STORMWATER RUN-ON
AND
RUN-OFF CONTROL PLAN

Prepared for:

Entergy Louisiana LLC - Nelson Coal Ash Disposal Landfill

Westlake, Louisiana

October 17, 2016

Prepared by:

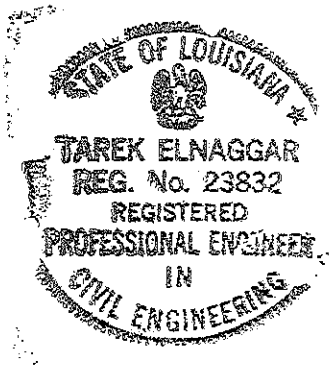
Pivotal Engineering LLC
1515 Poydras, Suite 1875
New Orleans, Louisiana 70112
Phone: 504-799-3653

PROFESSIONAL ENGINEER'S CERTIFICATION

In accordance with §257.81 I certify under penalty of law that I have personally examined and am familiar with the information submitted in this demonstration and all attached documents, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

This Stormwater Run-on and Run-off Control Plan for the Entergy Louisiana, LLC. Nelson Coal Ash Disposal Landfill was prepared under the direction and supervision of Mr. Tarek Elnaggar, a qualified State of Louisiana registered Professional Engineer of Pivotal Engineering LLC.

Signature _____ Date 10/07/16



PLAN AMENDMENTS

Amendment No.	Description of Amendment	Page Number in Plan

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1.0 INTRODUCTION

1.1 PURPOSE OF PLAN

In accordance with 40 CFR *§257, Subpart D – Standards for the Disposal of Coal Combustion Residuals in Landfills* (the CCR Rule), the purpose of this plan is to provide information that demonstrates that the stormwater run-on and run-off control system for the Entergy Louisiana, LLC. Nelson Coal Ash Disposal Landfill will collect and convey a 24-hour, 25-year storm event. From §257.81(a):

> *The owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill must design, construct, operate, and maintain:*
>
> > *(1) A run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm; and*
> >
> > *(2) A run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.*

This Stormwater Run-on and Run-off Control Plan includes:

1. A discussion of how the stormwater run-on and run-off control system has been designed and constructed; and
2. Demonstration of how these controls prevent stormwater run-on and run-off at the Landfill

Appendix A includes definitions for terms included in this Plan.

1.2 NELSON POWER PLANT INFORMATION

The facility is located in Westlake, Louisiana at 3500 Houston River Road (State Highway 379), approximately 4 miles northwest of the intersection of Highway 379 and Interstate 10. The geographical location of the center-point of the facility is located in Section 16, Township 9 South, Range 9 West, Calcasieu Parish, Westlake, Louisiana. The coal ash disposal landfill (CADL) occupies approximately 70 acres. The Run-on and Run-off Plan is based on the currently approved 31.77-acre cell area.

Nelson Coal Unit 6 is an existing coal-fired steam electric generating facility that has been in operation since 1982. The coal-fired boiler feeds a steam turbine and generator that has a maximum generating capacity of 550 megawatts. The facility consists of a coal-fired boiler and turbine unit, storage areas, drainage areas, a treatment pond, a recirculating water system (cooling tower), and other ancillary buildings and equipment. Entergy operates the permitted CADL and a coal storage area in the west and northwest areas of the site.

The CADL is designed to accommodate the disposal of non-marketable coal residue generated during the operation of Nelson Unit 6. Unit 6 burns sub-bituminous coal.

There are no known cultural, historical, or archaeological sites, recreational areas, or habitat for endangered species located at the CADL. A typical cypress swamp, exhibiting wildlife and sensitive ecological areas is located on the northern boundary of the Nelson Station.

There is no prime farm, pasture, or range land located within the immediate area of the CADL and all the land of the Nelson Station is currently within an industrial district of West Calcasieu Parish, Louisiana. The CADL does not impact any archaeological or historical sites, wetlands, or endangered species.

1.3 PERMIT HISTORY

The facility was originally constructed in 1982. The CADL was first permitted on May 26, 1983 and granted permit number P-0018. On August 17, 2011 permit renewal P-0018 R1 was issued. The most recent permit modification updating the groundwater monitoring system was approved on May 11, 2016. Currently a permit modification is under review and was deem technically complete on September 26, 2016. The pending permit modification revises the cell layout and increases the vertical height.

1.4 EXISTING CONDITIONS OF LANDFILL

The LDEQ-permitted landfill area consists of approximately 31.77 Acres. In the pending modification, the current layout of the CCR landfill includes a total of 15 disposal cells (Cells 1 through 15) and has a permitted waste capacity of approximately 1,863,314 cubic yards.

Construction of the CCR units is planned to commence in 2017 in accordance with requirements of the CCR rule. No final cover system has been installed on the active CCR units.

2.0 EXISTING CONDITIONS

The existing stormwater control system for the facility has been developed to collect and convey stormwater around and away from the site to prevent run-on and run-off. The Nelson (Coal Ash Disposal Landfill) CADL is located within the Roy S. Nelson Power Station boundaries, approximately 3,500 feet south-southwest of the plant buildings. The site lies entirely within the drainage basin of the Calcasieu River. The Houston River, which is a tributary to the Calcasieu River, lies north of the CADL and is the nearest natural drainage feature with continuous flow.

Regional drainage, consisting of a series of natural swales and man-made channels, conducts precipitation to either the Houston or Calcasieu Rivers.

As defined by the CCR Rule, stormwater run-off includes any stormwater that falls upon and is discharged from active areas of the landfill. In the case of covered slopes, the stormwater does not come in contact with CCR and can be directly discharged to adjacent stormwater channels. In the case of open landfill areas, the stormwater is either stored within the waste mass or is collected as leachate and discharged as allowed by the facility landfill permit. A schematic of the CADL drainage plan is shown on Figure 1.

3.0 METHODOLOGY

Hydrologic and Hydraulic analyses were completed for the run-off stormwater system based on the 24-hour, 25-year storm event. The Hydrologic and link route analysis were modeled and analyzed using Autodesk Storm and Sewer Analysis Software (Figure 2). The analysis method used in the software is SCS TR-55, that is the methodology described in the USDA Technical Release 55 (TR-55), *Urban Hydrology for Small Watersheds*. The SCS runoff equation is:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

Where,

Q = runoff (in)

P = rainfall (in)

S = potential maximum retention after runoff begins (in) and

I_a = initial abstraction (in)

The 24-hour/25-year storm rainfall (P) used is 10.2 inches. This data is from the U. S. Weather Bureau Technical Paper Number 40.

Initial abstraction (**I_a**) is all losses before runoff begins. It includes water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. **I_a** is highly variable but generally is correlated with soil and cover parameters. Through studies of many watersheds, **I_a** was found to be approximated by the following empirical equation:

$$I_a = 0.2S$$

By removing **I_a** as an independent parameter, this approximation allows use of a combination of **S** and **P** to produce a unique runoff amount. Substituting in the equation;

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

S is related to the soil and cover conditions of the watershed through the **CN**. **CN** has a range of 0 to 100, and **S** is related to **CN** by:

$$S = \frac{1000}{CN} - 10$$

The software hydraulic routing allows you to define the hydraulic routing parameters to use in the model for the analysis of link (pipe or channel) capacity. The link routing method uses the Manning equation to relate flow rate to flow depth and bed slope. The Manning's "n" values used to represent roughness were based on observations from site reconnaissance and best engineering judgment. Manning's equation is:

$$V = \frac{1}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$$

Where,

V = Mean velocity (ft/sec)
n = Manning's coefficient
R = Hydraulic radius (ft)
S = Friction slope (ft/ft)

Flow routing within a channel or pipe is governed by the conservation of mass and momentum equations for gradually varied, unsteady flow (i.e., the Saint Venant flow equations). The software uses kinematic wave to solve these equations. Kinematic wave routing solves the continuity equation along with a simplified form of the momentum equation in each channel or pipe (conduit). The momentum equation requires that the slope of the water surface equal the slope of the conduit. The maximum flow that can be conveyed through a conduit is the full-flow Manning equation value. Kinematic wave routing allows flow and area to vary both spatially and temporally within a conduit.

3.1 PREVENTION OF STORMWATER RUN-ON

The CADL drainage system and local drainage features for areas adjacent to the disposal site are shown in Figure 1. As shown in the figure, the adjacent areas show a quite mild relief with slopes of 2 percent or less flowing away from the CADL. Hence, a negligible amount of precipitation drains toward the facility and is intercepted by man-made channels preventing rainfall run-on to the site. Accordingly, a Run-on analysis is not warranted.

3.2 STORMWATER RUN-OFF

An internal system of ditches collects rainfall runoff and other water associated within the operation of the facility, and conveys them to the Nelson Unit 6 Settling Pond for treatment and discharge. The discharge from the Settling Pond is a LPDES permitted discharge (Permit No.

LA0059030). A complete description of the Settling Pond is contained in the Solid Waste Permit Application Unit 6 Settling Pond - Nelson Coal Generating Plant.

The disposal cells are designed so that during construction and operation, rainfall runoff from a particular cell(s) will be routed to the Settling Pond. The ditches and pipes are sized to have the capacity of conveying stormwater run-off from the 15 cells as shown on Figure 3. Only runoff from active disposal cells and the marketable ash staging area will be routed to the Settling Pond. All other noncontact areas at the CADL site will drain via the non-contact ditches to natural drainages. Runoff from capped cells will also be routed to natural drainages by non-contact ditches, refer to Figure 1.

