STORMWATER MANAGEMENT, GROUNDWATER RECHARGE AND WATER QUALITY ANALYSIS

For

RPM Development, LLC

Proposed Residential Development

2495 Brunswick Pike (AKA Alt. Route 1)
Block 2001, Lots 3, 60-66 & 68
Township of Lawrence
Mercer County, New Jersey

Prepared by:

DYNAMIC ENGINEERING

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APPENDIX

I. SITE DESCRIPTION

The project area is comprised of Block 2001, Lots 3, 60-66 & 68 in the Township of Lawrence, Mercer County, New Jersey. The property is located at 2495 Brunswick Pike (AKA Alt. Route 1). The proposed development consists of redeveloping the northern portion of the site which is currently mostly open space in order to construct a residential development consisting of three (3) multi-family three-story buildings and six (6) two-story duplexes for a total floor area of 87,283 SF with 102 parking spaces and associated driveways, landscaped areas, stormwater management facilities, and accompanying site amenities.

The southern portion of the lot is currently developed with the Lawrence Shopping Center and associated loading and parking areas. The northern portion of the lot was historically developed with a parking area and a man-made drainage ditch, and currently consists of mostly open space. There are wetlands along the northwestern property line, adjacent to Foch Avenue. Furthermore, the site is also located within a Flood Hazard Area and within the Delaware and Raritan Canal Review Zone B.

The property is bordered to the north by Texas Avenue with residential uses beyond, to the east and south by commercial uses with Brunswick Pike beyond, and to the west by wetlands with residential uses beyond.

The existing conditions of the tract have been verified by the Boundary and Partial Topographic Survey as prepared by Dynamic Survey, LLC, dated 06/06/2019.

II. DESIGN OVERVIEW

This report has been prepared to define and analyze the stormwater drainage conditions that would occur as a result of the development of Block 2001, Lots 3, 60-66 & 68 in the Township of Lawrence, Mercer County, New Jersey.

The proposed development consists of redeveloping the northern portion of the site which is currently mostly open space in order to construct a residential development consisting of three (3) multi-family three-story buildings and six (6) two-story duplexes for a total floor area of 87,283 SF with 102 parking spaces with associated driveways, landscaped areas, stormwater management facilities, and accompanying site amenities.

Based upon the scope of the project, the development is classified as a major development as it increases the amount of impervious coverage onsite by more than ¼ acre; therefore, the project has been designed to meet the stormwater runoff quantity and quality standards set forth under N.J.A.C. 7:8. Accordingly, the following items are addressed within this report:

- Erosion control, groundwater recharge and runoff quantity standards (7:8-5.4)

- Stormwater runoff quality standards (7:8-5.5)
- Calculation of stormwater runoff and groundwater recharge (7:8-5.6)
- Standards for structural stormwater management measures (7:8-5.7)

The proposed development is exempt from the groundwater recharge requirements set forth by N.J.A.C. 7:8 due to the fact that the project is located within an "urban redevelopment area" as it is a previously developed portion of the Metropolitan Planning Area as delineated on the State Plan Policy Map (SPPM).

A hydrological evaluation is provided for the NJDEP Water Quality, 2, 10, and 100 year storm events utilizing the Urban Hydrology for Small Watershed TR55 method.

The Township of Lawrence and NJDEP peak flow reduction requirements are as follows:

2-year:	50% reduction
10-year:	25% reduction
100-year:	20% reduction

It is the intention of the design of this facility to comply with the Stormwater Management Best Management Practices.

III. EXISTING DRAINAGE CONDITIONS

The tract has been evaluated with the following existing drainage sub-watershed areas as depicted on the Existing Drainage Area Map:

Existing Drainage Area South: This area of the tract consists of the southern portion of the development area. Runoff from the open space area and asphalt areas flow via overland flow and is ultimately tributary to the adjacent development on the southern side of the proposed development.

Existing Drainage Area Texas Avenue: This area of the tract consists of the northern portion of the development area adjacent to Texas Avenue, which includes an existing sidewalk. Runoff from the open space area and sidewalk areas flow via overland flow and is ultimately tributary to Texas Avenue.

Based on Mercer County soils survey information, the soil types native to the site include:

MERCER COUNTY SOIL SURVEY INFORMATION		
SOIL TYPE (SYMBOL)	**SOIL TYPE (NAME)**	**HYDROLOGIC SOIL GROUP (HSG)**
UdstB	Udorthents, stratified substratum, 0 to 8 percent slopes	D

IV. PROPOSED DRAINAGE CONDITIONS

The tract has been evaluated with the following drainage sub-watershed areas as depicted on the Proposed Drainage Area Map:

Proposed Drainage Area South: This area of the tract consists of proposed parking and building areas. Runoff from this area is collected by the onsite stormwater conveyance system and is tributary to the underground detention basin located underneath the proposed parking area. Stormwater from the detention basin is routed through an outlet control structure and into a Contech Peak Diversion StormFilter Manufactured Treatment Device. Runoff from the Manufactured Treatment Device is tributary to the headwall and scour hole located to the east of the proposed retaining wall and is ultimately tributary to the existing man-made drainage ditch on-site, which flows off-site towards the adjacent existing development on the southern side of the proposed development.

Proposed Drainage Area South Undetained: This area of the tract consists of the southwestern and southern portions of the development area which are not collected by the proposed onsite stormwater conveyance system. Runoff from the open space area and sidewalk areas flows overland and is ultimately tributary to the adjacent existing development on the southern side of the proposed development, similar to existing conditions.

Proposed Drainage Area Texas Avenue: This area of the tract consists of open space and asphalt areas on the northern portion of the site. Runoff from this area is not collected by the onsite stormwater conveyance system and will sheet flow directly to the existing stormwater conveyance system located on Texas Avenue, similar to existing conditions.

V. DESIGN METHODOLOGY

The intention of the proposed stormwater design is to provide measures as required to address applicable aspects of the Township of Lawrence Land Use Ordinance and N.J.A.C. 7:8. In order to prepare the stormwater calculations for the subject project, extensive initial investigation of the property and topography was performed.

On-site review of the tract was performed by Dynamic Engineering Consultants, PC to verify existing site conditions and land cover characteristics. Dynamic Survey, LLC, was contracted to prepare the Boundary and Partial Topographic Survey for the existing site. Furthermore, Dynamic Earth, LLC performed test pits within the site to establish the seasonal high water table.

Based on our review of the existing site conditions and the Boundary and Partial Topographic Survey, the Drainage Area Maps for the existing and proposed site conditions as defined within this report were established. A grading plan was developed for the proposed site improvements with the existing drainage patterns in mind. The plan was designed to ensure runoff from the proposed development could be directed to stormwater management facilities in order to address the applicable sections of the Township of Lawrence Land Use Ordinance and N.J.A.C. 7:8.

Under proposed conditions, the runoff from the proposed parking area will be collected via a series of inlets and is ultimately connected via an underground pipe network to the underground detention basin. The stormwater from the detention basin is routed through an outlet control structure and a Contech Peak Diversion StormFilter Manufactured Treatment Device. The Manufactured Treatment Device has been approved the by the NJDEP to remove 80% of the TSS generated by the water quality design storm for the study area, thereby satisfying the water quality aspect of N.J.A.C. 7:8.

All stormwater tributary to the proposed stormwater conveyance system is routed through an outlet control structure which discharges runoff at a controlled rate in order to satisfy the stormwater quantity requirements set forth by the Township Lawrence Land Use Ordinance and N.J.A.C. 7:8.

The proposed development is exempt from the groundwater recharge requirements set forth by N.J.A.C. 7:8 due to the fact that the project is located within and "urban redevelopment area" as it is a previously developed portion of the Metropolitan Planning Area as delineated on the State Plan Policy Map (SPPM).

The overall stormwater management report for the subject tract has been evaluated by Dynamic Engineering Consultants to ensure that the overall development satisfies the stormwater criteria set forth in the N.J.A.C. 7:8 and Township of Lawrence Land Use Ordinance.

VI. RUNOFF RATE REDUCTION PERFORMANCE

Pre-Development and Post-Development Peak Runoff Results
Summary for Point Of Analysis Northwest (Ex. Study Area South)

	EXISTING RUNOFF RATE (CFS)	PROPOSED RUNOFF RATE (CFS)	PROPOSED RUNOFF RATE REDUCTION (CFS)
2 Year	8.139	4.083	-4.056
10 Year	13.66	9.695	-3.965
100 Year	24.33	19.11	-5.110

Pre-Development and Post-Development Peak Runoff Results
Summary for Point Of Analysis North (Ex. Study Area Texas Avenue)

	EXISTING RUNOFF RATE (CFS)	PROPOSED RUNOFF RATE (CFS)	PROPOSED RUNOFF RATE REDUCTION (CFS)
2 Year	0.656	0.303	-0.353
10 Year	1.054	0.517	-0.537
100 Year	1.826	0.944	-0.882

Pre-development and Post Development Peak Runoff Results
Summary for Total Site

	EXISTING RUNOFF RATE (CFS)	REDUCTION REQUIREMENT	ALLOWABLE RUNOFF RATE (CFS)	PROPOSED RUNOFF RATE (CFS)
2 Year	8.795	50%	4.398	4.386
10 Year	14.71	25%	11.033	10.140
100 Year	26.15	20%	20.920	20.050

VII. UNDERGROUND DETENTION BASIN SYSTEM DESIGN

As previously stated within this report, the stormwater management design utilizes one (1) underground stormwater detention basin and a proposed underground conveyance pipe system to satisfy the stormwater quantity regulations set forth by the Township of Lawrence Land Use Ordinance and N.J.A.C 7:8. Stormwater runoff from the proposed underground detention basin will be released at a controlled rate through an outlet control structure in order to satisfy the stormwater runoff quantity regulations set forth by the Township of

Lawrence Land Use Ordinance and N.J.A.C 7:8. Stormwater runoff from the basin will be discharged out of a headwall adjacent to the existing drainage ditch located on the northeastern portion of the site.

VIII. WATER QUALITY

The TSS removal rate requirement set forth by the Township of Lawrence Ordinance and N.J.A.C. 7:8 is 80% for the newly proposed impervious coverage. The stormwater management design for the project satisfies this requirement by utilizing a Contech Peak Diversion StormFilter Manufactured Treatment Device certified by the NJDEP to provide a TSS removal rate of 80%. Therefore, the stormwater management facilities provide a TSS removal rate of 80% for the subject project, thereby, satisfying the water quality aspect of the Township of Lawrence Land Use Ordinance and N.J.A.C. 7:8.

IX. GROUNDWATER RECHARGE

As was mentioned previously, the proposed development is exempt from the groundwater recharge requirements set forth by N.J.A.C 7:8 due to the fact that the project is located within and "urban redevelopment area" as it is a previously developed portion of the Metropolitan Planning Area as delineated on the State Plan Policy Map (SPPM). Therefore, no groundwater recharge measures are required as part of the proposed development.

X. CONCLUSION

The proposed development has been designed with provisions for the safe and efficient control of stormwater runoff in a manner that will not adversely impact the existing drainage patterns, adjacent roadways, or adjacent parcels.

The proposed stormwater management design incorporates a StormFilter Manufactured Treatment Device capable of 80% total suspended solid (TSS) removal as stated within the New Jersey Stormwater Best Management Practices Manual thereby satisfying NJAC 7:8 Water Quality Standards.

The proposed development is exempt from the groundwater recharge requirements set forth by N.J.A.C 7:8 due to the fact that the project is located within and "urban redevelopment area" as it is a previously developed portion of the Metropolitan Planning Area as delineated on the State Plan Policy Map (SPPM).

Furthermore, the stormwater management design shall reduce peak flow rates for the proposed development area and meets the minimum peak flow reduction for the 2, 10 and 100-year storm as dictated by N.J.A.C. 7:8. With this stated, it is evident that the proposed development will not have a negative impact on the existing stormwater management system, water quality or groundwater recharge on site or within the vicinity of the subject parcel.

APPENDIX

RUNOFF COEFFICIENT (CN) CALCULATIONS – EXISTING

DYNAMIC ENGINEERING

EXISTING DRAINAGE AREA SUMMARY AND AVERAGE CURVE NUMBER (CN) CALCULATIONS

Project:	Proposed Residential Development	Computed By:	TAZ
Job #:	1279-99-010	Checked By:	LPG
Location:	Lawrence, NJ	Date:	9/29/2020

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG D - Gravel Area (acre)	HSG D - Gravel Area (sf)	Curve Number (CN) Used	HSG D - Open Space Area (acre)	HSG D - Open Space Area (sf)	Curve Number (CN) Used	HSG D - Wooded Area (acre)	HSG D - Wooded Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total Pervious Area (acres)	Total Area (acres)	Total Area (sf)	TC (Min.)
Ex. DA South	0.28	12,117	98	0.20	8,720	91	3.39	147,658	89	0.08	3,626	77	89	3.67	3.95	172,121.00	10
Ex. DA Texas Ave	0.13	5,471	98	0.00		91	0.16	6,899	89	0.00		77	89	0.16	0.28	12,370.00	10
Total	0.40	17588.00		0.20	8720.00		3.55	154557.00		0.08	3626.00			3.83	4.24	184,491	

Per County Soil Survey -	UdstB	HSG	D	Soil	Udorthents, stratified substratum 0 to 8 percent slopes

Description	Runoff Curve Number (CN) (HSG A)	Runoff Curve Number (CN) (HSG B)	Runoff Curve Number (CN) (HSG C)	Runoff Curve Number (CN) (HSG D)
Impervious Surface	98	98	98	98
Open Space (lawn) (poor)	68	79	86	89
Woods (good)	30	55	70	77

RUNOFF COEFFICIENT (CN) CALCULATIONS – PROPOSED

DYNAMIC ENGINEERING

Proposed Drainage Area Summary and Average Curve Number(CN) Calculations

Project:	Proposed Residential Development	Computed By:	TAZ
Job #:	1279-99-010	Checked By:	LPG
Location:	Lawrence, NJ	Date:	9/29/2020

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG D - Open Space Area (acre)	HSG D - Open Space Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total Pervious Area (acres)	Total Area (acres)	Total Area (sf)	TC (Min.)
Prop. DA South (Basin)	1.72	74,822	98	0.25	10,886	80	80	0.25	1.97	85,708.00	10
Prop. DA South (Und)	0.37	15,965	98	1.74	75,668	80	80	1.74	2.10	91,633.00	11
Prop. DA Texas Ave	0.07	3,083	98	0.09	4,067	80	80	0.09	0.16	7,150.00	10
Total	**2.15**	**93,870**		**2.08**	**90,621**			**2.08**	**4.24**	**184,491**	

Per County Soil Survey -	OthA	HSG	C/D	Soil	Othello silt loams, 0 to 2 percent slopes, northern coastal plain
Per County Soil Survey -	UdstB	HSG	D	Soil	Udorthents, stratified substratum 0 to 8 percent slopes

Description	Runoff Curve Number (CN) (HSG A)	Runoff Curve Number (CN) (HSG B)	Runoff Curve Number (CN) (HSG C)	Runoff Curve Number (CN) (HSG D)
Impervious Surface	98	98	98	98
Open Space (lawn) (good)	39	61	74	80
Woods (good)	30	55	70	77

HYDROGRAPH SUMMARY REPORTS – EXISTING AND PROPOSED CONDITIONS
2 YR. 10 YR. & 100 YR.

Hydraflow Table of Contents

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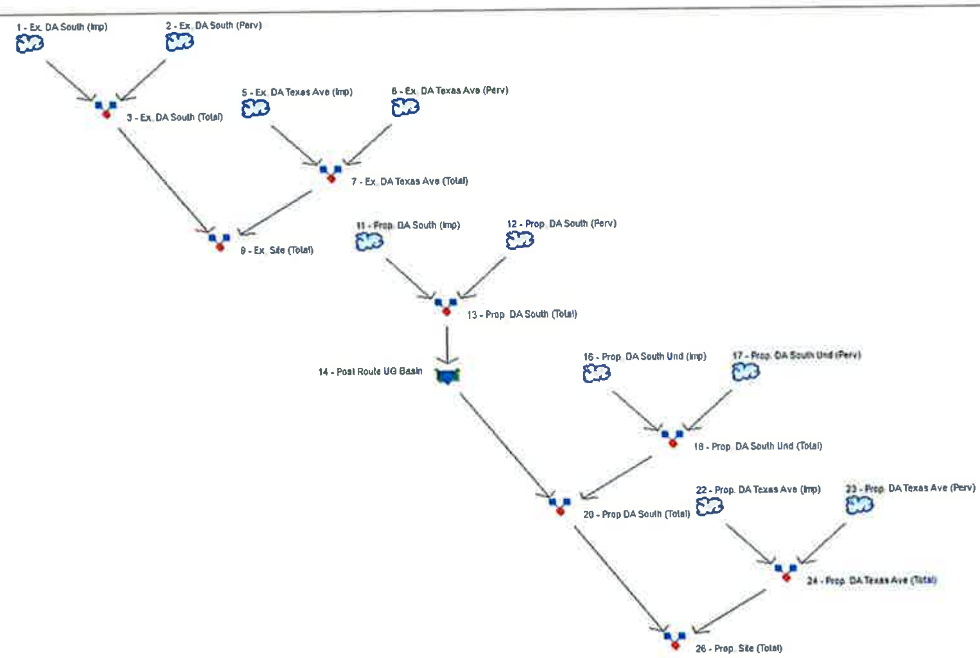
Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	Ex. DA South (Imp)
2	SCS Runoff	Ex. DA South (Perv)
3	Combine	Ex. DA South (Total)
5	SCS Runoff	Ex. DA Texas Ave (Imp)
6	SCS Runoff	Ex. DA Texas Ave (Perv)
7	Combine	Ex. DA Texas Ave (Total)
9	Combine	Ex. Site (Total)
11	SCS Runoff	Prop. DA South (Imp)
12	SCS Runoff	Prop. DA South (Perv)
13	Combine	Prop. DA South (Total)
14	Reservoir	Post Route UG Basin
16	SCS Runoff	Prop. DA South Und (Imp)
17	SCS Runoff	Prop. DA South Und (Perv)
18	Combine	Prop. DA South Und (Total)
20	Combine	Prop DA South (Total)
22	SCS Runoff	Prop. DA Texas Ave (Imp)
23	SCS Runoff	Prop. DA Texas Ave (Perv)
24	Combine	Prop. DA Texas Ave (Total)
26	Combine	Prop. Site (Total)

