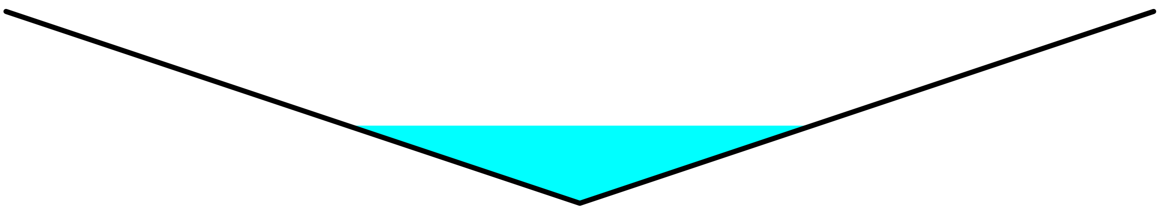
Summary for Reach 1R: Ditch 1

Inflow Area = 10.160 ac, 36.00% Impervious, Inflow Depth = 7.06" for 1000yr 24hr event
Inflow = 9.89 cfs @ 15.79 hrs, Volume= 5.980 af
Outflow = 9.87 cfs @ 15.83 hrs, Volume= 5.980 af, Atten= 0%, Lag= 2.4 min

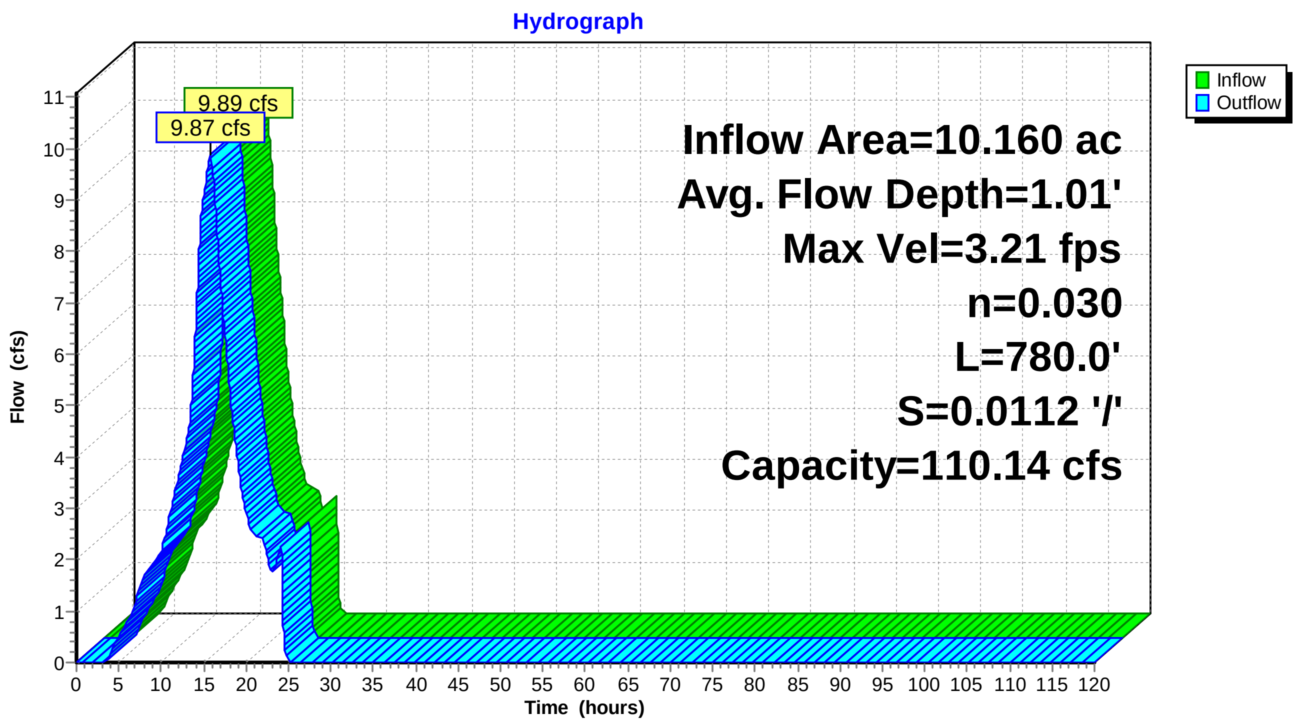
Routing by Sim-Route method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.21 fps, Min. Travel Time= 4.0 min
Avg. Velocity = 1.79 fps, Avg. Travel Time= 7.3 min

