

Run-On and
Run-Off Control System Plan
Iatan CCR Landfill



Evergy Metro, Inc.

Iatan Generating Station

**Revision 2
5/2/2023**

Run-On and Run-Off Control System Plan Iatan CCR Landfill

prepared for

**Evergy Metro, Inc.
Iatan Generating Station
Weston, Missouri**

**Revision 2
5/2/2023**

prepared by

**Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri**

INDEX AND CERTIFICATION

Evergy Metro, Inc. Run-On and Run-Off Control System Plan Iatan CCR Landfill

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Certification

I hereby certify, as a Professional Engineer in the state of Missouri, that the information in this document was assembled under my direct personal charge and that this periodic run-on and run-off control system plan meets the applicable requirements of 40 CFR 257.81. This report is not intended or represented to be suitable for reuse by Evergy Metro, Inc. or others without specific verification or adaptation by the Engineer.

Kira E. Wylam

Kira Wylam, P.E.

Missouri License #2011000966

Date: 5/2/2023

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LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
Evergy	Evergy Metro, Inc.
HDPE	High-Density Polyethylene
Iatan	Iatan Generating Station
MDNR	Missouri Department of Natural Resources
NDPES	National Pollutant Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
PFDS	Precipitation Frequency Data Server
RCRA	Resource Conservations and Recovery Act
U.S.C.	United States Code

1.0 BACKGROUND

On April 17, 2015, the Environmental Protection Agency (EPA) issued the federal Coal Combustion Residuals Rule (CCR Rule) to regulate the disposal of CCR materials generated at coal-fired units. The rule is being administered as part of the Resource Conservation and Recovery Act [RCRA, 42 United States Code (U.S.C.) §6901 et seq.], under Subtitle D.

Evergy Metro, Inc. (Evergy) is subject to the CCR Rule and as such must develop a run-on and run-off control system plan for the CCR Landfill at Iatan Generating Station (Iatan) per 40 Code of Federal Regulations (CFR) §257.81. This report serves as the periodic update to the run-on and run-off control system plan, which was originally developed by Evergy Metro, Inc. (formerly known as Kansas City Power & Light). This run-on and run-off control system plan is in addition to, not in place of, any other applicable site permits, environmental standards, or work safety practices.

1.1 Facility Information

Name of Facility:	Iatan Generating Station
Name of CCR Unit:	CCR Landfill
Name of Operator:	Evergy Metro, Inc.
Facility Mailing Address:	20250 Hwy. 45, Weston, MO 64098
Location:	Approximately five miles northwest of Weston, Missouri.
Facility Description:	The Iatan Generating Station has two coal-fired units that produce fly ash, bottom ash, and gypsum. CCR not beneficially used is transported to the on-site landfill for disposal. Related landfill facilities include a groundwater monitoring system, stormwater and leachate management systems, and haul/access roads.

1.2 Regulatory Requirements

Per 40 CFR §257.81, the run-on and run-off control system plan must contain documentation (including supporting engineering calculations) that the control system has been designed and constructed to meet the applicable requirements of 40 CFR 257.81. The owner or operator of a CCR unit must prepare a written plan that includes the information specified in 40 CFR 257.81 (a) and (b) which is as follows:

- (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.
- (b) Run-off from the active portion of CCR unit must be handled in accordance with the surface water requirements under §257.3-3.

These items are addressed in Sections 2.0 and 3.0 of this document. Per 40 CFR §257.81(c)(5), Evergy must obtain certification from a qualified professional engineer that the run-on and run-off control system plan, and subsequent updates to the plan, meet the requirements of 40 CFR §257.81. This sealed document serves as that certification.

2.0 LANDFILL RUN-ON AND RUN-OFF CONTROLS

The Iatan CCR Landfill is permitted with the Missouri Department of Natural Resources (MDNR). The permitted landfill area is 120 acres, while the drainage areas are approximately 115 acres. The Missouri DNR-permitted run-on and run-off control system design was prepared by Burns & McDonnell in 2007 for compliance with Missouri DNR Utility Waste Rules (10 CSR 80-11.010(8)). A revision table for previous Landfill Run-on and Run-off Control System Plans for compliance with the CCR Rule is provided in Section 6. The system consists of a perimeter berm, ditches, and culverts which were designed to control the National Oceanic and Atmospheric Administration (NOAA) Precipitation Frequency Data Server (PFDS) 25-year, 24-hour storm event of 6.29 inches in accordance with 40 CFR §257.81.

Modifications have been made to the landfill run-off control system design to support on-going landfill operations and other work adjacent to the landfill. These modifications allow for the continued control of the 25-year, 24-hour storm event.

2.1 Run-On Controls

The landfill's perimeter berm, consisting of compacted cohesive soil material, prevents run-on to the landfill on all sides. The berm crest is constructed to a minimum elevation of 787 feet (National Geodetic Vertical Datum [NGVD], 1929) which minimized the likelihood of inundation by the 100-year flood. The berm was constructed with a top width of approximately 25-feet, 3H:1V side slopes, and a crest elevation 2.4 feet above the 100-year flood elevation of the nearby Missouri River, which exceeds the requirement in 40 CFR 257.81(a)(1) to provide protection from run-on from the 24-hour, 25-year storm event.

2.2 Run-Off Controls

The run-off control system consists of benches, berms, swales, channels, culverts, and letdown channels, as well as a stormwater pond. The landfill is delineated into 18 drainage areas ranging from 2.01 acres to 8.57 acres. Each subcatchment has a drainage structure designed to handle peak flows from the 25-year, 24-hour storm; namely, two, 24-inch High-Density Polyethylene (HDPE) culverts. The runoff controls are constructed during phased landfill construction events. Contact runoff water is routed to the landfill perimeter ditches, which drain to the landfill storm water pond for reuse at the landfill, the plant, or discharges via a NPDES-permitted outfall.

Table 2-1 presents the capacities of the storm water run-off system components from the current active area for the 25-year, 24-hour design storm event.

Table 2-1: Run-Off Control Protection

Storm Water System Component	Required Capacity/ Parameter	Design Capacity/ Parameter	Excess	Units
Existing Stormwater Pond	25.4	59.7	34.3	acre-ft
Letdown Channels	0.83	1.00	0.17	feet of freeboard
24" dia. HDPE Culverts*	59.60	73.07	13.47	cubic feet per second
Berms-Landfill Top	0.32	2.00	1.68	feet of freeboard
Berm/Ditch on 25% Sideslope	1.29	2.00	0.71	feet of freeboard
Benches/Swales on 25% Sideslope	0.37	0.40	0.03	feet of freeboard
Berm/Ditch at Landfill Base	1.29	2.00	0.71	feet of freeboard

*At peak location DA-16 (ie. worst case condition).

As indicated in Table 2-1 and Appendix A, the landfill's drainage structures have capacity beyond the design 25-year, 24-hour storm event, therefore the run-off control system exceeds the requirement to provide protection from run-off from the 25-year, 24-hour storm event.

3.0 RUN-OFF CONTROL FOR §257.3-3

The run-off from the Iatan CCR Landfill active area is routed through the landfill perimeter ditches to the unit's stormwater pond, which discharge to NPDES-permitted outfalls, or is reused by the station. Water discharges are monitored in accordance with the NPDES permit for the landfill; therefore the discharges meet the minimum regulatory requirements of the permit. The facility does 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, and therefore meets the requirements of 40 CFR 257.81(b).

4.0 AMENDMENT OF RUN-ON AND RUN-OFF CONTROL PLAN

The owner or operator may amend the written run-off and run-on control system plan at any time provided the revised plan is placed in the facility's operating record as required by §257.105(g)(3). The owner or operator must amend the written run-on and runoff control system plan whenever there is a change in conditions that would substantially affect the written plan in effect. Additionally, the owner or operator of the CCR unit must prepare periodic run-on and runoff control system plans every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first subsequent plan.

The owner or operator may complete any required plan prior to the required deadline provided the completed plan is placed into the facility's operating record within a reasonable amount of time.

A written certification from a qualified professional engineer that the initial and any amendment of the written run-on and run-off control system plan meets the requirements of §257.81 must be obtained. Plan changes will be documented using the Revision History which follows this Plan. Changes to this Plan will be certified by a Qualified Professional Engineer.

5.0 REFERENCES

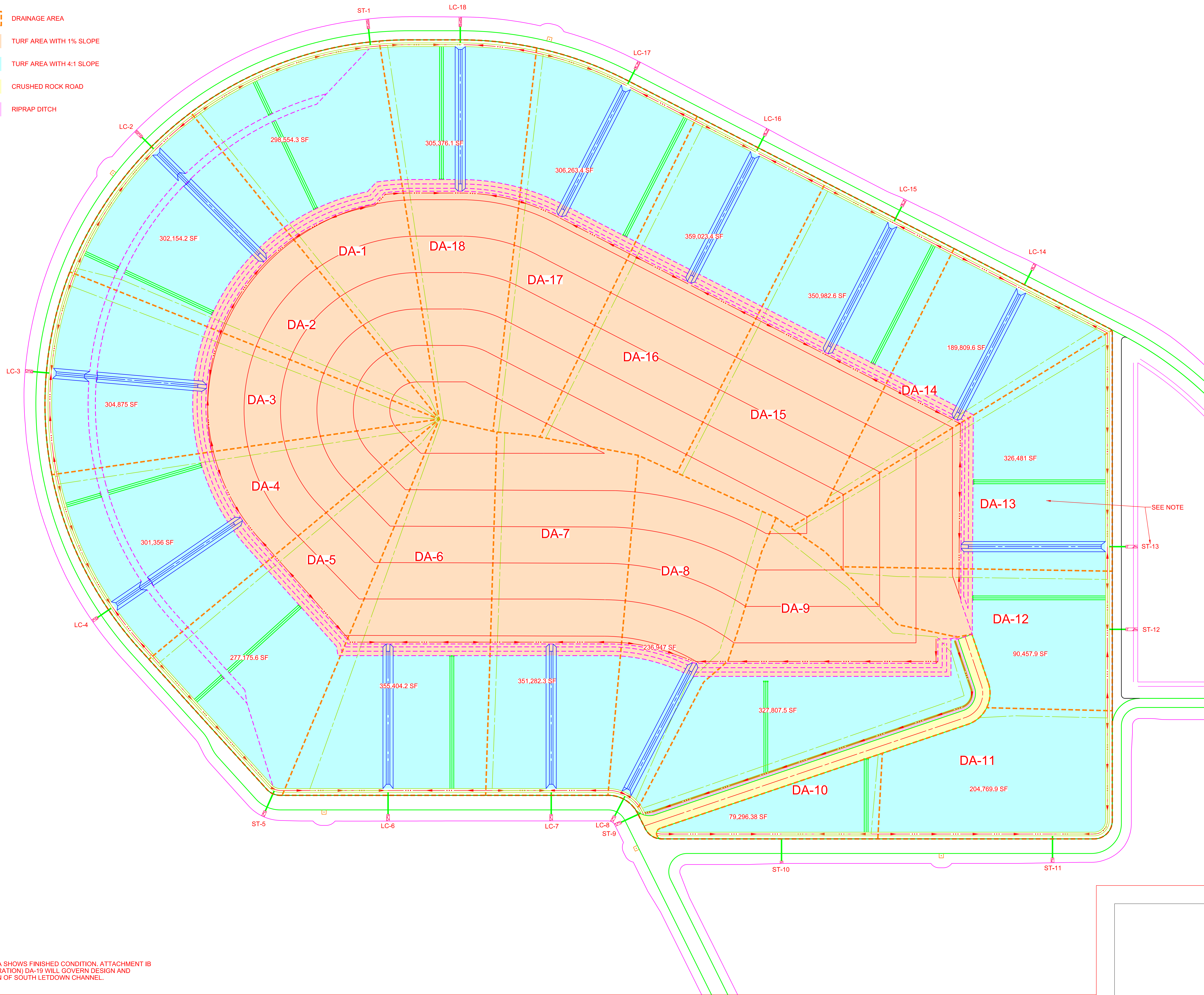
1. U.S. Environmental Protection Agency, Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments, 40 CFR §257, Federal Register 80, Subpart D, April 17, 2015.
2. Evergy Environmental Services, Initial Run-On and Run-off Control System Plan, CCR Landfill, Iatan Generating Station, October, 2016.
3. McLaughlin Mueller, Inc., Topographic Survey, February 23, 2022.
4. Federal Emergency Management Agency (FEMA) Maps, Iatan Plant Area, March 2021.
5. ClosureTurf® Design Guidelines Manual, ClosureTurf® Hydrology Parameters, March 2019.
6. National Oceanic and Atmospheric Administration, NOAA Atlas 14 Point Precipitation Frequency Estimates, Volume 8, Version 2, Accessed: 10/21/2020.
7. USDA Natural Resources Conservation Service, Web Soil Survey, Hydrologic Soil Groups – Platte County, Missouri; Accessed: 11/29/2020.
8. Alternative Final Cover System Engineering Report, Revision 2”, dated August 15, 2022.

6.0 RECORD OF REVISIONS

Revision Number	Date	Revisions Made	By Whom
0	10/2016	Original Issue	Kasas City Power & Light Co., Inc.
1	10/1/2021	Five-year periodic update; new company name; period review for compliance; added MDNR-approved stormwater calculations.	Evergy Metro, Inc.
2	5/2/2023	Updated for revised closure cover system.	Burns & McDonnell

APPENDIX A – SUPPORTING CALCULATIONS

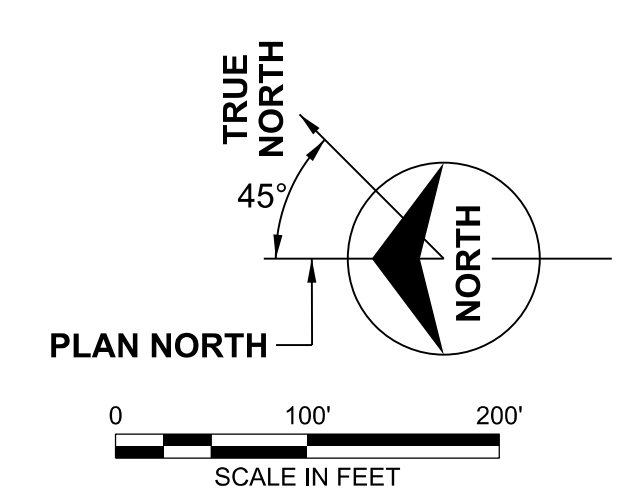
- TIME OF CONCENTRATION
- DA-17** DRAINAGE AREA
- TURF AREA WITH 1% SLOPE
- TURF AREA WITH 4:1 SLOPE
- CRUSHED ROCK ROAD
- RIPRAP DITCH



NOTES:
 1. ATTACHMENT IA SHOWS FINISHED CONDITION. ATTACHMENT IB (PHASE IV OPERATION) DA-19 WILL GOVERN DESIGN AND CONSTRUCTION OF SOUTH LETDOWN CHANNEL.

no.	date	by	ckd	description
1				WORKING

PRELIMINARY - NOT FOR CONSTRUCTION



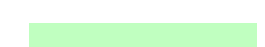





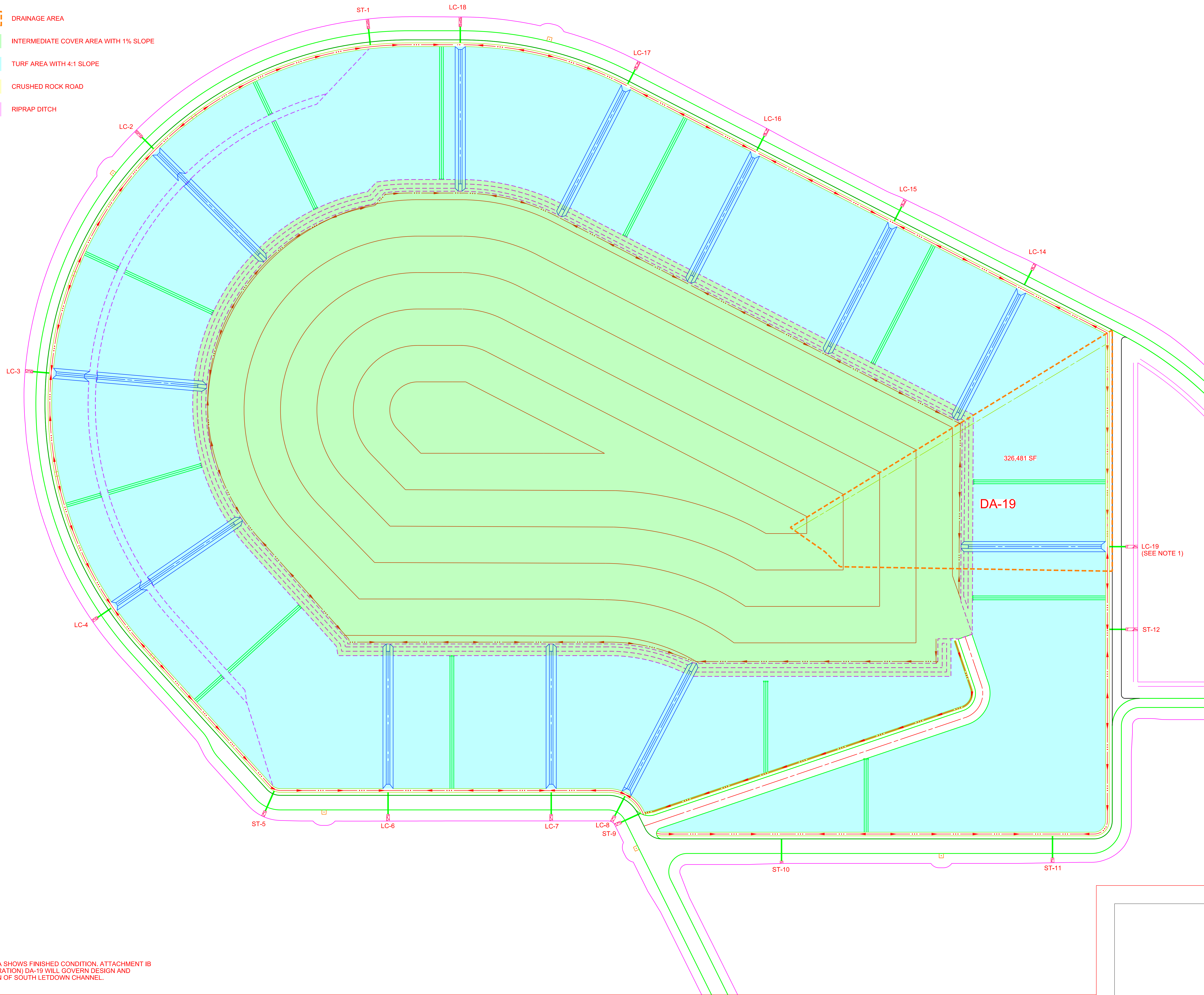
date FEBRUARY 10, 2006	detailed C. ALTES
designed C. SPEEGLE	checked C. HOTOP