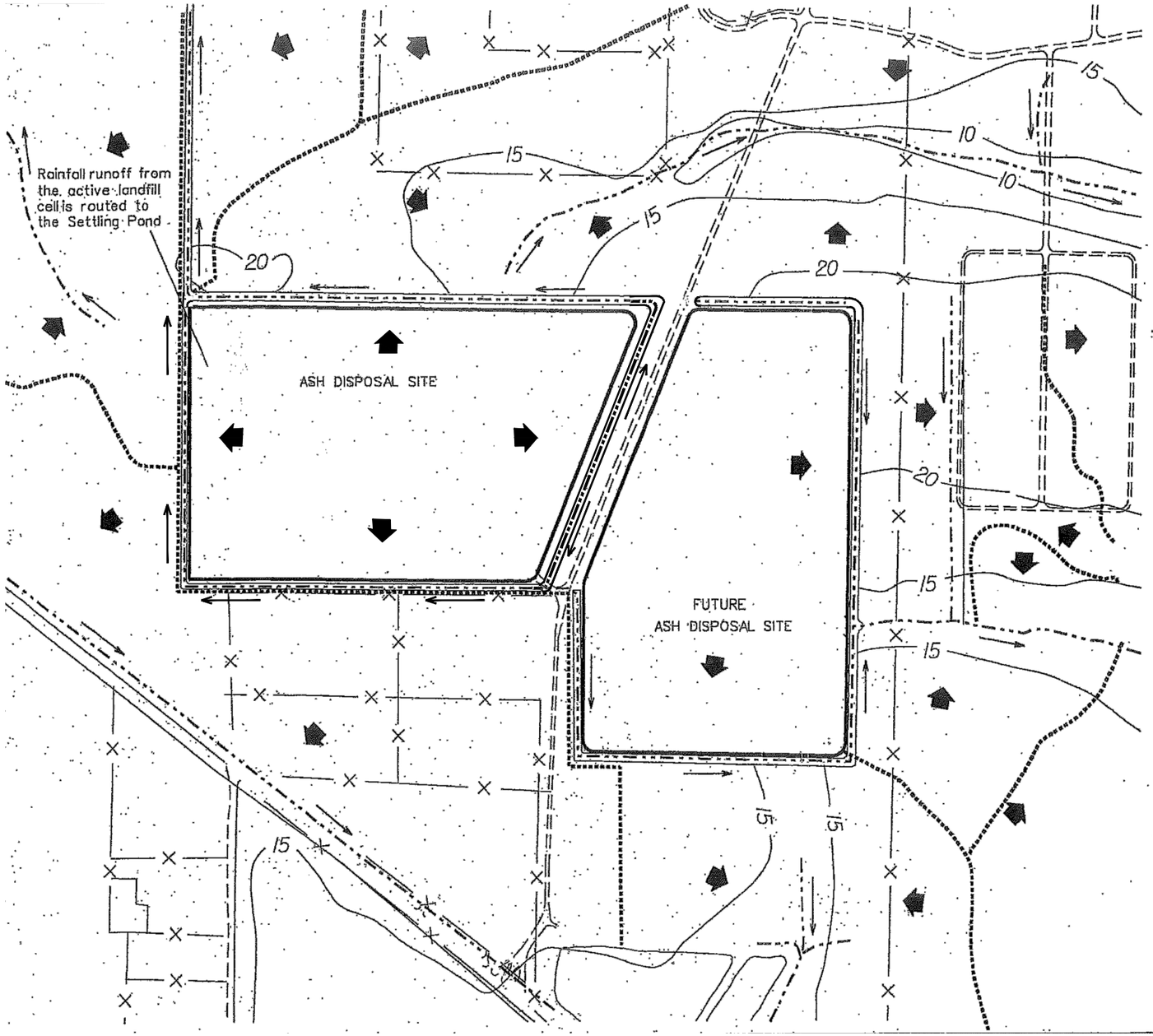
The 24-hour/25-year storm is 10.2 inches. This data is from the U. S. Weather Bureau Technical Paper Number 40. Runoff from a given cell will drain into the cell's sump and is pumped to the pond and neutralized. The pond and ditches are sized to collect the design rainfall event per LAC 33: 711.A.3 runoff from the active areas of the landfill and pond.

Discharge from the Settling Pond is routed through the permitted LPDES Outfall 003 which is regularly monitored according to the permit requirements.

4.0 RESULTS

All hydrologic and hydraulic calculation results are presented in Appendix B.

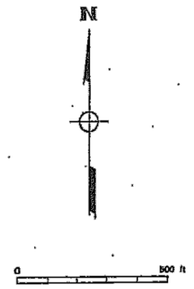
Figures



LEGEND

- THALWEG OF DITCH/SWALE
- DRAINAGE BOUNDARY
- OVERLAND FLOW DIRECTION
- CHANNEL FLOW DIRECTION

NOTE: Only Drainage from active areas of the landfill will be directed to the Settling Pond



SOURCE: ESPEY, HUSTON AND ASSOCIATES, INC
GULF STATES UTILITY COMPANY
FIGURE: 1-7
TITLE: SCHEMATIC OF ASH DISPOSAL AND SITE DRAINAGE

DATE	DESCRIPTION	BY
	REVISIONS	

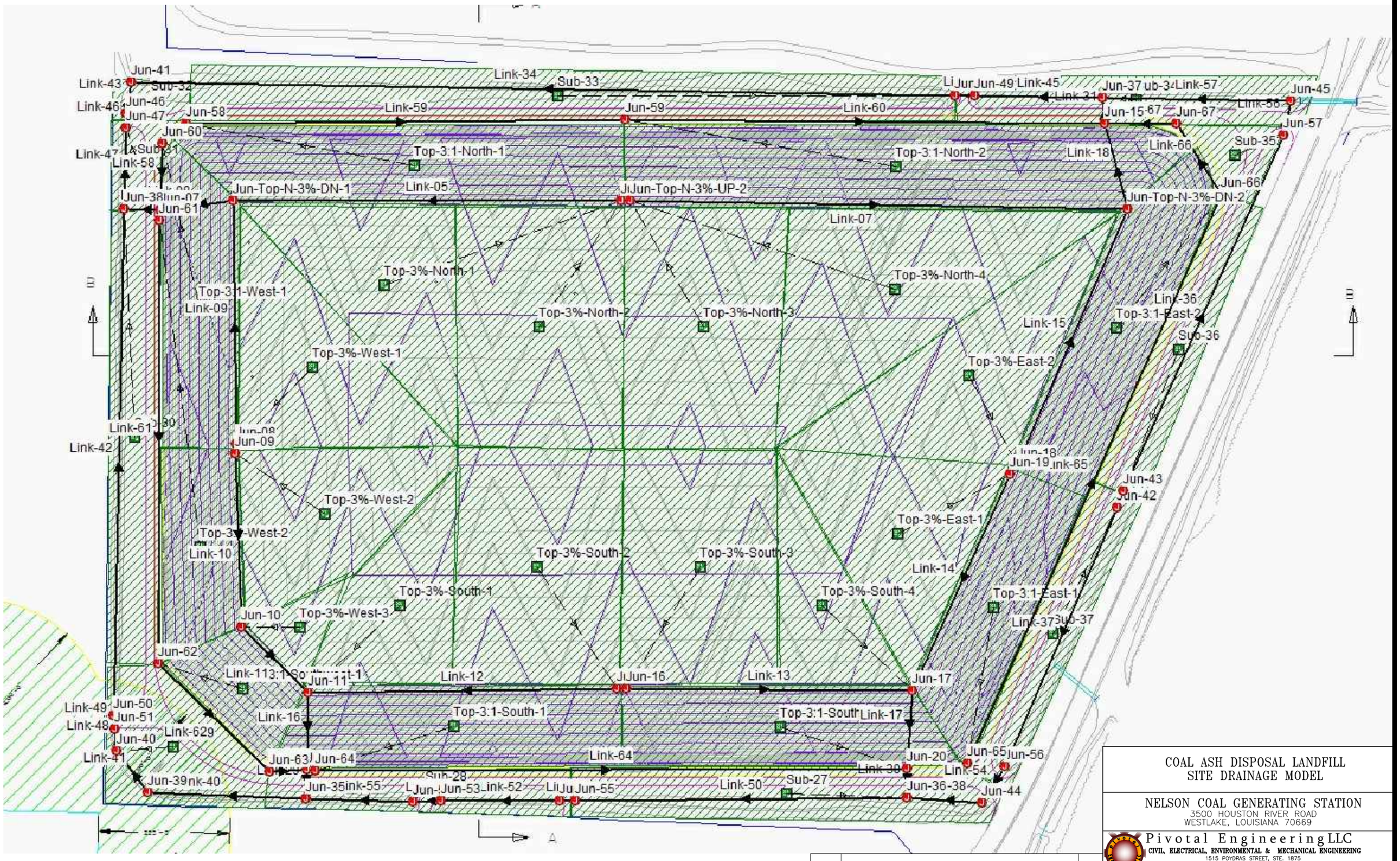
COAL ASH DISPOSAL LANDFILL
SCHEMATIC SITE DRAINAGE

NELSON COAL GENERATING STATION
3500 HOUSTON RIVER ROAD
WESTLAKE, LOUISIANA 70669

Pivotal Engineering LLC
CIVIL, ELECTRICAL, ENVIRONMENTAL & MECHANICAL ENGINEERING
1515 POYDRAS STREET, STE. 1875
NEW ORLEANS, LA. 70112
(504) 799-3653 (504) 799-3654(FAX)