Peak Storage= 2,396 cf @ 15.83 hrs
Average Depth at Peak Storage= 1.01'
Bank-Full Depth= 2.50' Flow Area= 18.8 sf, Capacity= 110.14 cfs

0.00' x 2.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 780.0' Slope= 0.0112 '/'
Inlet Invert= 400.20', Outlet Invert= 391.46'



Reach 1R: Ditch 1



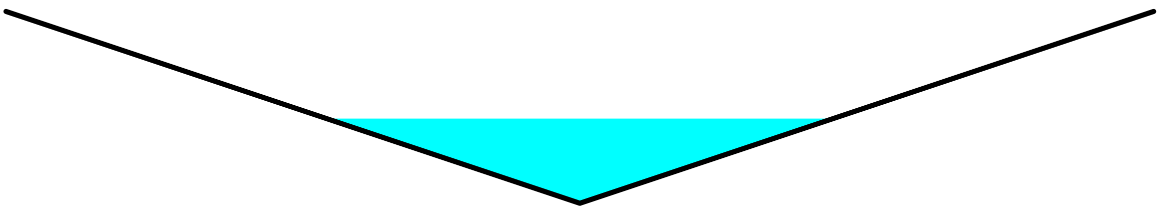
Summary for Reach 2R: Ditch 2

Inflow Area = 16.148 ac, 0.00% Impervious, Inflow Depth = 6.27" for 1000yr 24hr event
Inflow = 14.50 cfs @ 15.77 hrs, Volume= 8.440 af
Outflow = 14.49 cfs @ 15.82 hrs, Volume= 8.440 af, Atten= 0%, Lag= 2.7 min

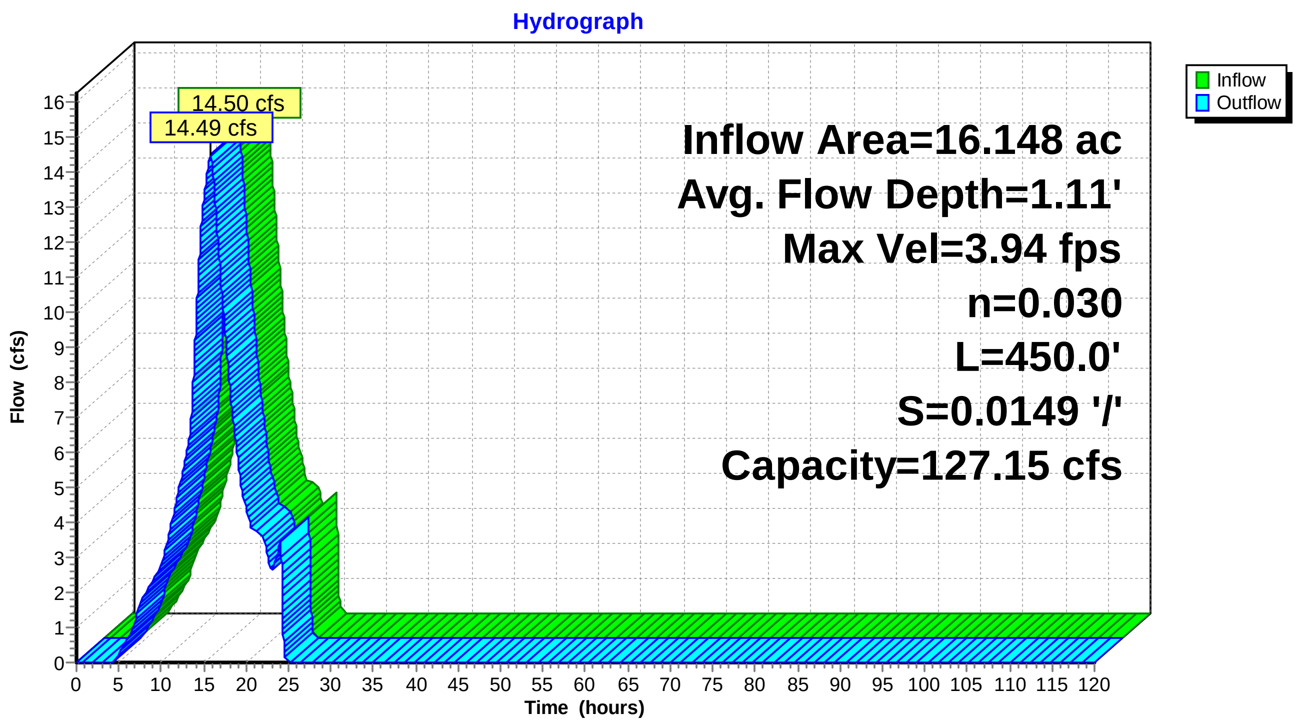
Routing by Sim-Route method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.94 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 2.44 fps, Avg. Travel Time= 3.1 min