IATAN GENERATING STATION
 UTILITY WASTE LANDFILL
 ATTACHMENT IA
 FINISHED CONDITION

project 94358	contract
drawing SKC003	rev. A
sheet 1 of 1	sheets
file 94358SKC003.DGN	

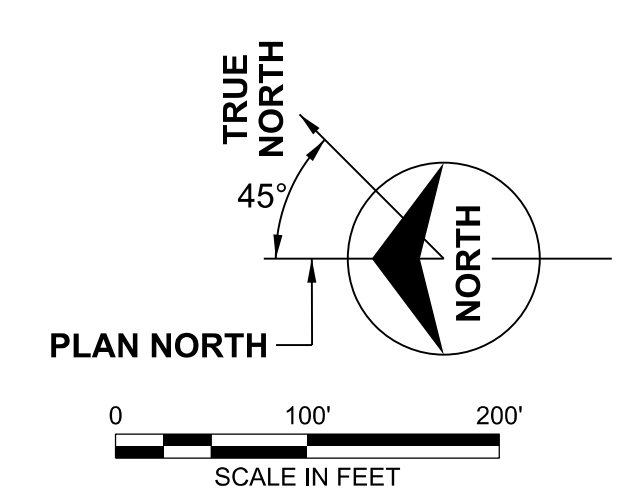
-  TIME OF CONCENTRATION
-  **DA-17** DRAINAGE AREA
-  INTERMEDIATE COVER AREA WITH 1% SLOPE
-  TURF AREA WITH 4:1 SLOPE
-  CRUSHED ROCK ROAD
-  RIPRAP DITCH



NOTES:
 1. ATTACHMENT IA SHOWS FINISHED CONDITION. ATTACHMENT IB (PHASE IV OPERATION) DA-19 WILL GOVERN DESIGN AND CONSTRUCTION OF SOUTH LETDOWN CHANNEL.

no.	date	by	ckd	description
1				WORKING

PRELIMINARY - NOT FOR CONSTRUCTION

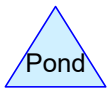
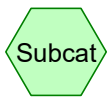
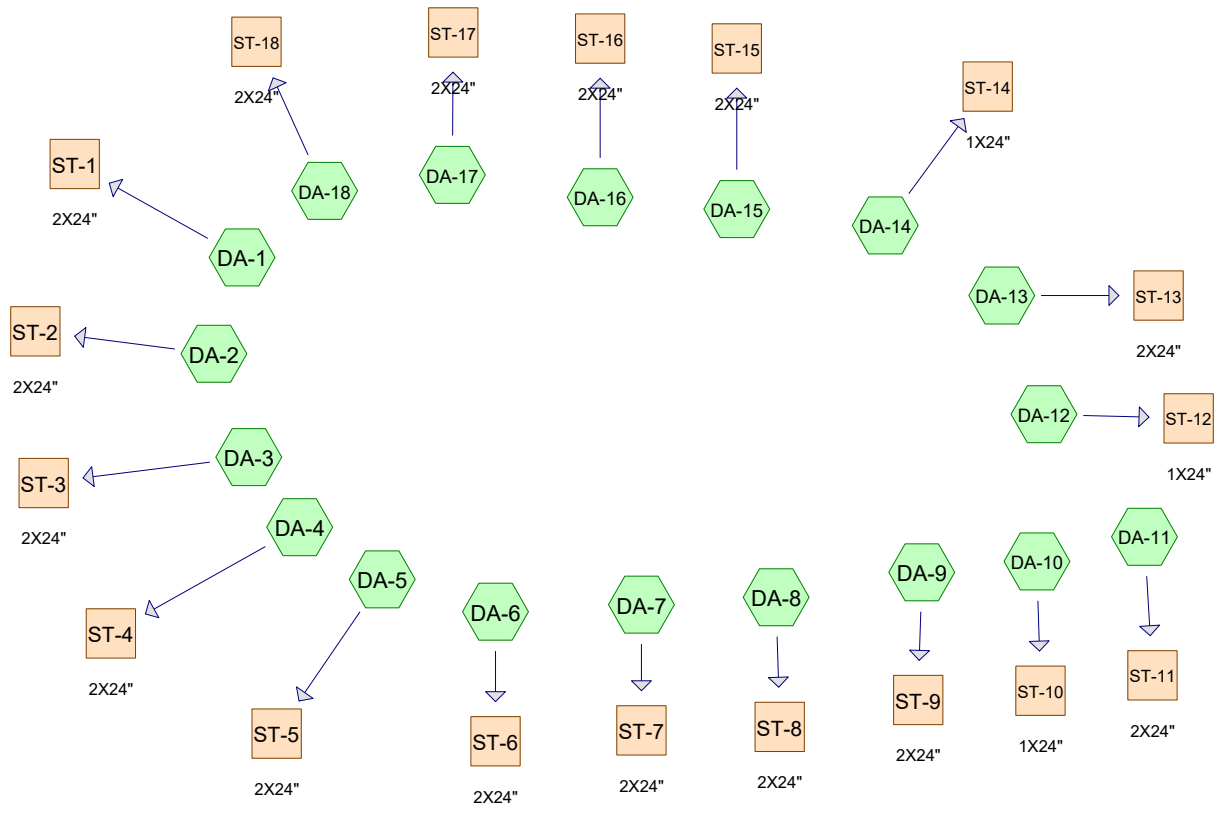


date FEBRUARY 10, 2006	detailed C. ALTES
designed C. SPEEGLE	checked C. HOTOP



IATAN GENERATING STATION
 UTILITY WASTE LANDFILL
 ATTACHMENT IB
 INTERIM PHASE IV CONDITION

project 94358	contract
drawing SKC004	rev. A
sheet 1 of 1	sheets
file 94358SKC004.DGN	



Routing Diagram for Iatan Landfill Revised Stormwater Calculation
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latan landfill Revised Stormwater calculation

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
116.346	95	ClosureTurf (DA-1, DA-10, DA-11, DA-12, DA-13, DA-14, DA-15, DA-16, DA-17, DA-18, DA-2, DA-3, DA-4, DA-5, DA-6, DA-7, DA-8, DA-9)
1.026	96	Gravel surface, HSG D (DA-9)
2.188	98	Paved parking, HSG D (DA-1, DA-10, DA-11, DA-14, DA-15, DA-16, DA-17, DA-18, DA-2, DA-3, DA-4, DA-5, DA-6, DA-7, DA-8, DA-9)

latan landfill Revised Stormwater calculation

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	116.346	116.346	ClosureTurf	DA-1, DA-10, DA-11, DA-12, DA-13, DA-14, DA-15, DA-16, DA-17, DA-18, DA-2, DA-3, DA-4, DA-5, DA-6, DA-7, DA-8, DA-9
0.000	0.000	0.000	1.026	0.000	1.026	Gravel surface	DA-9
0.000	0.000	0.000	2.188	0.000	2.188	Paved parking	DA-1, DA-10, DA-11, DA-14, DA-15, DA-16, DA-17, DA-18, DA-2, DA-3, DA-4, DA-5, DA-6, DA-7, DA-8, DA-9

latan landfill Revised Stormwater calculation

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	ST-1	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
2	ST-10	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
3	ST-11	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
4	ST-12	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
5	ST-13	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
6	ST-14	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
7	ST-15	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
8	ST-16	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
9	ST-17	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
10	ST-18	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
11	ST-2	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
12	ST-3	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
13	ST-4	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
14	ST-5	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
15	ST-6	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
16	ST-7	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
17	ST-8	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0
18	ST-9	784.00	783.00	45.0	0.0222	0.012	0.0	24.0	0.0

latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-1:

Runoff = 46.90 cfs @ 12.06 hrs, Volume= 3.334 af, Depth= 5.70"
 Routed to Reach ST-1 : 2X24"

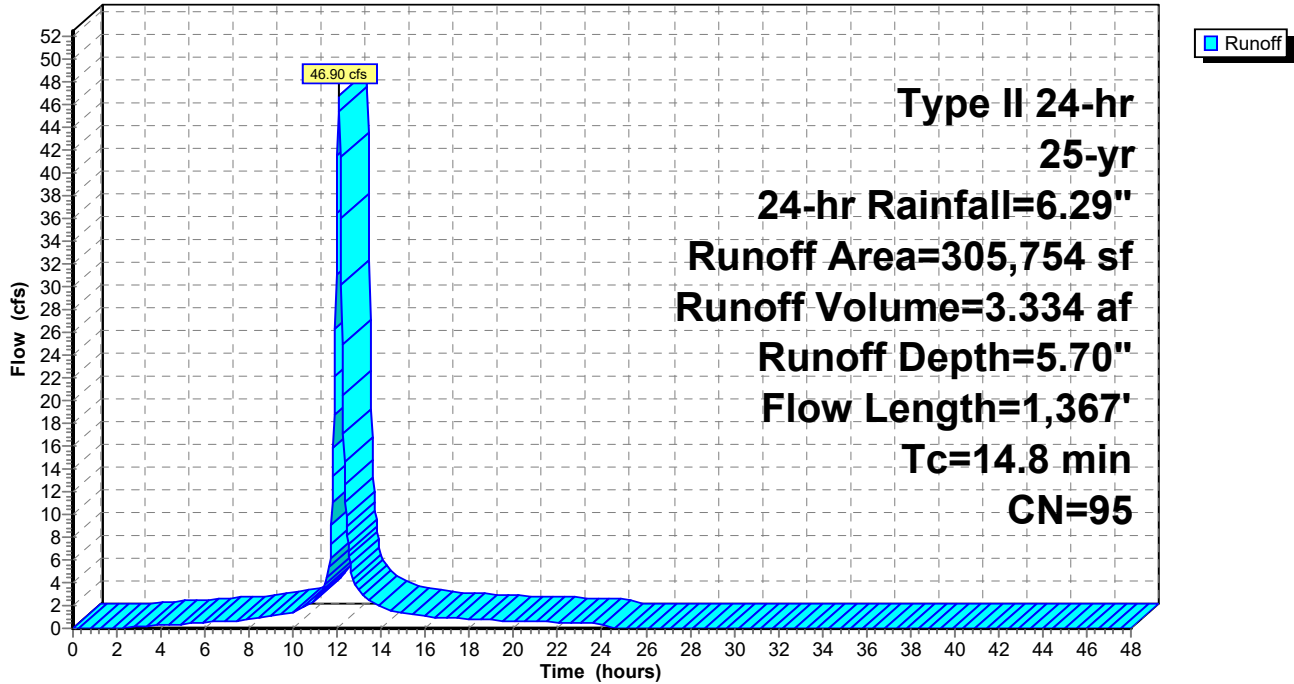
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

Area (sf)	CN	Description
* 298,554	95	ClosureTurf
7,200	98	Paved parking, HSG D
305,754	95	Weighted Average
298,554		97.65% Pervious Area
7,200		2.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
5.5	536	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	265	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.8	416	0.0050	3.89	40.84	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=1.00' Z= 3.0 & 4.0 '/' Top.W=14.00' n= 0.022
14.8	1,367	Total			

Subcatchment DA-1:

Hydrograph



Summary for Subcatchment DA-10:

Runoff = 17.61 cfs @ 11.97 hrs, Volume= 0.953 af, Depth= 5.70"
 Routed to Reach ST-10 : 1X24"

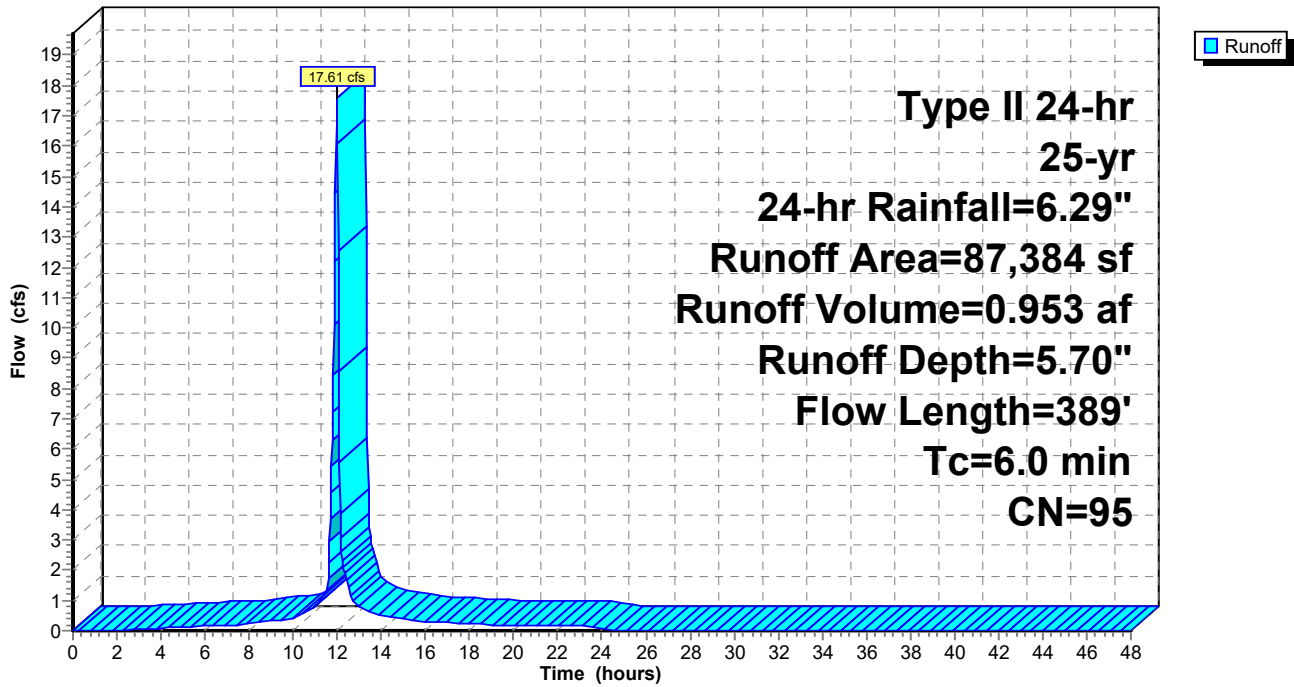
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	79,296	95	ClosureTurf
	8,088	98	Paved parking, HSG D
	87,384	95	Weighted Average
	79,296		90.74% Pervious Area
	8,088		9.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	65	0.2500	1.10		Sheet Flow, Fallow n= 0.050 P2= 3.61"
0.7	324	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 ' Top.W=31.00' n= 0.022
1.7	389	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-10:

Hydrograph



latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-11:

Runoff = 43.77 cfs @ 11.97 hrs, Volume= 2.368 af, Depth= 5.70"
 Routed to Reach ST-11 : 2X24"

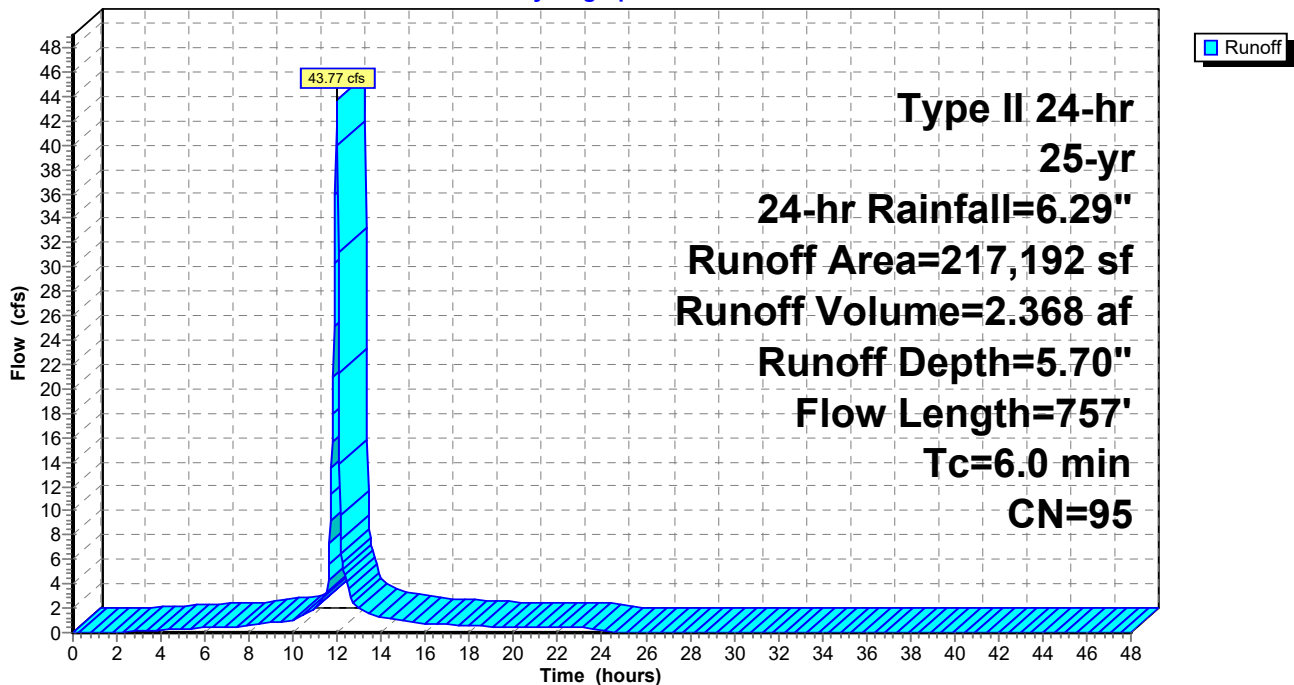
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	204,767	95	ClosureTurf
	12,425	98	Paved parking, HSG D
	217,192	95	Weighted Average
	204,767		94.28% Pervious Area
	12,425		5.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	150	0.2500	1.30		Sheet Flow, Fallow n= 0.050 P2= 3.61"
0.3	162	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.0	445	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 ' Top.W=31.00' n= 0.022
3.2	757	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-11:

Hydrograph



Iatan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-12:

Runoff = 34.12 cfs @ 12.01 hrs, Volume= 2.077 af, Depth= 5.70"
 Routed to Reach ST-12 : 1X24"