SCALE: AS NOTED	DRAWN BY: Y.S.
DATE: APRIL 29, 2016	CHECKED BY: T.E.
JOB NO. 15-125	

1
FIG. NO.



AUTODESK STORM AND SANITARY ANALYSIS
SOFTWARE WAS USED TO MODEL SITE

DATE	DESCRIPTION	BY
	REVISIONS	

COAL ASH DISPOSAL LANDFILL
SITE DRAINAGE MODEL

NELSON COAL GENERATING STATION
3500 HOUSTON RIVER ROAD
WESTLAKE, LOUISIANA 70669

Pivotal Engineering LLC
CIVIL, ELECTRICAL, ENVIRONMENTAL & MECHANICAL ENGINEERING
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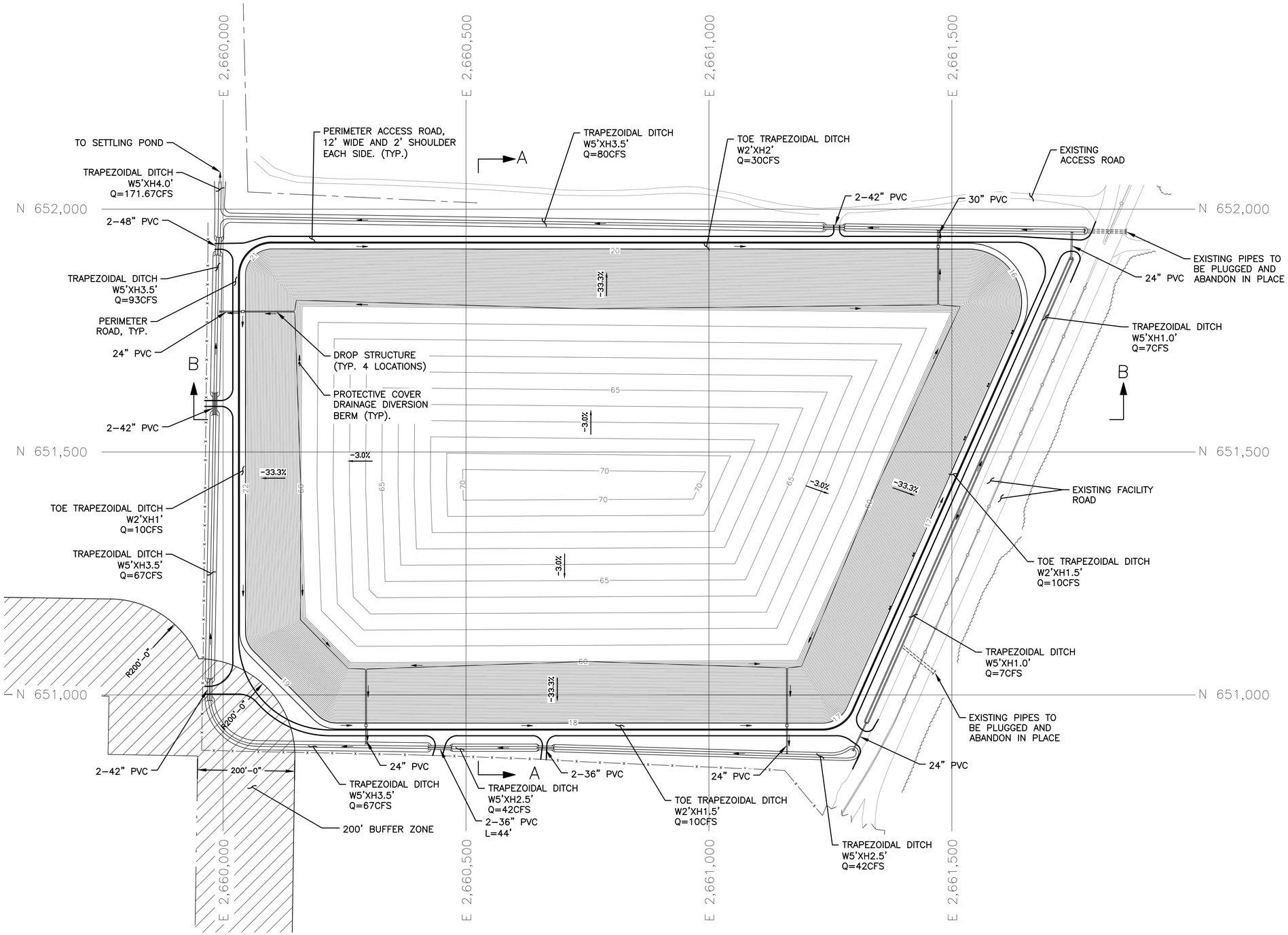
JOB NO. 15-125	

FIG. NO. 2



100' 0 100' 200'

24" X 36" SCALE: 1" = 100'

N

SURVEY DONE BY MORRISON SURVEYING, INC ON MAY AND OCTOBER 2015.

NOTE:

1) HORIZONTAL CONTROL IS REFERENCED TO NAD 83 LA SOUTH ZONE AS PER O.P.U.S. SOLUTION AT MSI NETWORK BASE STATION.

2) VERTICAL CONTROL IS REFERENCED TO NAVD 88 GEOID 12A AS PER O.P.U.S. SOLUTION AT MSI NETWORK BASE STATION.

3) ONLY THOSE UTILITIES EVIDENT FROM A CAREFUL VISUAL INSPECTION OF THE SITE ARE SHOWN AND MAY NOT REPRESENT ALL UTILITIES PRESENT.

4) STANDARD FIELD CALIBRATIONS FOR EQUIPMENT WERE PERFORMED. THIS SURVEY AND ACCURACY RESULTS ARE WITHIN MANUFACTURER'S SPECIFICATIONS.

5) THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF THE SURVEY MADE ON THE DATES INDICATED AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.

6) STATE PLANE COORDINATES ARE REFERENCED TO NORTH & SOUTH PLANT MONUMENTS.

NORTH MONUMENT		
STATE PLANE COORDINATE	*PLANT COORDINATE*	
N 654941.39	*N 12799.99*	
E 2664674.94	*E 11995.00*	
SOUTH MONUMENT		
STATE PLANE COORDINATE	*PLANT COORDINATE*	*ELEV.*
N 654141.56	*N 11999.99*	*17.42'*
E 2664681.28	*E 11995.00*	

NAVD 88 GEOID 12A ELEV. = 15.74'

7) THIS SURVEY IS A COMPILATION OF DATA COLLECTED IN MAY 2015 & OCTOBER 2015.

8) BOUNDARY LINE AND EASEMENT DATA WAS TAKEN FROM REFERENCE MAPS PROVIDED.

COAL ASH DISPOSAL LANDFILL SITE DRAINAGE PLAN

NELSON COAL GENERATING STATION

3500 HOUSTON RIVER ROAD
WESTLAKE, LOUISIANA 70669

Pivotal EngineeringLLC
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1515 POYDRAS STREET, STE. 1875
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DATE	DESCRIPTION	BY
	REVISIONS	

SCALE: AS NOTED	DRAWN BY: Y.S.
DATE: APRIL 29, 2016	CHECKED BY: T.E.
JOB NO. 15-125	

FIG. NO. 3

Appendices

Appendix A

DEFINITIONS

The following definitions are from §257.53 of the CCR Rule:

Active Life (or In Operation): the period of operation beginning with the initial placement of CCR in the CCR unit and ending at completion of closure activities in accordance with §257.102.

Active portion: that part of the CCR unit that has received or is receiving CCR or non-CCR waste and that has not completed closure in accordance with §257.102.

Coal Combustion Residues (CCR): fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers.

CCR Landfill: an area of land or land excavation receives CCR and which is not a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground or surface coal mine, or a cave. It also includes sand and gravel pits and quarries that receive CCR, CCR piles, and any practice that does not meet the definition of a beneficial use of CCR.

CCR Unit: any CCR landfill, CCR surface impoundment, or lateral expansion of a CCR unit, or a combination of more than one of these units. This term includes both new and existing units.

Closed Unit or Landfill: placement of CCR in a CCR unit has ceased, and the owner or operator has completed closure of the CCR unit in accordance with § 257.102 and has initiated post-closure care in accordance with § 257.104.

Existing CCR Landfill: a CCR Landfill that receives CCR both before and after October 15, 2015, or for which construction commenced prior to October 14, 2015. A CCR landfill has commenced construction if the owner or operator has obtained the federal, state, and local approvals or permits necessary to begin physical construction and a continuous onsite physical construction program

had begun prior to October 14, 2015.

Hydraulic Conductivity: the rate at which water can move through a permeable medium (i.e., the coefficient of permeability).

Lateral Expansion: a horizontal expansion of the waste boundaries of an existing CCR landfill or existing CCR surface impoundment made after October 14, 2015.

New CCR Landfill: a CCR landfill or lateral expansion of a CCR landfill that first receives CCR or commences construction after October 14, 2015. A CCR landfill has commenced construction if the owner or operator has obtained the federal, state, and local approvals or permits necessary to begin physical construction and a continuous onsite physical construction program had begun after October 14, 2015.

Operator: the person(s) responsible for the overall operation of a CCR unit.

Qualified Professional Engineer: an individual who is licensed by a state as a Professional Engineer to practice one or more disciplines of engineering and who is qualified by education, technical knowledge and experience to make the specific technical certifications required under this subpart. Professional engineers making these certifications must be currently licensed in the state where the CCR unit(s) is located.

Recognized and Generally Accepted Good Engineering Practices: engineering maintenance or operation activities based on established codes, widely accepted standards, published technical reports, or a practice widely recommended throughout the industry. Such practices generally detail approved ways to perform specific engineering, inspection, or mechanical integrity activities.

Run-Off: any rainwater, leachate, or other liquid that drains over land from any part of a CCR landfill or lateral expansion of a CCR landfill.

Run-On: any rainwater, leachate, or other liquid that drains over land onto any part of a CCR

landfill or lateral expansion of a CCR landfill.

Structural Components: liners, leachate collection and removal systems, final covers, run-on and run-off systems, inflow design flood control systems, and any other component used in the construction and operation of the CCR unit that is necessary to ensure the integrity of the unit and that the contents of the unit are not released into the environment.