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	-------	0.715	-------	-------	1.090	-------	-------	1.818	Ex. DA South (Imp)
2	SCS Runoff	------	-------	7.424	-------	-------	12.57	-------	-------	22.51	Ex. DA South (Perv)
3	Combine	1, 2	-------	8.139	-------	-------	13.66	-------	-------	24.33	Ex. DA South (Total)
5	SCS Runoff	------	-------	0.332	-------	-------	0.506	-------	-------	0.844	Ex. DA Texas Ave (Imp)
6	SCS Runoff	------	-------	0.324	-------	-------	0.548	-------	-------	0.981	Ex. DA Texas Ave (Perv)
7	Combine	5, 6	-------	0.656	-------	-------	1.054	-------	-------	1.826	Ex. DA Texas Ave (Total)
9	Combine	3, 7,	-------	8.795	-------	-------	14.71	-------	-------	26.15	Ex. Site (Total)
11	SCS Runoff	------	-------	4.392	-------	-------	6.693	-------	-------	11.17	Prop. DA South (Imp)
12	SCS Runoff	------	-------	0.346	-------	-------	0.679	-------	-------	1.360	Prop. DA South (Perv)
13	Combine	11, 12	-------	4.738	-------	-------	7.372	-------	-------	12.53	Prop. DA South (Total)
14	Reservoir	13	-------	1.577	-------	-------	4.670	-------	-------	8.731	Post Route UG Basin
16	SCS Runoff	------	-------	0.945	-------	-------	1.440	-------	-------	2.403	Prop. DA South Und (Imp)
17	SCS Runoff	------	-------	2.407	-------	-------	4.723	-------	-------	9.467	Prop. DA South Und (Perv)
18	Combine	16, 17	-------	3.352	-------	-------	6.163	-------	-------	11.87	Prop. DA South Und (Total)
20	Combine	14, 18,	-------	4.083	-------	-------	9.695	-------	-------	19.11	Prop DA South (Total)
22	SCS Runoff	------	-------	0.179	-------	-------	0.272	-------	-------	0.455	Prop. DA Texas Ave (Imp)
23	SCS Runoff	------	-------	0.124	-------	-------	0.244	-------	-------	0.490	Prop. DA Texas Ave (Perv)
24	Combine	22, 23	-------	0.303	-------	-------	0.517	-------	-------	0.944	Prop. DA Texas Ave (Total)
26	Combine	20, 24,	-------	4.386	-------	-------	10.14	-------	-------	20.05	Prop. Site (Total)

Hydrograph Summary Report

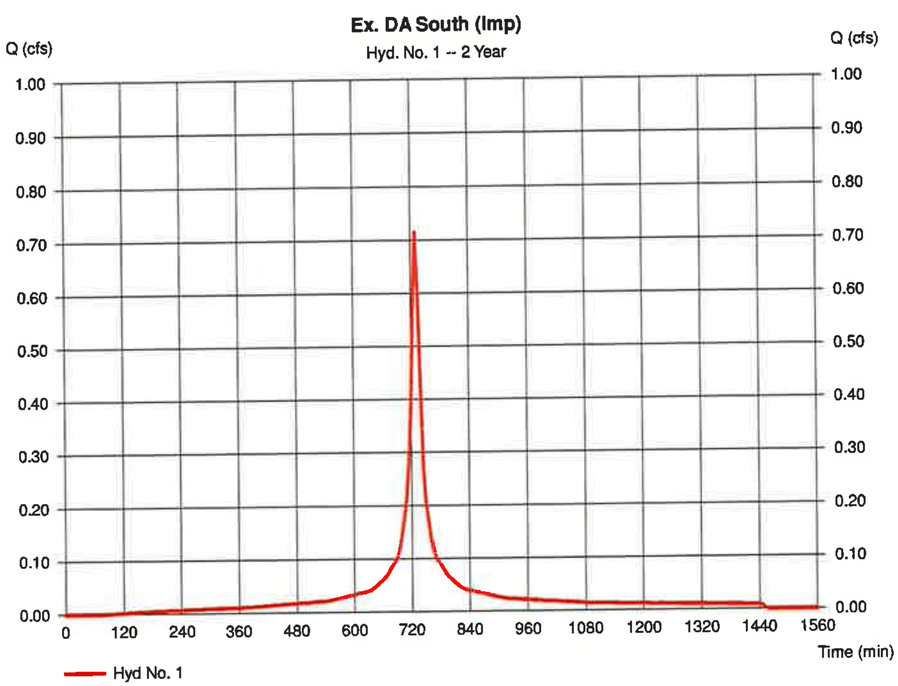
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.715	5	730	2,932	------	------	------	Ex. DA South (Imp)
2	SCS Runoff	7.424	5	730	27,255	------	------	------	Ex. DA South (Perv)
3	Combine	8.139	5	730	30,187	1, 2	------	------	Ex. DA South (Total)
5	SCS Runoff	0.332	5	730	1,361	------	------	------	Ex. DA Texas Ave (Imp)
6	SCS Runoff	0.324	5	730	1,188	------	------	------	Ex. DA Texas Ave (Perv)
7	Combine	0.656	5	730	2,550	5, 6	------	------	Ex. DA Texas Ave (Total)
9	Combine	8.795	5	730	32,736	3, 7,	------	------	Ex. Site (Total)
11	SCS Runoff	4.392	5	730	18,011	------	------	------	Prop. DA South (Imp)
12	SCS Runoff	0.346	5	730	1,265	------	------	------	Prop. DA South (Perv)
13	Combine	4.738	5	730	19,276	11, 12	------	------	Prop. DA South (Total)
14	Reservoir	1.577	5	750	19,268	13	60.46	6,486	Post Route UG Basin
16	SCS Runoff	0.945	5	730	3,875	------	------	------	Prop. DA South Und (Imp)
17	SCS Runoff	2.407	5	730	8,805	------	------	------	Prop. DA South Und (Perv)
18	Combine	3.352	5	730	12,680	16, 17	------	------	Prop. DA South Und (Total)
20	Combine	4.083	5	730	31,948	14, 18,	------	------	Prop DA South (Total)
22	SCS Runoff	0.179	5	730	733	------	------	------	Prop. DA Texas Ave (Imp)
23	SCS Runoff	0.124	5	730	455	------	------	------	Prop. DA Texas Ave (Perv)
24	Combine	0.303	5	730	1,188	22, 23	------	------	Prop. DA Texas Ave (Total)
26	Combine	4.386	5	730	33,137	20, 24,	------	------	Prop. Site (Total)

Hydrograph Report

Hyd. No. 1

Ex. DA South (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.715 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,932 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

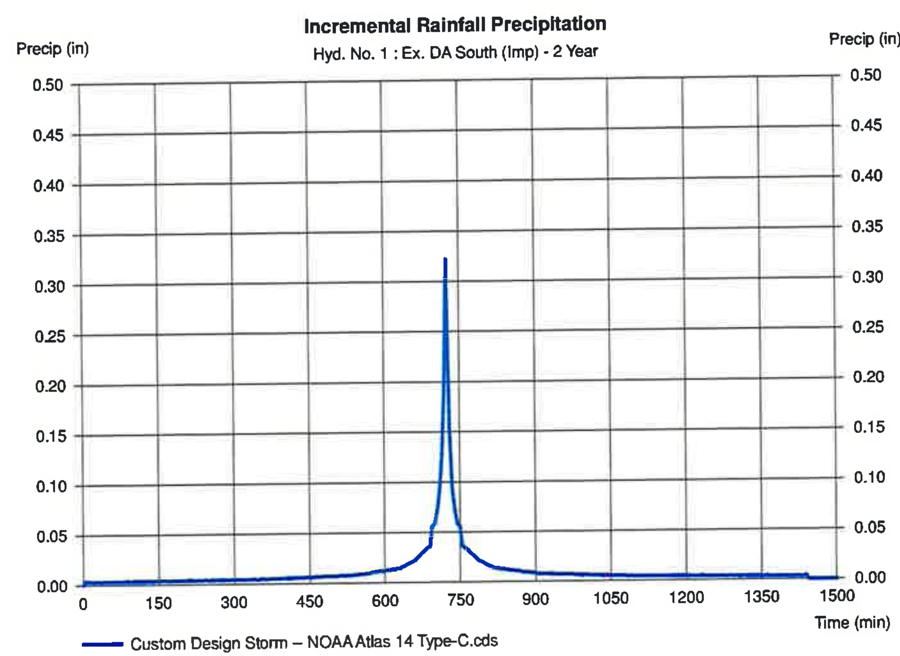


Precipitation Report

Hyd. No. 1

Ex. DA South (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

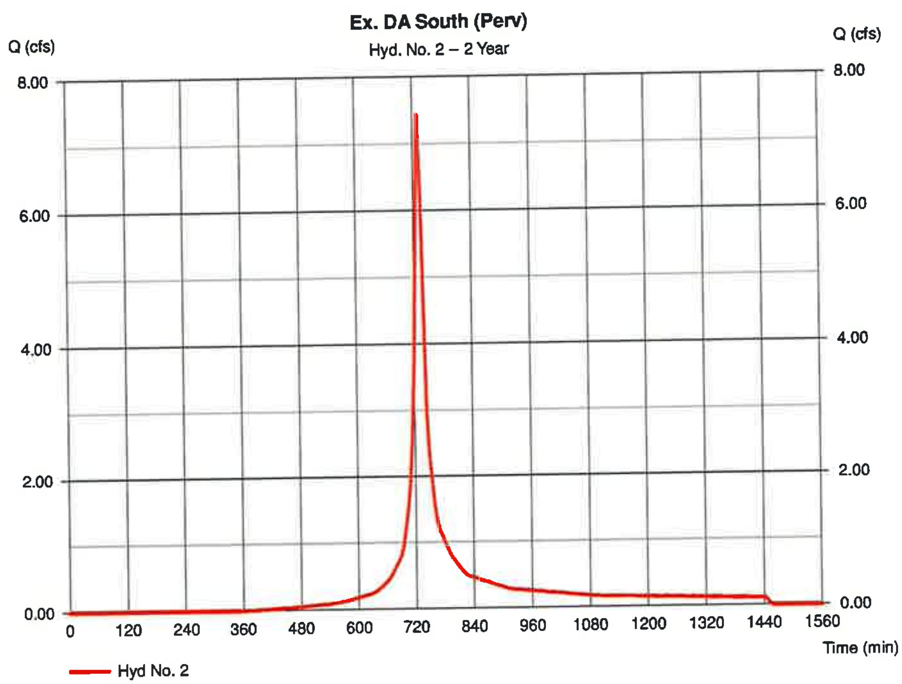


Hydrograph Report

Hyd. No. 2

Ex. DA South (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 7.424 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 27,255 cuft
Drainage area	= 3.670 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

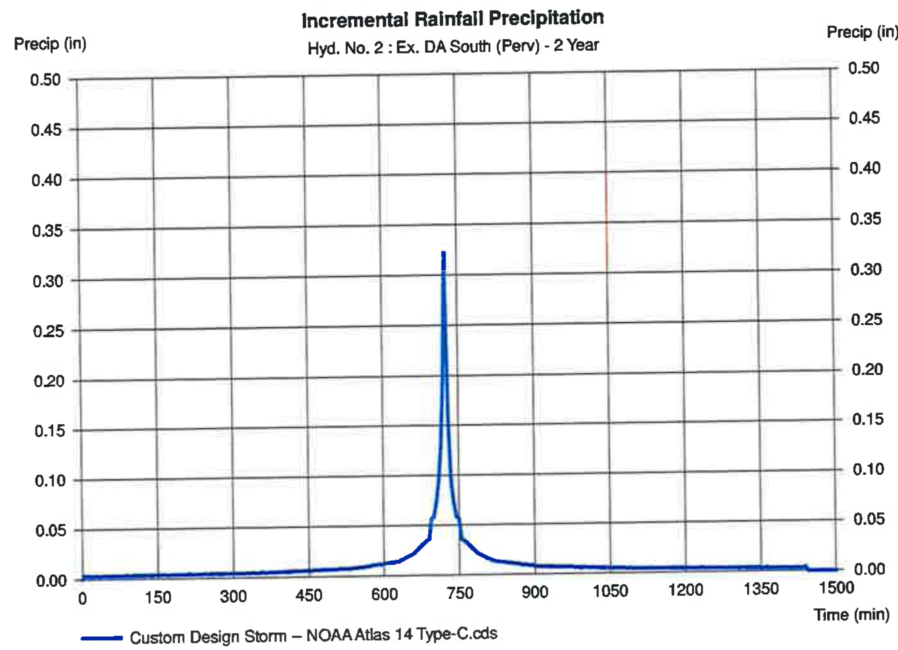


Precipitation Report

Hyd. No. 2

Ex. DA South (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

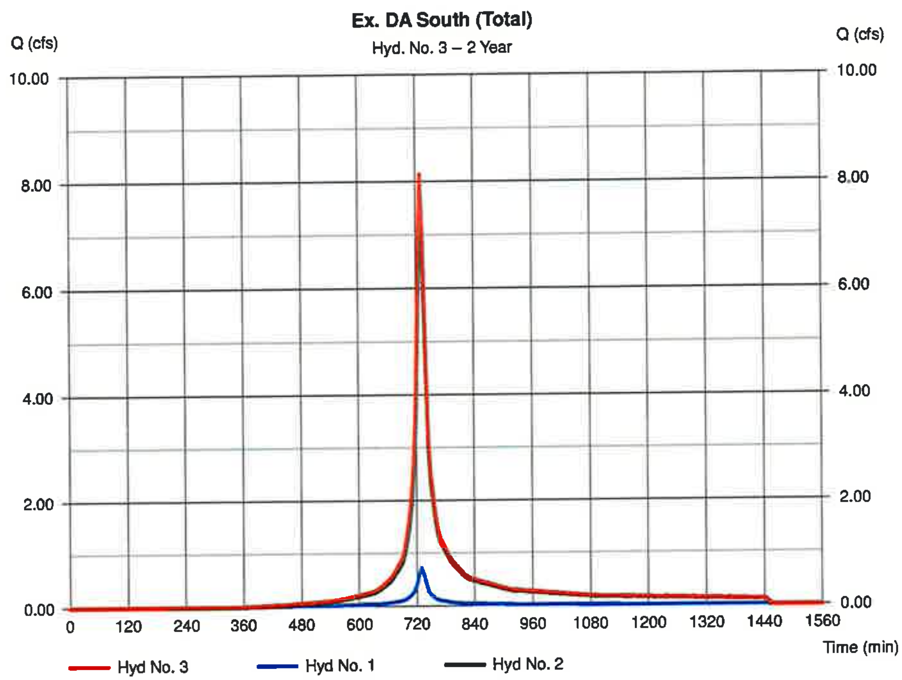


Hydrograph Report

Hyd. No. 3

Ex. DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 8.139 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 30,187 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.950 ac

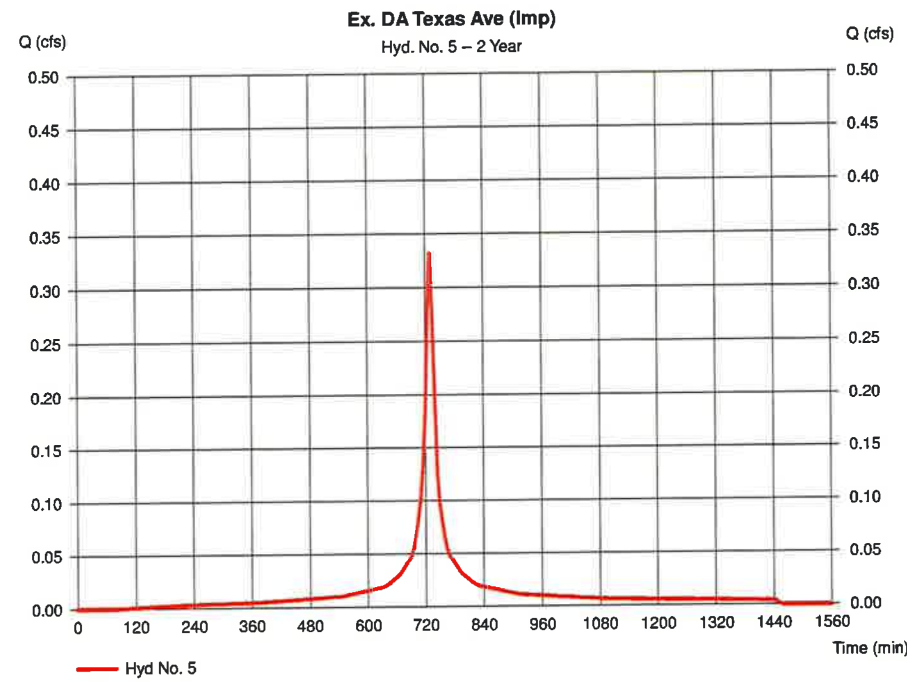


Hydrograph Report

Hyd. No. 5

Ex. DA Texas Ave (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.332 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,361 cuft
Drainage area	= 0.130 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