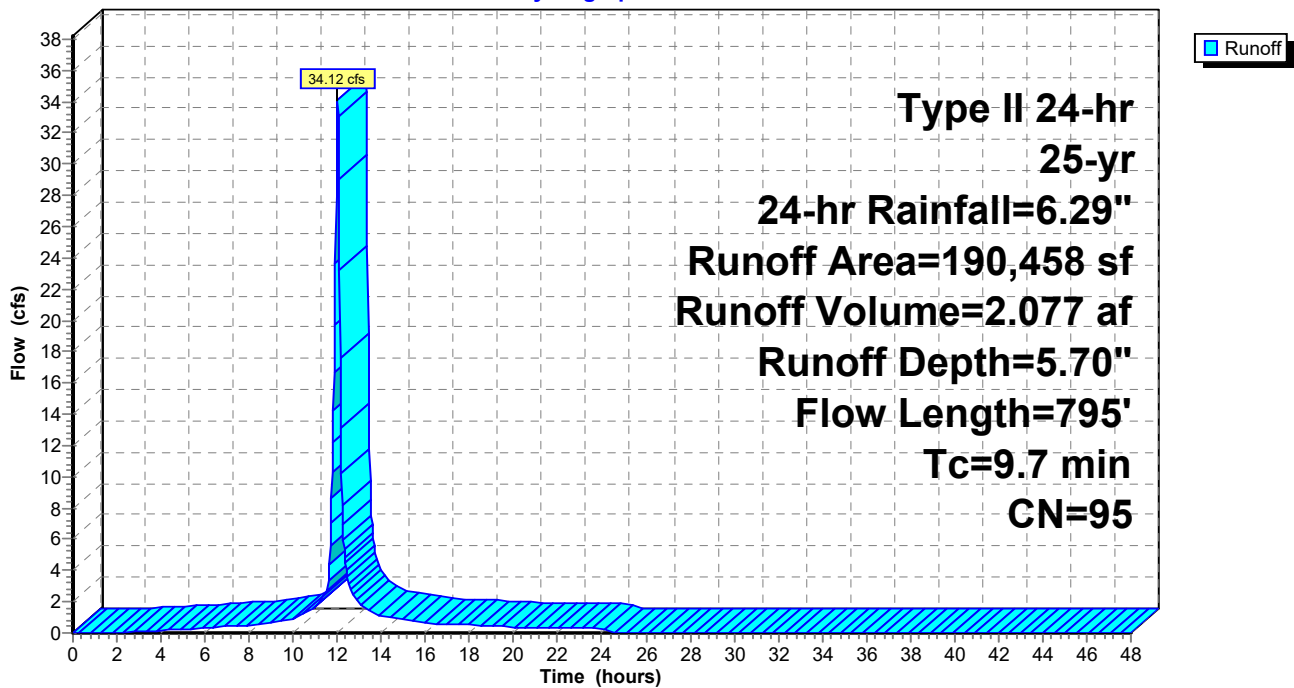
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

Area (sf)	CN	Description
* 190,458	95	ClosureTurf
190,458		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
1.6	150	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	373	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	122	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
9.7	795	Total			

Subcatchment DA-12:

Hydrograph



Iatan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-13:

Runoff = 52.19 cfs @ 12.04 hrs, Volume= 3.560 af, Depth= 5.70"
 Routed to Reach ST-13 : 2X24"

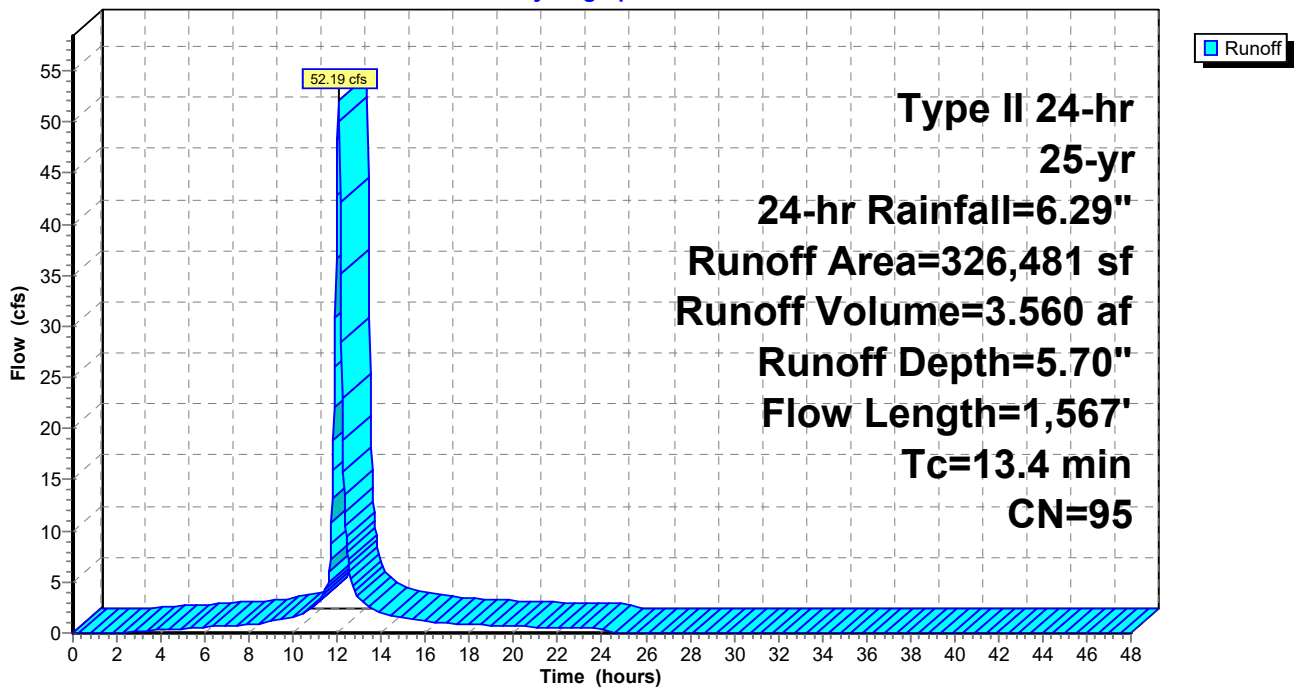
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

Area (sf)	CN	Description
* 326,481	95	ClosureTurf
326,481		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
4.2	408	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	424	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.3	585	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
13.4	1,567	Total			

Subcatchment DA-13:

Hydrograph



latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-14:

Runoff = 33.75 cfs @ 12.02 hrs, Volume= 2.137 af, Depth= 5.70"
 Routed to Reach ST-14 : 1X24"

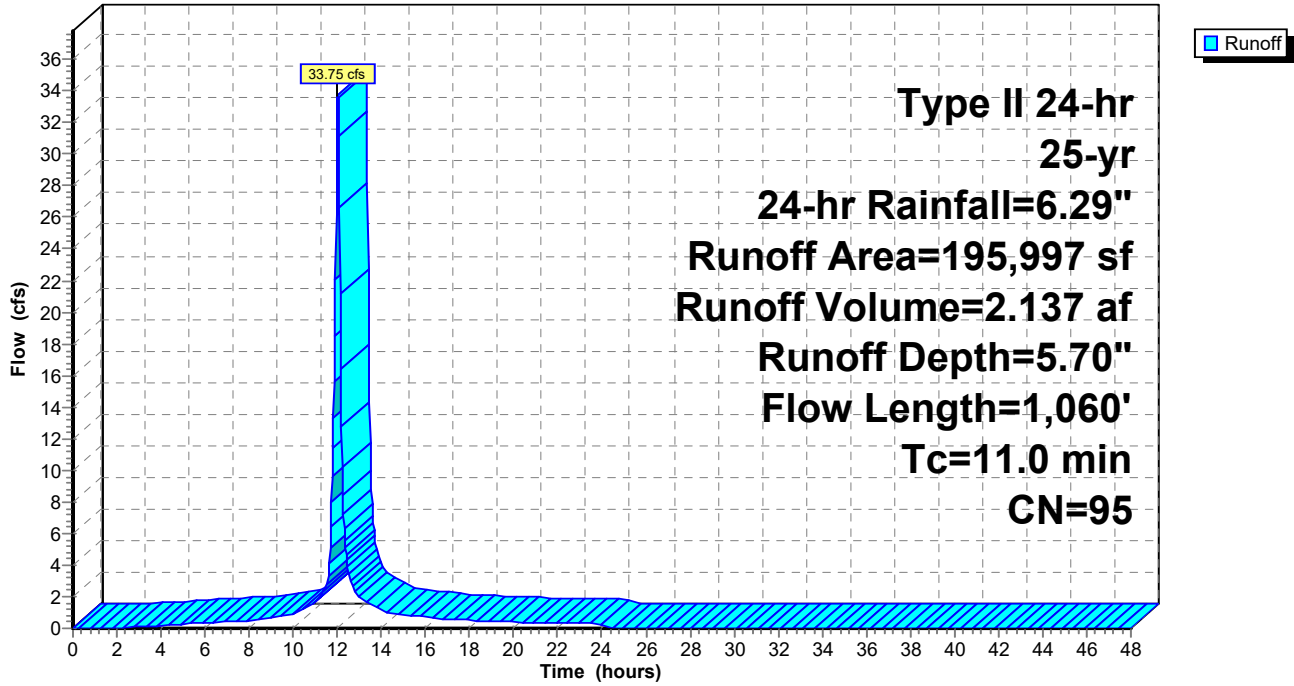
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	189,809	95	ClosureTurf
	6,188	98	Paved parking, HSG D
	195,997	95	Weighted Average
	189,809		96.84% Pervious Area
	6,188		3.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
2.6	251	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	420	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	239	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
11.0	1,060	Total			

Subcatchment DA-14:

Hydrograph



latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-15:

Runoff = 59.76 cfs @ 12.03 hrs, Volume= 3.880 af, Depth= 5.70"
 Routed to Reach ST-15 : 2X24"

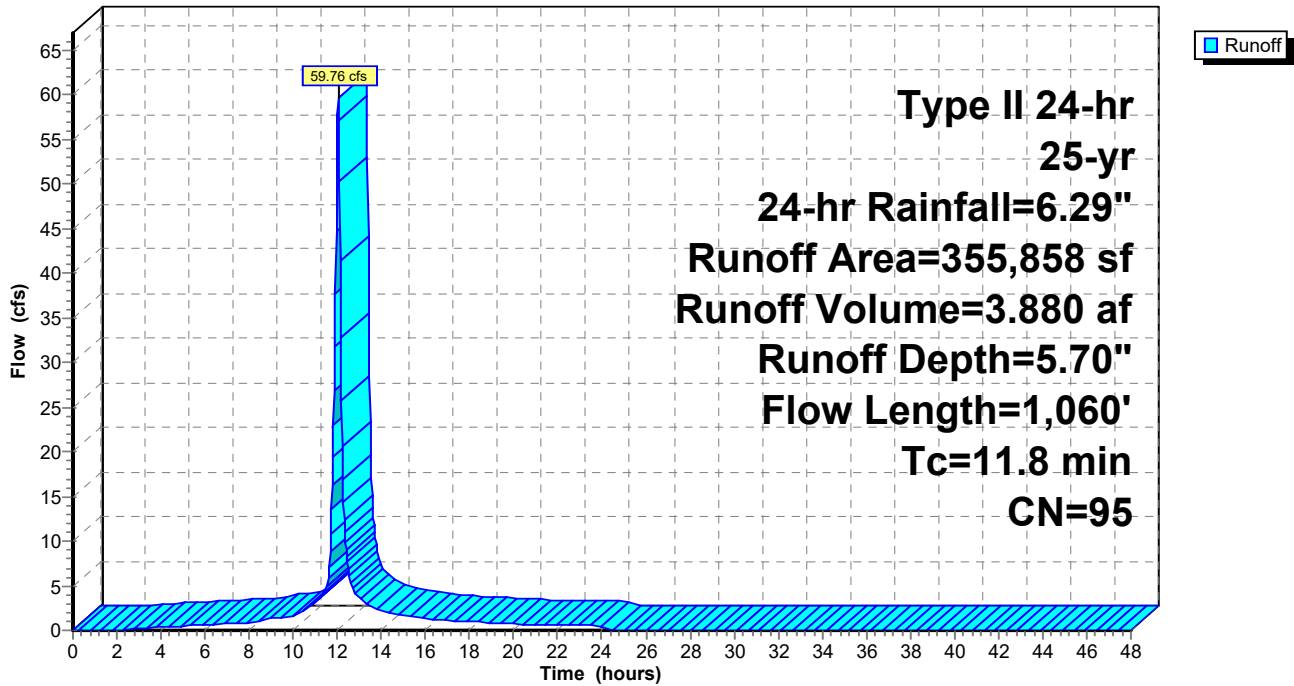
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	350,983	95	ClosureTurf
	4,875	98	Paved parking, HSG D
	355,858	95	Weighted Average
	350,983		98.63% Pervious Area
	4,875		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
3.6	343	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	362	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	205	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
11.8	1,060	Total			

Subcatchment DA-15:

Hydrograph



latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-16:

Runoff = 59.60 cfs @ 12.04 hrs, Volume= 3.967 af, Depth= 5.70"
 Routed to Reach ST-16 : 2X24"

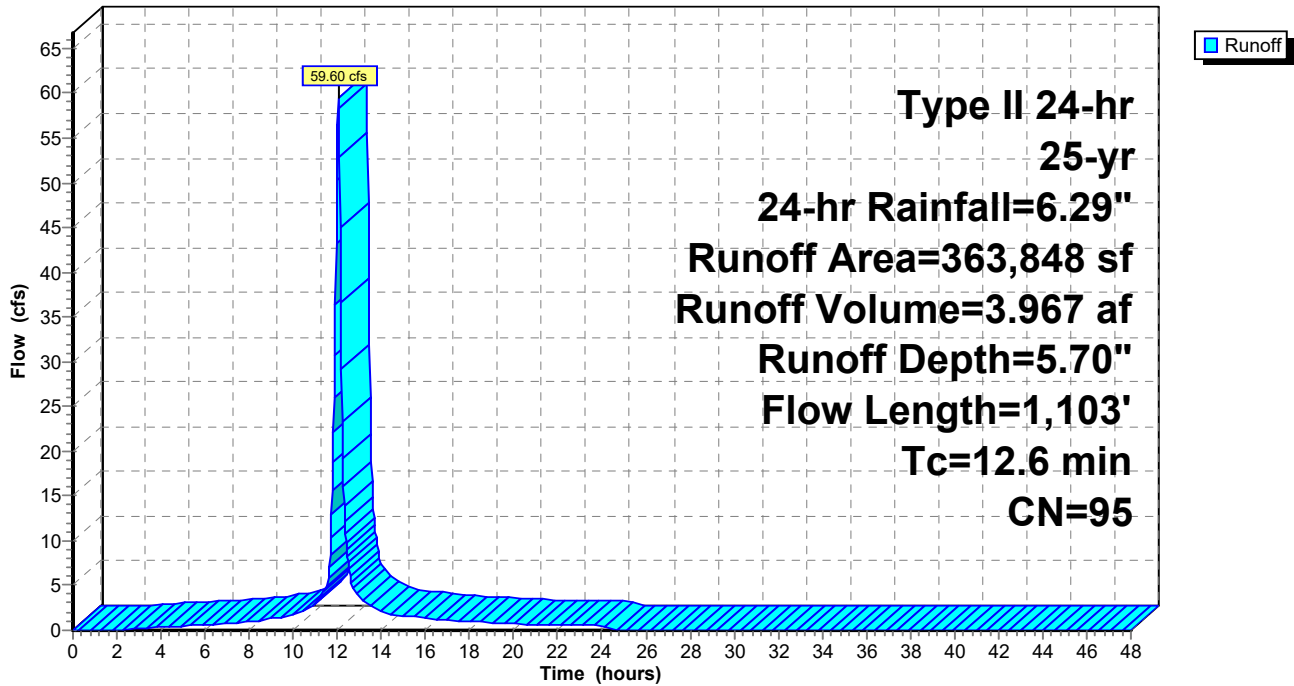
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	359,023	95	ClosureTurf
	4,825	98	Paved parking, HSG D
	363,848	95	Weighted Average
	359,023		98.67% Pervious Area
	4,825		1.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
4.5	435	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	372	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	146	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
12.6	1,103	Total			

Subcatchment DA-16:

Hydrograph



latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-17:

Runoff = 50.09 cfs @ 12.04 hrs, Volume= 3.407 af, Depth= 5.70"
 Routed to Reach ST-17 : 2X24"

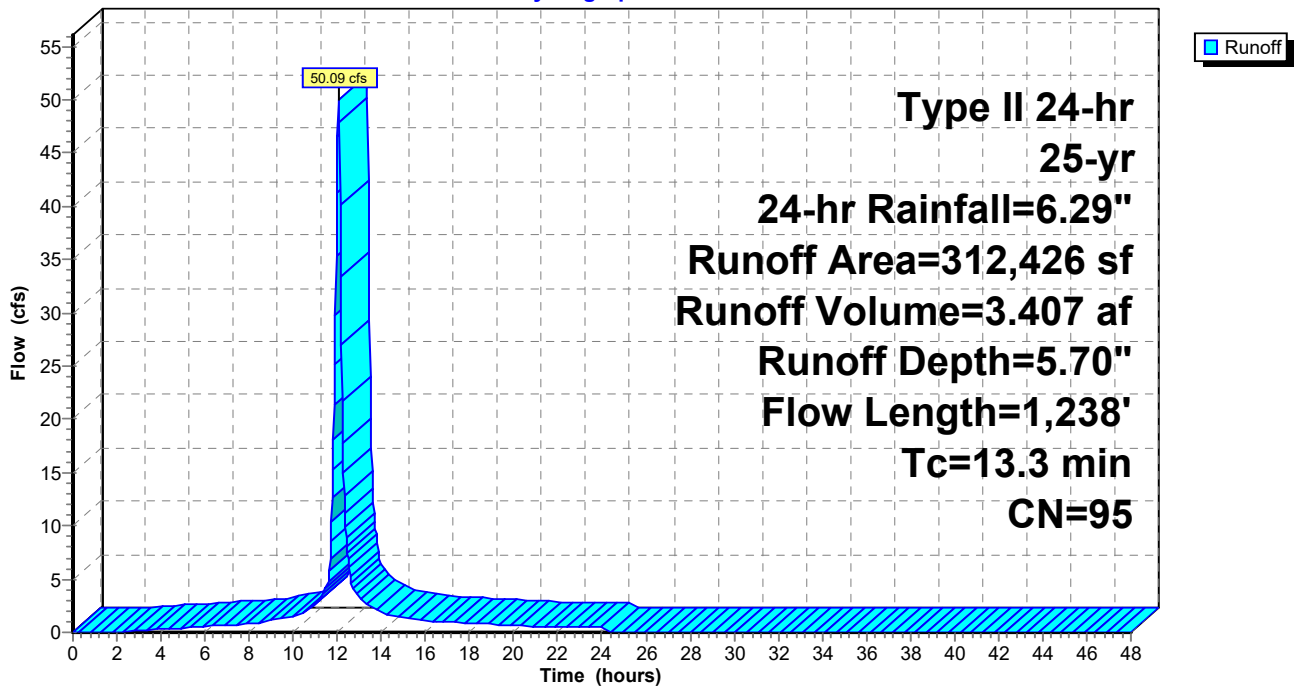
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	306,263	95	ClosureTurf
	6,163	98	Paved parking, HSG D
	312,426	95	Weighted Average
	306,263		98.03% Pervious Area
	6,163		1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
5.0	479	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	373	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	236	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
13.3	1,238	Total			

Subcatchment DA-17:

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-18:

Runoff = 49.85 cfs @ 12.04 hrs, Volume= 3.390 af, Depth= 5.70"
 Routed to Reach ST-18 : 2X24"