Appendix B

Project Description

File Name	Nelson Coal generating Station Drainage Analysis.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	YES

Analysis Options

Start Analysis On	Feb 02, 2016	00:00:00
End Analysis On	Feb 03, 2016	00:00:00
Start Reporting On	Feb 02, 2016	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	33
Nodes	50
Junctions	50
Outfalls	0
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	49
Channels	38
Pipes	11
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Calcasieu County- Louisiana	Time Series	TS-01 (25y,24h)	Cumulative	inches	Louisiana	Calcasieu	25	10.20	SCS Type III 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-27	1.17	80.00	10.20	7.71	9.01	8.98	0 00:02:54
2	Sub-28	0.68	80.00	10.20	7.71	5.24	5.24	0 00:02:39
3	Sub-29	0.91	80.00	10.20	7.71	7.02	6.78	0 00:07:10
4	Sub-30	1.20	80.00	10.20	7.71	9.29	9.24	0 00:03:58
5	Sub-31	0.25	80.00	10.20	7.71	1.90	1.93	0 00:02:38
6	Sub-32	0.16	80.00	10.20	7.71	1.26	1.23	0 00:07:45
7	Sub-33	2.06	80.00	10.20	7.71	15.87	15.90	0 00:02:39
8	Sub-34	0.91	80.00	10.20	7.71	6.98	7.01	0 00:02:41
9	Sub-35	0.27	80.00	10.20	7.71	2.09	1.99	0 00:07:57
10	Sub-36	0.80	80.00	10.20	7.71	6.20	6.22	0 00:02:35
11	Sub-37	0.86	80.00	10.20	7.71	6.65	6.63	0 00:04:15
12	Top-3%-East-1	1.42	80.00	10.20	7.71	10.96	6.23	0 00:41:21
13	Top-3%-East-2	1.62	80.00	10.20	7.71	12.51	7.12	0 00:41:13
14	Top-3%-North-1	1.41	80.00	10.20	7.71	10.84	6.29	0 00:39:40
15	Top-3%-North-2	2.13	80.00	10.20	7.71	16.40	9.56	0 00:39:07
16	Top-3%-North-3	2.04	80.00	10.20	7.71	15.70	9.07	0 00:39:53
17	Top-3%-North-4	2.12	80.00	10.20	7.71	16.35	8.85	0 00:45:23
18	Top-3%-South-1	1.03	80.00	10.20	7.71	7.98	3.98	0 00:53:22
19	Top-3%-South-2	2.09	80.00	10.20	7.71	16.15	8.44	0 00:48:44
20	Top-3%-South-3	1.95	80.00	10.20	7.71	15.01	8.58	0 00:40:49
21	Top-3%-South-4	0.83	80.00	10.20	7.71	6.41	3.73	0 00:39:30
22	Top-3%-West-1	1.40	80.00	10.20	7.71	10.81	6.29	0 00:39:21
23	Top-3%-West-2	1.29	80.00	10.20	7.71	9.94	3.83	0 01:22:11
24	Top-3%-West-3	0.25	80.00	10.20	7.71	1.91	1.42	0 00:22:34
25	Top-3:1-East-1	1.17	80.00	10.20	7.71	9.06	8.86	0 00:06:36
26	Top-3:1-East-2	1.50	80.00	10.20	7.71	11.58	11.04	0 00:08:24
27	Top-3:1-North-1	1.82	80.00	10.20	7.71	14.00	13.69	0 00:06:27
28	Top-3:1-North-2	2.42	80.00	10.20	7.71	18.68	18.28	0 00:06:24
29	Top-3:1-South-1	1.48	80.00	10.20	7.71	11.39	11.14	0 00:06:23
30	Top-3:1-South-2	1.33	80.00	10.20	7.71	10.24	9.99	0 00:06:24
31	Top-3:1-Southwest-1	0.53	80.00	10.20	7.71	4.11	3.98	0 00:06:52
32	Top-3:1-West-1	1.13	80.00	10.20	7.71	8.71	8.51	0 00:06:13
33	Top-3:1-West-2	0.82	80.00	10.20	7.71	6.36	6.25	0 00:06:03