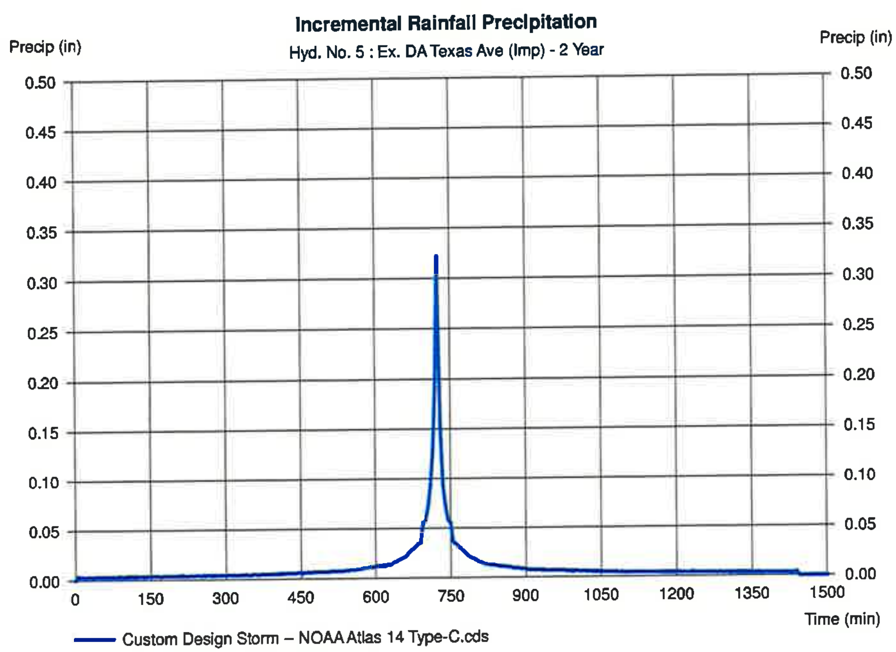


Precipitation Report

Hyd. No. 5

Ex. DA Texas Ave (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

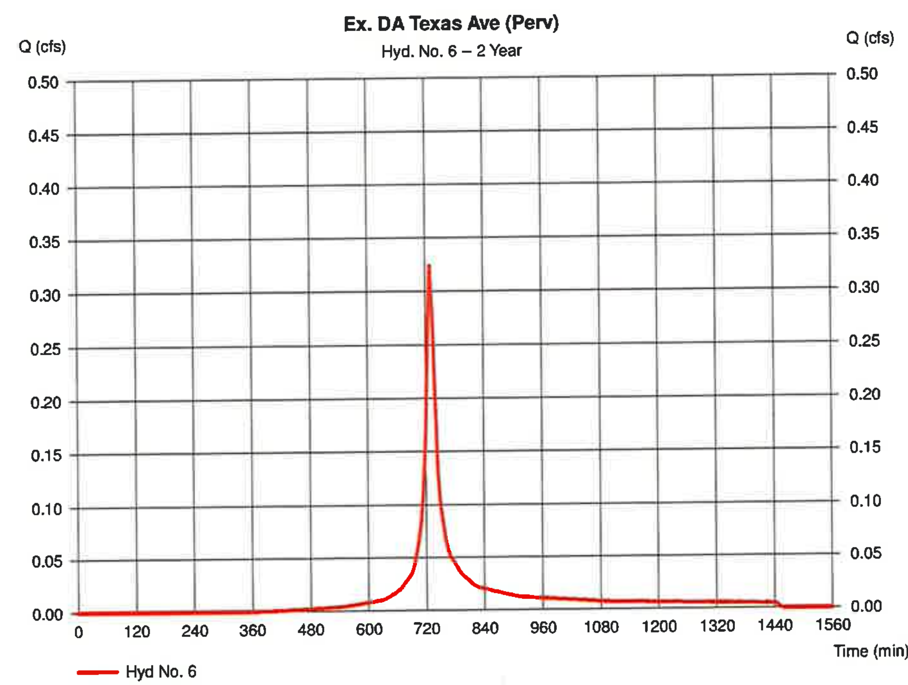


Hydrograph Report

Hyd. No. 6

Ex. DA Texas Ave (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.324 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,188 cuft
Drainage area	= 0.160 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484



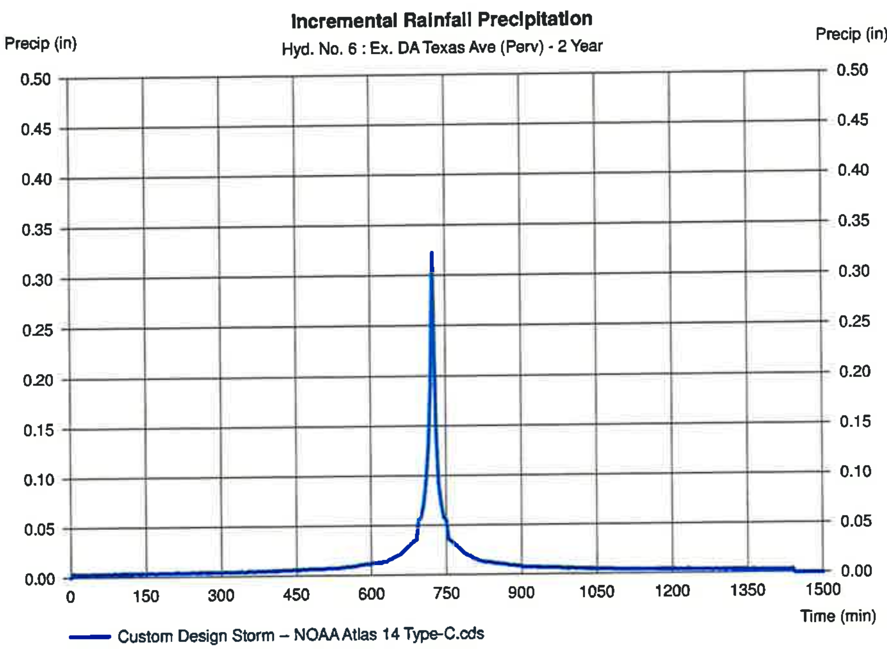
Precipitation Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 6

Ex. DA Texas Ave (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



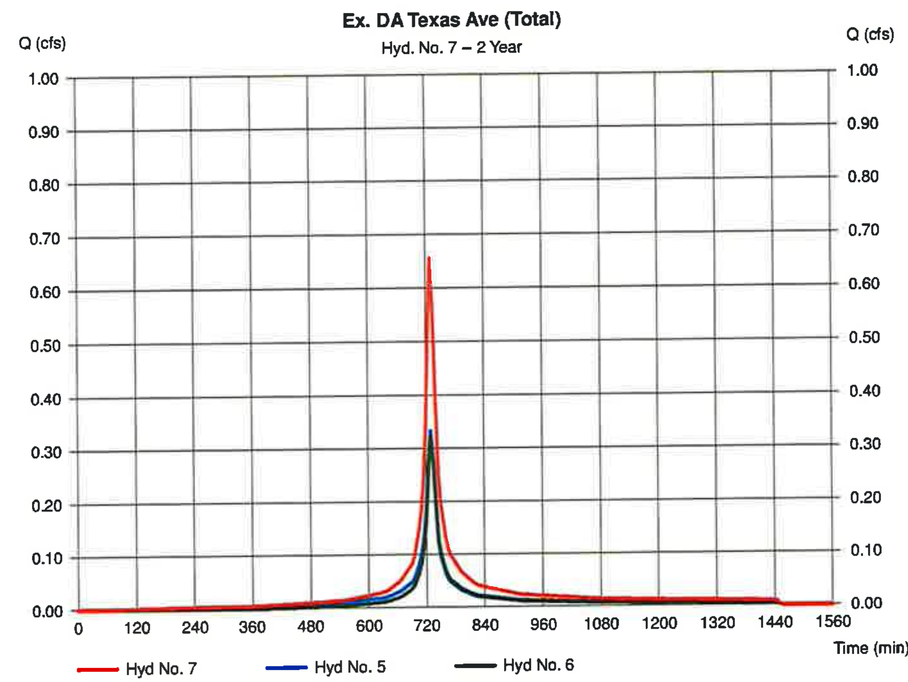
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 7

Ex. DA Texas Ave (Total)

Hydrograph type	= Combine	Peak discharge	= 0.656 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,550 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.290 ac



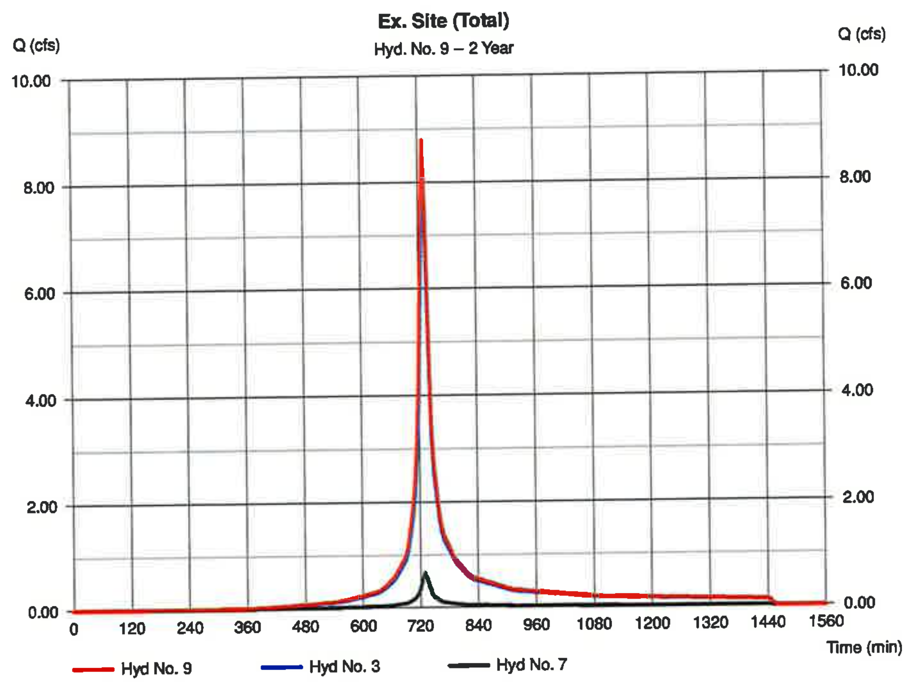
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Friday, Oct 9, 2020

Hyd. No. 9

Ex. Site (Total)

Hydrograph type	= Combine	Peak discharge	= 8.795 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 32,736 cuft
Inflow hyds.	= 3, 7	Contrib. drain. area	= 0.000 ac



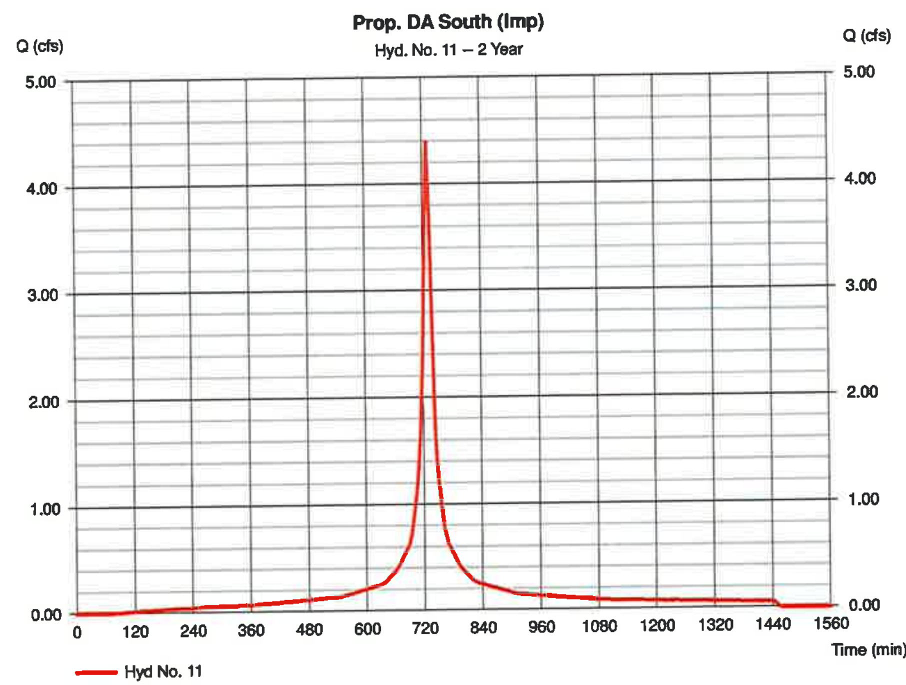
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Friday, Oct 9, 2020

Hyd. No. 11

Prop. DA South (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.392 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 18,011 cuft
Drainage area	= 1.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484



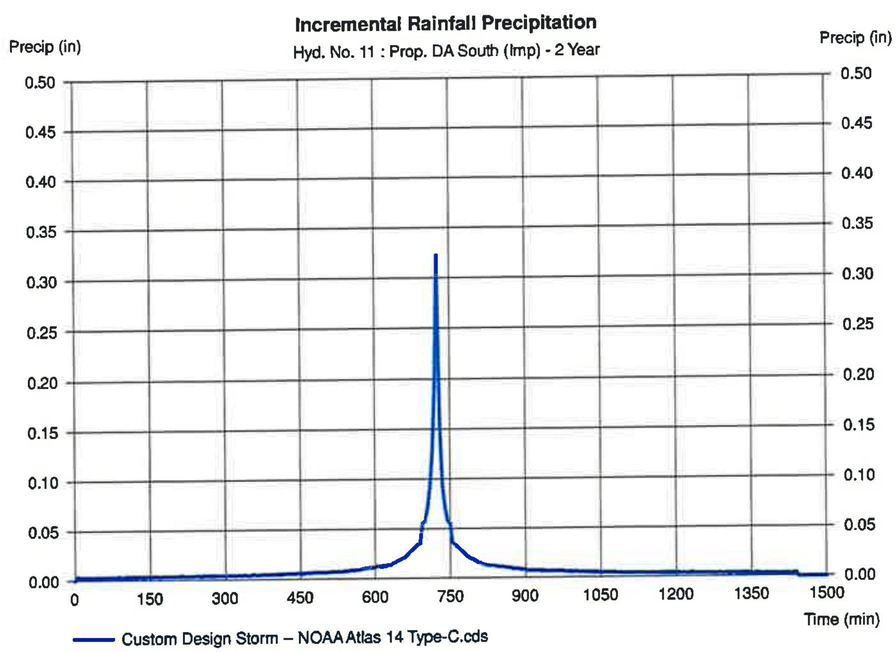
Precipitation Report

Hydraflow Hydrographs by Intelisolve v9.1 Friday, Oct 9, 2020

Hyd. No. 11

Prop. DA South (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



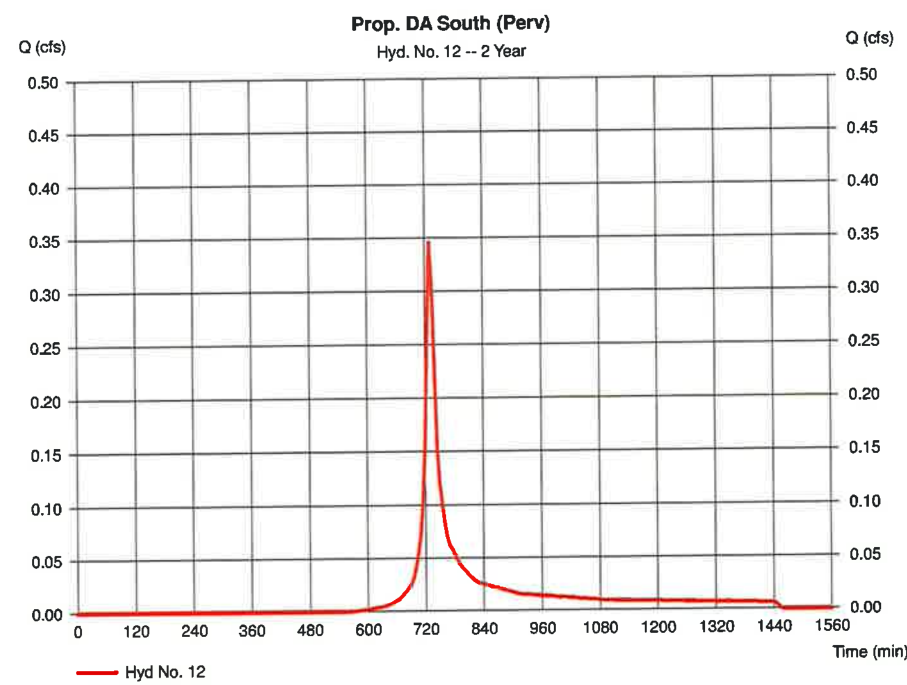
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Friday, Oct 9, 2020

Hyd. No. 12

Prop. DA South (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.346 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,265 cuft
Drainage area	= 0.250 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484



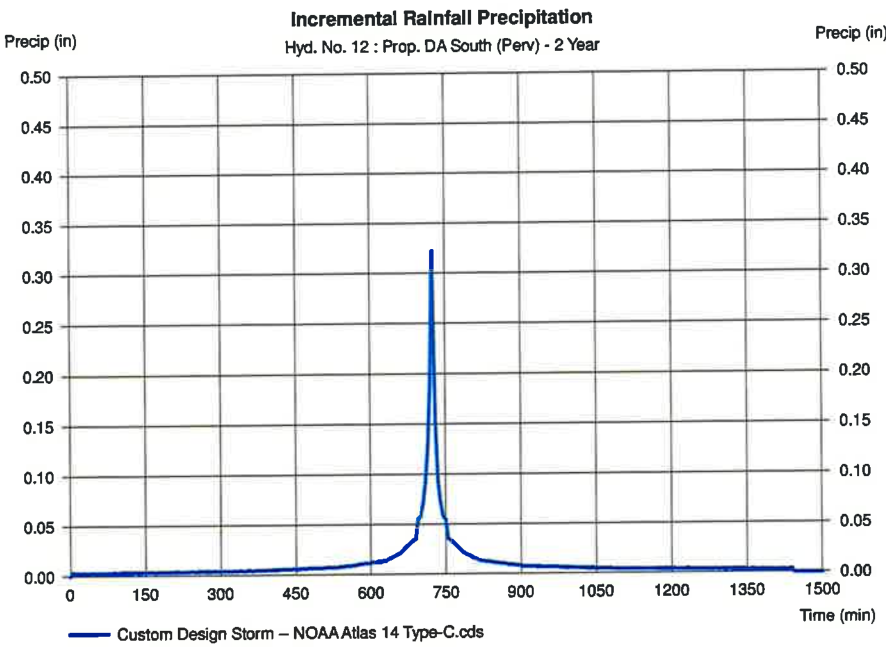
Precipitation Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 12