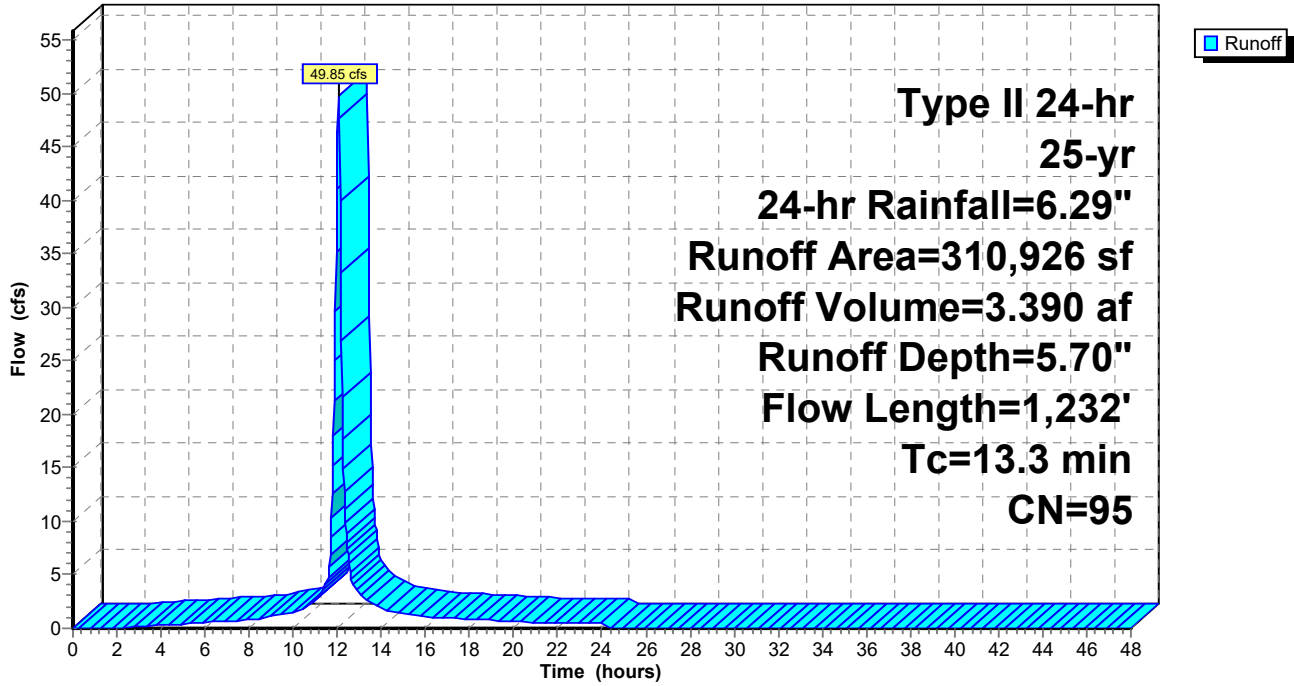
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	305,376	95	ClosureTurf
	5,550	98	Paved parking, HSG D
	310,926	95	Weighted Average
	305,376		98.22% Pervious Area
	5,550		1.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
5.0	483	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	387	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	212	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
13.3	1,232	Total			

Subcatchment DA-18:

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-2:

Runoff = 47.89 cfs @ 12.06 hrs, Volume= 3.364 af, Depth= 5.70"
 Routed to Reach ST-2 : 2X24"

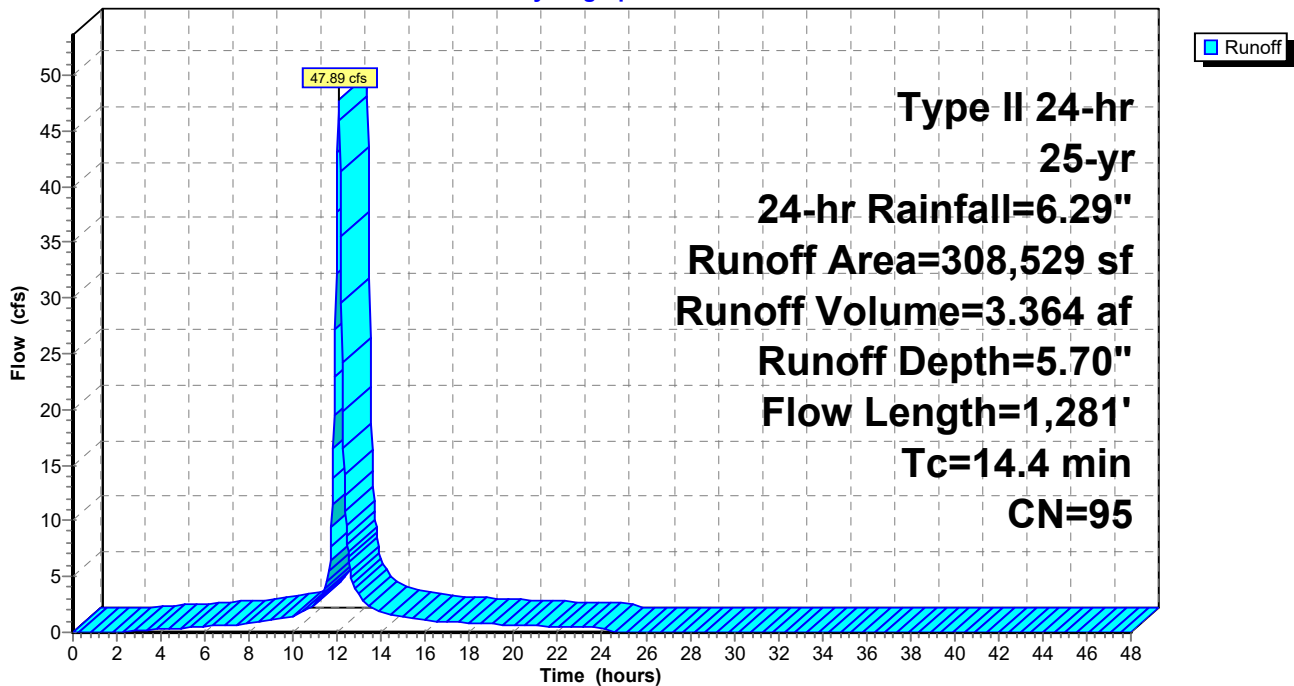
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	302,154	95	ClosureTurf
	6,375	98	Paved parking, HSG D
	308,529	95	Weighted Average
	302,154		97.93% Pervious Area
	6,375		2.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
5.5	536	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	265	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.4	330	0.0050	3.89	40.84	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=1.00' Z= 3.0 & 4.0 '/' Top.W=14.00' n= 0.022 Earth, clean & straight
14.4	1,281	Total			

Subcatchment DA-2:

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-3:

Runoff = 48.86 cfs @ 12.05 hrs, Volume= 3.403 af, Depth= 5.70"
 Routed to Reach ST-3 : 2X24"

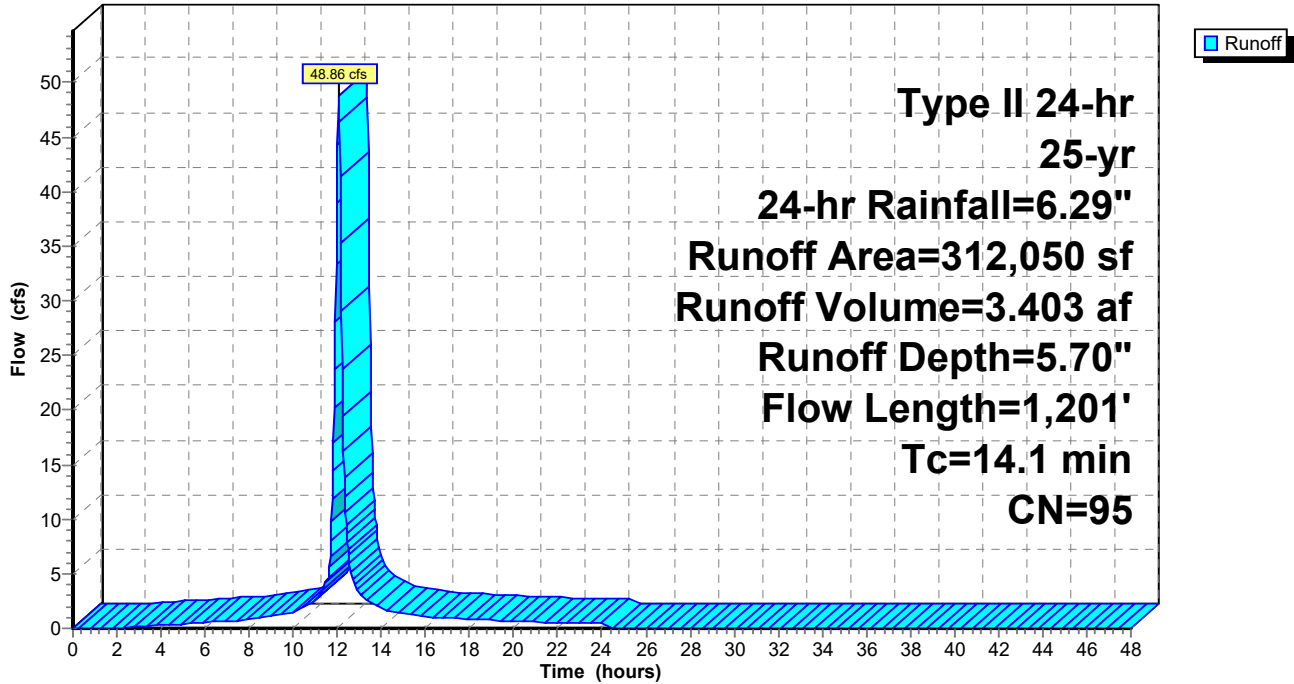
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	304,875	95	ClosureTurf
	7,175	98	Paved parking, HSG D
	312,050	95	Weighted Average
	304,875		97.70% Pervious Area
	7,175		2.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
5.5	536	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	265	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.1	250	0.0050	3.89	40.84	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=1.00' Z= 3.0 & 4.0 '/' Top.W=14.00' n= 0.022
14.1	1,201	Total			

Subcatchment DA-3:

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-4:

Runoff = 47.78 cfs @ 12.06 hrs, Volume= 3.365 af, Depth= 5.70"
 Routed to Reach ST-4 : 2X24"

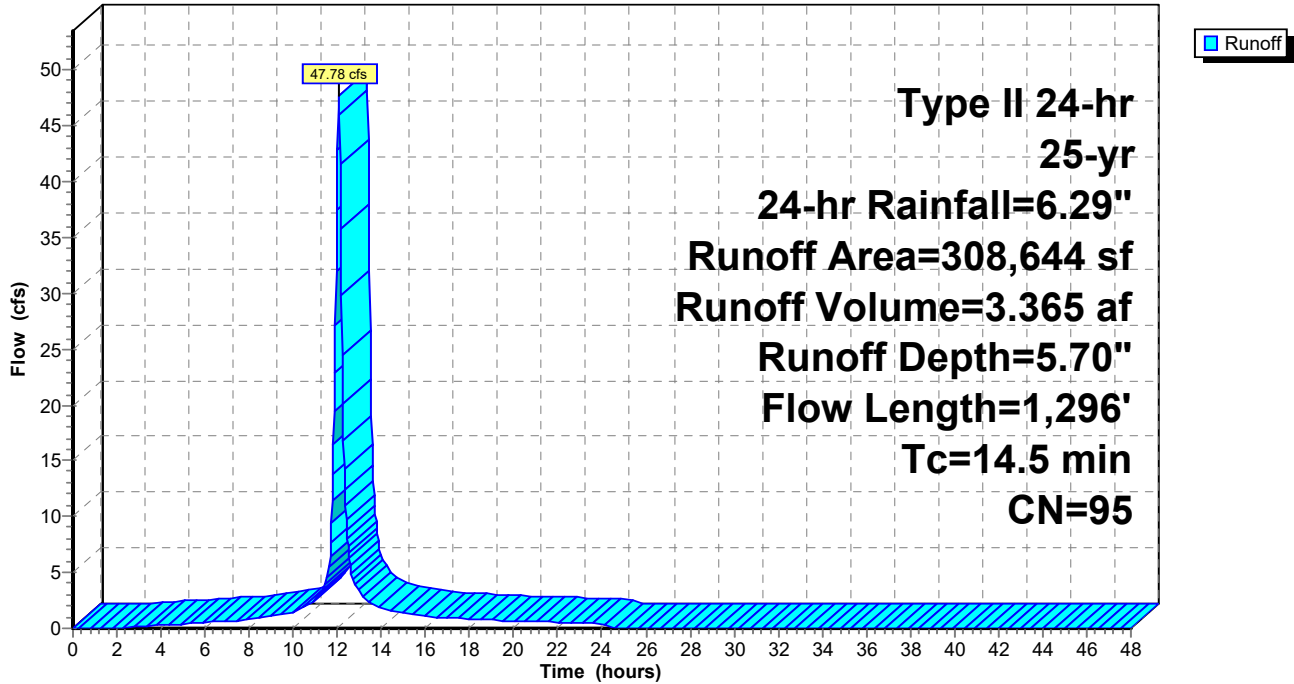
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	301,356	95	ClosureTurf
	7,288	98	Paved parking, HSG D
	308,644	95	Weighted Average
	301,356		97.64% Pervious Area
	7,288		2.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
5.5	536	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	265	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.5	345	0.0050	3.89	40.84	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=1.00' Z= 3.0 & 4.0 '/' Top.W=14.00' n= 0.022
14.5	1,296	Total			

Subcatchment DA-4:

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-5:

Runoff = 43.62 cfs @ 12.06 hrs, Volume= 3.091 af, Depth= 5.70"
 Routed to Reach ST-5 : 2X24"

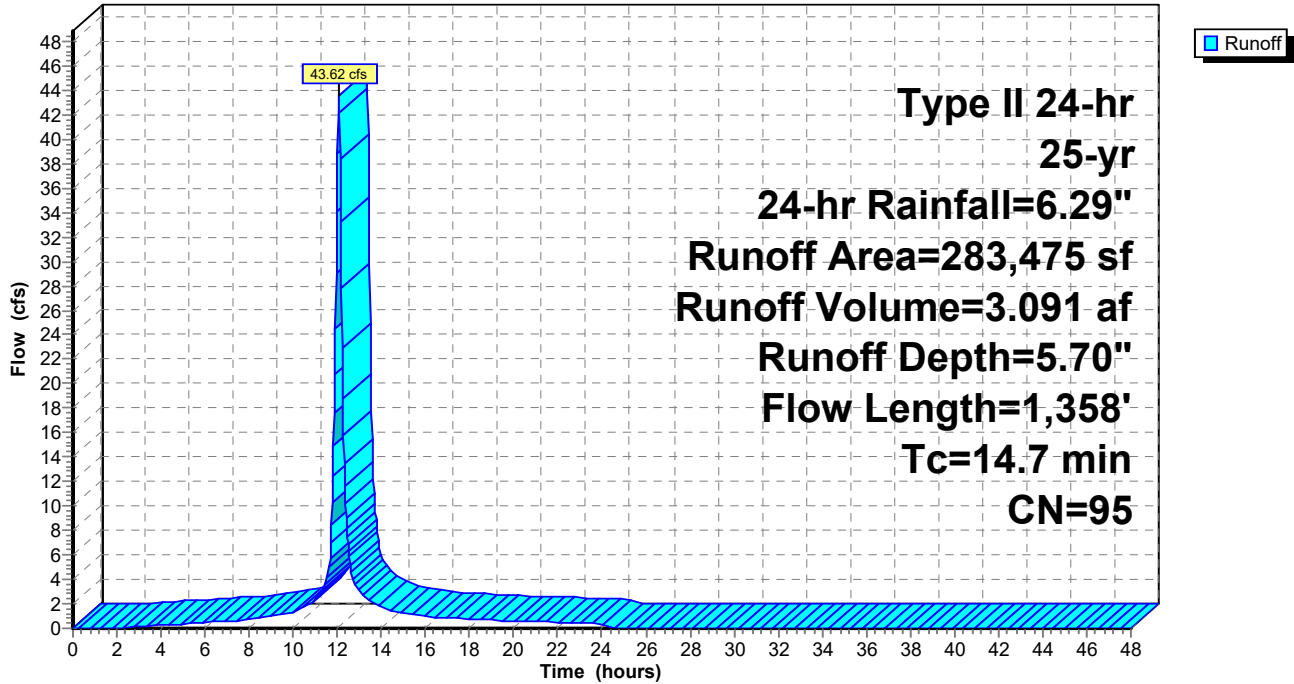
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

Area (sf)	CN	Description
* 277,175	95	ClosureTurf
6,300	98	Paved parking, HSG D
283,475	95	Weighted Average
277,175		97.78% Pervious Area
6,300		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
5.5	536	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	265	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.7	407	0.0050	3.89	40.84	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=1.00' Z= 3.0 & 4.0 '/' Top.W=14.00' n= 0.022
14.7	1,358	Total			

Subcatchment DA-5:

Hydrograph



latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-6:

Runoff = 57.78 cfs @ 12.05 hrs, Volume= 3.952 af, Depth= 5.70"
 Routed to Reach ST-6 : 2X24"

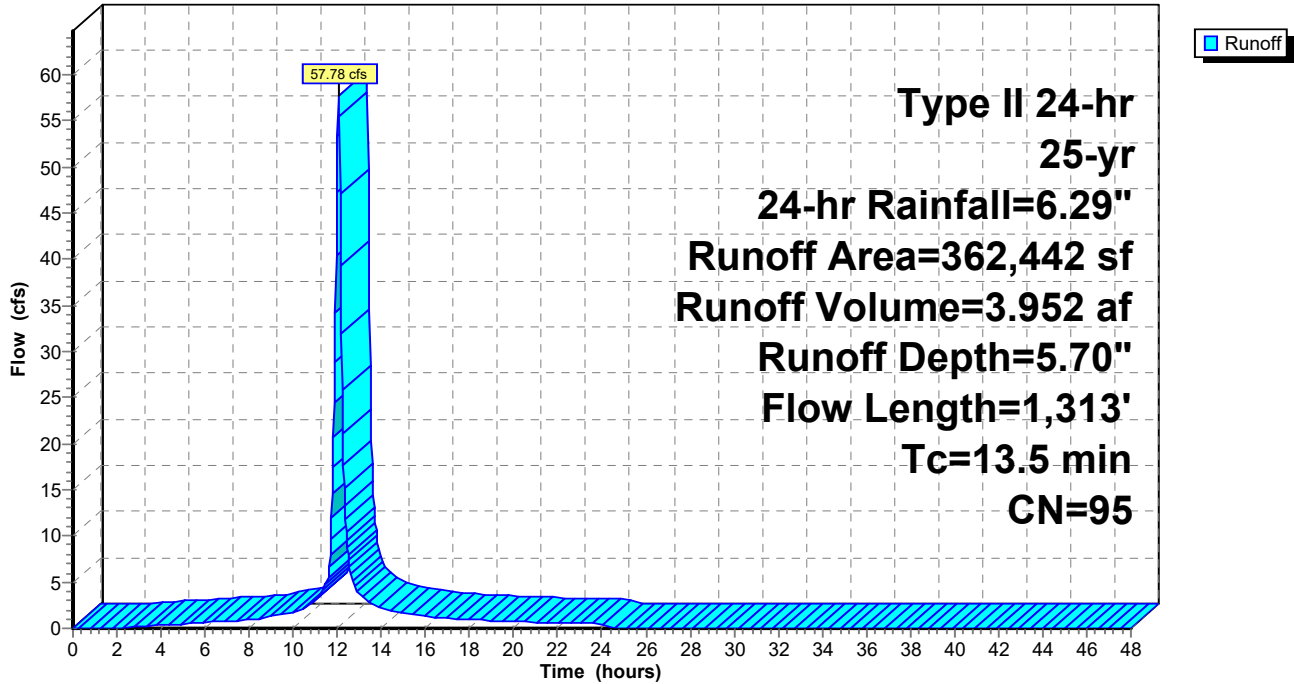
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	355,404	95	ClosureTurf
	7,038	98	Paved parking, HSG D
	362,442	95	Weighted Average
	355,404		98.06% Pervious Area
	7,038		1.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
5.1	496	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	397	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	270	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
13.5	1,313	Total			