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-07	Junction	14.00	21.50	0.00	21.50	0.00	24.57	15.08	0.00	6.42	0 00:00	0.00	0.00
2	Jun-08	Junction	57.50	60.00	0.00	60.00	0.00	6.27	58.61	0.00	1.39	0 00:00	0.00	0.00
3	Jun-09	Junction	57.50	60.00	0.00	60.00	0.00	3.83	58.52	0.00	1.48	0 00:00	0.00	0.00
4	Jun-10	Junction	56.50	59.00	0.00	59.00	0.00	4.17	57.52	0.00	1.48	0 00:00	0.00	0.00
5	Jun-11	Junction	55.50	58.00	0.00	58.00	0.00	16.25	56.86	0.00	1.14	0 00:00	0.00	0.00
6	Jun-12	Junction	57.50	60.00	0.00	60.00	0.00	8.40	58.86	0.00	1.14	0 00:00	0.00	0.00
7	Jun-14	Junction	16.00	19.00	0.00	19.00	0.00	19.22	16.88	0.00	2.12	0 00:00	0.00	0.00
8	Jun-15	Junction	13.60	16.50	0.00	16.50	0.00	60.64	15.65	0.00	0.85	0 00:00	0.00	0.00
9	Jun-16	Junction	57.50	60.00	0.00	60.00	0.00	8.51	58.78	0.00	1.22	0 00:00	0.00	0.00
10	Jun-17	Junction	55.00	57.50	0.00	57.50	0.00	18.34	56.28	0.00	1.22	0 00:00	0.00	0.00
11	Jun-18	Junction	57.50	60.00	0.00	60.00	0.00	7.06	58.69	0.00	1.31	0 00:00	0.00	0.00
12	Jun-19	Junction	57.50	60.00	0.00	60.00	0.00	6.18	58.60	0.00	1.40	0 00:00	0.00	0.00
13	Jun-20	Junction	14.00	17.00	0.00	17.00	0.00	29.26	16.24	0.00	0.76	0 00:00	0.00	0.00
14	Jun-35	Junction	12.54	17.00	0.00	17.00	0.00	62.03	15.88	0.00	1.12	0 00:00	0.00	0.00
15	Jun-36	Junction	13.45	16.00	0.00	16.00	0.00	41.39	15.36	0.00	0.64	0 00:00	0.00	0.00
16	Jun-37	Junction	12.95	16.00	0.00	16.00	0.00	72.11	14.96	0.00	1.04	0 00:00	0.00	0.00
17	Jun-38	Junction	11.35	20.00	0.00	20.00	0.00	91.98	14.18	0.00	5.82	0 00:00	0.00	0.00
18	Jun-39	Junction	12.30	16.00	0.00	16.00	0.00	61.91	14.63	0.00	1.37	0 00:00	0.00	0.00
19	Jun-40	Junction	12.22	16.00	0.00	16.00	0.00	66.81	14.66	0.00	1.34	0 00:00	0.00	0.00
20	Jun-41	Junction	11.00	20.00	0.00	20.00	0.00	171.67	20.00	0.00	0.00	0 00:00	0.00	0.00
21	Jun-42	Junction	14.13	15.50	0.00	15.50	0.00	6.59	14.83	0.00	0.67	0 00:00	0.00	0.00
22	Jun-43	Junction	14.13	15.50	0.00	15.50	0.00	6.19	14.76	0.00	0.74	0 00:00	0.00	0.00
23	Jun-44	Junction	13.57	15.50	0.00	15.50	0.00	6.42	14.79	0.00	0.78	0 00:00	0.00	0.00
24	Jun-45	Junction	13.24	15.00	0.00	15.00	0.00	7.95	14.79	0.00	0.95	0 00:00	0.00	0.00
25	Jun-46	Junction	11.20	20.00	0.00	20.00	0.00	93.34	14.04	0.00	5.96	0 00:00	0.00	0.00
26	Jun-47	Junction	11.22	6.00	0.00	6.00	0.00	92.71	14.05	0.00	1.17	0 00:00	0.00	0.00
27	Jun-48	Junction	12.44	16.00	0.00	16.00	0.00	82.46	15.13	0.00	0.87	0 00:00	0.00	0.00
28	Jun-49	Junction	12.47	16.00	0.00	16.00	0.00	72.09	15.02	0.00	0.98	0 00:00	0.00	0.00
29	Jun-50	Junction	12.17	16.00	0.00	16.00	0.00	66.81	14.58	0.00	1.42	0 00:00	0.00	0.00
30	Jun-51	Junction	12.19	16.00	0.00	16.00	0.00	66.81	14.62	0.00	1.38	0 00:00	0.00	0.00
31	Jun-52	Junction	12.70	17.00	0.00	17.00	0.00	43.79	14.66	0.00	2.34	0 00:00	0.00	0.00
32	Jun-53	Junction	12.75	17.00	0.00	17.00	0.00	41.02	14.67	0.00	2.33	0 00:00	0.00	0.00
33	Jun-54	Junction	12.93	17.00	0.00	17.00	0.00	41.08	14.86	0.00	2.14	0 00:00	0.00	0.00
34	Jun-55	Junction	12.95	17.00	0.00	17.00	0.00	41.08	14.89	0.00	2.11	0 00:00	0.00	0.00
35	Jun-56	Junction	13.63	15.50	0.00	15.50	0.00	6.43	14.86	0.00	0.77	0 00:00	0.00	0.00
36	Jun-57	Junction	13.29	15.00	0.00	15.00	0.00	7.96	14.84	0.00	0.95	0 00:00	0.00	0.00
37	Jun-58	Junction	18.00	21.00	0.00	21.00	0.00	13.49	19.12	0.00	1.88	0 00:00	0.00	0.00
38	Jun-59	Junction	16.00	20.00	0.00	20.00	0.00	30.25	17.67	0.00	2.33	0 00:00	0.00	0.00
39	Jun-60	Junction	19.00	21.00	0.00	21.00	0.00	8.38	19.43	0.00	1.57	0 00:00	0.00	0.00
40	Jun-61	Junction	19.00	21.00	0.00	21.00	0.00	6.18	19.91	0.00	1.09	0 00:00	0.00	0.00
41	Jun-62	Junction	18.00	20.00	0.00	20.00	0.00	9.45	18.88	0.00	1.12	0 00:00	0.00	0.00
42	Jun-63	Junction	17.00	19.00	0.00	19.00	0.00	9.42	17.86	0.00	1.14	0 00:00	0.00	0.00
43	Jun-64	Junction	16.00	19.00	0.00	19.00	0.00	10.98	17.28	0.00	1.72	0 00:00	0.00	0.00
44	Jun-65	Junction	15.00	17.00	0.00	17.00	0.00	8.72	16.18	0.00	0.82	0 00:00	0.00	0.00
45	Jun-66	Junction	14.05	16.00	0.00	16.00	0.00	17.96	15.69	0.00	0.31	0 00:00	0.00	0.00
46	Jun-67	Junction	13.92	16.00	0.00	16.00	0.00	17.95	15.56	0.00	0.44	0 00:00	0.00	0.00
47	Jun-Top-N-3%-DN-1	Junction	55.00	57.50	0.00	57.50	0.00	21.94	56.72	0.00	0.78	0 00:00	0.00	0.00
48	Jun-Top-N-3%-DN-2	Junction	55.00	57.50	0.00	57.50	0.00	24.81	56.88	0.00	0.62	0 00:00	0.00	0.00
49	Jun-Top-N-3%-UP-1	Junction	57.50	60.00	0.00	60.00	0.00	15.79	59.22	0.00	0.78	0 00:00	0.00	0.00
50	Jun-Top-N-3%-UP-2	Junction	57.50	60.00	0.00	60.00	0.00	17.78	59.38	0.00	0.62	0 00:00	0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-29	Pipe	Jun-14	Jun-35	37.93	16.00	15.00	2.6400	24.000	0.0100	19.22	47.75	0.40	14.38	0.88	0.44	0.00	Calculated
2	Link-30	Pipe	Jun-20	Jun-36	43.75	14.00	13.00	2.2900	24.000	0.0100	29.26	32.91	0.89	11.83	1.46	0.73	0.00	Calculated
3	Link-31	Pipe	Jun-15	Jun-37	48.12	13.60	12.95	1.3400	30.000	0.0100	60.67	61.83	0.98	14.35	2.00	0.80	0.00	Calculated
4	Link-32	Pipe	Jun-07	Jun-38	46.65	14.00	13.00	2.1400	24.000	0.0100	24.57	43.06	0.57	14.15	1.08	0.54	0.00	Calculated
5	Link-44	Pipe	Jun-49	Jun-48	29.45	12.47	12.44	0.1000	42.000	0.0100	72.09	82.09	0.88	4.81	2.55	0.73	0.00	Calculated
6	Link-46	Pipe	Jun-47	Jun-46	22.54	11.22	11.20	0.1000	48.000	0.0100	92.70	116.68	0.79	5.15	2.68	0.67	0.00	Calculated
7	Link-49	Pipe	Jun-51	Jun-50	20.28	12.19	12.17	0.1000	42.000	0.0100	66.81	82.15	0.81	4.76	2.37	0.69	0.00	Calculated
8	Link-51	Pipe	Jun-55	Jun-54	24.04	12.95	12.93	0.1000	36.000	0.0100	41.08	54.79	0.75	4.25	1.94	0.65	0.00	Calculated
9	Link-53	Pipe	Jun-53	Jun-52	43.66	12.75	12.70	0.1000	36.000	0.0100	41.01	55.05	0.74	4.27	1.93	0.64	0.00	Calculated
10	Link-54	Pipe	Jun-56	Jun-44	65.31	13.63	13.57	0.1000	24.000	0.0100	6.42	9.28	0.69	3.19	1.17	0.61	0.00	Calculated
11	Link-56	Pipe	Jun-57	Jun-45	52.57	13.29	13.24	0.1000	30.000	0.0150	7.95	11.29	0.70	2.49	1.48	0.62	0.00	Calculated
12	Link-05	Channel	Jun-Top-N-3%-UP-1	Jun-Top-N-3%-DN-1	578.92	57.50	55.00	0.4300	30.000	0.0220	15.70	42.72	0.37	3.57	1.71	0.69	0.00	
13	Link-07	Channel	Jun-Top-N-3%-UP-2	Jun-Top-N-3%-DN-2	725.55	57.50	55.00	0.3400	30.000	0.0220	17.74	38.16	0.47	3.38	1.87	0.75	0.00	
14	Link-08	Channel	Jun-Top-N-3%-DN-1	Jun-07	126.01	55.00	14.00	32.5400	12.000	0.0220	21.94	84.16	0.26	19.03	0.47	0.47	0.00	
15	Link-09	Channel	Jun-08	Jun-Top-N-3%-DN-1	353.11	57.50	55.00	0.7100	30.000	0.0220	6.24	54.70	0.11	3.40	1.11	0.44	0.00	
16	Link-10	Channel	Jun-09	Jun-10	246.61	57.50	56.50	0.4100	30.000	0.0220	3.83	41.39	0.09	2.44	1.02	0.41	0.00	
17	Link-11	Channel	Jun-10	Jun-11	125.87	56.50	55.50	0.7900	30.000	0.0220	4.17	57.94	0.07	3.20	0.93	0.37	0.00	
18	Link-12	Channel	Jun-12	Jun-11	459.05	57.50	55.50	0.4400	30.000	0.0220	8.38	42.91	0.20	3.06	1.35	0.54	0.00	
19	Link-13	Channel	Jun-16	Jun-17	413.26	57.50	55.00	0.6000	30.000	0.0220	8.50	50.56	0.17	3.47	1.28	0.51	0.00	
20	Link-14	Channel	Jun-19	Jun-17	344.27	57.50	55.00	0.7300	30.000	0.0220	6.18	55.39	0.11	3.43	1.10	0.44	0.00	
21	Link-15	Channel	Jun-18	Jun-Top-N-3%-DN-2	405.21	57.50	55.00	0.6200	30.000	0.0220	7.07	51.06	0.14	3.34	1.19	0.48	0.00	
22	Link-16	Channel	Jun-11	Jun-14	137.51	55.50	16.00	28.7300	12.000	0.0220	16.25	79.08	0.21	16.61	0.41	0.41	0.00	
23	Link-17	Channel	Jun-17	Jun-20	136.82	55.00	14.00	29.9700	12.000	0.0220	18.34	80.77	0.23	17.50	0.43	0.43	0.00	
24	Link-18	Channel	Jun-Top-N-3%-DN-2	Jun-15	150.73	55.00	13.95	27.2300	12.000	0.0220	24.81	77.00	0.32	18.57	0.53	0.53	0.00	
25	Link-34	Channel	Jun-48	Jun-41	1443.82	12.44	11.00	0.1000	36.000	0.0220	79.48	103.99	0.76	3.06	2.60	0.87	0.00	
26	Link-36	Channel	Jun-43	Jun-57	644.40	14.13	13.29	0.1300	12.000	0.0220	6.09	13.90	0.44	1.75	0.62	0.62	0.00	
27	Link-37	Channel	Jun-42	Jun-56	492.54	14.13	13.63	0.1000	12.000	0.0220	6.43	12.23	0.53	1.54	0.69	0.69	0.00	
28	Link-38	Channel	Jun-44	Jun-36	114.64	13.57	13.45	0.1000	12.000	0.0220	6.40	12.24	0.52	1.44	0.67	0.70	0.00	
29	Link-40	Channel	Jun-35	Jun-39	241.88	12.54	12.30	0.1000	42.000	0.0220	61.91	144.04	0.43	2.75	2.31	0.67	0.00	
30	Link-41	Channel	Jun-39	Jun-40	78.57	12.30	12.22	0.1000	42.000	0.0220	61.91	144.39	0.43	2.76	2.32	0.67	0.00	
31	Link-42	Channel	Jun-50	Jun-38	819.54	12.17	11.35	0.1000	42.000	0.0220	65.86	144.04	0.46	2.83	2.40	0.69	0.00	
32	Link-43	Channel	Jun-46	Jun-41	196.04	11.20	11.00	0.1000	42.000	0.0220	93.31	143.99	0.65	3.06	2.84	0.81	0.00	
33	Link-45	Channel	Jun-37	Jun-49	163.09	12.64	12.47	0.1000	24.000	0.0220	72.09	78.20	0.92	4.25	1.92	0.96	0.00	
34	Link-47	Channel	Jun-38	Jun-47	127.38	11.35	11.22	0.1000	42.000	0.0220	91.96	143.79	0.64	3.05	2.82	0.81	0.00	
35	Link-48	Channel	Jun-40	Jun-51	33.98	12.22	12.19	0.1000	42.000	0.0220	66.81	141.91	0.47	2.78	2.42	0.70	0.00	
36	Link-50	Channel	Jun-36	Jun-55	503.01	13.45	12.95	0.1000	30.000	0.0220	41.08	71.37	0.58	2.48	1.89	0.76	0.00	
37	Link-52	Channel	Jun-54	Jun-53	179.98	12.93	12.75	0.1000	30.000	0.0220	41.02	71.37	0.57	2.46	1.90	0.76	0.00	
38	Link-55	Channel	Jun-52	Jun-35	161.75	12.70	12.54	0.1000	42.000	0.0220	43.75	144.11	0.30	2.51	1.96	0.56	0.00	
39	Link-57	Channel	Jun-45	Jun-37	285.73	13.24	12.95	0.1000	24.000	0.0220	7.84	45.52	0.17	1.58	0.77	0.39	0.00	
40	Link-58	Channel	Jun-60	Jun-07	101.04	19.00	14.00	4.9500	12.000	0.0220	8.34	43.61	0.19	6.90	0.43	0.43	0.00	
41	Link-59	Channel	Jun-58	Jun-59	667.56	18.00	16.00	0.3000	18.000	0.0220	13.02	25.10	0.52	2.93	1.09	0.73	0.00	
42	Link-60	Channel	Jun-59	Jun-15	727.21	16.00	14.00	0.2800	24.000	0.0220	29.71	45.20	0.66	3.49	1.62	0.82	0.00	
43	Link-61	Channel	Jun-61	Jun-62	672.45	19.00	18.00	0.1500	12.000	0.0220	5.83	7.56	0.77	1.90	0.87	0.87	0.00	
44	Link-62	Channel	Jun-62	Jun-63	235.00	18.00	17.00	0.4300	12.000	0.0220	9.42	12.79	0.74	2.96	0.85	0.86	0.00	
45	Link-63	Channel	Jun-63	Jun-14	57.68	17.00	16.00	1.7300	12.000	0.0220	9.43	25.81	0.37	4.91	0.60	0.60	0.00	
46	Link-64	Channel	Jun-64	Jun-20	898.67	16.00	15.00	0.1100	18.000	0.0220	10.14	15.30	0.66	2.07	1.21	0.81	0.00	
47	Link-65	Channel	Jun-65	Jun-66	947.23	15.00	14.05	0.1000	18.000	0.0220	7.99	14.50	0.55	1.90	1.10	0.74	0.00	
48	Link-66	Channel	Jun-66	Jun-67	126.28	14.05	13.92	0.1100	21.000	0.0220	17.95	20.81	0.86	2.09	1.64	0.93	0.00	
49	Link-67	Channel	Jun-67	Jun-15	109.45	13.92	13.60	0.2900	21.000	0.0220	17.94	28.87	0.62	3.16	1.39	0.79	0.00	