Peak Storage= 1,655 cf @ 15.82 hrs
Average Depth at Peak Storage= 1.11'
Bank-Full Depth= 2.50' Flow Area= 18.8 sf, Capacity= 127.15 cfs

0.00' x 2.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 450.0' Slope= 0.0149 '/'
Inlet Invert= 398.00', Outlet Invert= 391.28'



Reach 2R: Ditch 2



Summary for Pond 1P: Culley West Pond

Culley West Pond is mostly dewatered. The operating level of 370' is maintained by means of a temporary sump pump whcih outlets to the West Ash Pond pump station, which discharges through a single 10" HDPE pipe to the East Ash Pond. The East Ash Pond has an existing pump station that discharges to the underground discharge tunnel, which discharges through a NPDES permitted outfall to the Ohio River at the Unit #2 Building.

For the purpose of this analysis the assumption is that the lift station is out of order and no pumps are running.

Inflow Area = 72.298 ac, 55.55% Impervious, Inflow Depth > 9.09" for 1000yr 24hr event
Inflow = 74.90 cfs @ 15.60 hrs, Volume= 54.752 af, Incl. 0.50 cfs Base Flow
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Sim-Route method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Starting Elev= 370.00' Surf.Area= 0.000 ac Storage= 109.240 af
Peak Elev= 372.38' @ 120.00 hrs Surf.Area= 0.000 ac Storage= 163.992 af (54.752 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

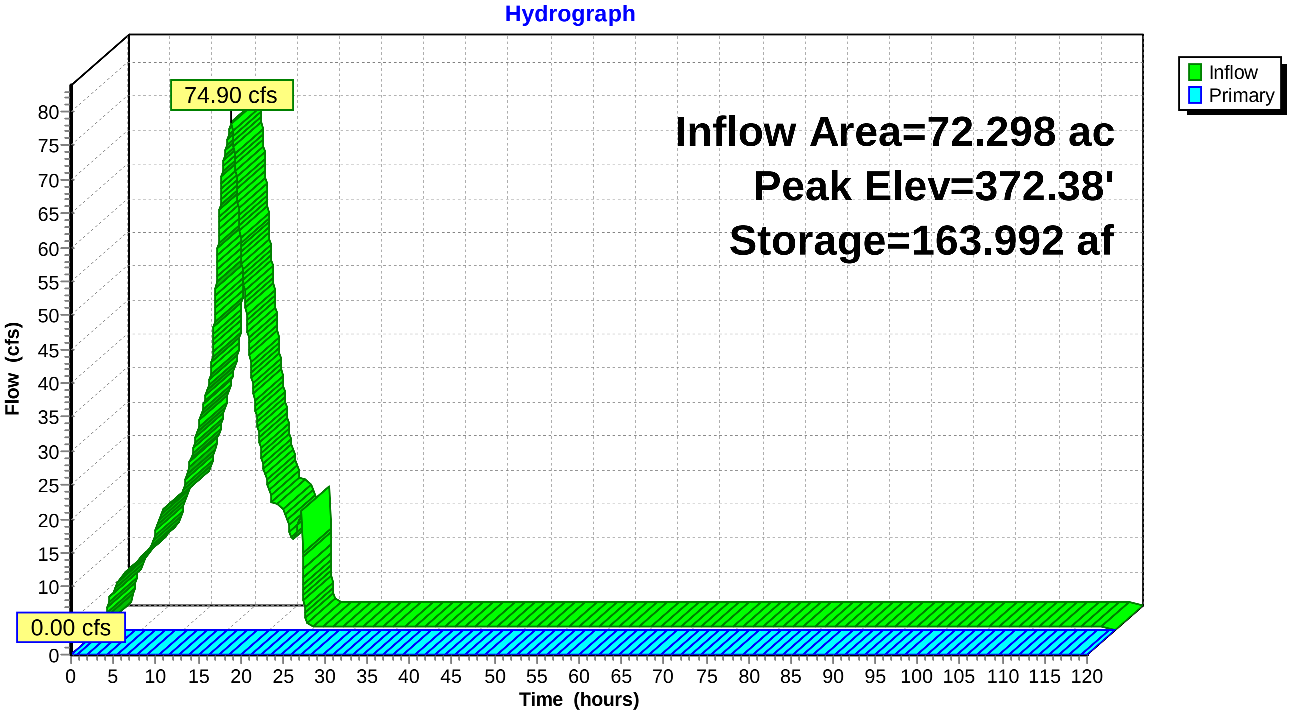
Volume	Invert	Avail.Storage	Storage Description
#1	340.00'	735.240 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
340.00	0.000
342.00	0.930
344.00	2.030
346.00	3.390
348.00	5.030
350.00	7.370
354.00	11.560
358.00	17.320
362.00	25.720
366.00	43.540
368.00	65.610
370.00	109.240
375.00	224.050
380.00	355.450
385.00	492.750
393.50	735.240