Prop. DA South (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



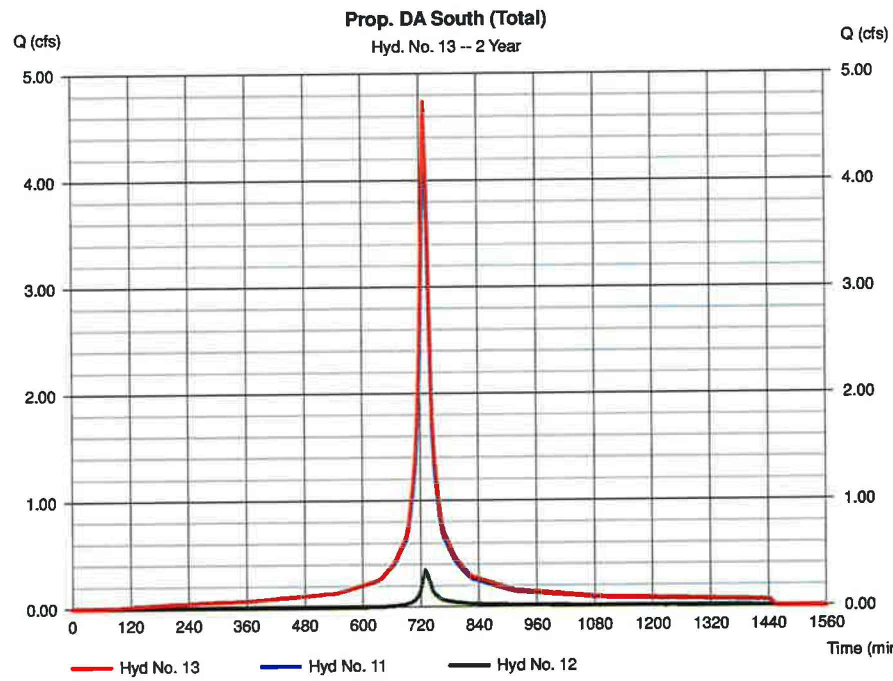
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 13

Prop. DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 4.738 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 19,276 cuft
Inflow hyds.	= 11, 12	Contrib. drain. area	= 1.970 ac



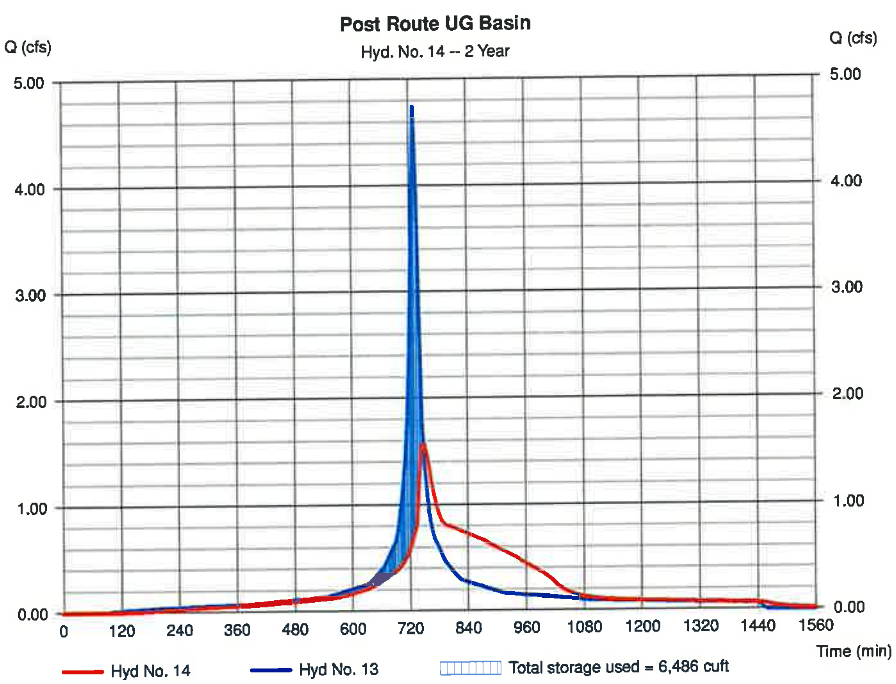
Hydrograph Report

Hyd. No. 14

Post Route UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 1.577 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 19,268 cuft
Inflow hyd. No.	= 13 - Prop. DA South (Total)	Max. Elevation	= 60.46 ft
Reservoir name	= UG Det Basin	Max. Storage	= 6,486 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - UG Det Basin

Pond Data

UG Chambers - Invert elev. = 59.00 ft, Rise x Span = 3.00 x 3.00 ft, Barrel Len = 230.00 ft, No. Barrels = 8, Slope = 0.00%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	59.00	n/a	0	0
0.30	59.30	n/a	702	702
0.60	59.60	n/a	1,220	1,923
0.90	59.90	n/a	1,484	3,407
1.20	60.20	n/a	1,635	5,042
1.50	60.50	n/a	1,708	6,750
1.80	60.80	n/a	1,708	8,458
2.10	61.10	n/a	1,634	10,092
2.40	61.40	n/a	1,484	11,576
2.70	61.70	n/a	1,219	12,795
3.00	62.00	n/a	701	13,497

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	4.00	5.00	0.00
Span (in)	= 36.00	6.00	44.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 58.95	59.00	60.30	0.00
Length (ft)	= 60.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.50	0.00	0.00	0.00
Crest El. (ft)	= 60.80	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

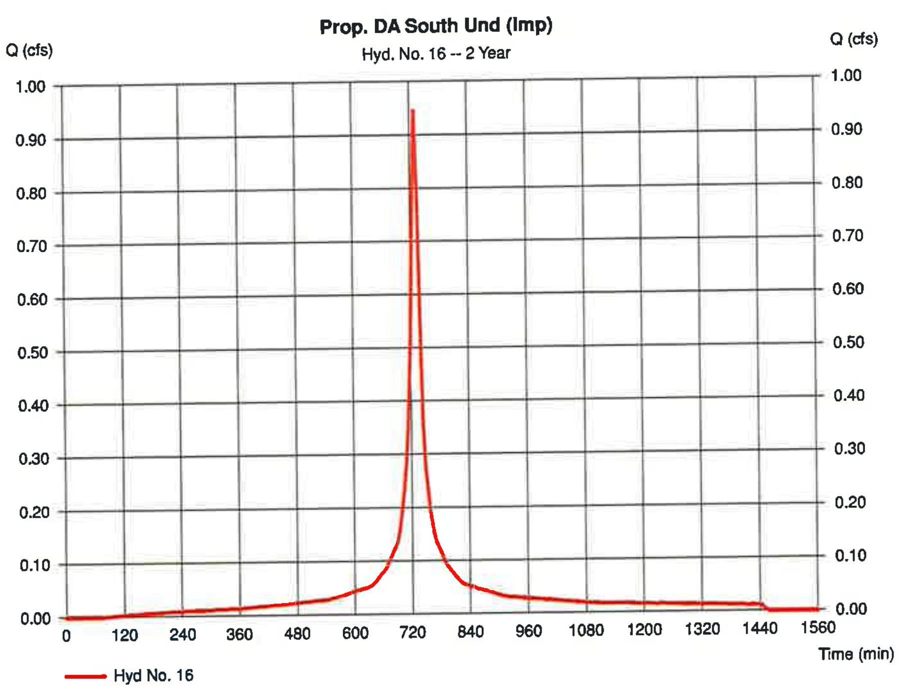
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	59.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.30	702	59.30	0.29 ic	0.28 ic	0.00	---	0.00	---	---	---	---	---	0.28
0.60	1,923	59.60	0.51 ic	0.51 ic	0.00	---	0.00	---	---	---	---	---	0.51
0.90	3,407	59.90	0.67 ic	0.65 ic	0.00	---	0.00	---	---	---	---	---	0.65
1.20	5,042	60.20	0.81 ic	0.78 ic	0.00	---	0.00	---	---	---	---	---	0.78
1.50	6,750	60.50	2.02 ic	0.82 ic	1.12 ic	---	0.00	---	---	---	---	---	1.94
1.80	8,458	60.80	4.92 oc	0.81 ic	3.97 ic	---	0.00	---	---	---	---	---	4.78
2.10	10,092	61.10	6.98 oc	0.84 ic	5.66 ic	---	0.27	---	---	---	---	---	6.77
2.40	11,576	61.40	8.80 oc	0.88 ic	6.95 ic	---	0.77	---	---	---	---	---	8.60
2.70	12,795	61.70	10.46 oc	0.93 ic	8.03 ic	---	1.42	---	---	---	---	---	10.38
3.00	13,497	62.00	12.14 oc	0.98 ic	8.95 ic	---	2.19	---	---	---	---	---	12.11

Hydrograph Report

Hyd. No. 16

Prop. DA South Und (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.945 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 3,875 cuft
Drainage area	= 0.370 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

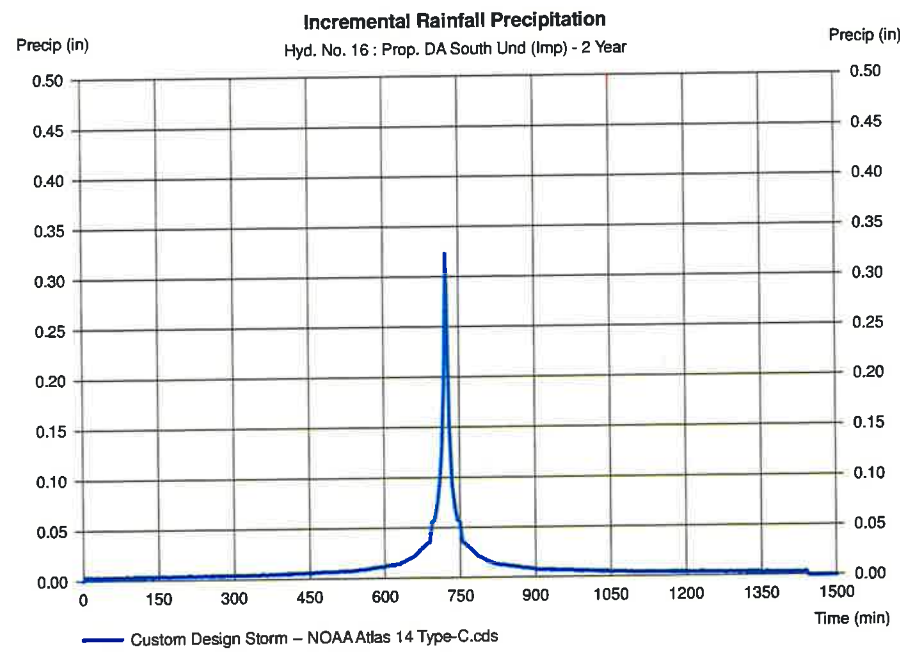


Precipitation Report

Hyd. No. 16

Prop. DA South Und (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

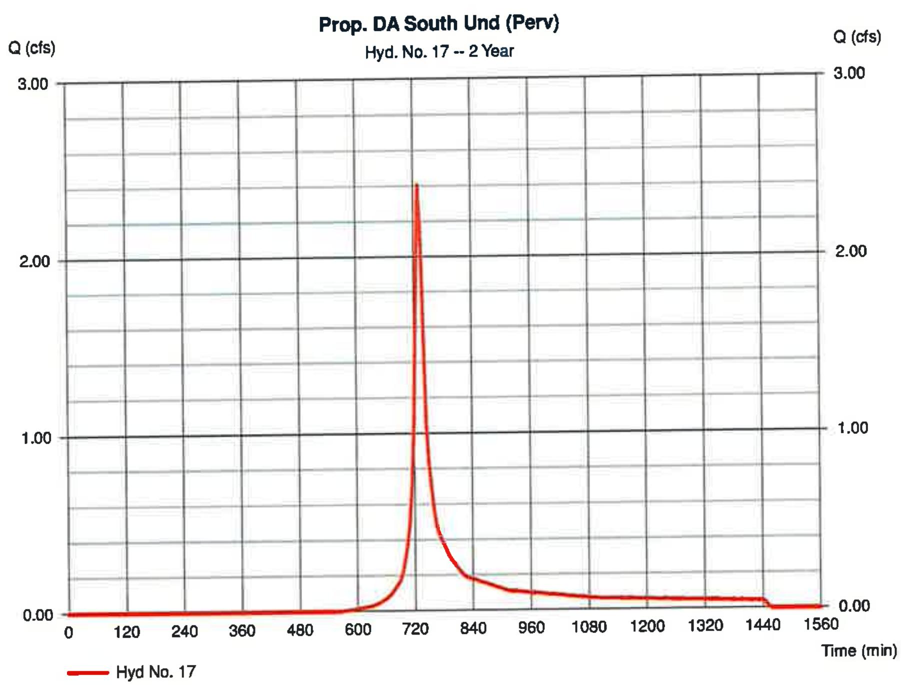


Hydrograph Report

Hyd. No. 17

Prop. DA South Und (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.407 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 8,805 cuft
Drainage area	= 1.740 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

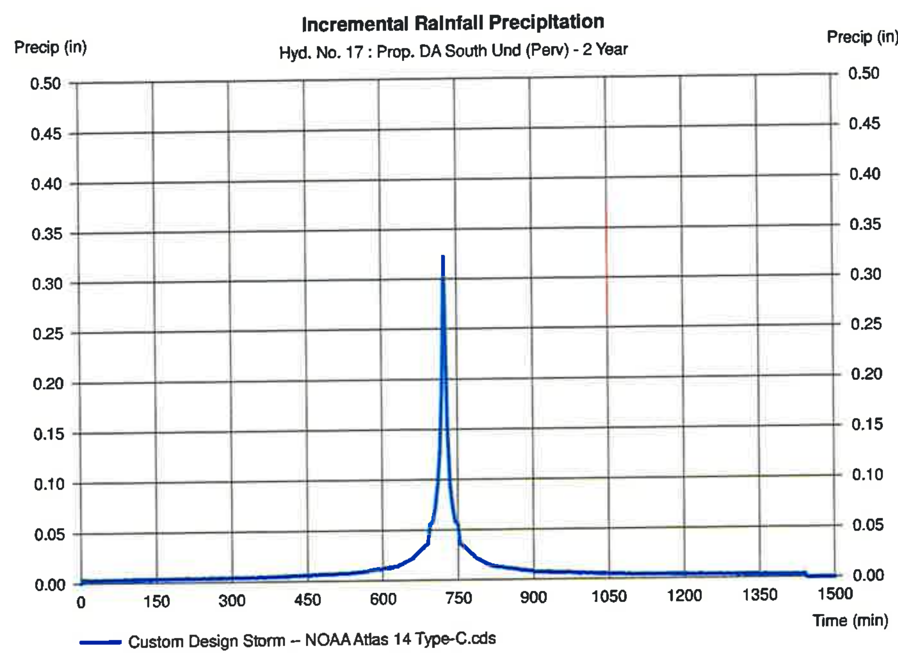


Precipitation Report

Hyd. No. 17

Prop. DA South Und (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

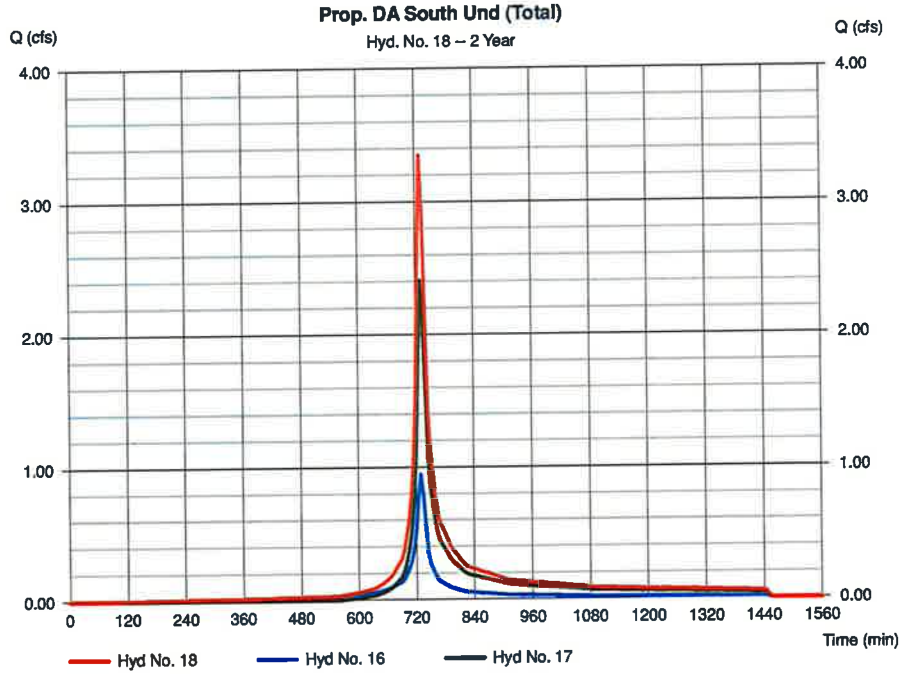


Hydrograph Report

Hyd. No. 18

Prop. DA South Und (Total)

Hydrograph type	= Combine	Peak discharge	= 3.352 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 12,680 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 2.110 ac

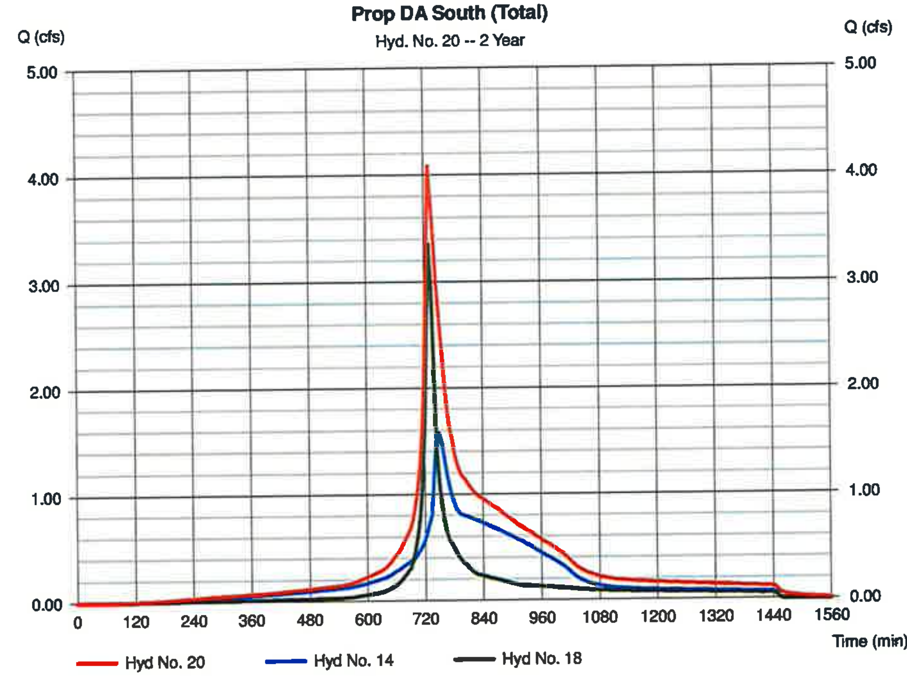


Hydrograph Report

Hyd. No. 20

Prop DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 4.083 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 31,948 cuft
Inflow hyds.	= 14, 18	Contrib. drain. area	= 0.000 ac