Subcatchment DA-6:

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-7:

Runoff = 57.68 cfs @ 12.04 hrs, Volume= 3.875 af, Depth= 5.70"
 Routed to Reach ST-7 : 2X24"

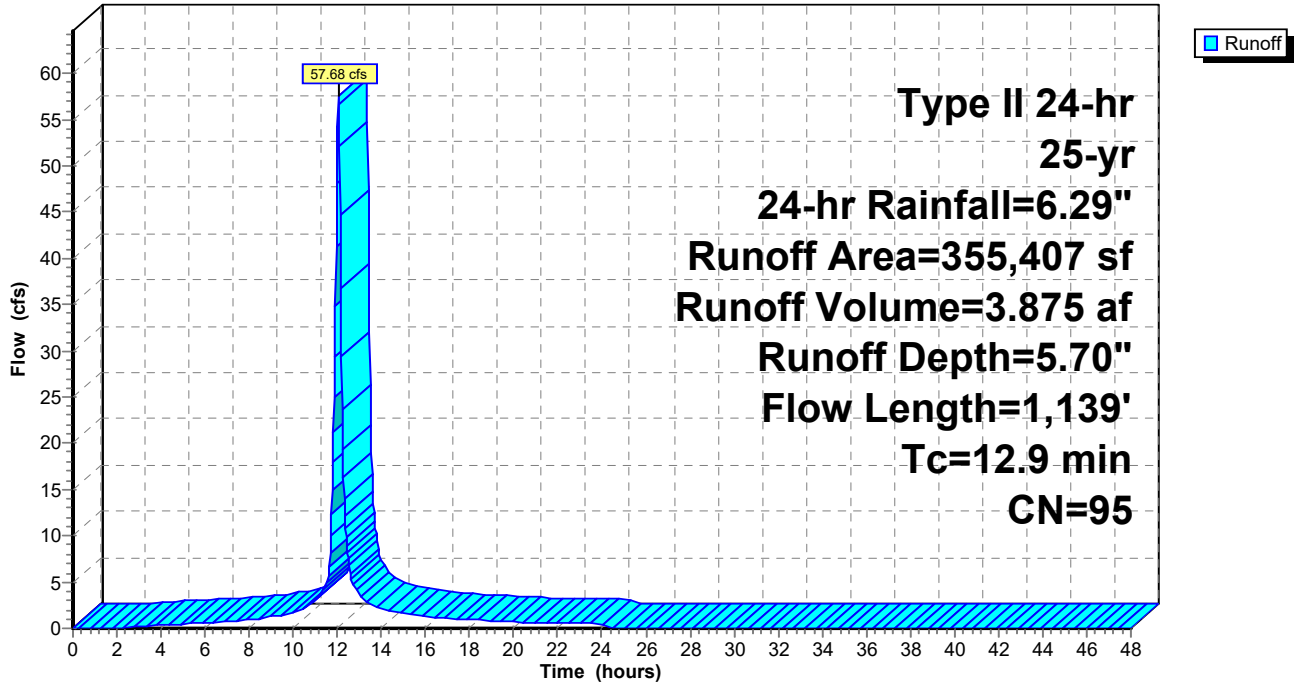
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	351,282	95	ClosureTurf
	4,125	98	Paved parking, HSG D
	355,407	95	Weighted Average
	351,282		98.84% Pervious Area
	4,125		1.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
4.8	462	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	372	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	155	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
12.9	1,139	Total			

Subcatchment DA-7:

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-8:

Runoff = 40.44 cfs @ 12.02 hrs, Volume= 2.593 af, Depth= 5.70"
 Routed to Reach ST-8 : 2X24"

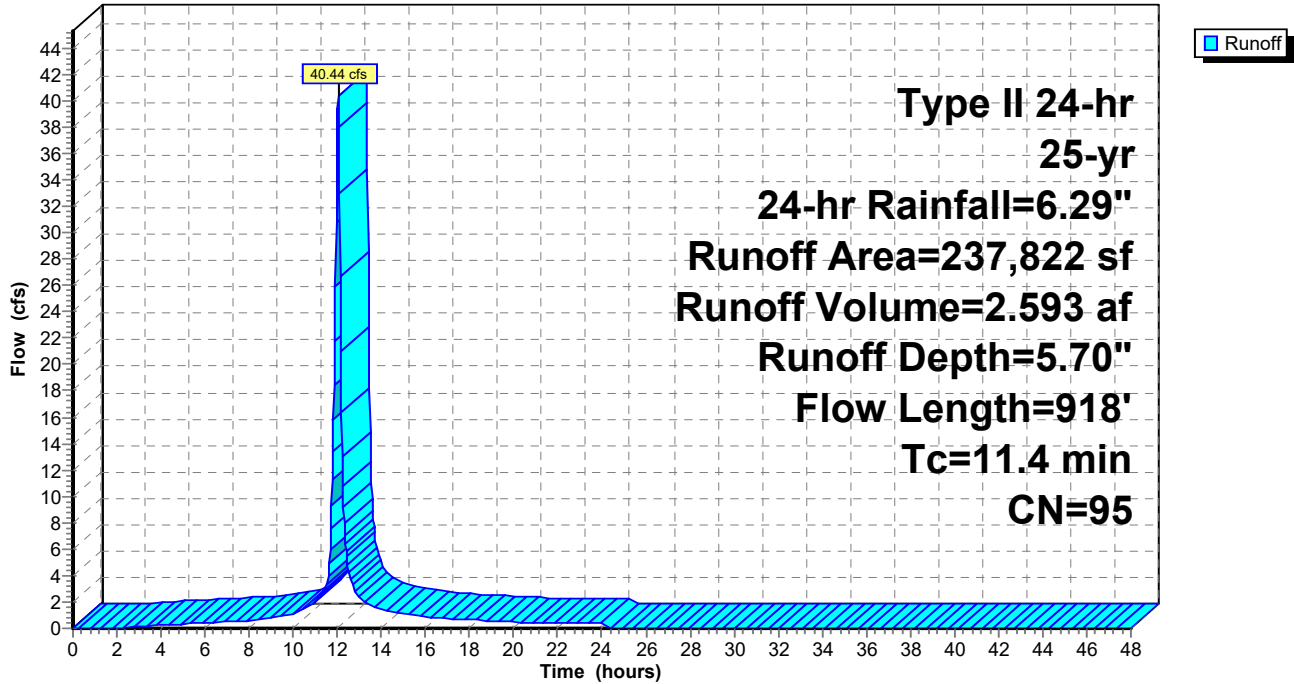
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	236,947	95	ClosureTurf
	875	98	Paved parking, HSG D
	237,822	95	Weighted Average
	236,947		99.63% Pervious Area
	875		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
3.4	326	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.8	372	0.2500	8.05		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	70	0.0050	7.41	455.42	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=3.00' Z= 3.0 & 4.0 '/' Top.W=31.00' n= 0.022
11.4	918	Total			

Subcatchment DA-8:

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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Summary for Subcatchment DA-9:

Runoff = 51.87 cfs @ 12.10 hrs, Volume= 4.070 af, Depth= 5.70"
 Routed to Reach ST-9 : 2X24"

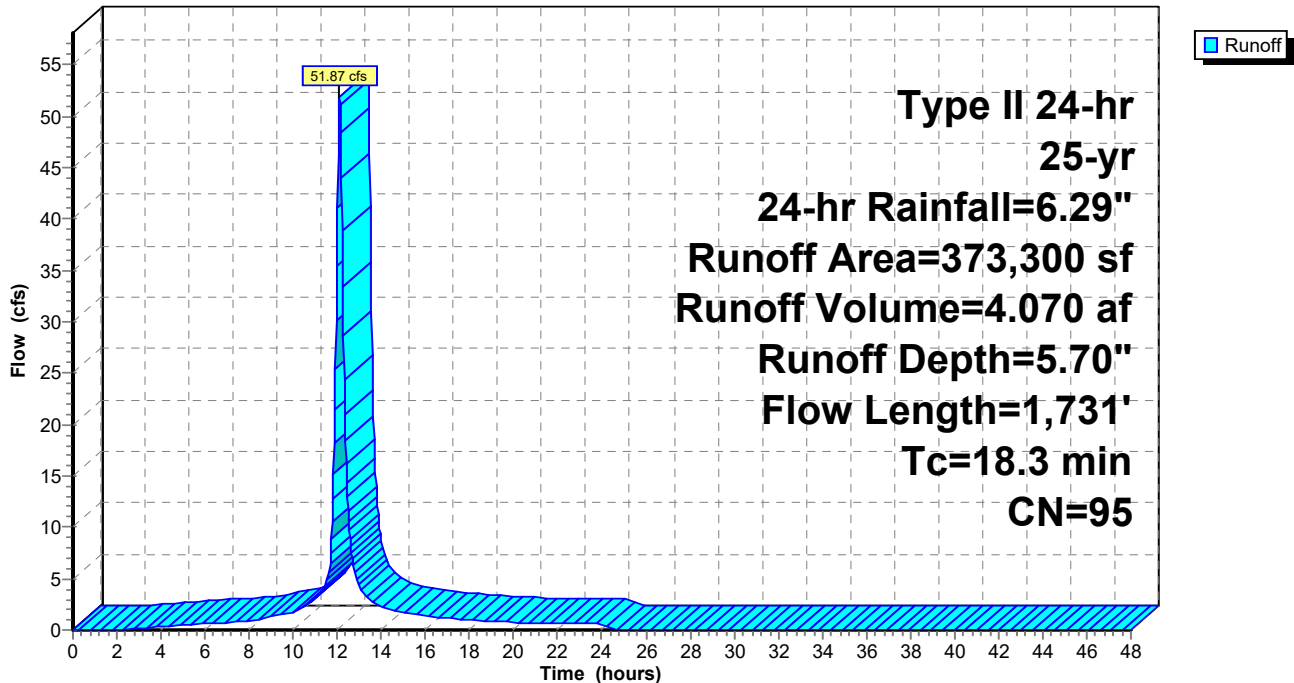
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

	Area (sf)	CN	Description
*	327,807	95	ClosureTurf
	44,680	96	Gravel surface, HSG D
	813	98	Paved parking, HSG D
	373,300	95	Weighted Average
	372,487		99.78% Pervious Area
	813		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.0100	0.36		Sheet Flow, Fallow n= 0.050 P2= 3.61"
4.9	472	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	1,109	0.0050	2.87	63.13	Trap/Vee/Rect Channel Flow, Bot.W=4.00' D=2.00' Z= 3.0 & 4.0 '/' Top.W=18.00' n= 0.041 Riprap, 2-inch
18.3	1,731	Total			

Subcatchment DA-9:

Hydrograph



Iatan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

Prepared by Burns and McDonnell

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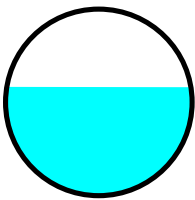
Summary for Reach ST-1: 2X24"

Inflow Area = 7.019 ac, 2.35% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 46.90 cfs @ 12.06 hrs, Volume= 3.334 af
Outflow = 46.90 cfs @ 12.06 hrs, Volume= 3.334 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.35 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.97 fps, Avg. Travel Time= 0.2 min

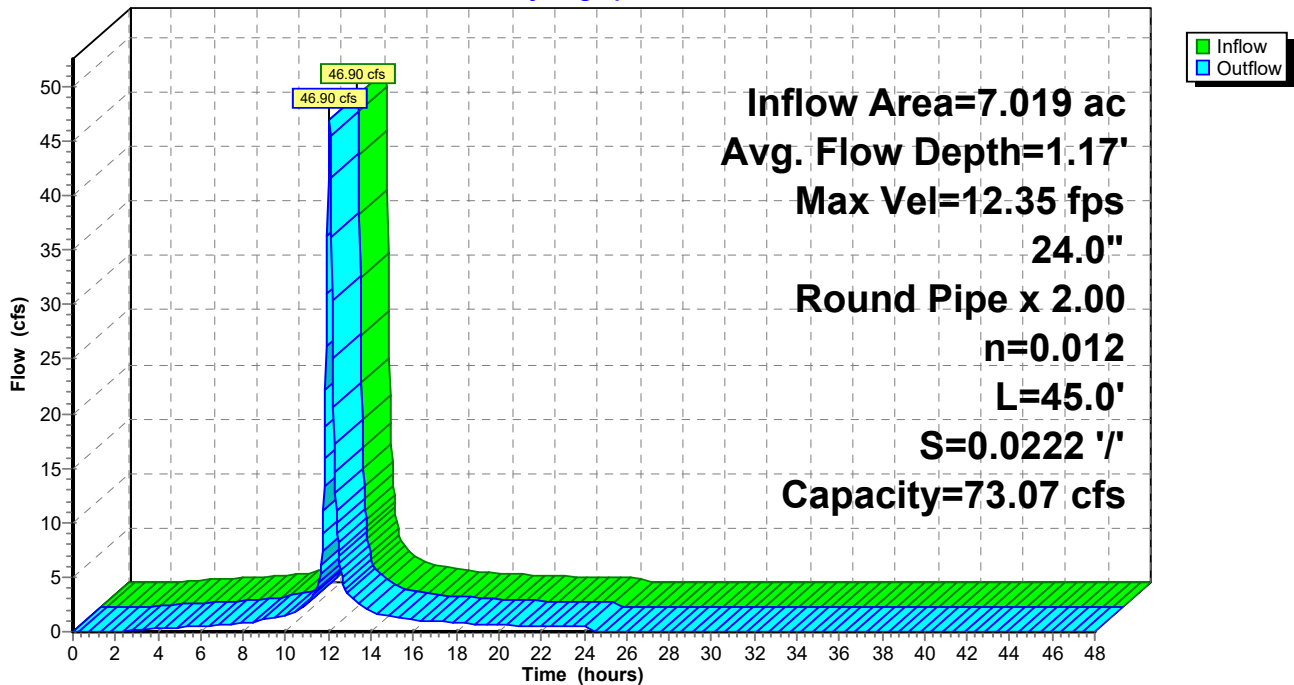
Peak Storage= 171 cf @ 12.06 hrs
Average Depth at Peak Storage= 1.17' , Surface Width= 3.95'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-1: 2X24"

Hydrograph



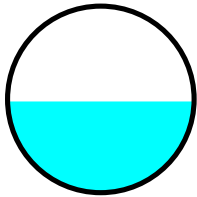
Summary for Reach ST-10: 1X24"

Inflow Area = 2.006 ac, 9.26% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 17.61 cfs @ 11.97 hrs, Volume= 0.953 af
Outflow = 17.61 cfs @ 11.97 hrs, Volume= 0.953 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 11.52 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.40 fps, Avg. Travel Time= 0.2 min

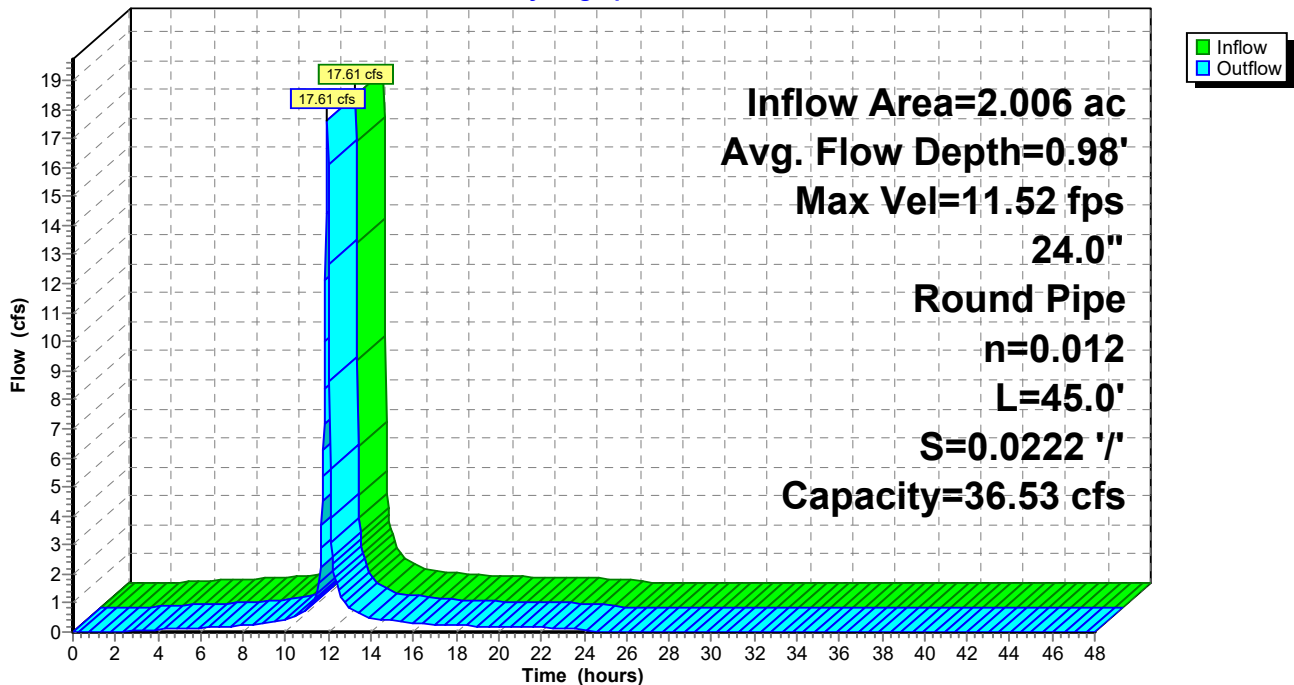
Peak Storage= 69 cf @ 11.97 hrs
Average Depth at Peak Storage= 0.98' , Surface Width= 2.00'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 36.53 cfs

24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-10: 1X24"

Hydrograph



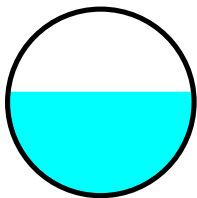
Summary for Reach ST-11: 2X24"