Device	Routing	Invert	Outlet Devices
#1	Primary	394.00'	**40.0' long Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=370.00' TW=386.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Culley West Pond



Summary for Pond 2P: Main Treatment Pond

Pump curve modeled off of the given pumps for Culley East pump curves. Two Flyght pumps, CP 3170 LT 3~ 603.

Base flow directed to the Main Treatment Pond ncludes: Unit 2 & 3 Pyrite, Unit 2 & 3 Heater Wash, Unit 2 & 3 Boiler Sumps, Unit 3 Oil Trap, and West Yard Sumps. The total of these was given by the water balance as 1.32 MGD, converted equates to 2.04 cfs.

Vectren has maintained operating WSE of 378'.

For the purpose of this analysis the assumption is that the lift station is out of order and no pumps are running. This simulates the worst case scenario at the pond for the certifying design storm.

Volume calculated based on 11-30-16 topographic survey.

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[62] Hint: Exceeded Reach 1R OUTLET depth by 0.36' @ 119.99 hrs

Inflow	=	33.00 cfs @	15.61 hrs, Volume=	41.850 af,	Incl. 2.10 cfs Base Flow
Outflow	=	3.33 cfs @	16.20 hrs, Volume=	3.895 af,	Atten= 90%, Lag= 35.3 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Secondary	=	3.33 cfs @	16.20 hrs, Volume=	3.895 af	
Tertiary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Sim-Route method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Starting Elev= 386.00' Surf.Area= 0.000 ac Storage= 42.860 af
Peak Elev= 391.82' @ 120.00 hrs Surf.Area= 0.000 ac Storage= 80.816 af (37.956 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 479.4 min (2,729.3 - 2,249.9)

Volume	Invert	Avail.Storage	Storage Description
#1	377.00'	89.160 af	**Custom Stage Data** Listed below