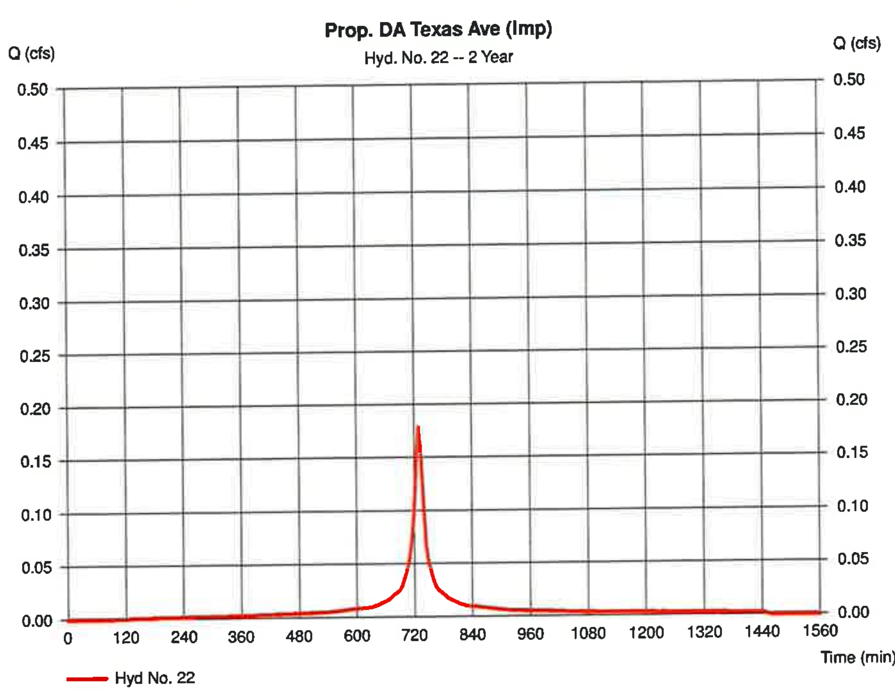


Hydrograph Report

Hyd. No. 22

Prop. DA Texas Ave (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.179 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 733 cuft
Drainage area	= 0.070 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

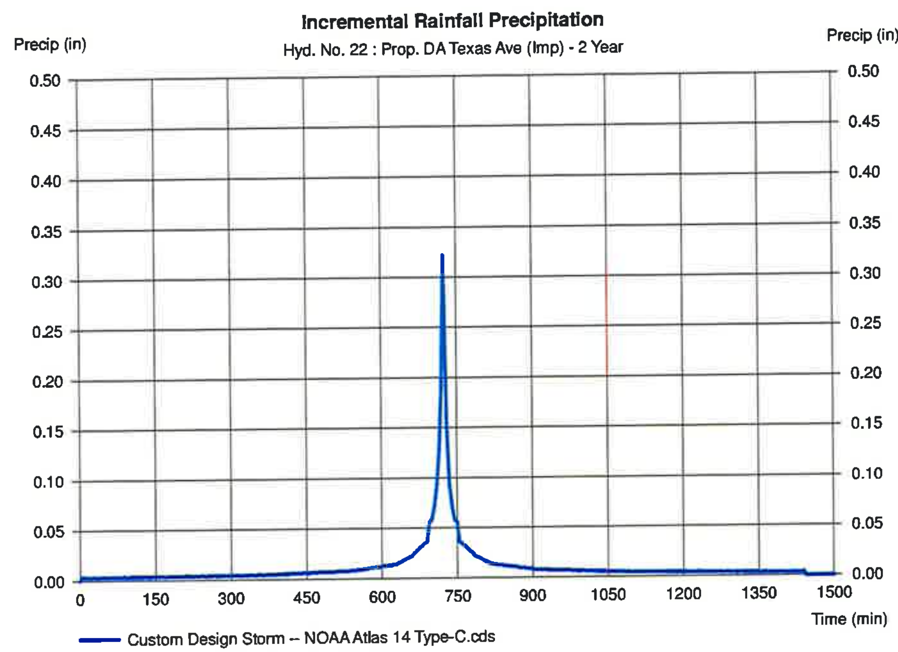


Precipitation Report

Hyd. No. 22

Prop. DA Texas Ave (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

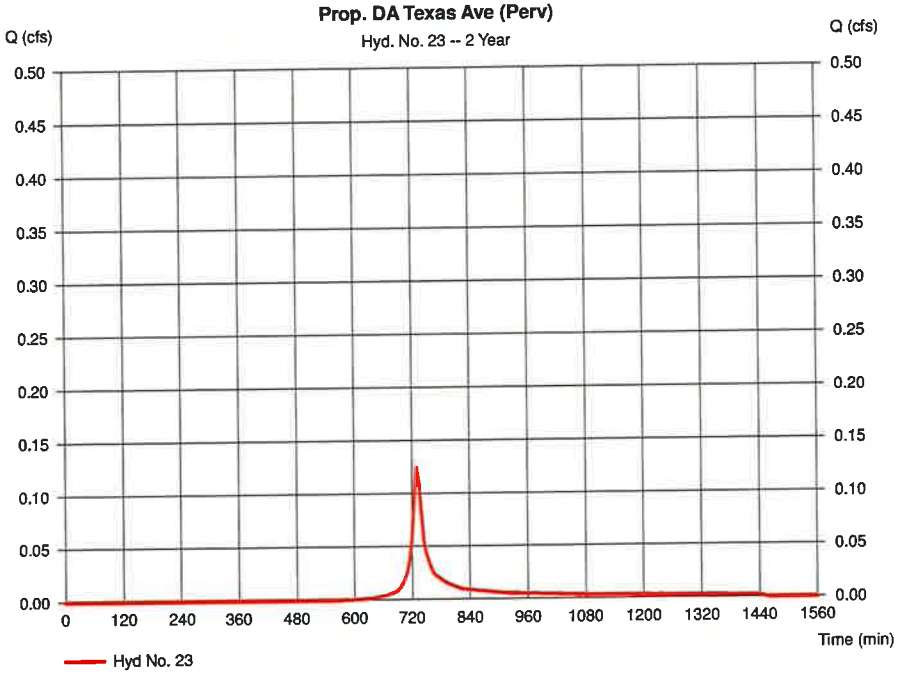


Hydrograph Report

Hyd. No. 23

Prop. DA Texas Ave (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.124 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 455 cuft
Drainage area	= 0.090 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

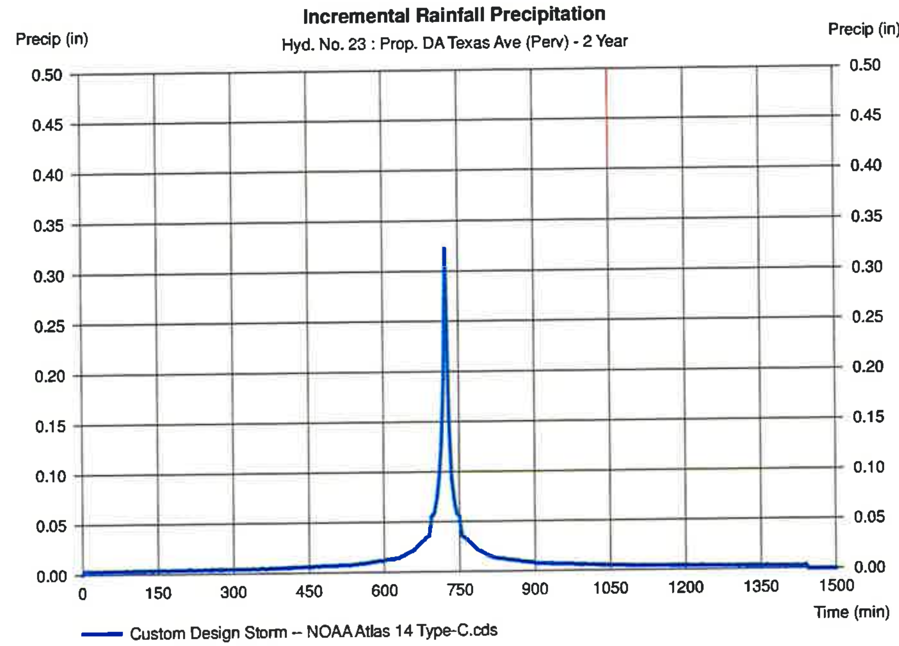


Precipitation Report

Hyd. No. 23

Prop. DA Texas Ave (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



Hydrograph Report

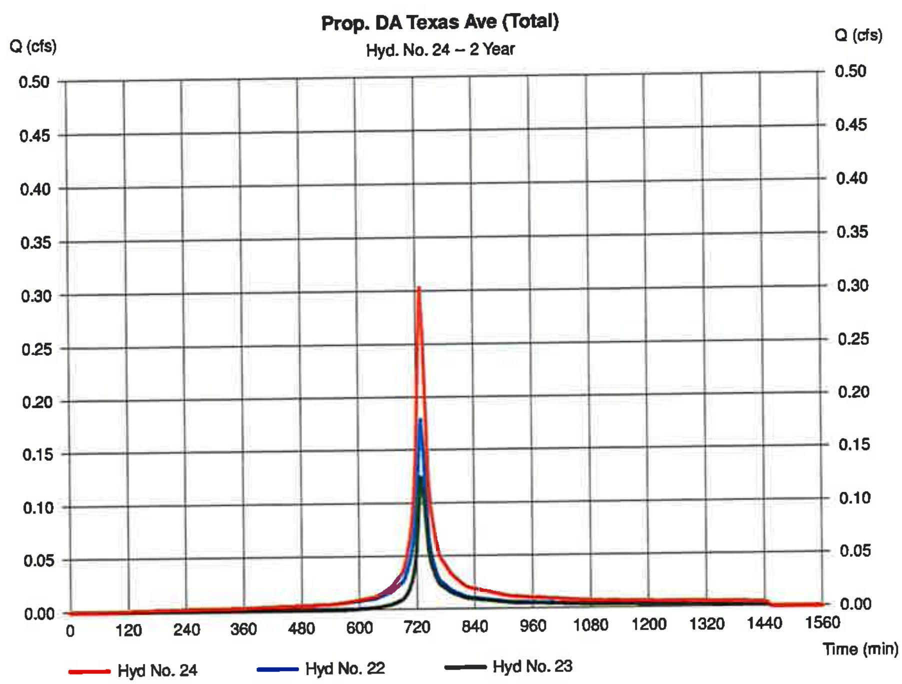
Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Hyd. No. 24

Prop. DA Texas Ave (Total)

Hydrograph type	= Combine	Peak discharge	= 0.303 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,188 cuft
Inflow hyds.	= 22, 23	Contrib. drain. area	= 0.160 ac



Hydrograph Report

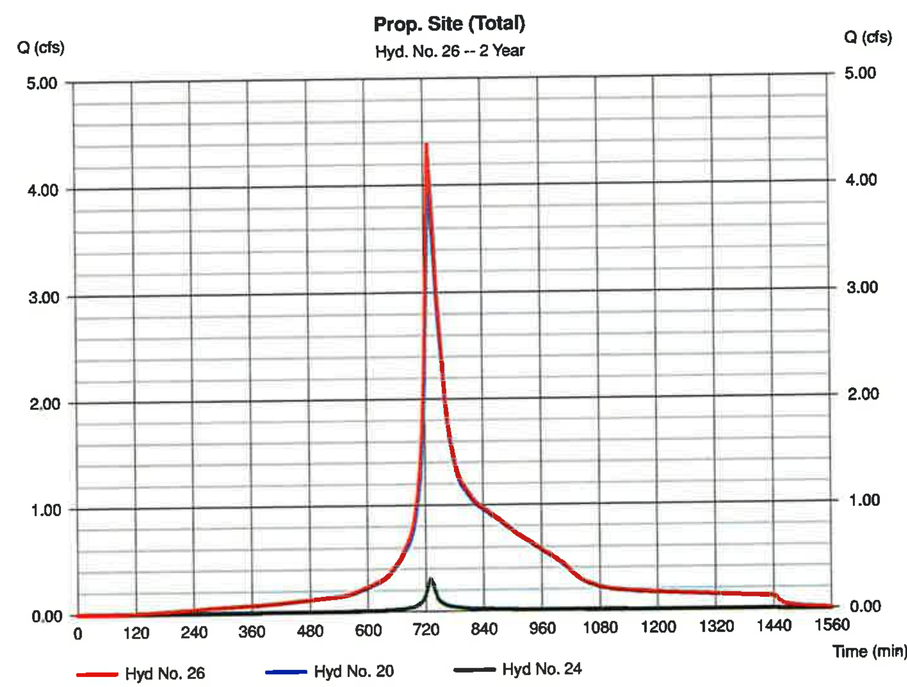
Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Hyd. No. 26

Prop. Site (Total)

Hydrograph type	= Combine	Peak discharge	= 4.386 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 33,137 cuft
Inflow hyds.	= 20, 24	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	1.090	5	730	4,548	----	------	------	Ex. DA South (Imp)
2	SCS Runoff	12.57	5	730	47,229	----	------	------	Ex. DA South (Perv)
3	Combine	13.66	5	730	51,777	1, 2	------	------	Ex. DA South (Total)
5	SCS Runoff	0.506	5	730	2,112	----	------	------	Ex. DA Texas Ave (Imp)
6	SCS Runoff	0.548	5	730	2,059	----	------	------	Ex. DA Texas Ave (Perv)
7	Combine	1.054	5	730	4,171	5, 6	------	------	Ex. DA Texas Ave (Total)
9	Combine	14.71	5	730	55,948	3, 7,	------	------	Ex. Site (Total)
11	SCS Runoff	6.693	5	730	27,939	----	------	------	Prop. DA South (Imp)
12	SCS Runoff	0.679	5	730	2,469	----	------	------	Prop. DA South (Perv)
13	Combine	7.372	5	730	30,408	11, 12	------	------	Prop. DA South (Total)
14	Reservoir	4.670	5	740	30,400	13	60.79	8,370	Post Route UG Basin
16	SCS Runoff	1.440	5	730	6,010	----	------	------	Prop. DA South Und (Imp)
17	SCS Runoff	4.723	5	730	17,182	----	------	------	Prop. DA South Und (Perv)
18	Combine	6.163	5	730	23,192	16, 17	------	------	Prop. DA South Und (Total)
20	Combine	9.695	5	735	53,591	14, 18,	------	------	Prop DA South (Total)
22	SCS Runoff	0.272	5	730	1,137	----	------	------	Prop. DA Texas Ave (Imp)
23	SCS Runoff	0.244	5	730	889	----	------	------	Prop. DA Texas Ave (Perv)
24	Combine	0.517	5	730	2,026	22, 23	------	------	Prop. DA Texas Ave (Total)
26	Combine	10.14	5	735	55,617	20, 24,	------	------	Prop. Site (Total)

Hydrograph Report

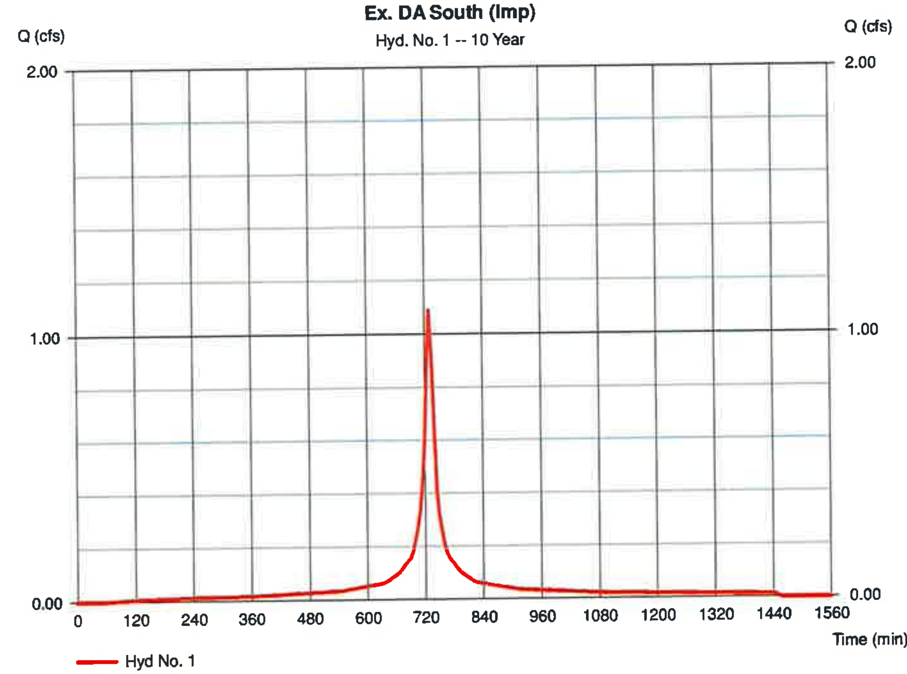
Hyd. No. 1

Ex. DA South (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.090 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 4,548 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

Ex. DA South (Imp)