Inflow Area = 4.986 ac, 5.72% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 43.77 cfs @ 11.97 hrs, Volume= 2.368 af
Outflow = 43.76 cfs @ 11.97 hrs, Volume= 2.368 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.15 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.62 fps, Avg. Travel Time= 0.2 min

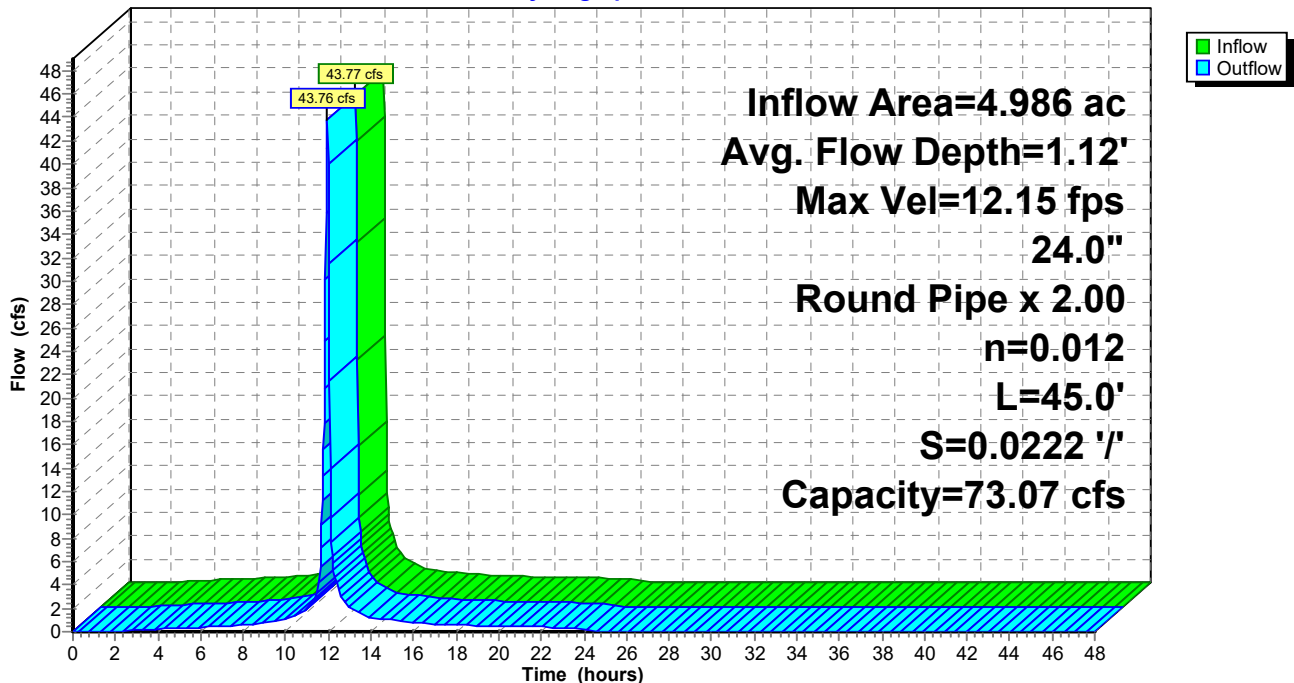
Peak Storage= 162 cf @ 11.97 hrs
Average Depth at Peak Storage= 1.12' , Surface Width= 3.97'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-11: 2X24"

Hydrograph



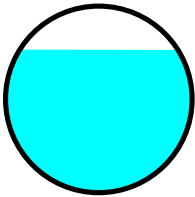
Summary for Reach ST-12: 1X24"

Inflow Area = 4.372 ac, 0.00% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 34.12 cfs @ 12.01 hrs, Volume= 2.077 af
Outflow = 34.11 cfs @ 12.01 hrs, Volume= 2.077 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 13.21 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.27 fps, Avg. Travel Time= 0.2 min

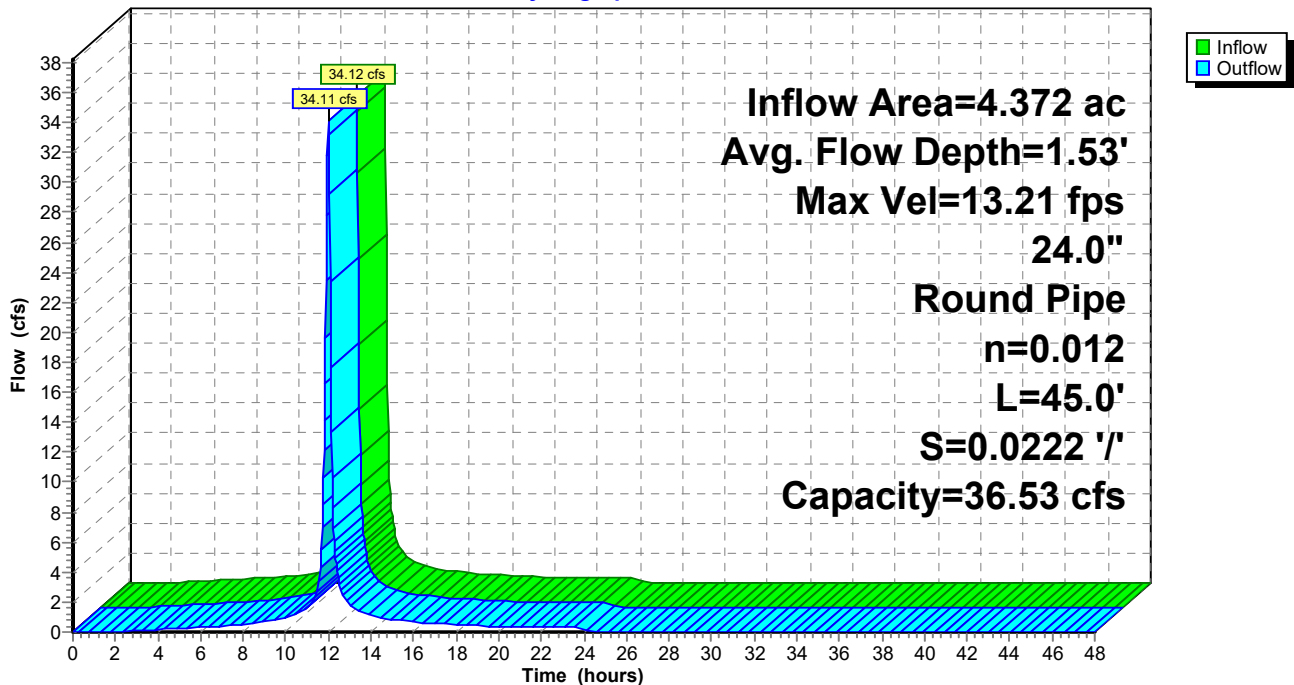
Peak Storage= 116 cf @ 12.01 hrs
Average Depth at Peak Storage= 1.53', Surface Width= 1.69'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 36.53 cfs

24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-12: 1X24"

Hydrograph



latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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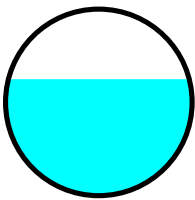
Summary for Reach ST-13: 2X24"

Inflow Area = 7.495 ac, 0.00% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 52.19 cfs @ 12.04 hrs, Volume= 3.560 af
Outflow = 52.20 cfs @ 12.05 hrs, Volume= 3.560 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.62 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.06 fps, Avg. Travel Time= 0.2 min

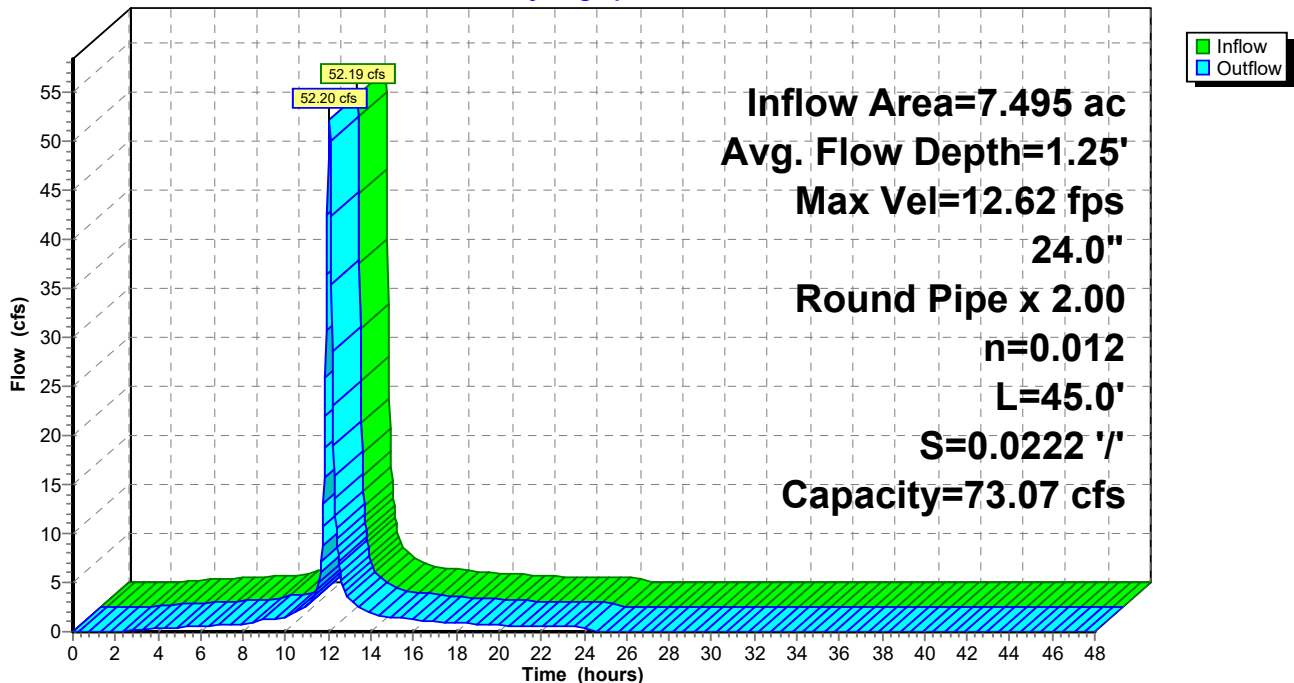
Peak Storage= 186 cf @ 12.05 hrs
Average Depth at Peak Storage= 1.25' , Surface Width= 3.87'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-13: 2X24"

Hydrograph



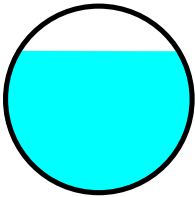
Summary for Reach ST-14: 1X24"

Inflow Area = 4.499 ac, 3.16% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 33.75 cfs @ 12.02 hrs, Volume= 2.137 af
Outflow = 33.75 cfs @ 12.02 hrs, Volume= 2.137 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 13.19 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.29 fps, Avg. Travel Time= 0.2 min

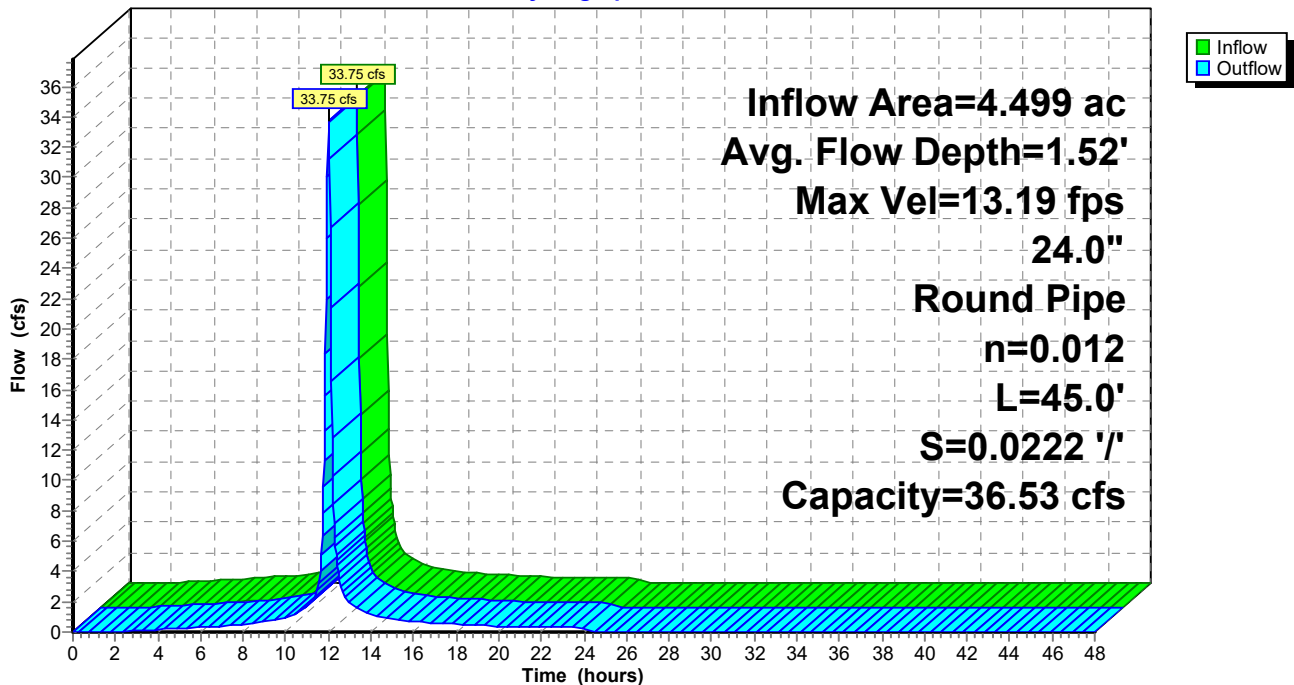
Peak Storage= 115 cf @ 12.02 hrs
Average Depth at Peak Storage= 1.52', Surface Width= 1.71'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 36.53 cfs

24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-14: 1X24"

Hydrograph



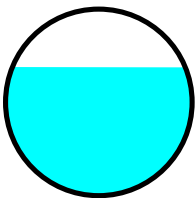
Summary for Reach ST-15: 2X24"

Inflow Area = 8.169 ac, 1.37% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 59.76 cfs @ 12.03 hrs, Volume= 3.880 af
Outflow = 59.76 cfs @ 12.03 hrs, Volume= 3.880 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.97 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.17 fps, Avg. Travel Time= 0.2 min

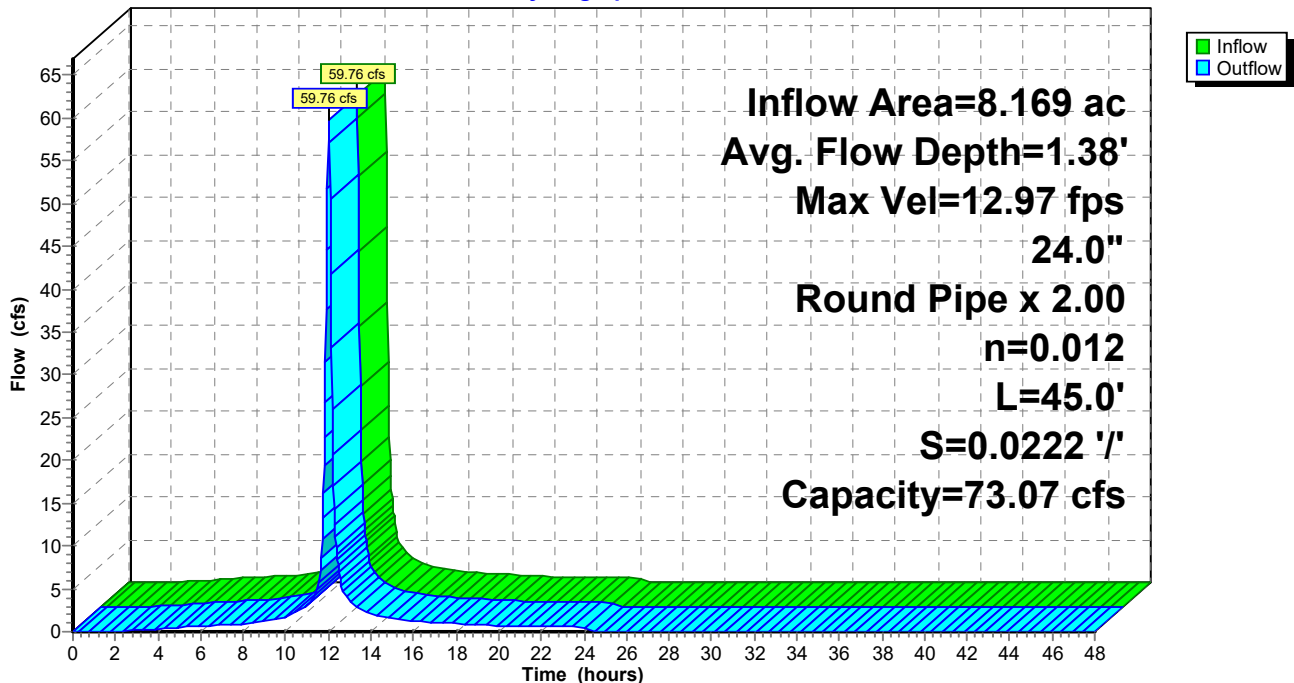
Peak Storage= 207 cf @ 12.03 hrs
Average Depth at Peak Storage= 1.38' , Surface Width= 3.71'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-15: 2X24"

Hydrograph



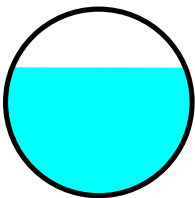
Summary for Reach ST-16: 2X24"

Inflow Area = 8.353 ac, 1.33% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 59.60 cfs @ 12.04 hrs, Volume= 3.967 af
Outflow = 59.60 cfs @ 12.04 hrs, Volume= 3.967 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.96 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.19 fps, Avg. Travel Time= 0.2 min