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Jun-07	14.00	21.50	7.50	0.00	-14.00	21.50	0.00	0.00	0.00
2	Jun-08	57.50	60.00	2.50	0.00	-57.50	60.00	0.00	0.00	0.00
3	Jun-09	57.50	60.00	2.50	0.00	-57.50	60.00	0.00	0.00	0.00
4	Jun-10	56.50	59.00	2.50	0.00	-56.50	59.00	0.00	0.00	0.00
5	Jun-11	55.50	58.00	2.50	0.00	-55.50	58.00	0.00	0.00	0.00
6	Jun-12	57.50	60.00	2.50	0.00	-57.50	60.00	0.00	0.00	0.00
7	Jun-14	16.00	19.00	3.00	0.00	-16.00	19.00	0.00	0.00	0.00
8	Jun-15	13.60	16.50	2.90	0.00	-13.60	16.50	0.00	0.00	0.00
9	Jun-16	57.50	60.00	2.50	0.00	-57.50	60.00	0.00	0.00	0.00
10	Jun-17	55.00	57.50	2.50	0.00	-55.00	57.50	0.00	0.00	0.00
11	Jun-18	57.50	60.00	2.50	0.00	-57.50	60.00	0.00	0.00	0.00
12	Jun-19	57.50	60.00	2.50	0.00	-57.50	60.00	0.00	0.00	0.00
13	Jun-20	14.00	17.00	3.00	0.00	-14.00	17.00	0.00	0.00	0.00
14	Jun-35	12.54	17.00	4.46	0.00	-12.54	17.00	0.00	0.00	0.00
15	Jun-36	13.45	16.00	2.55	0.00	-13.45	16.00	0.00	0.00	0.00
16	Jun-37	12.95	16.00	3.05	0.00	-12.95	16.00	0.00	0.00	0.00
17	Jun-38	11.35	20.00	8.66	0.00	-11.35	20.00	0.00	0.00	0.00
18	Jun-39	12.30	16.00	3.70	0.00	-12.30	16.00	0.00	0.00	0.00
19	Jun-40	12.22	16.00	3.78	0.00	-12.22	16.00	0.00	0.00	0.00
20	Jun-41	11.00	20.00	9.00	0.00	-11.00	20.00	0.00	0.00	0.00
21	Jun-42	14.13	15.50	1.38	0.00	-14.13	15.50	0.00	0.00	0.00
22	Jun-43	14.13	15.50	1.38	0.00	-14.13	15.50	0.00	0.00	0.00
23	Jun-44	13.57	15.50	1.93	0.00	-13.57	15.50	0.00	0.00	0.00
24	Jun-45	13.24	15.00	1.76	0.00	-13.24	15.00	0.00	0.00	0.00
25	Jun-46	11.20	20.00	8.80	0.00	-11.20	20.00	0.00	0.00	0.00
26	Jun-47	11.22	6.00	-5.22	0.00	-11.22	6.00	0.00	0.00	0.00
27	Jun-48	12.44	16.00	3.56	0.00	-12.44	16.00	0.00	0.00	0.00
28	Jun-49	12.47	16.00	3.53	0.00	-12.47	16.00	0.00	0.00	0.00
29	Jun-50	12.17	16.00	3.84	0.00	-12.17	16.00	0.00	0.00	0.00
30	Jun-51	12.19	16.00	3.82	0.00	-12.19	16.00	0.00	0.00	0.00
31	Jun-52	12.70	17.00	4.30	0.00	-12.70	17.00	0.00	0.00	0.00
32	Jun-53	12.75	17.00	4.26	0.00	-12.75	17.00	0.00	0.00	0.00
33	Jun-54	12.93	17.00	4.08	0.00	-12.93	17.00	0.00	0.00	0.00
34	Jun-55	12.95	17.00	4.05	0.00	-12.95	17.00	0.00	0.00	0.00
35	Jun-56	13.63	15.50	1.87	0.00	-13.63	15.50	0.00	0.00	0.00
36	Jun-57	13.29	15.00	1.71	0.00	-13.29	15.00	0.00	0.00	0.00
37	Jun-58	18.00	21.00	3.00	0.00	-18.00	21.00	0.00	0.00	0.00
38	Jun-59	16.00	20.00	4.00	0.00	-16.00	20.00	0.00	0.00	0.00
39	Jun-60	19.00	21.00	2.00	0.00	-19.00	21.00	0.00	0.00	0.00
40	Jun-61	19.00	21.00	2.00	0.00	-19.00	21.00	0.00	0.00	0.00
41	Jun-62	18.00	20.00	2.00	0.00	-18.00	20.00	0.00	0.00	0.00
42	Jun-63	17.00	19.00	2.00	0.00	-17.00	19.00	0.00	0.00	0.00
43	Jun-64	16.00	19.00	3.00	0.00	-16.00	19.00	0.00	0.00	0.00
44	Jun-65	15.00	17.00	2.00	0.00	-15.00	17.00	0.00	0.00	0.00
45	Jun-66	14.05	16.00	1.95	0.00	-14.05	16.00	0.00	0.00	0.00
46	Jun-67	13.92	16.00	2.08	0.00	-13.92	16.00	0.00	0.00	0.00
47	Jun-Top-N-3%-DN-1	55.00	57.50	2.50	0.00	-55.00	57.50	0.00	0.00	0.00
48	Jun-Top-N-3%-DN-2	55.00	57.50	2.50	0.00	-55.00	57.50	0.00	0.00	0.00
49	Jun-Top-N-3%-UP-1	57.50	60.00	2.50	0.00	-57.50	60.00	0.00	0.00	0.00
50	Jun-Top-N-3%-UP-2	57.50	60.00	2.50	0.00	-57.50	60.00	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-07	24.57	0.00	15.08	1.08	0.00	6.42	14.21	0.21	0 12:31	0 00:00	0.00	0.00
2	Jun-08	6.27	6.27	58.61	1.11	0.00	1.39	57.79	0.29	0 12:30	0 00:00	0.00	0.00
3	Jun-09	3.83	3.83	58.52	1.02	0.00	1.48	57.81	0.31	0 13:00	0 00:00	0.00	0.00
4	Jun-10	4.17	1.42	57.52	1.02	0.00	1.48	56.82	0.32	0 13:00	0 00:00	0.00	0.00
5	Jun-11	16.25	3.98	56.86	1.36	0.00	1.14	55.87	0.37	0 12:40	0 00:00	0.00	0.00
6	Jun-12	8.40	8.40	58.86	1.36	0.00	1.14	57.87	0.37	0 12:35	0 00:00	0.00	0.00
7	Jun-14	19.22	0.00	16.88	0.88	0.00	2.12	16.20	0.20	0 12:33	0 00:00	0.00	0.00
8	Jun-15	60.64	0.00	15.65	2.05	0.00	0.85	14.25	0.65	0 12:13	0 00:00	0.00	0.00
9	Jun-16	8.51	8.51	58.78	1.28	0.00	1.22	57.84	0.34	0 12:30	0 00:00	0.00	0.00
10	Jun-17	18.34	3.71	56.28	1.28	0.00	1.22	55.34	0.34	0 12:35	0 00:00	0.00	0.00
11	Jun-18	7.06	7.06	58.69	1.19	0.00	1.31	57.82	0.32	0 12:30	0 00:00	0.00	0.00
12	Jun-19	6.18	6.18	58.60	1.10	0.00	1.40	57.79	0.29	0 12:35	0 00:00	0.00	0.00
13	Jun-20	29.26	9.84	16.24	2.24	0.00	0.76	15.17	1.17	0 12:16	0 00:00	0.00	0.00
14	Jun-35	62.03	0.00	15.88	3.34	0.00	1.12	15.20	2.66	0 12:33	0 00:00	0.00	0.00
15	Jun-36	41.39	8.94	15.36	1.91	0.00	0.64	13.77	0.32	0 12:12	0 00:00	0.00	0.00
16	Jun-37	72.11	6.98	14.96	2.01	0.00	1.04	13.28	0.33	0 12:16	0 00:00	0.00	0.00
17	Jun-38	91.98	9.19	14.18	2.83	0.00	5.82	13.21	1.86	0 12:22	0 00:00	0.00	0.00
18	Jun-39	61.91	0.00	14.63	2.33	0.00	1.37	12.73	0.43	0 12:17	0 00:00	0.00	0.00
19	Jun-40	66.81	6.65	14.66	2.44	0.00	1.34	12.67	0.45	0 12:17	0 00:00	0.00	0.00
20	Jun-41	171.67	0.00	20.00	9.00	0.00	0.00	18.10	7.10	0 05:05	0 00:00	0.00	0.00
21	Jun-42	6.59	6.59	14.83	0.70	0.00	0.67	14.21	0.08	0 12:10	0 00:00	0.00	0.00
22	Jun-43	6.19	6.19	14.76	0.63	0.00	0.74	14.20	0.07	0 12:10	0 00:00	0.00	0.00
23	Jun-44	6.42	0.00	14.79	1.22	0.00	0.78	13.74	0.17	0 12:12	0 00:00	0.00	0.00
24	Jun-45	7.95	0.00	14.79	1.55	0.00	0.95	13.45	0.21	0 12:12	0 00:00	0.00	0.00
25	Jun-46	93.34	1.20	14.04	2.84	0.00	5.96	11.75	0.55	0 12:23	0 00:00	0.00	0.00
26	Jun-47	92.71	1.92	14.05	2.83	0.00	1.17	11.77	0.55	0 12:23	0 00:00	0.00	0.00
27	Jun-48	82.46	15.83	15.13	2.69	0.00	0.87	12.90	0.46	0 12:12	0 00:00	0.00	0.00
28	Jun-49	72.09	0.00	15.02	2.55	0.00	0.98	12.89	0.42	0 12:15	0 00:00	0.00	0.00