Hyd. No. 1 -- 10 Year

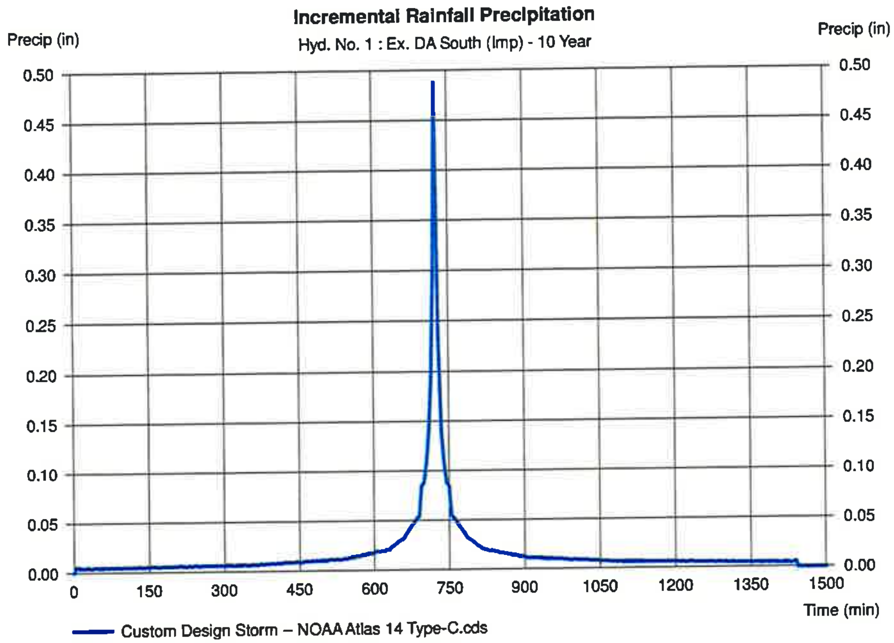


Precipitation Report

Hyd. No. 1

Ex. DA South (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

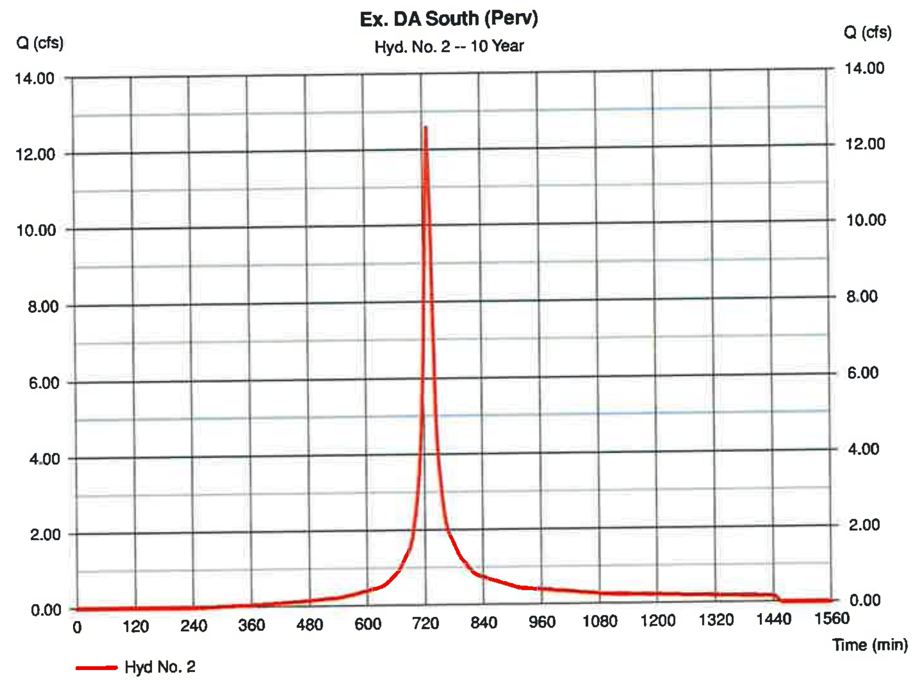


Hydrograph Report

Hyd. No. 2

Ex. DA South (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 12.57 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 47,229 cuft
Drainage area	= 3.670 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484



Precipitation Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

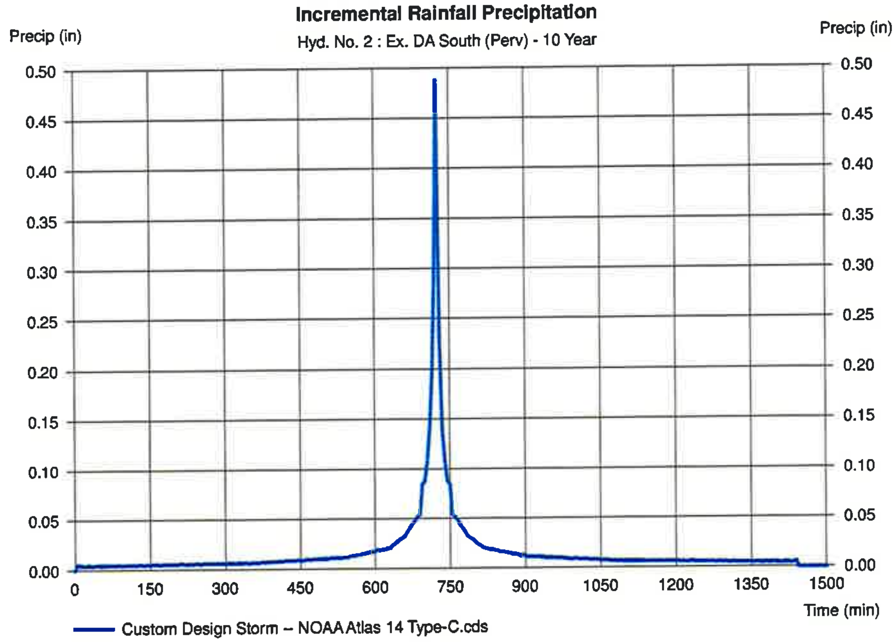
Hyd. No. 2

Ex. DA South (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

Incremental Rainfall Precipitation

Hyd. No. 2 : Ex. DA South (Perv) - 10 Year



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

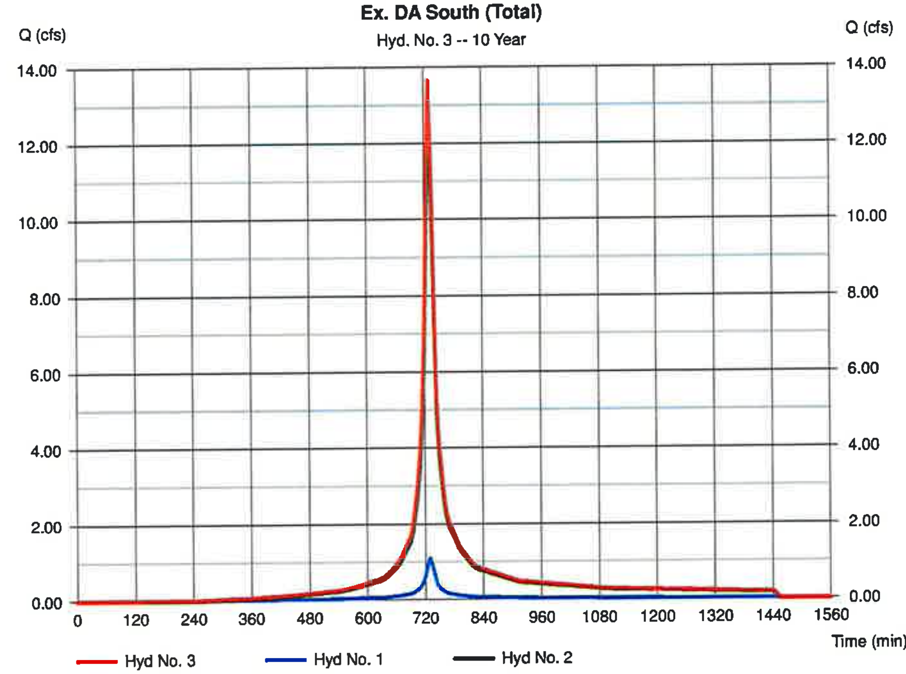
Hyd. No. 3

Ex. DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 13.66 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 51,777 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.950 ac

Ex. DA South (Total)

Hyd. No. 3 -- 10 Year

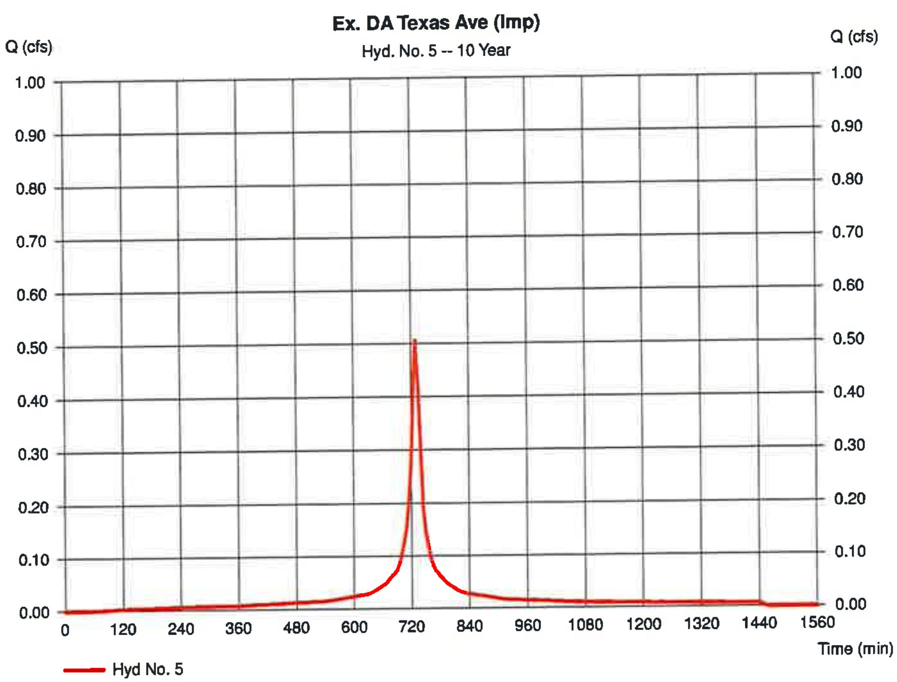


Hydrograph Report

Hyd. No. 5

Ex. DA Texas Ave (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.506 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,112 cuft
Drainage area	= 0.130 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

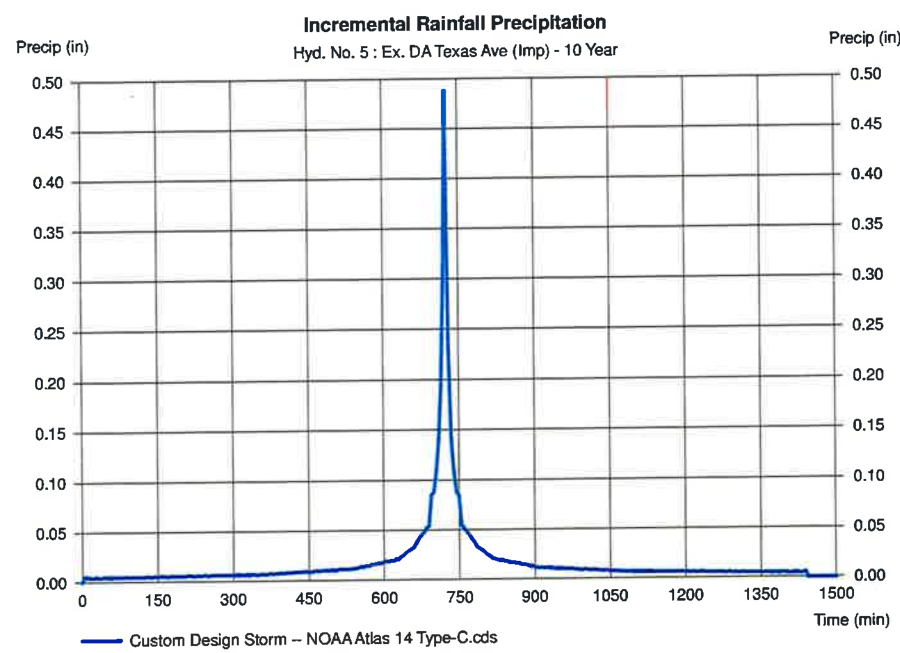


Precipitation Report

Hyd. No. 5

Ex. DA Texas Ave (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

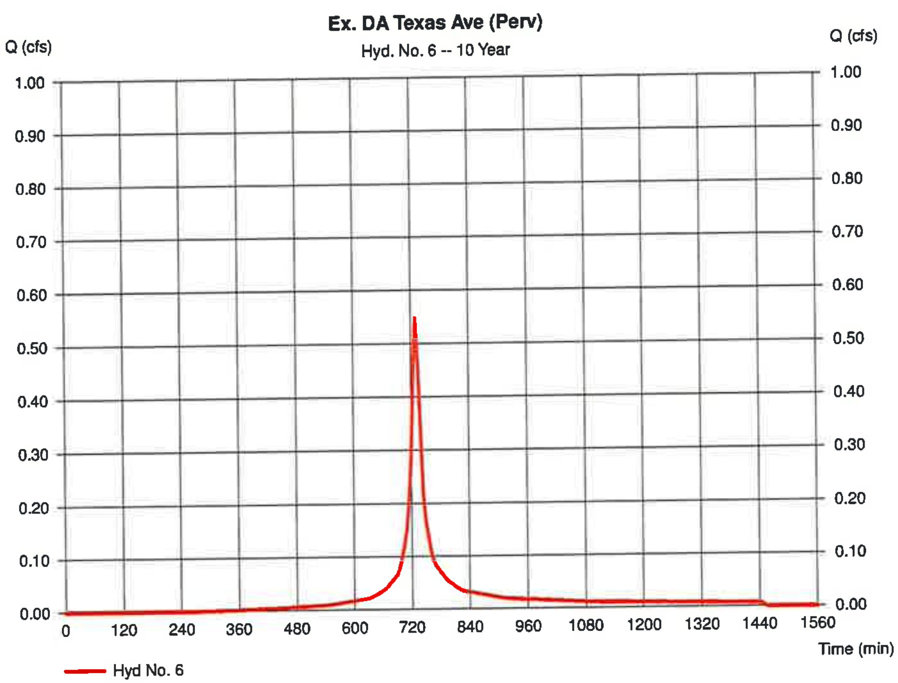


Hydrograph Report

Hyd. No. 6

Ex. DA Texas Ave (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.548 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,059 cuft
Drainage area	= 0.160 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

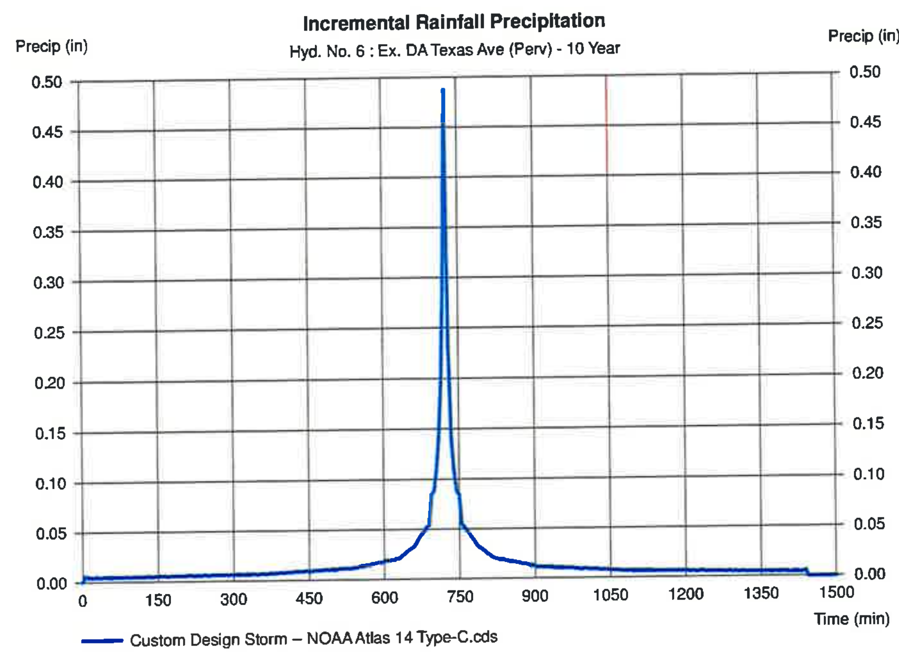


Precipitation Report

Hyd. No. 6

Ex. DA Texas Ave (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



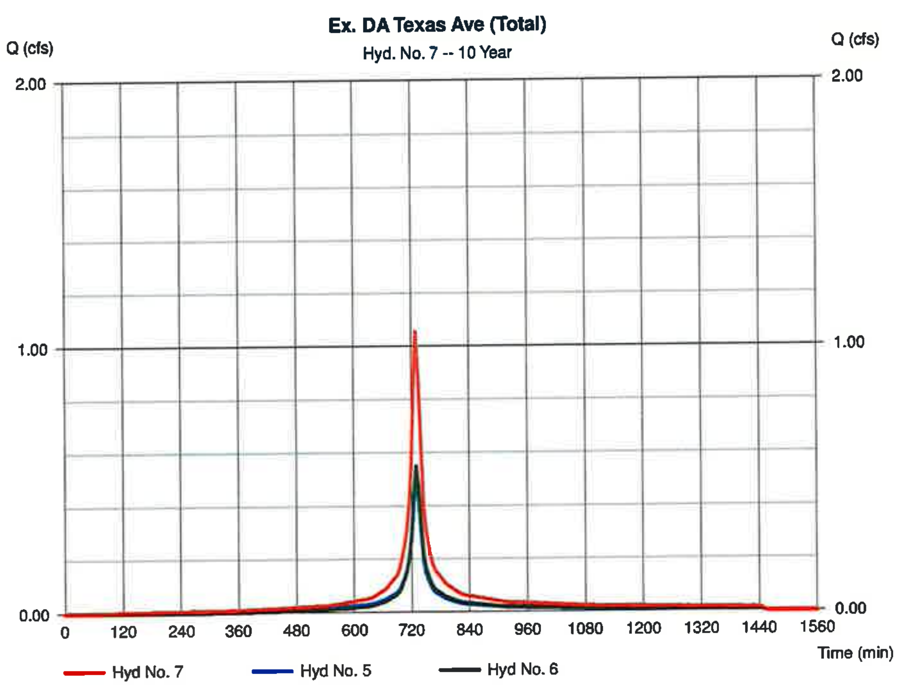
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Friday, Oct 9, 2020