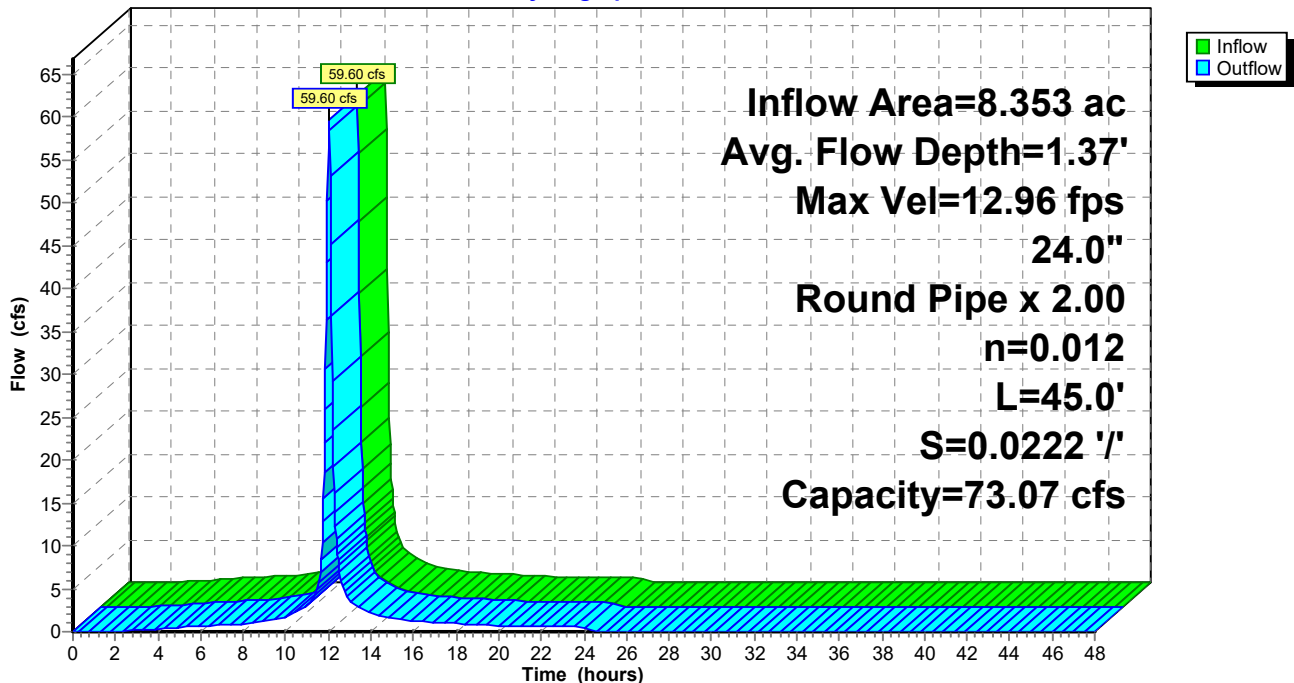
Peak Storage= 207 cf @ 12.04 hrs
Average Depth at Peak Storage= 1.37' , Surface Width= 3.71'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-16: 2X24"

Hydrograph



latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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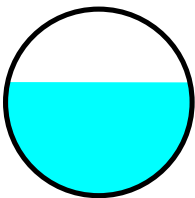
Summary for Reach ST-17: 2X24"

Inflow Area = 7.172 ac, 1.97% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 50.09 cfs @ 12.04 hrs, Volume= 3.407 af
Outflow = 50.09 cfs @ 12.04 hrs, Volume= 3.407 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.50 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.00 fps, Avg. Travel Time= 0.2 min

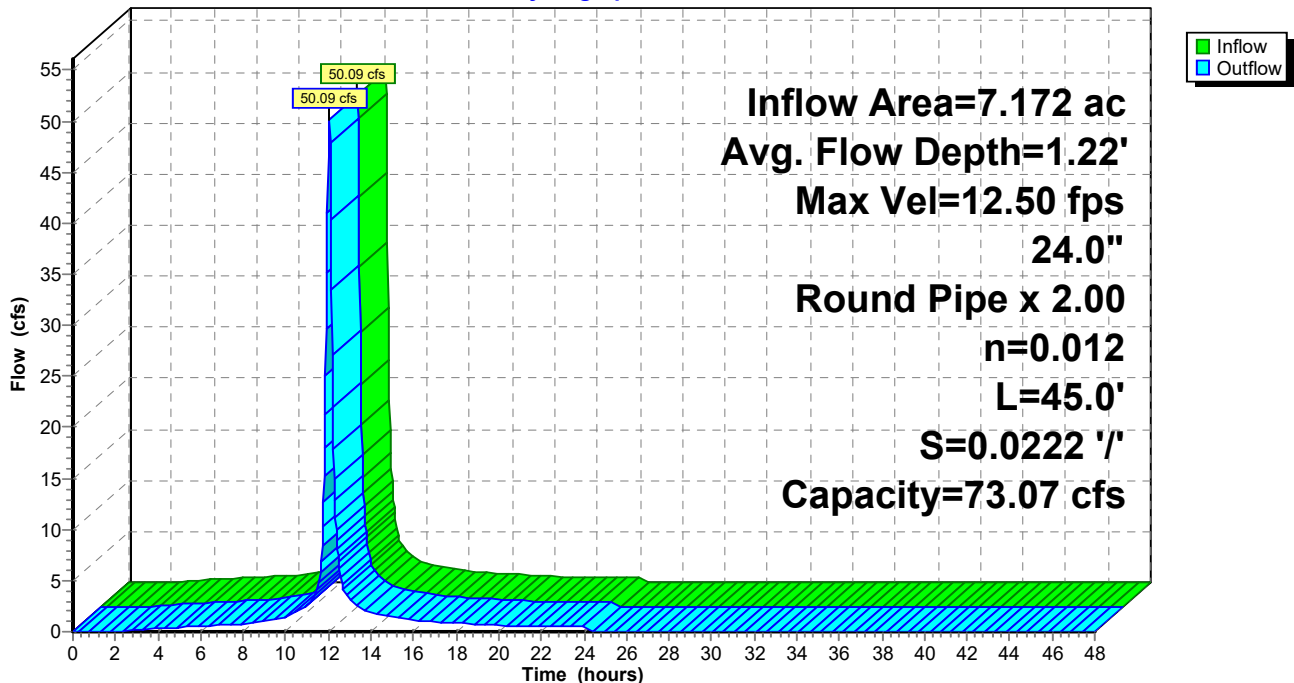
Peak Storage= 180 cf @ 12.04 hrs
Average Depth at Peak Storage= 1.22' , Surface Width= 3.91'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-17: 2X24"

Hydrograph



Iatan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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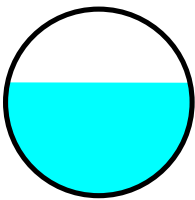
Summary for Reach ST-18: 2X24"

Inflow Area = 7.138 ac, 1.78% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 49.85 cfs @ 12.04 hrs, Volume= 3.390 af
Outflow = 49.85 cfs @ 12.04 hrs, Volume= 3.390 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.49 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.00 fps, Avg. Travel Time= 0.2 min

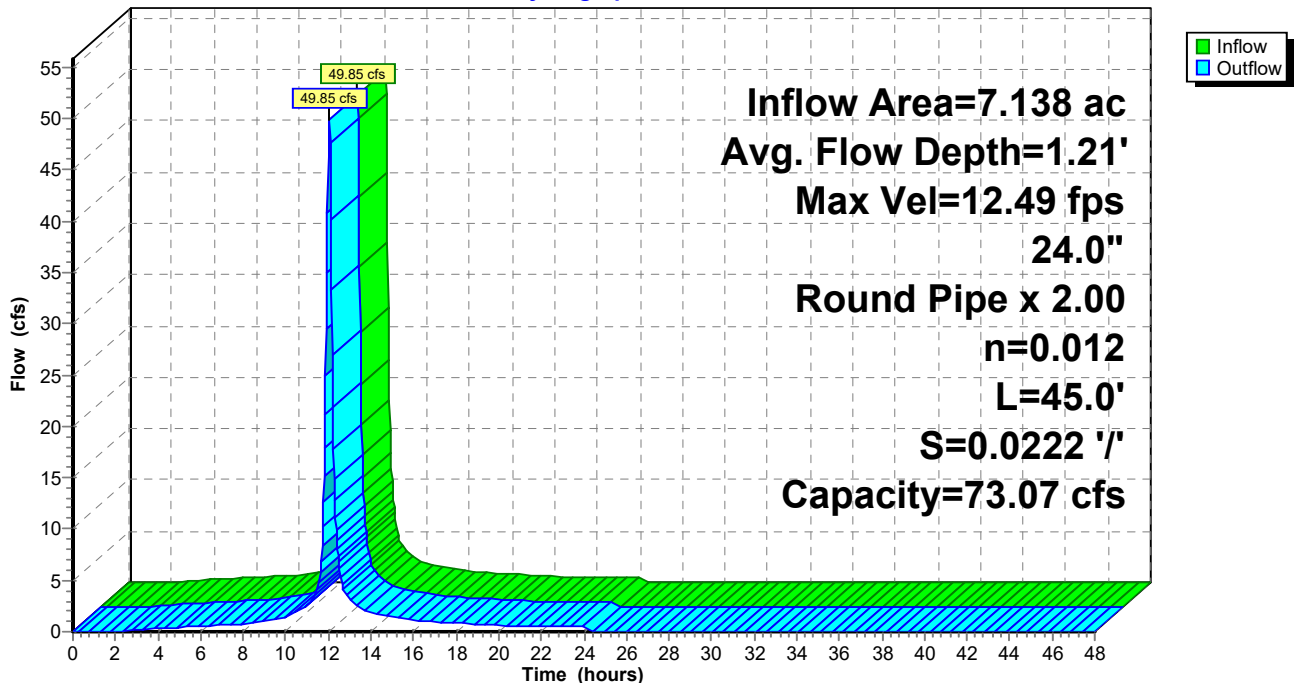
Peak Storage= 179 cf @ 12.04 hrs
Average Depth at Peak Storage= 1.21' , Surface Width= 3.91'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-18: 2X24"

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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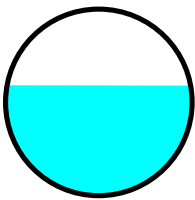
Summary for Reach ST-2: 2X24"

Inflow Area = 7.083 ac, 2.07% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
 Inflow = 47.89 cfs @ 12.06 hrs, Volume= 3.364 af
 Outflow = 47.88 cfs @ 12.06 hrs, Volume= 3.364 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Max. Velocity= 12.40 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 3.98 fps, Avg. Travel Time= 0.2 min

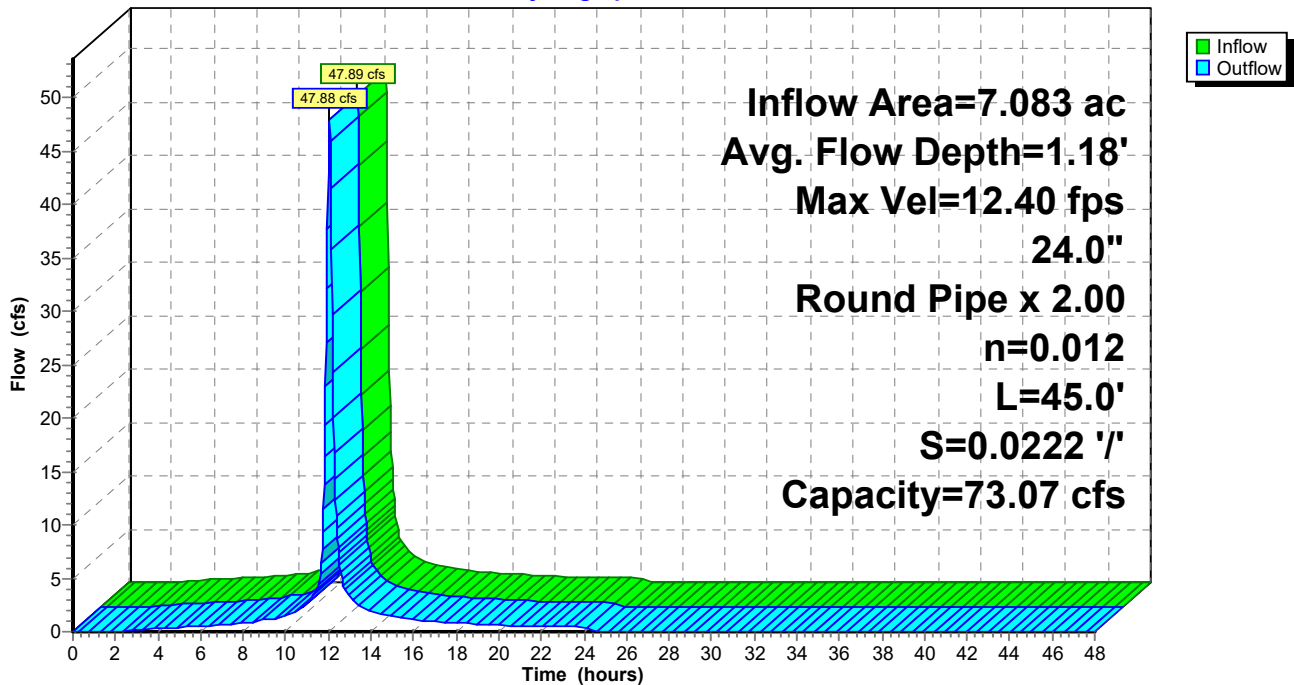
Peak Storage= 174 cf @ 12.06 hrs
 Average Depth at Peak Storage= 1.18' , Surface Width= 3.93'
 Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
 24.0" Round Pipe
 n= 0.012 Corrugated PP, smooth interior
 Length= 45.0' Slope= 0.0222 '/'
 Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-2: 2X24"

Hydrograph



Iatan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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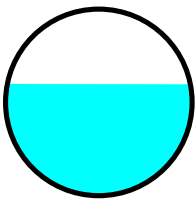
Summary for Reach ST-3: 2X24"

Inflow Area = 7.164 ac, 2.30% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
 Inflow = 48.86 cfs @ 12.05 hrs, Volume= 3.403 af
 Outflow = 48.86 cfs @ 12.05 hrs, Volume= 3.403 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Max. Velocity= 12.45 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 4.00 fps, Avg. Travel Time= 0.2 min

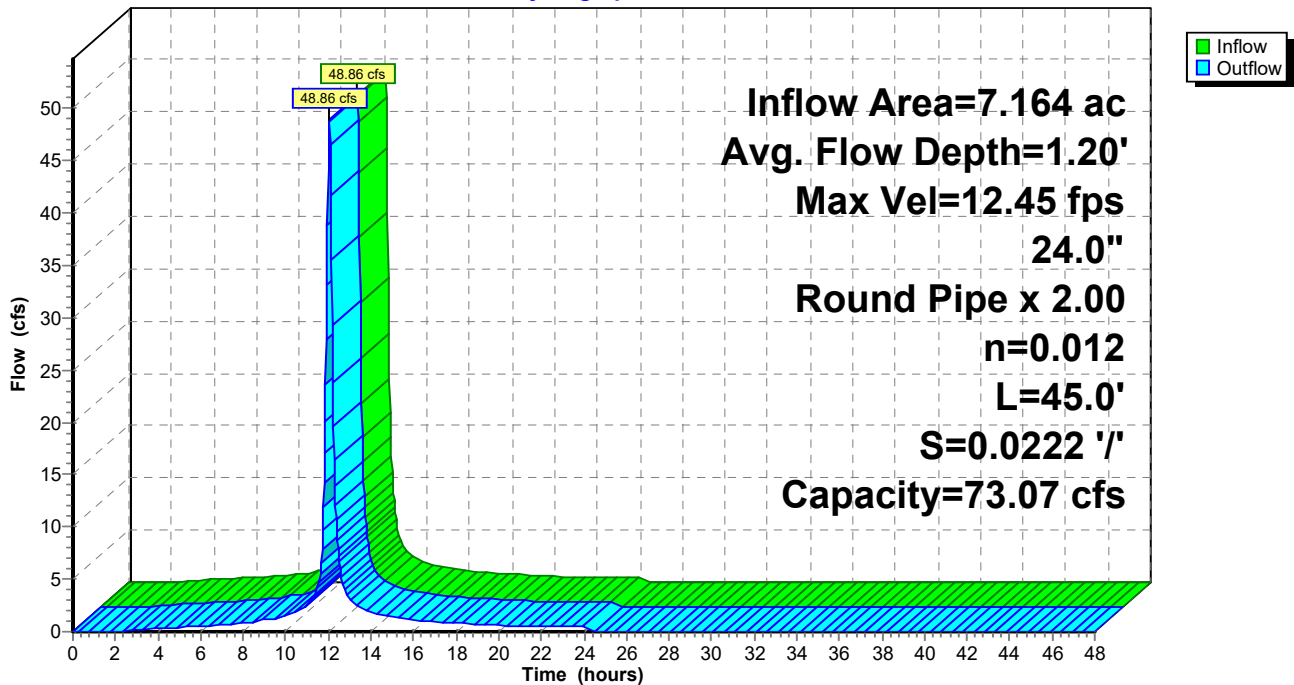
Peak Storage= 176 cf @ 12.05 hrs
 Average Depth at Peak Storage= 1.20' , Surface Width= 3.92'
 Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
 24.0" Round Pipe
 n= 0.012 Corrugated PP, smooth interior
 Length= 45.0' Slope= 0.0222 '/'
 Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-3: 2X24"

Hydrograph



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Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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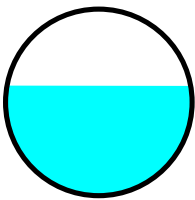
Summary for Reach ST-4: 2X24"

Inflow Area = 7.085 ac, 2.36% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
 Inflow = 47.78 cfs @ 12.06 hrs, Volume= 3.365 af
 Outflow = 47.78 cfs @ 12.06 hrs, Volume= 3.365 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
 Max. Velocity= 12.40 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 3.98 fps, Avg. Travel Time= 0.2 min

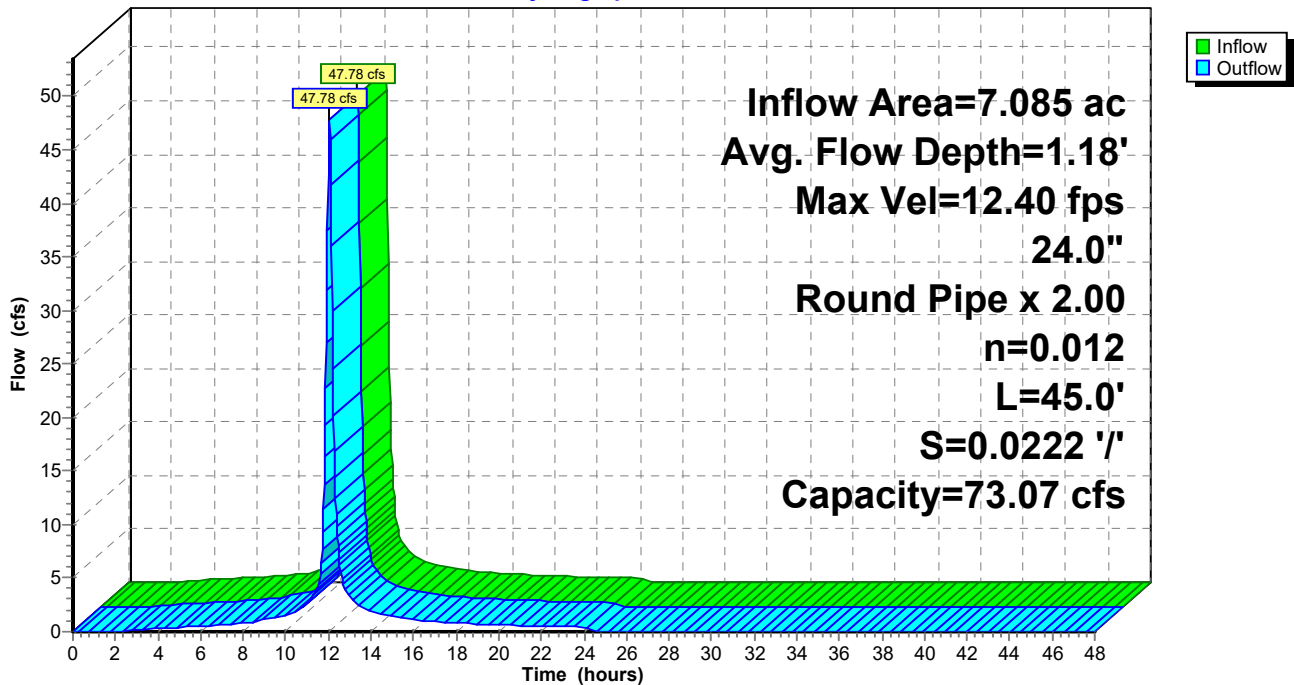
Peak Storage= 173 cf @ 12.06 hrs
 Average Depth at Peak Storage= 1.18' , Surface Width= 3.94'
 Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
 24.0" Round Pipe
 n= 0.012 Corrugated PP, smooth interior
 Length= 45.0' Slope= 0.0222 '/'
 Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-4: 2X24"