29	Jun-50	66.81	0.00	14.58	2.42	0.00	1.42	12.62	0.46	0 12:17	0 00:00	0.00	0.00
30	Jun-51	66.81	0.00	14.62	2.43	0.00	1.38	12.65	0.46	0 12:17	0 00:00	0.00	0.00
31	Jun-52	43.79	5.21	14.66	1.96	0.00	2.34	13.05	0.35	0 12:15	0 00:00	0.00	0.00
32	Jun-53	41.02	0.00	14.67	1.93	0.00	2.33	13.09	0.35	0 12:15	0 00:00	0.00	0.00
33	Jun-54	41.08	0.00	14.86	1.93	0.00	2.14	13.27	0.34	0 12:15	0 00:00	0.00	0.00
34	Jun-55	41.08	0.00	14.89	1.94	0.00	2.11	13.29	0.34	0 12:15	0 00:00	0.00	0.00
35	Jun-56	6.43	0.00	14.86	1.23	0.00	0.77	13.80	0.17	0 12:12	0 00:00	0.00	0.00
36	Jun-57	7.96	1.93	14.84	1.55	0.00	0.95	13.51	0.22	0 12:12	0 00:00	0.00	0.00
37	Jun-58	13.49	13.49	19.12	1.12	0.00	1.88	18.15	0.15	0 12:10	0 00:00	0.00	0.00
38	Jun-59	30.25	18.00	17.67	1.67	0.00	2.33	16.25	0.25	0 12:10	0 00:00	0.00	0.00
39	Jun-60	8.38	8.38	19.43	0.43	0.00	1.57	19.05	0.05	0 12:10	0 00:00	0.00	0.00
40	Jun-61	6.18	6.18	19.91	0.91	0.00	1.09	19.12	0.12	0 12:10	0 00:00	0.00	0.00
41	Jun-62	9.45	3.91	18.88	0.88	0.00	1.12	18.12	0.12	0 12:13	0 00:00	0.00	0.00
42	Jun-63	9.42	0.00	17.86	0.86	0.00	1.14	17.11	0.11	0 12:13	0 00:00	0.00	0.00
43	Jun-64	10.98	10.98	17.28	1.28	0.00	1.72	16.18	0.18	0 12:10	0 00:00	0.00	0.00
44	Jun-65	8.72	8.72	16.18	1.18	0.00	0.82	15.16	0.16	0 12:10	0 00:00	0.00	0.00
45	Jun-66	17.96	10.68	15.69	1.64	0.00	0.31	14.30	0.25	0 12:14	0 00:00	0.00	0.00
46	Jun-67	17.95	0.00	15.56	1.64	0.00	0.44	14.17	0.25	0 12:15	0 00:00	0.00	0.00
47	Jun-Top-N-3%-DN-1	21.94	0.00	56.72	1.72	0.00	0.78	55.45	0.45	0 12:32	0 00:00	0.00	0.00
48	Jun-Top-N-3%-DN-2	24.81	0.00	56.88	1.88	0.00	0.62	55.50	0.50	0 12:36	0 00:00	0.00	0.00
49	Jun-Top-N-3%-UP-1	15.79	15.79	59.22	1.72	0.00	0.78	57.95	0.45	0 12:30	0 00:00	0.00	0.00
50	Jun-Top-N-3%-UP-2	17.78	17.78	59.38	1.88	0.00	0.62	58.00	0.50	0 12:35	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	Link-05	578.92	57.50	0.00	55.00	0.00	2.50	0.4300	Triangular	2.500	7.500	0.0220	0.0000	0.0000	0.0000	0.00	No
2	Link-07	725.55	57.50	0.00	55.00	0.00	2.50	0.3400	Triangular	2.500	7.500	0.0220	0.0000	0.0000	0.0000	0.00	No
3	Link-08	126.01	55.00	0.00	14.00	0.00	41.00	32.5400	Trapezoidal	1.000	4.000	0.0220	0.0000	0.0000	0.0000	0.00	No
4	Link-09	353.11	57.50	0.00	55.00	0.00	2.50	0.7100	Triangular	2.500	7.500	0.0220	0.0000	0.0000	0.0000	0.00	No
5	Link-10	246.61	57.50	0.00	56.50	0.00	1.00	0.4100	Triangular	2.500	7.500	0.0220	0.0000	0.0000	0.0000	0.00	No
6	Link-11	125.87	56.50	0.00	55.50	0.00	1.00	0.7900	Triangular	2.500	7.500	0.0220	0.0000	0.0000	0.0000	0.00	No
7	Link-12	459.05	57.50	0.00	55.50	0.00	2.00	0.4400	Triangular	2.500	7.500	0.0220	0.0000	0.0000	0.0000	0.00	No
8	Link-13	413.26	57.50	0.00	55.00	0.00	2.50	0.6000	Triangular	2.500	7.500	0.0220	0.0000	0.0000	0.0000	0.00	No
9	Link-14	344.27	57.50	0.00	55.00	0.00	2.50	0.7300	Triangular	2.500	7.500	0.0220	0.0000	0.0000	0.0000	0.00	No
10	Link-15	405.21	57.50	0.00	55.00	0.00	2.50	0.6200	Triangular	2.500	7.500	0.0220	0.0000	0.0000	0.0000	0.00	No
11	Link-16	137.51	55.50	0.00	16.00	0.00	39.50	28.7300	Trapezoidal	1.000	4.000	0.0220	0.0000	0.0000	0.0000	0.00	No
12	Link-17	136.82	55.00	0.00	14.00	0.00	41.00	29.9700	Trapezoidal	1.000	4.000	0.0220	0.0000	0.0000	0.0000	0.00	No
13	Link-18	150.73	55.00	0.00	13.95	0.35	41.05	27.2300	Trapezoidal	1.000	4.000	0.0220	0.0000	0.0000	0.0000	0.00	No
14	Link-34	1443.82	12.44	0.00	11.00	0.00	1.44	0.1000	Trapezoidal	3.000	17.000	0.0220	0.0000	0.0000	0.0000	0.00	No
15	Link-36	644.40	14.13	0.00	13.29	0.00	0.83	0.1300	Trapezoidal	1.000	9.000	0.0220	0.0000	0.0000	0.0000	0.00	No
16	Link-37	492.54	14.13	0.00	13.63	0.00	0.49	0.1000	Trapezoidal	1.000	9.000	0.0220	0.0000	0.0000	0.0000	0.00	No
17	Link-38	114.64	13.57	0.00	13.45	0.00	0.12	0.1000	Trapezoidal	1.000	9.000	0.0220	0.0000	0.0000	0.0000	0.00	No
18	Link-40	241.88	12.54	0.00	12.30	0.00	0.24	0.1000	Trapezoidal	3.500	19.000	0.0220	0.0000	0.0000	0.0000	0.00	No
19	Link-41	78.57	12.30	0.00	12.22	0.00	0.08	0.1000	Trapezoidal	3.500	19.000	0.0220	0.0000	0.0000	0.0000	0.00	No
20	Link-42	819.54	12.17	0.00	11.35	0.00	0.82	0.1000	Trapezoidal	3.500	19.000	0.0220	0.0000	0.0000	0.0000	0.00	No
21	Link-43	196.04	11.20	0.00	11.00	0.00	0.20	0.1000	Trapezoidal	3.500	19.000	0.0220	0.0000	0.0000	0.0000	0.00	No
22	Link-45	163.09	12.64	-0.32	12.47	0.00	0.16	0.1000	Trapezoidal	2.000	13.000	0.0220	0.0000	0.0000	0.0000	0.00	No
23	Link-47	127.38	11.35	0.00	11.22	0.00	0.13	0.1000	Trapezoidal	3.500	19.000	0.0220	0.0000	0.0000	0.0000	0.00	No
24	Link-48	33.98	12.22	0.00	12.19	0.00	0.03	0.1000	Trapezoidal	3.500	19.000	0.0220	0.0000	0.0000	0.0000	0.00	No
25	Link-50	503.01	13.45	0.00	12.95	0.00	0.50	0.1000	Trapezoidal	2.500	15.000	0.0220	0.0000	0.0000	0.0000	0.00	No
26	Link-52	179.98	12.93	0.00	12.75	0.00	0.18	0.1000	Trapezoidal	2.500	15.000	0.0220	0.0000	0.0000	0.0000	0.00	No
27	Link-55	161.75	12.70	0.00	12.54	0.00	0.16	0.1000	Trapezoidal	3.500	19.000	0.0220	0.0000	0.0000	0.0000	0.00	No
28	Link-57	285.73	13.24	0.00	12.95	0.00	0.29	0.1000	Trapezoidal	2.000	13.000	0.0220	0.0000	0.0000	0.0000	0.00	No
29	Link-58	101.04	19.00	0.00	14.00	0.00	5.00	4.9500	Trapezoidal	1.000	6.000	0.0220	0.0000	0.0000	0.0000	0.00	No
30	Link-59	667.56	18.00	0.00	16.00	0.00	2.00	0.3000	Trapezoidal	1.500	8.000	0.0220	0.0000	0.0000	0.0000	0.00	No
31	Link-60	727.21	16.00	0.00	14.00	0.40	2.00	0.2800	Trapezoidal	2.000	10.000	0.0220	0.0000	0.0000	0.0000	0.00	No