Hyd. No. 7

Ex. DA Texas Ave (Total)

Hydrograph type	= Combine	Peak discharge	= 1.054 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 4,171 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.290 ac



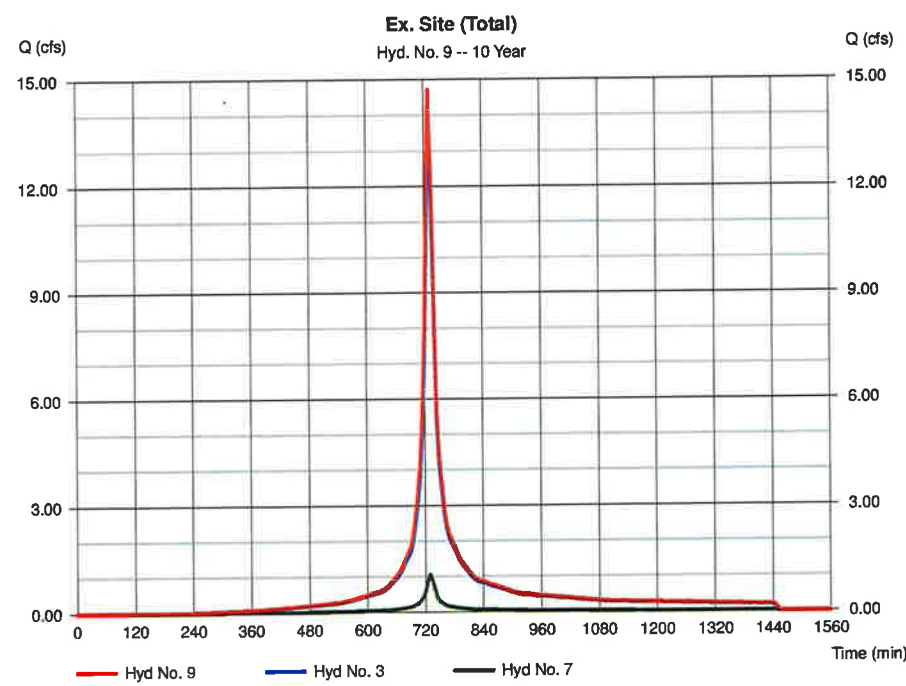
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Friday, Oct 9, 2020

Hyd. No. 9

Ex. Site (Total)

Hydrograph type	= Combine	Peak discharge	= 14.71 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 55,948 cuft
Inflow hyds.	= 3, 7	Contrib. drain. area	= 0.000 ac



Hydrograph Report

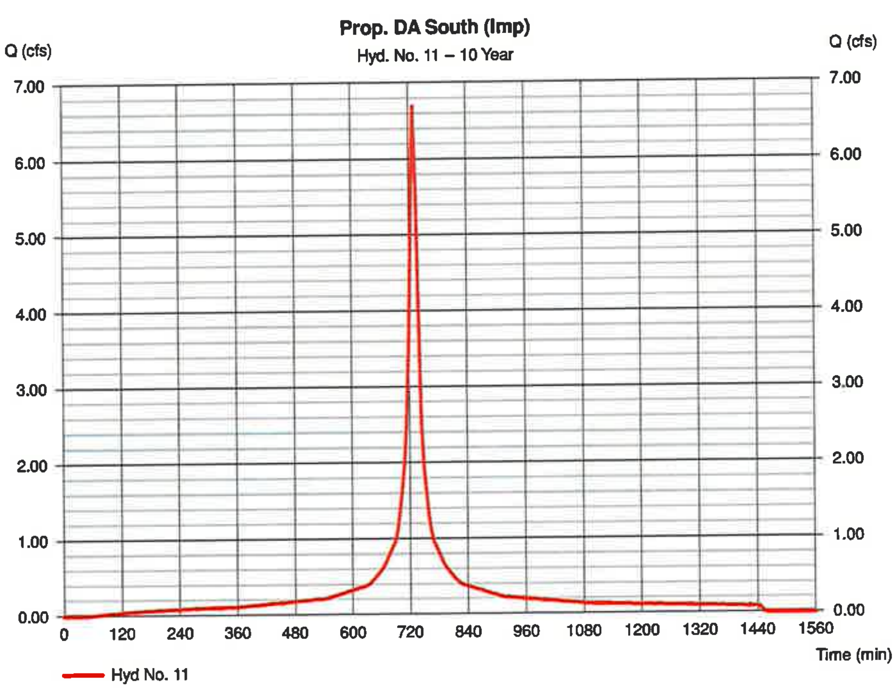
Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Hyd. No. 11

Prop. DA South (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.693 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 27,939 cuft
Drainage area	= 1.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484



Precipitation Report

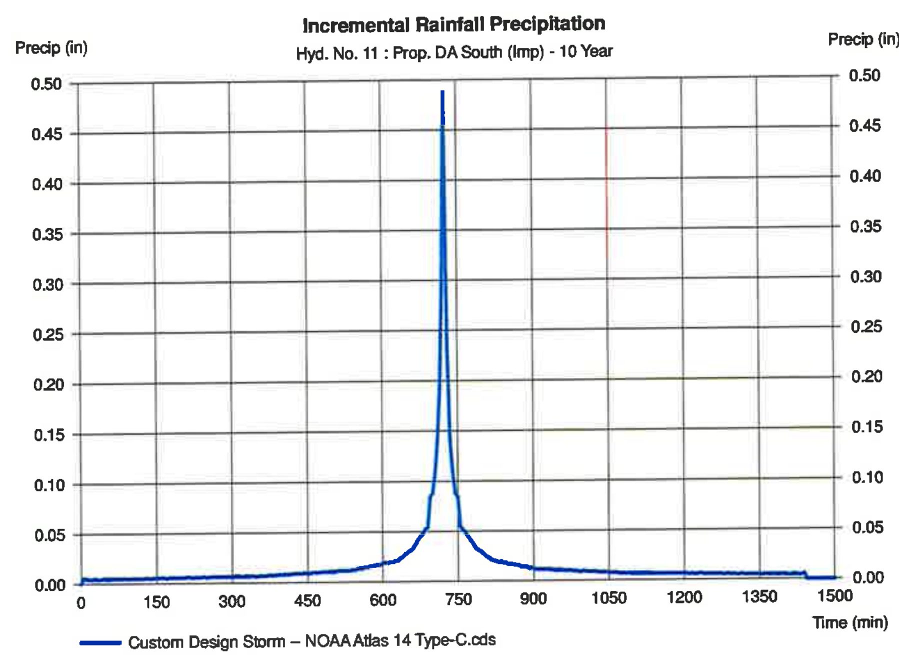
Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Hyd. No. 11

Prop. DA South (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

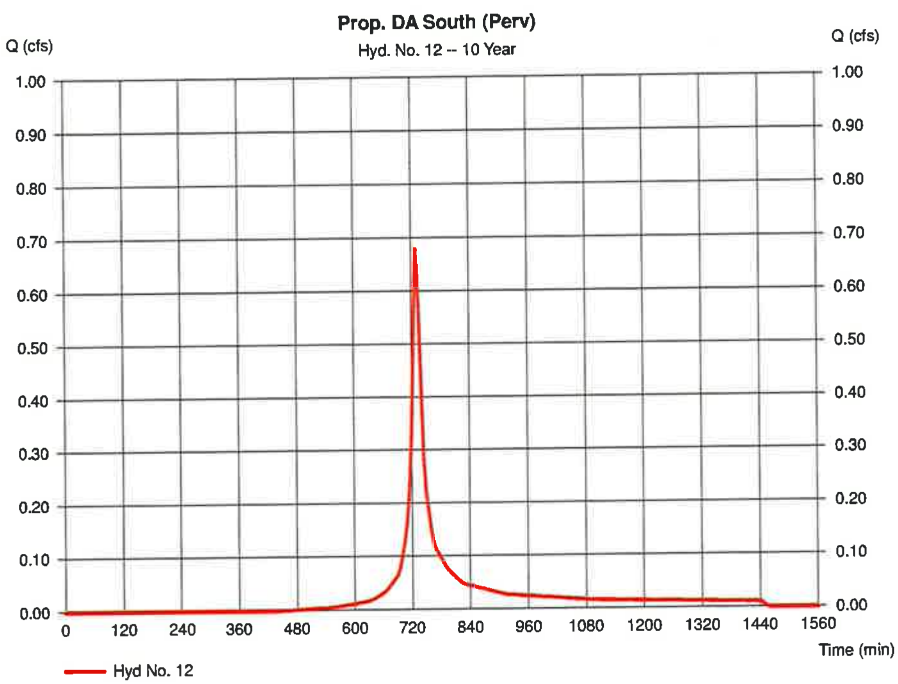


Hydrograph Report

Hyd. No. 12

Prop. DA South (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.679 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,469 cuft
Drainage area	= 0.250 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

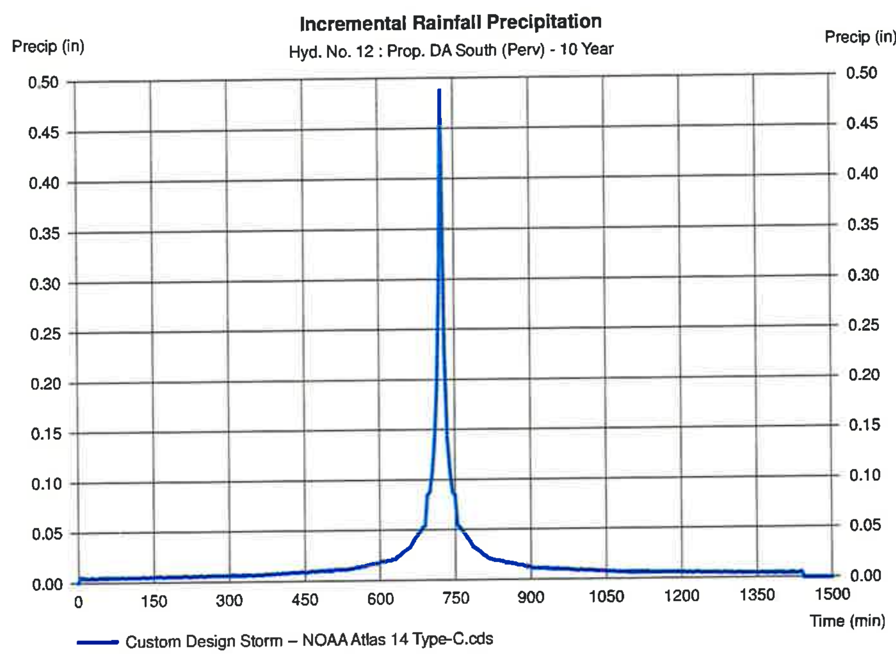


Precipitation Report

Hyd. No. 12

Prop. DA South (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



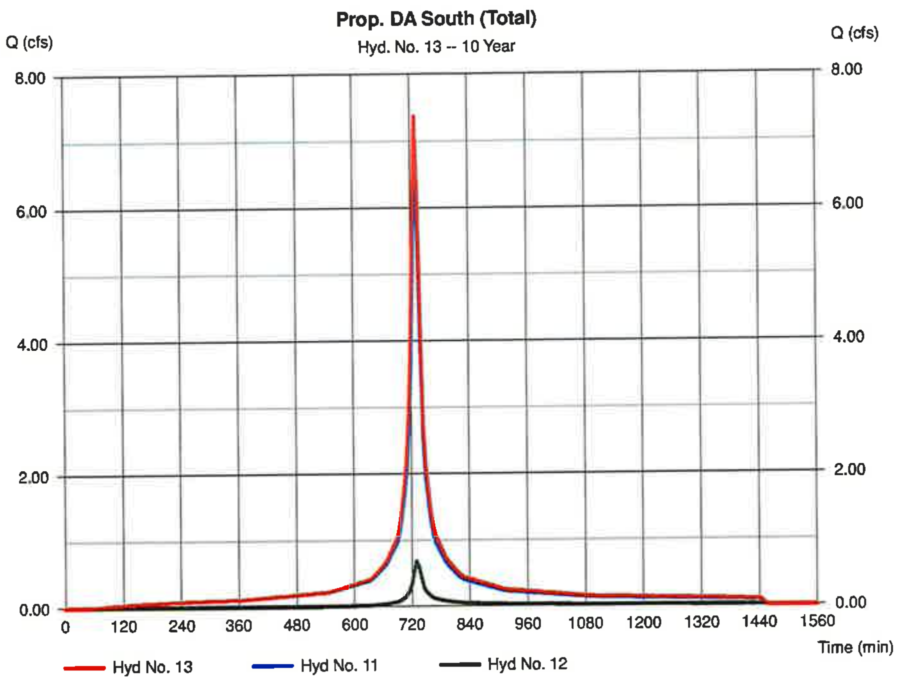
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 13

Prop. DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 7.372 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 30,408 cuft
Inflow hyds.	= 11, 12	Contrib. drain. area	= 1.970 ac



Hydrograph Report

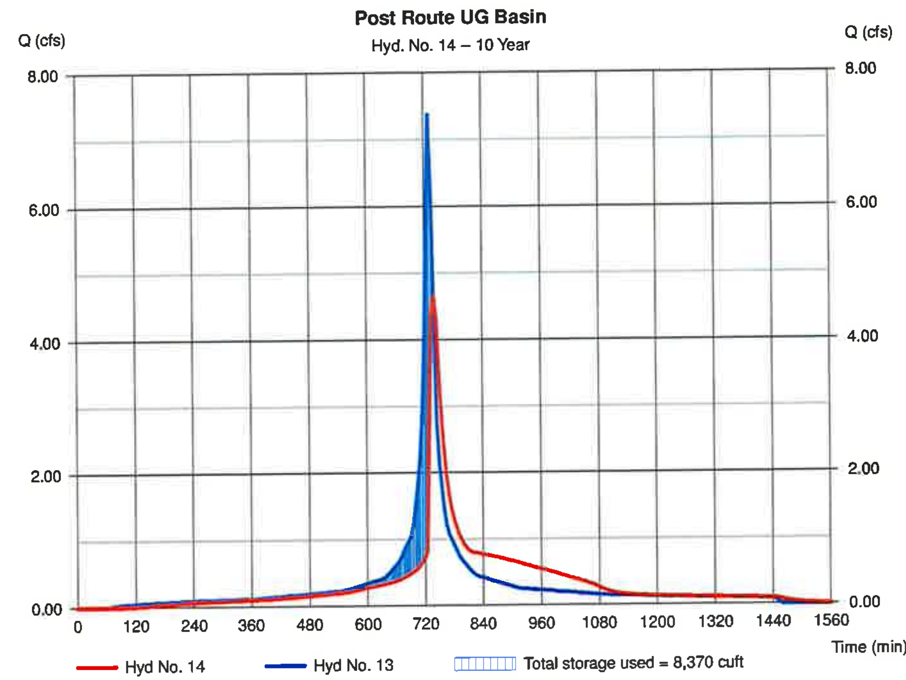
Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 14

Post Route UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 4.670 cfs
Storm frequency	= 10 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 30,400 cuft
Inflow hyd. No.	= 13 - Prop. DA South (Total)	Max. Elevation	= 60.79 ft
Reservoir name	= UG Det Basin	Max. Storage	= 8,370 cuft

Storage Indication method used.

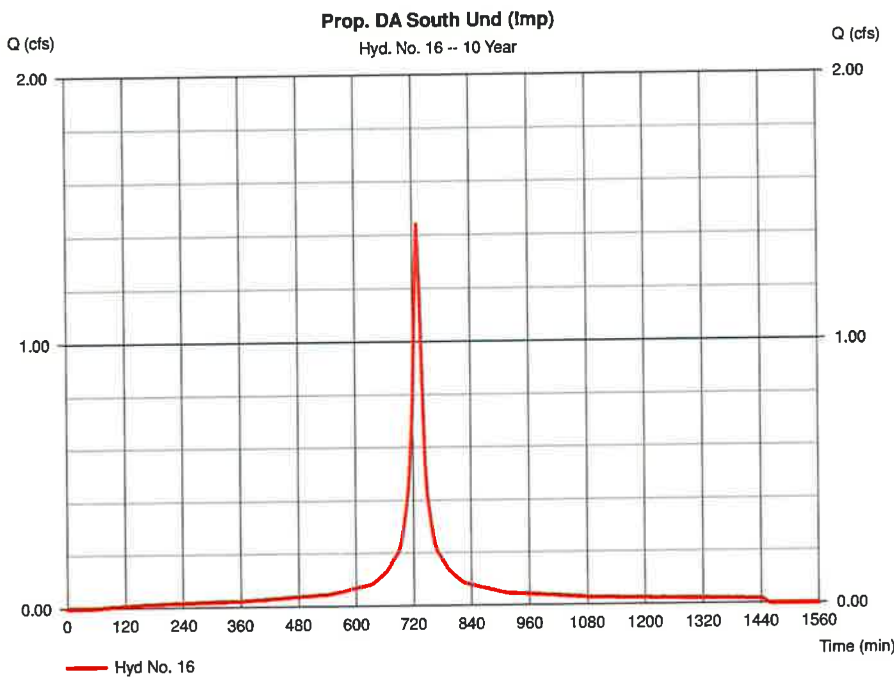


Hydrograph Report

Hyd. No. 16

Prop. DA South Und (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.440 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 6,010 cuft
Drainage area	= 0.370 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