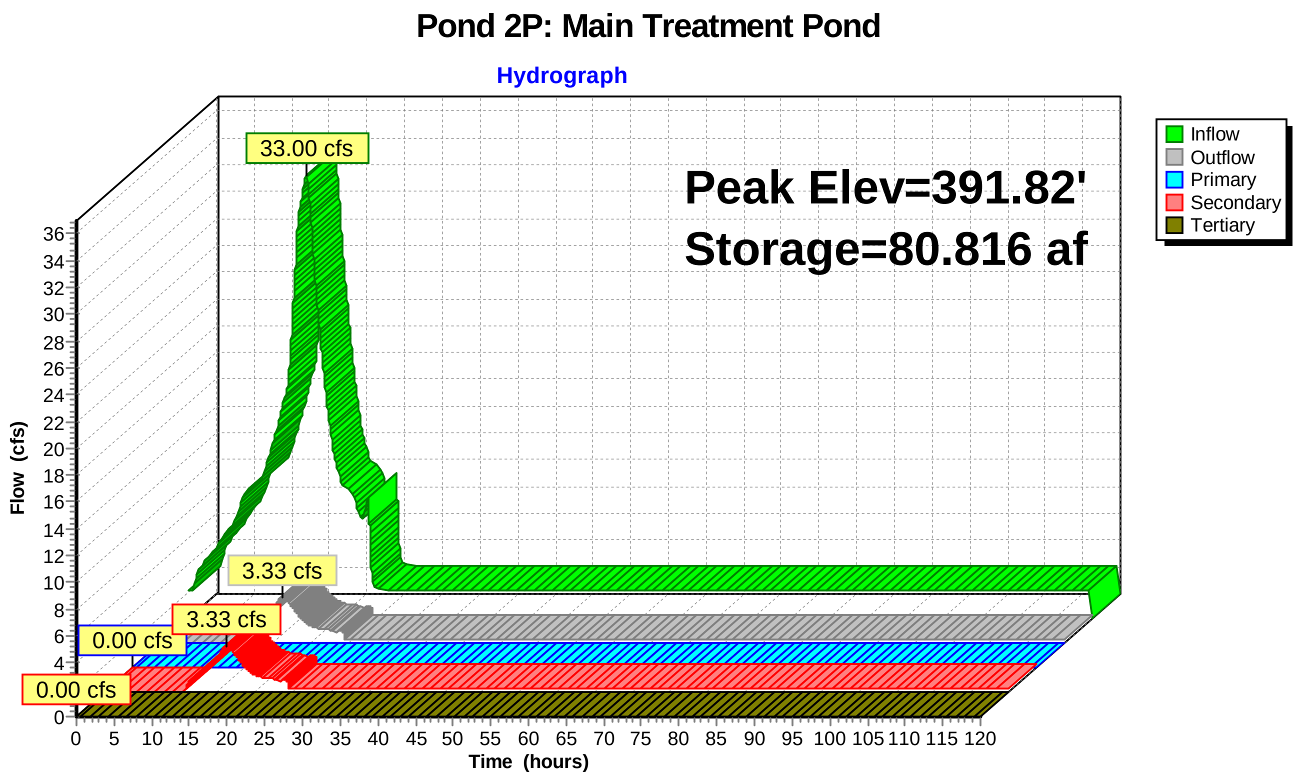
Elevation (feet)	Cum.Store (acre-feet)
377.00	0.000
378.00	1.030
379.00	4.760
380.00	9.240
381.00	14.100
382.00	19.250
383.00	24.770
384.00	30.650
385.00	36.700
386.00	42.860
387.00	49.120
388.00	55.500
389.00	61.990
390.00	68.580
391.00	75.260
392.00	82.060
393.00	89.160

Device	Routing	Invert	Outlet Devices
#1	Device 3	386.50'	**12.0' long x 1.2' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.66 2.69 2.71 2.78 2.89 2.99 3.09 3.20 3.21 3.19 3.30 3.32
#2	Device 4	386.50'	**12.0' long x 1.2' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.66 2.69 2.71 2.78 2.89 2.99 3.09 3.20 3.21 3.19 3.30 3.32
#3	Primary	387.00'	**Dewatering Pump #1 X 0.00** Discharges@390.15' Turns Off@386.98' 10.0" Diam. x 500.0' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 2,177.0 4,500.0 5,400.0 Head (feet)= 48.00 31.30 12.00 4.00 -Loss (feet)= 0.00 13.01 49.94 69.99 =Lift (feet)= 48.00 18.29 -37.94 -65.99
#4	Primary	388.00'	**Dewatering Pump #2 X 0.00** Discharges@390.15' Turns Off@387.01' 10.0" Diam. x 500.0' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 2,177.0 4,500.0 5,400.0 Head (feet)= 48.00 31.30 12.00 4.00 -Loss (feet)= 0.00 13.01 49.94 69.99 =Lift (feet)= 48.00 18.29 -37.94 -65.99
#5	Tertiary	392.67'	**10.0' long Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#6	Secondary	386.07'	**24.0" Round Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 385.82' / 386.07' S= -0.0027 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=386.00' TW=383.50' (Dynamic Tailwater)
—**3=Dewatering Pump #1** (Controls 0.00 cfs)
—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
—**4=Dewatering Pump #2** (Controls 0.00 cfs)
—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=3.26 cfs @ 16.20 hrs HW=388.39' TW=388.32' (Dynamic Tailwater)
—**6=Culvert** (Inlet Controls 3.26 cfs @ 1.04 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=386.00' TW=383.50' (Dynamic Tailwater)
—**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)



Summary for Pond 3P: Ohio River

Arbitrary storage entered for the Ohio River, begins at elevation of 383.5, the 100 year flood elevation.