Hydrograph



Iatan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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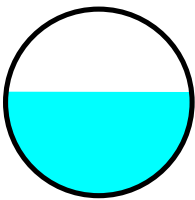
Summary for Reach ST-5: 2X24"

Inflow Area = 6.508 ac, 2.22% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 43.62 cfs @ 12.06 hrs, Volume= 3.091 af
Outflow = 43.62 cfs @ 12.06 hrs, Volume= 3.091 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.14 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.88 fps, Avg. Travel Time= 0.2 min

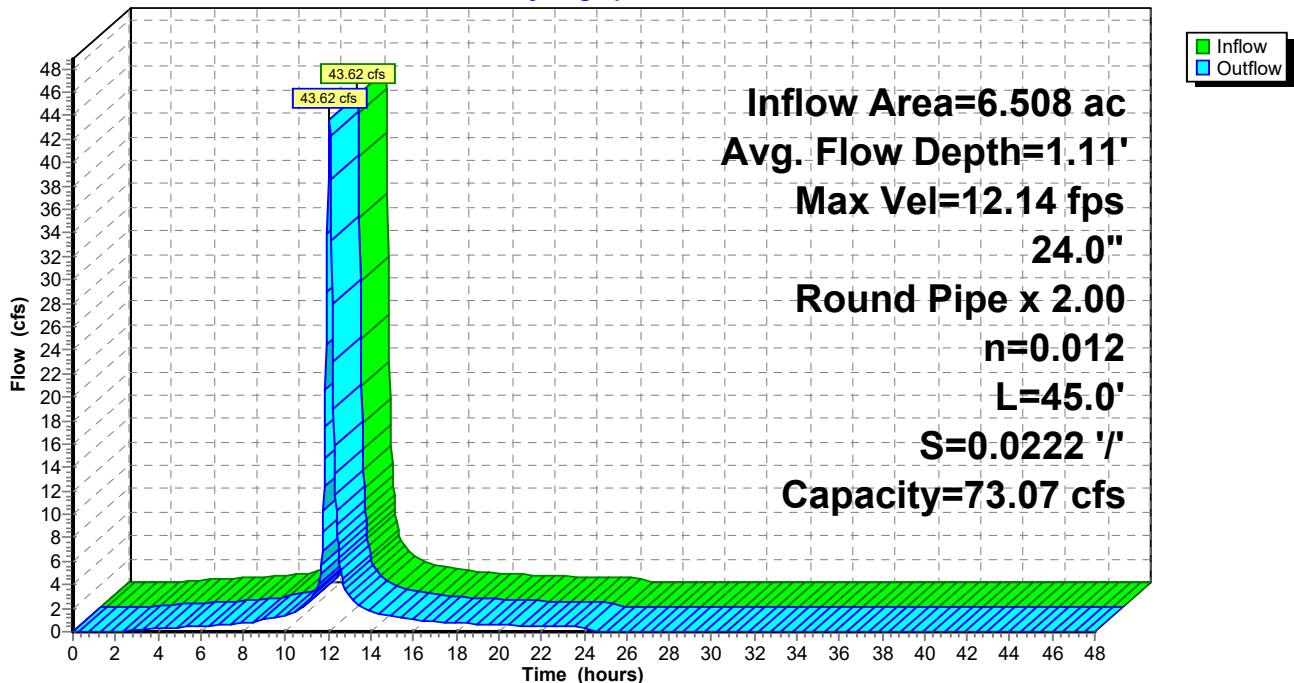
Peak Storage= 162 cf @ 12.06 hrs
Average Depth at Peak Storage= 1.11' , Surface Width= 3.97'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-5: 2X24"

Hydrograph



latan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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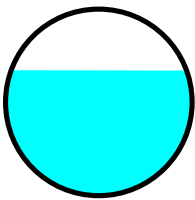
Summary for Reach ST-6: 2X24"

Inflow Area = 8.321 ac, 1.94% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 57.78 cfs @ 12.05 hrs, Volume= 3.952 af
Outflow = 57.78 cfs @ 12.05 hrs, Volume= 3.952 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.88 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.18 fps, Avg. Travel Time= 0.2 min

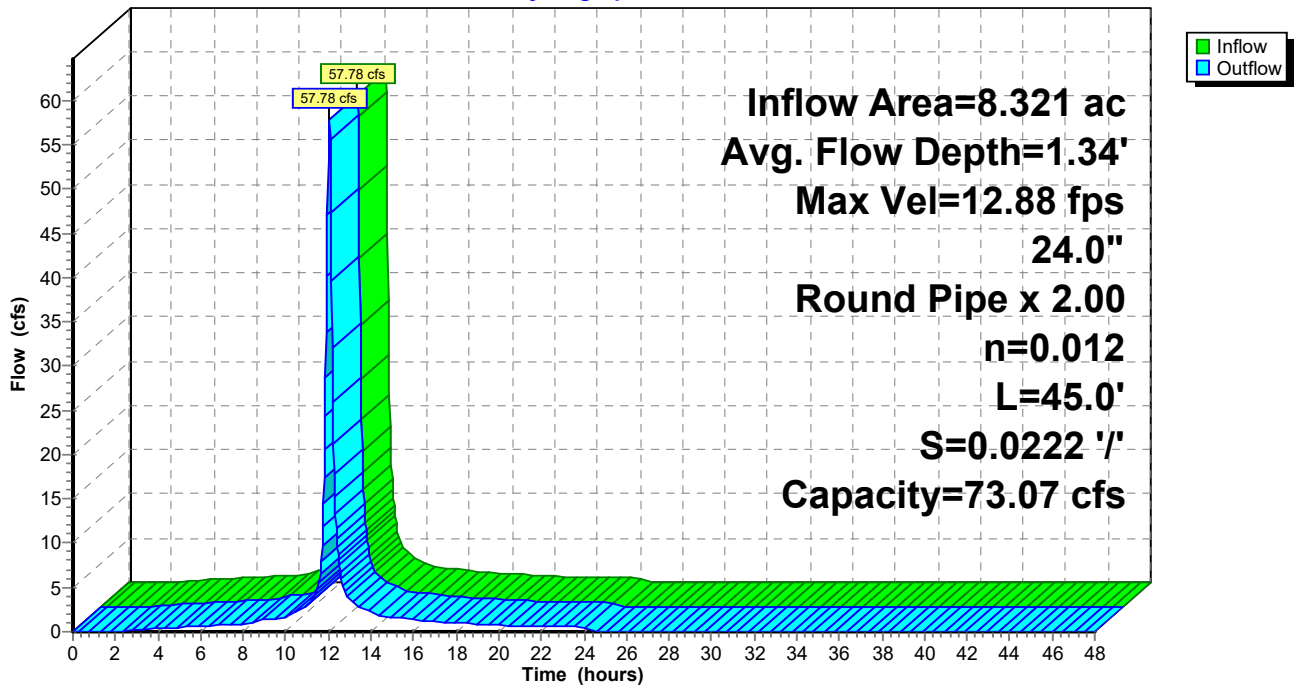
Peak Storage= 202 cf @ 12.05 hrs
Average Depth at Peak Storage= 1.34' , Surface Width= 3.76'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-6: 2X24"

Hydrograph



Iatan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

Prepared by Burns and McDonnell

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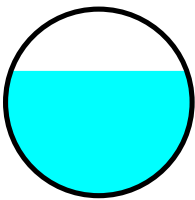
Summary for Reach ST-7: 2X24"

Inflow Area = 8.159 ac, 1.16% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 57.68 cfs @ 12.04 hrs, Volume= 3.875 af
Outflow = 57.67 cfs @ 12.04 hrs, Volume= 3.875 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.88 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.16 fps, Avg. Travel Time= 0.2 min

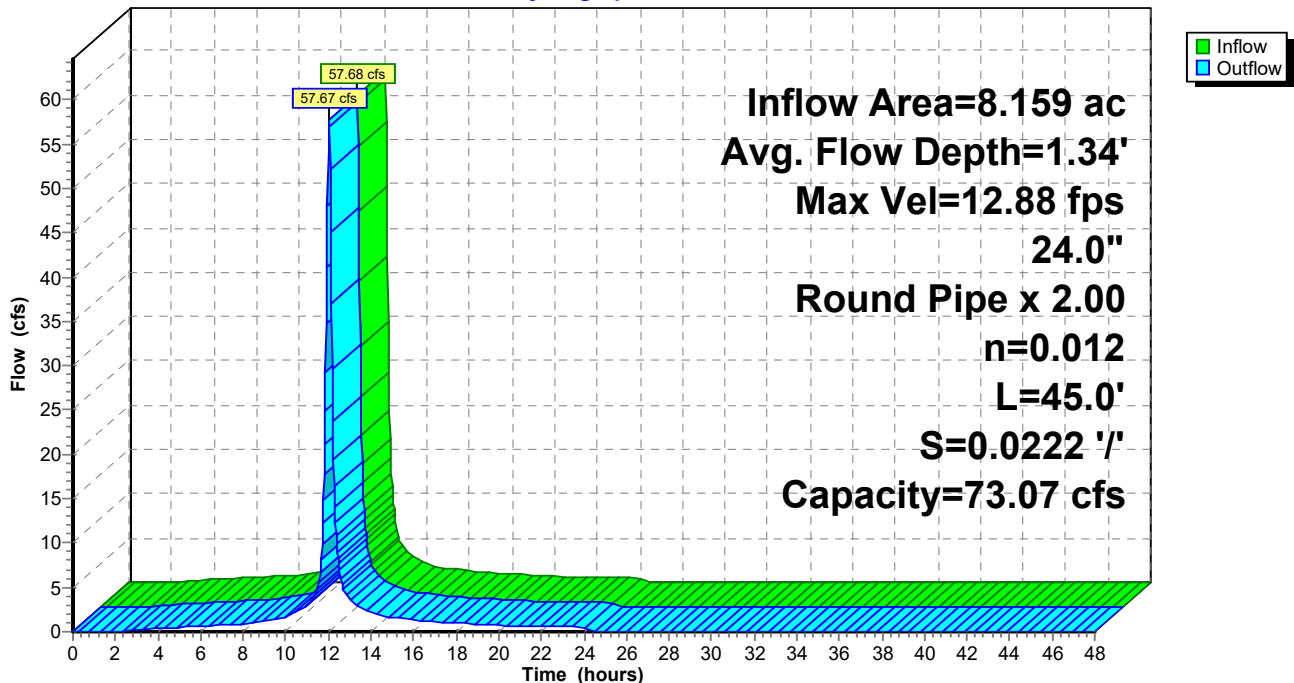
Peak Storage= 201 cf @ 12.04 hrs
Average Depth at Peak Storage= 1.34' , Surface Width= 3.76'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-7: 2X24"

Hydrograph



Iatan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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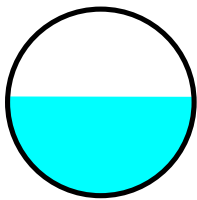
Summary for Reach ST-8: 2X24"

Inflow Area = 5.460 ac, 0.37% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 40.44 cfs @ 12.02 hrs, Volume= 2.593 af
Outflow = 40.44 cfs @ 12.02 hrs, Volume= 2.593 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 11.92 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.70 fps, Avg. Travel Time= 0.2 min

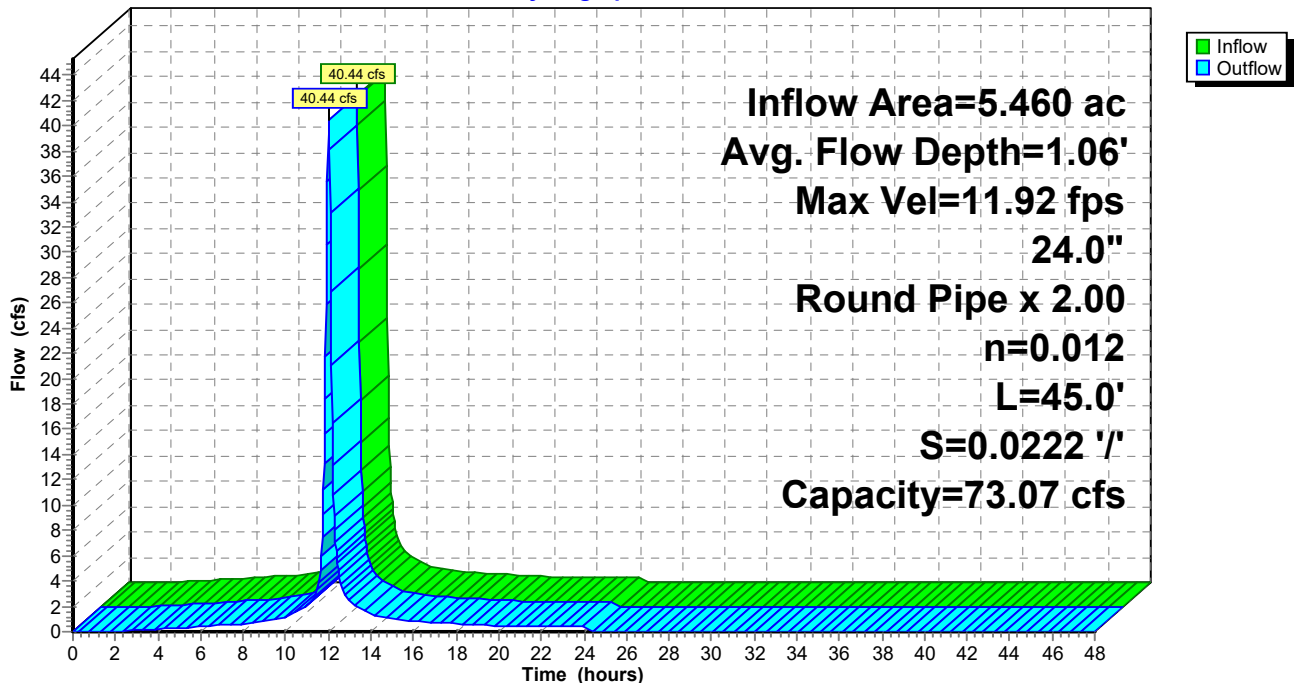
Peak Storage= 153 cf @ 12.02 hrs
Average Depth at Peak Storage= 1.06' , Surface Width= 3.99'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-8: 2X24"

Hydrograph



Iatan landfill Revised Stormwater calculation

Type II 24-hr 25-yr, 24-hr Rainfall=6.29"

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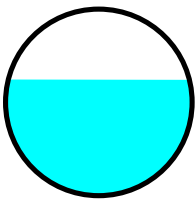
Summary for Reach ST-9: 2X24"

Inflow Area = 8.570 ac, 0.22% Impervious, Inflow Depth = 5.70" for 25-yr, 24-hr event
Inflow = 51.87 cfs @ 12.10 hrs, Volume= 4.070 af
Outflow = 51.87 cfs @ 12.10 hrs, Volume= 4.070 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Max. Velocity= 12.62 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.20 fps, Avg. Travel Time= 0.2 min

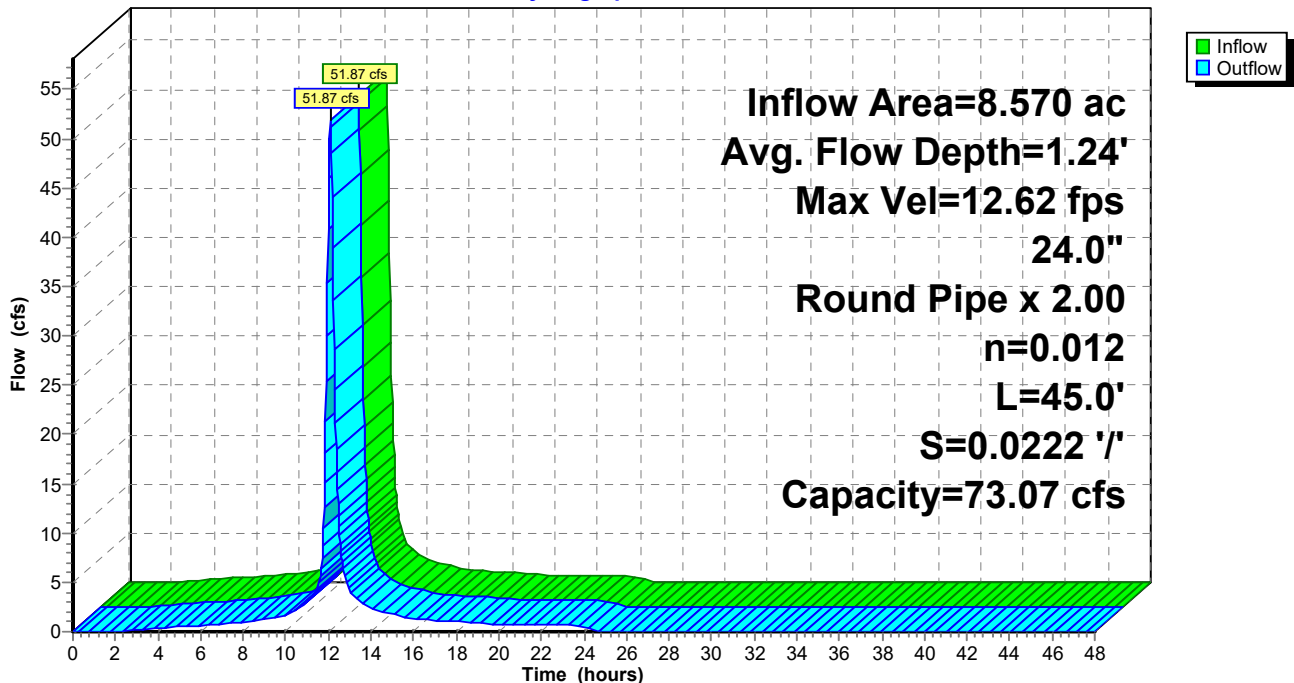
Peak Storage= 185 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.24' , Surface Width= 3.88'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 73.07 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 784.00', Outlet Invert= 783.00'



Reach ST-9: 2X24"

Hydrograph





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