32	Link-61	672.45	19.00	0.00	18.00	0.00	1.00	0.1500	Trapezoidal	1.000	6.000	0.0220	0.0000	0.0000	0.0000	0.00	No
33	Link-62	235.00	18.00	0.00	17.00	0.00	1.00	0.4300	Trapezoidal	1.000	6.000	0.0220	0.0000	0.0000	0.0000	0.00	No
34	Link-63	57.68	17.00	0.00	16.00	0.00	1.00	1.7300	Trapezoidal	1.000	6.000	0.0220	0.0000	0.0000	0.0000	0.00	No
35	Link-64	898.67	16.00	0.00	15.00	1.00	1.00	0.1100	Trapezoidal	1.500	8.000	0.0220	0.0000	0.0000	0.0000	0.00	No
36	Link-65	947.23	15.00	0.00	14.05	0.00	0.95	0.1000	Trapezoidal	1.500	8.000	0.0220	0.0000	0.0000	0.0000	0.00	No
37	Link-66	126.28	14.05	0.00	13.92	0.00	0.13	0.1100	Trapezoidal	1.750	9.000	0.0220	0.0000	0.0000	0.0000	0.00	No
38	Link-67	109.45	13.92	0.00	13.60	0.00	0.32	0.2900	Trapezoidal	1.750	7.250	0.0220	0.0000	0.0000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	Link-05	15.70	0 12:32	42.72	0.37	3.57	2.70	1.71	0.69	0.00		
2	Link-07	17.74	0 12:36	38.16	0.47	3.38	3.58	1.87	0.75	0.00		
3	Link-08	21.94	0 12:32	84.16	0.26	19.03	0.11	0.47	0.47	0.00		
4	Link-09	6.24	0 12:31	54.70	0.11	3.40	1.73	1.11	0.44	0.00		
5	Link-10	3.83	0 13:00	41.39	0.09	2.44	1.68	1.02	0.41	0.00		
6	Link-11	4.17	0 12:56	57.94	0.07	3.20	0.66	0.93	0.37	0.00		
7	Link-12	8.38	0 12:40	42.91	0.20	3.06	2.50	1.35	0.54	0.00		
8	Link-13	8.50	0 12:35	50.56	0.17	3.47	1.98	1.28	0.51	0.00		
9	Link-14	6.18	0 12:35	55.39	0.11	3.43	1.67	1.10	0.44	0.00		
10	Link-15	7.07	0 12:35	51.06	0.14	3.34	2.02	1.19	0.48	0.00		
11	Link-16	16.25	0 12:41	79.08	0.21	16.61	0.14	0.41	0.41	0.00		
12	Link-17	18.34	0 12:33	80.77	0.23	17.50	0.13	0.43	0.43	0.00		
13	Link-18	24.81	0 12:36	77.00	0.32	18.57	0.14	0.53	0.53	0.00		
14	Link-34	79.48	0 12:20	103.99	0.76	3.06	7.86	2.60	0.87	0.00		
15	Link-36	6.09	0 12:12	13.90	0.44	1.75	6.14	0.62	0.62	0.00		
16	Link-37	6.43	0 12:12	12.23	0.53	1.54	5.33	0.69	0.69	0.00		
17	Link-38	6.40	0 12:13	12.24	0.52	1.44	1.33	0.67	0.70	0.00		
18	Link-40	61.91	0 12:17	144.04	0.43	2.75	1.47	2.31	0.67	0.00		
19	Link-41	61.91	0 12:18	144.39	0.43	2.76	0.47	2.32	0.67	0.00		
20	Link-42	65.86	0 12:21	144.04	0.46	2.83	4.83	2.40	0.69	0.00		
21	Link-43	93.31	0 12:23	143.99	0.65	3.06	1.07	2.84	0.81	0.00		
22	Link-45	72.09	0 12:15	78.20	0.92	4.25	0.64	1.92	0.96	0.00		
23	Link-47	91.96	0 12:23	143.79	0.64	3.05	0.70	2.82	0.81	0.00		
24	Link-48	66.81	0 12:17	141.91	0.47	2.78	0.20	2.42	0.70	0.00		
25	Link-50	41.08	0 12:15	71.37	0.58	2.48	3.38	1.89	0.76	0.00		
26	Link-52	41.02	0 12:15	71.37	0.57	2.46	1.22	1.90	0.76	0.00		
27	Link-55	43.75	0 12:16	144.11	0.30	2.51	1.07	1.96	0.56	0.00		
28	Link-57	7.84	0 12:14	45.52	0.17	1.58	3.01	0.77	0.39	0.00		
29	Link-58	8.34	0 12:10	43.61	0.19	6.90	0.24	0.43	0.43	0.00		
30	Link-59	13.02	0 12:12	25.10	0.52	2.93	3.80	1.09	0.73	0.00		
31	Link-60	29.71	0 12:13	45.20	0.66	3.49	3.47	1.62	0.82	0.00		
32	Link-61	5.83	0 12:13	7.56	0.77	1.90	5.90	0.87	0.87	0.00		
33	Link-62	9.42	0 12:13	12.79	0.74	2.96	1.32	0.85	0.86	0.00		
34	Link-63	9.43	0 12:13	25.81	0.37	4.91	0.20	0.60	0.60	0.00		
35	Link-64	10.14	0 12:16	15.30	0.66	2.07	7.24	1.21	0.81	0.00		
36	Link-65	7.99	0 12:16	14.50	0.55	1.90	8.31	1.10	0.74	0.00		
37	Link-66	17.95	0 12:15	20.81	0.86	2.09	1.01	1.64	0.93	0.00		
38	Link-67	17.94	0 12:15	28.87	0.62	3.16	0.58	1.39	0.79	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-29	37.93	16.00	0.00	15.00	2.46	1.00	2.6400	CIRCULAR	24.000	24.000	0.0100	0.0000	0.0000	0.0000	0.00	No	1
2	Link-30	43.75	14.00	0.00	13.00	-0.45	1.00	2.2900	CIRCULAR	24.000	24.000	0.0100	0.0000	0.0000	0.0000	0.00	No	1
3	Link-31	48.12	13.60	0.00	12.95	0.00	0.65	1.3400	CIRCULAR	30.000	30.000	0.0100	0.0000	0.0000	0.0000	0.00	No	1
4	Link-32	46.65	14.00	0.00	13.00	1.66	1.00	2.1400	CIRCULAR	24.000	24.000	0.0100	0.0000	0.0000	0.0000	0.00	No	1
5	Link-44	29.45	12.47	0.00	12.44	0.00	0.03	0.1000	CIRCULAR	42.000	42.000	0.0100	0.0000	0.0000	0.0000	0.00	No	2
6	Link-46	22.54	11.22	0.00	11.20	0.00	0.02	0.1000	CIRCULAR	48.000	48.000	0.0100	0.0000	0.0000	0.0000	0.00	No	2
7	Link-49	20.28	12.19	0.00	12.17	0.00	0.02	0.1000	CIRCULAR	42.000	42.000	0.0100	0.0000	0.0000	0.0000	0.00	No	2
8	Link-51	24.04	12.95	0.00	12.93	0.00	0.02	0.1000	CIRCULAR	36.000	36.000	0.0100	0.0000	0.0000	0.0000	0.00	No	2
9	Link-53	43.66	12.75	0.00	12.70	0.00	0.04	0.1000	CIRCULAR	36.000	36.000	0.0100	0.0000	0.0000	0.0000	0.00	No	2
10	Link-54	65.31	13.63	0.00	13.57	0.00	0.06	0.1000	CIRCULAR	24.000	24.000	0.0100	0.0000	0.0000	0.0000	0.00	No	1
11	Link-56	52.57	13.29	0.00	13.24	0.00	0.05	0.1000	CIRCULAR	30.000	30.000	0.0150	0.0000	0.0000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-29	19.22	0 12:33	47.75	0.40	14.38	0.04	0.88	0.44	0.00		Calculated
2	Link-30	29.26	0 12:16	32.91	0.89	11.83	0.06	1.46	0.73	0.00		Calculated
3	Link-31	60.67	0 12:16	61.83	0.98	14.35	0.06	2.00	0.80	0.00		Calculated
4	Link-32	24.57	0 12:31	43.06	0.57	14.15	0.05	1.08	0.54	0.00		Calculated
5	Link-44	72.09	0 12:15	82.09	0.88	4.81	0.10	2.55	0.73	0.00		Calculated
6	Link-46	92.70	0 12:23	116.68	0.79	5.15	0.07	2.68	0.67	0.00		Calculated
7	Link-49	66.81	0 12:17	82.15	0.81	4.76	0.07	2.37	0.69	0.00		Calculated
8	Link-51	41.08	0 12:15	54.79	0.75	4.25	0.09	1.94	0.65	0.00		Calculated
9	Link-53	41.01	0 12:16	55.05	0.74	4.27	0.17	1.93	0.64	0.00		Calculated
10	Link-54	6.42	0 12:12	9.28	0.69	3.19	0.34	1.17	0.61	0.00		Calculated
11	Link-56	7.95	0 12:12	11.29	0.70	2.49	0.35	1.48	0.62	0.00		Calculated