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Sim-Route method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Peak Elev= 383.50' @ 0.00 hrs Surf.Area= 1,000.000 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

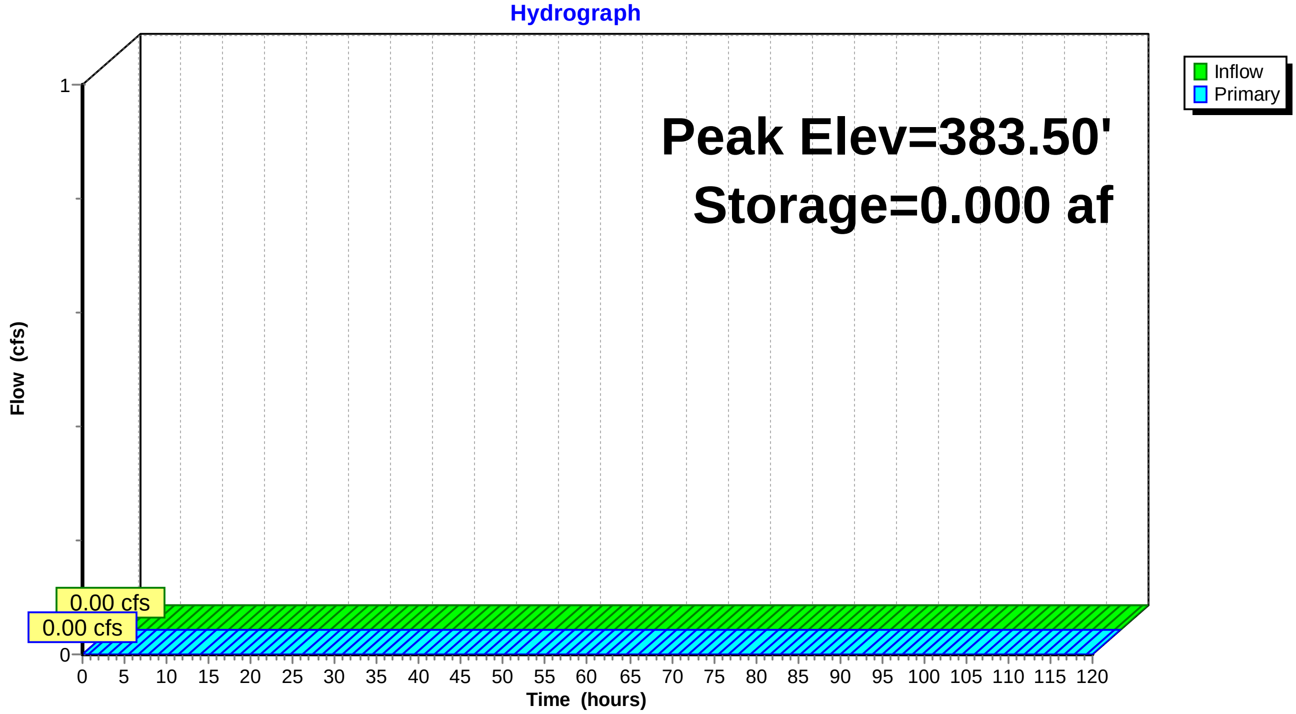
Volume	Invert	Avail.Storage	Storage Description
#1	383.50'	3,250.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
383.50	1,000.000	0.000	0.000
384.00	2,000.000	750.000	750.000
385.00	3,000.000	2,500.000	3,250.000

Device	Routing	Invert	Outlet Devices
#1	Primary	383.50'	**1,500.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=383.50' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P: Ohio River



Summary for Pond 8P: Gypsum Pond

Process Flow FGD Waste and Clarified River Water total to 0.131 MGD per the process flow diagram supplied by the Vectren. Which equals 0.20cfs.

Starting WSE = 386.5'

Volume calculated based on 11-30-16 topographic survey.

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[86] Warning: Oscillations may require smaller dt (severity=2)

Inflow	=	5.70 cfs @	15.77 hrs, Volume=	7.646 af,	Incl. 0.20 cfs Base Flow
Outflow	=	0.53 cfs @	7.49 hrs, Volume=	0.558 af,	Atten= 91%, Lag= 0.0 min
Primary	=	0.53 cfs @	7.49 hrs, Volume=	0.558 af	
Secondary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Sim-Route method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Peak Elev= 391.82' @ 120.00 hrs Surf.Area= 0.000 ac Storage= 7.088 af

Plug-Flow detention time= 2,053.0 min calculated for 0.558 af (7% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	386.00'	9.040 af	**Custom Stage Data** Listed below

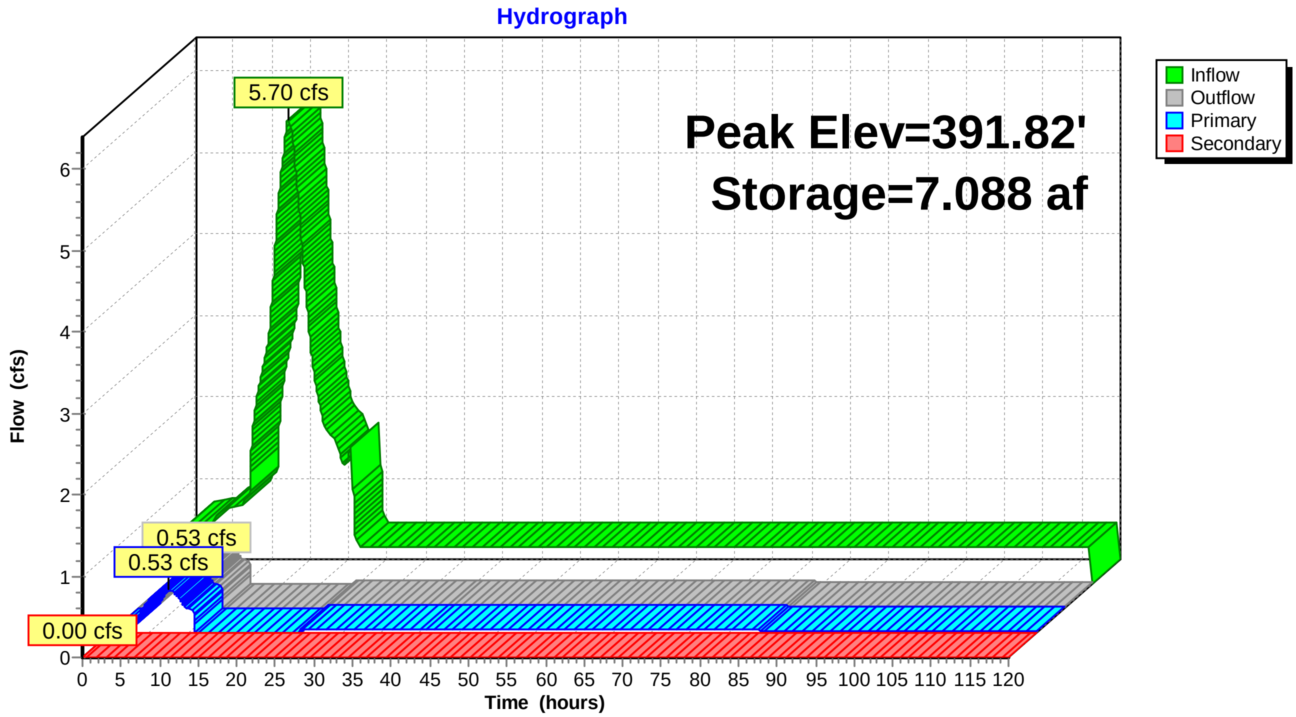
Elevation (feet)	Cum.Store (acre-feet)
386.00	0.000
387.00	0.430
388.00	1.610
389.00	2.960
390.00	4.370
391.00	5.830
392.00	7.370
393.00	9.040

Device	Routing	Invert	Outlet Devices
#1	Primary	386.07'	**24.0" Round Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 386.07' / 385.82' S= 0.0027 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	392.00'	**250.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.52 cfs @ 7.49 hrs HW=386.63' TW=386.53' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.52 cfs @ 1.11 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=386.00' TW=386.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Gypsum Pond



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