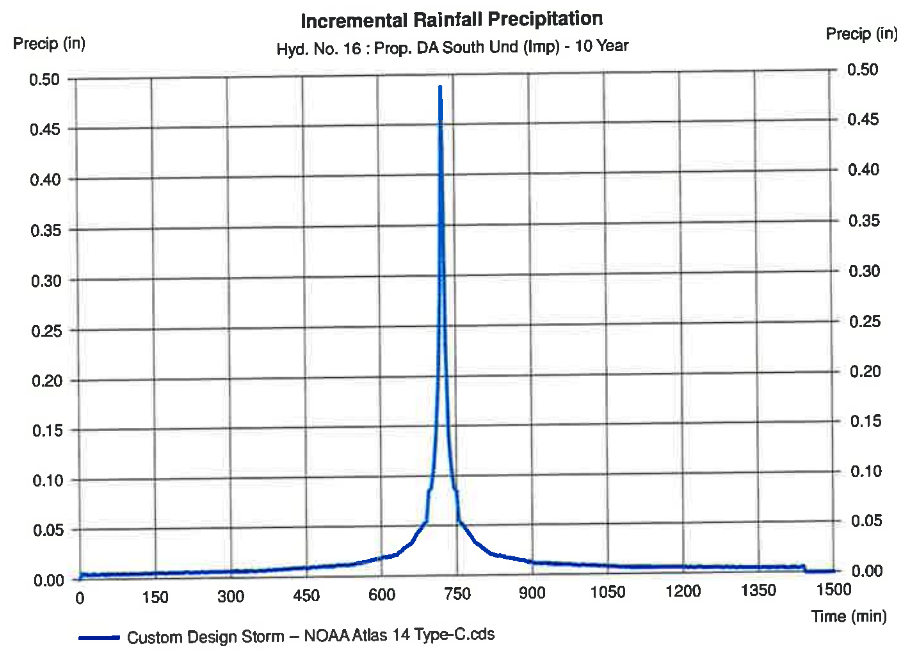


Precipitation Report

Hyd. No. 16

Prop. DA South Und (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



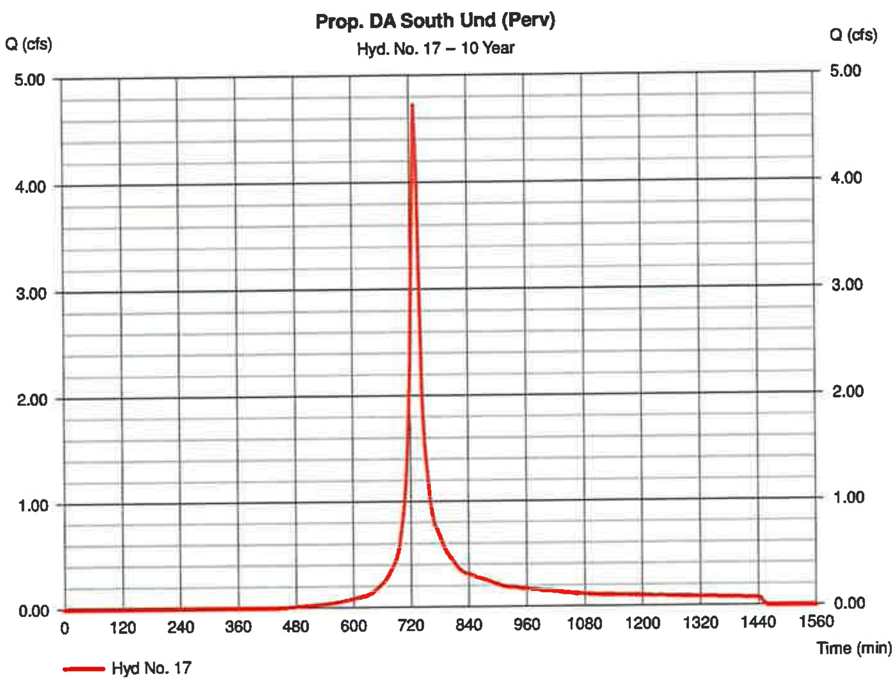
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 17

Prop. DA South Und (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.723 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 17,182 cuft
Drainage area	= 1.740 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484



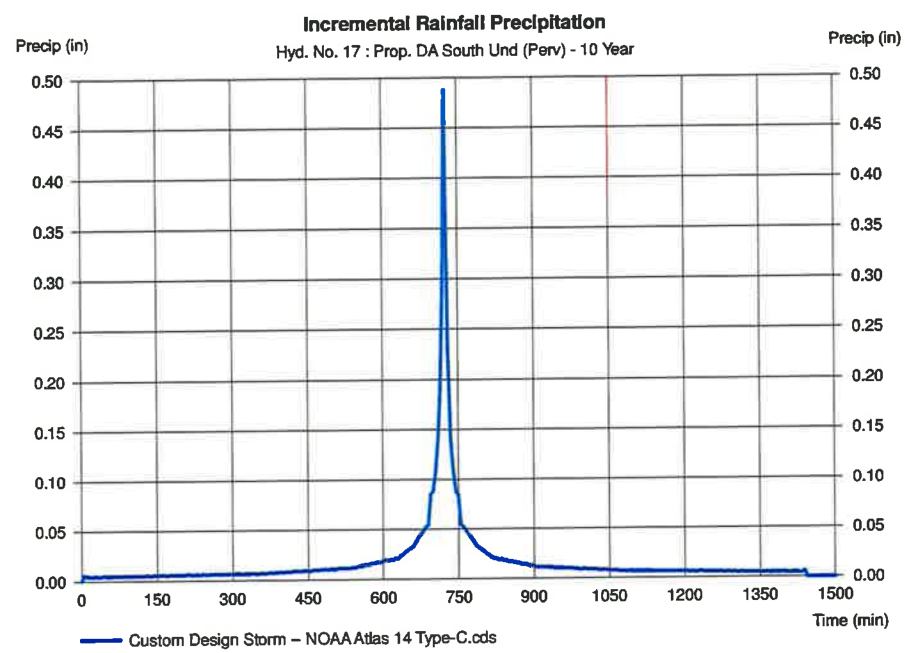
Precipitation Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 17

Prop. DA South Und (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



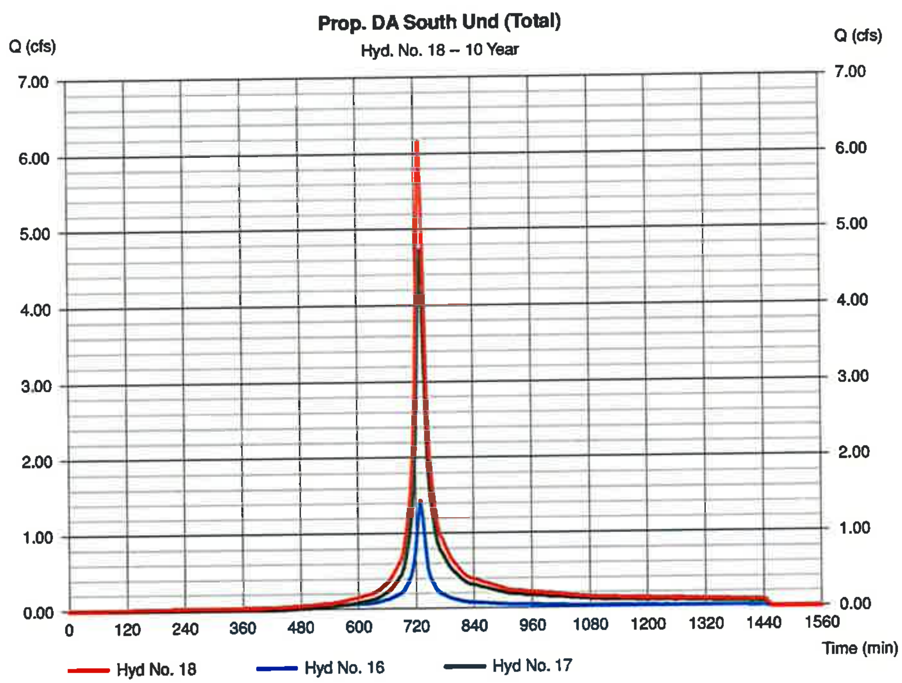
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Friday, Oct 9, 2020

Hyd. No. 18

Prop. DA South Und (Total)

Hydrograph type	= Combine	Peak discharge	= 6.163 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 23,192 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 2.110 ac



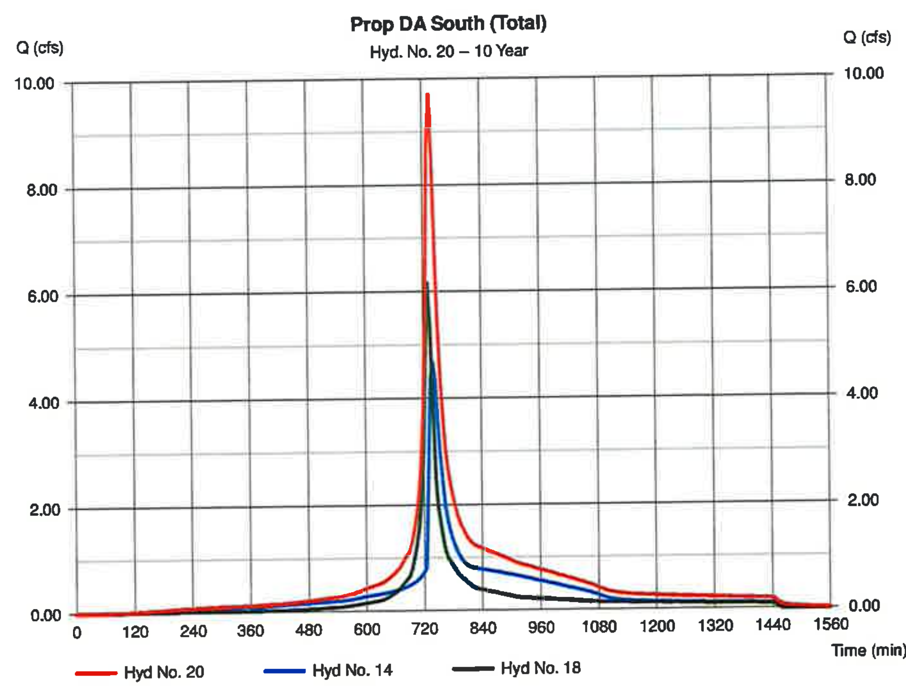
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Friday, Oct 9, 2020

Hyd. No. 20

Prop DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 9.695 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 53,591 cuft
Inflow hyds.	= 14, 18	Contrib. drain. area	= 0.000 ac

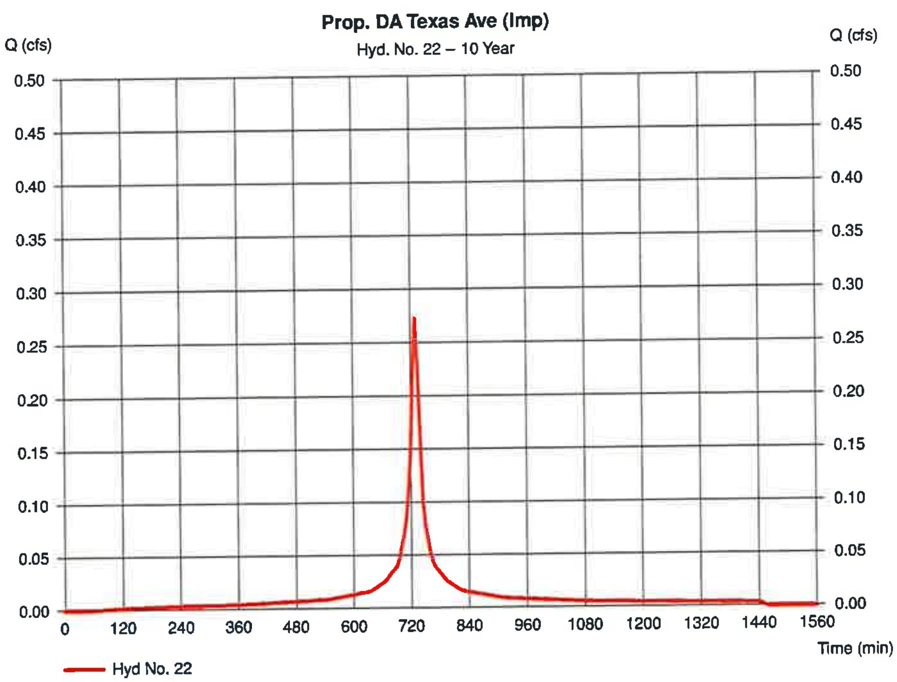


Hydrograph Report

Hyd. No. 22

Prop. DA Texas Ave (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.272 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,137 cuft
Drainage area	= 0.070 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

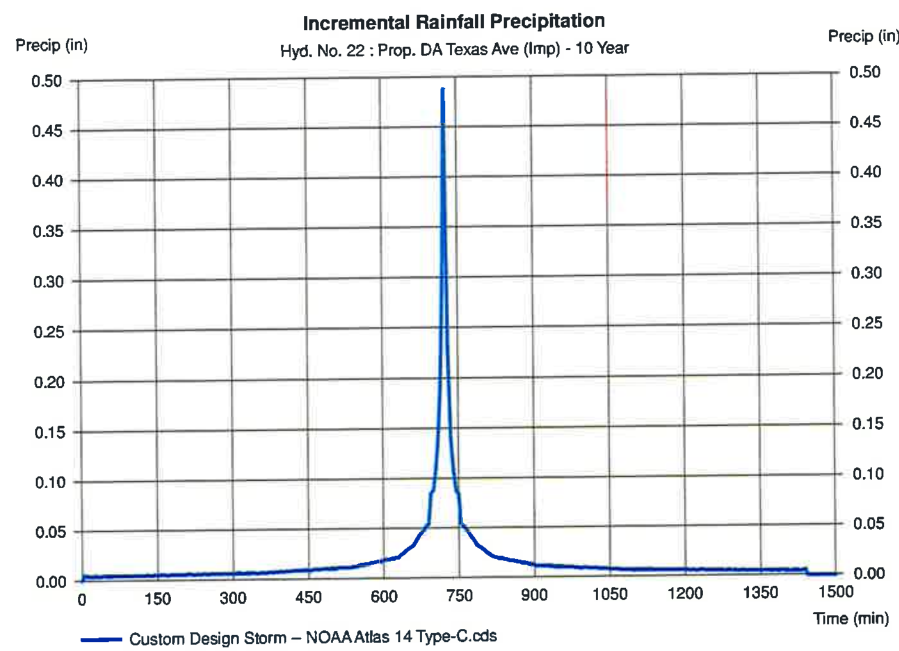


Precipitation Report

Hyd. No. 22

Prop. DA Texas Ave (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

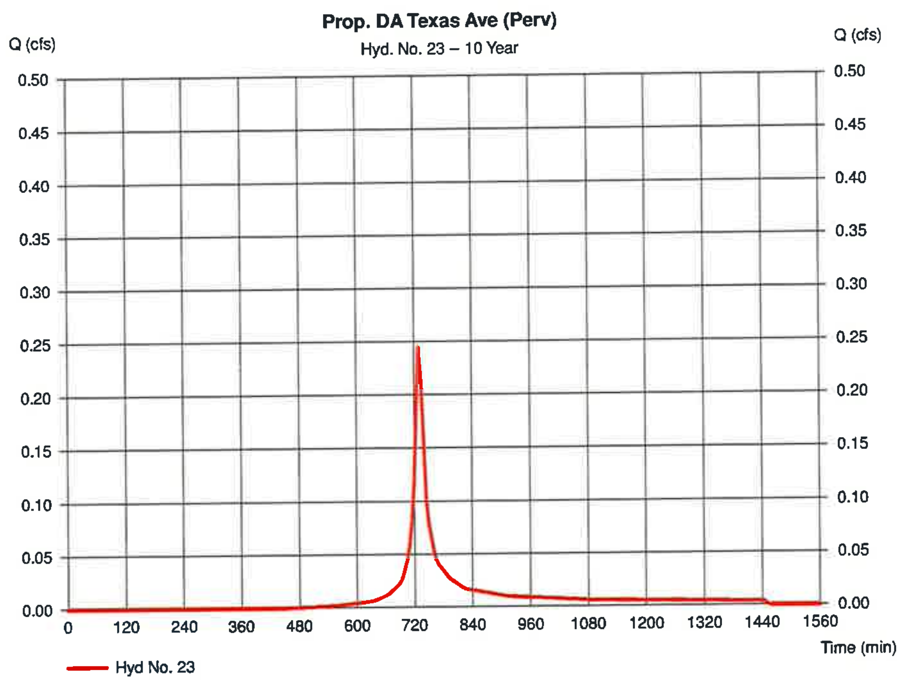


Hydrograph Report

Hyd. No. 23

Prop. DA Texas Ave (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.244 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 889 cuft
Drainage area	= 0.090 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

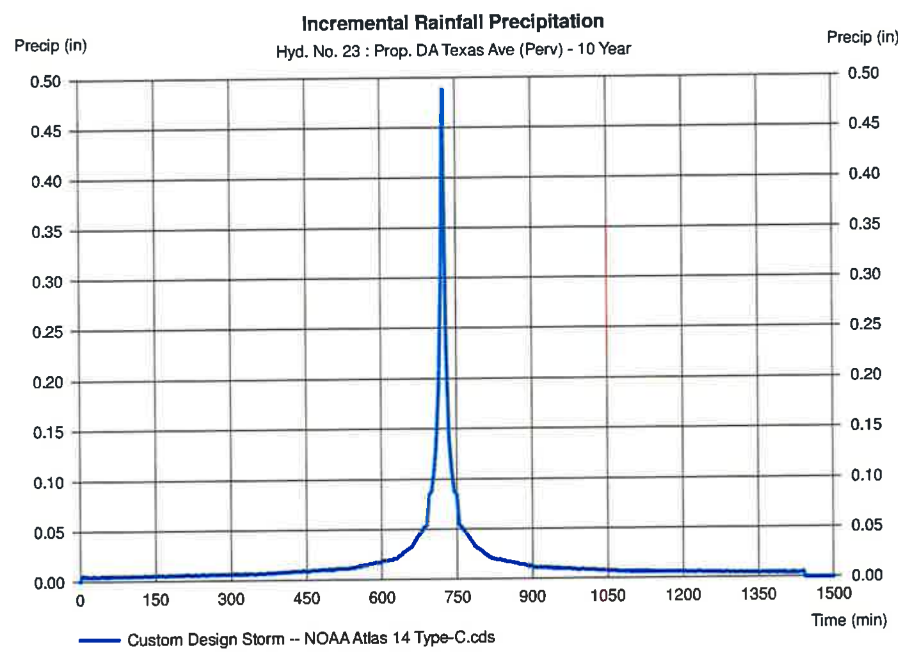


Precipitation Report

Hyd. No. 23

Prop. DA Texas Ave (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



Hydrograph Report

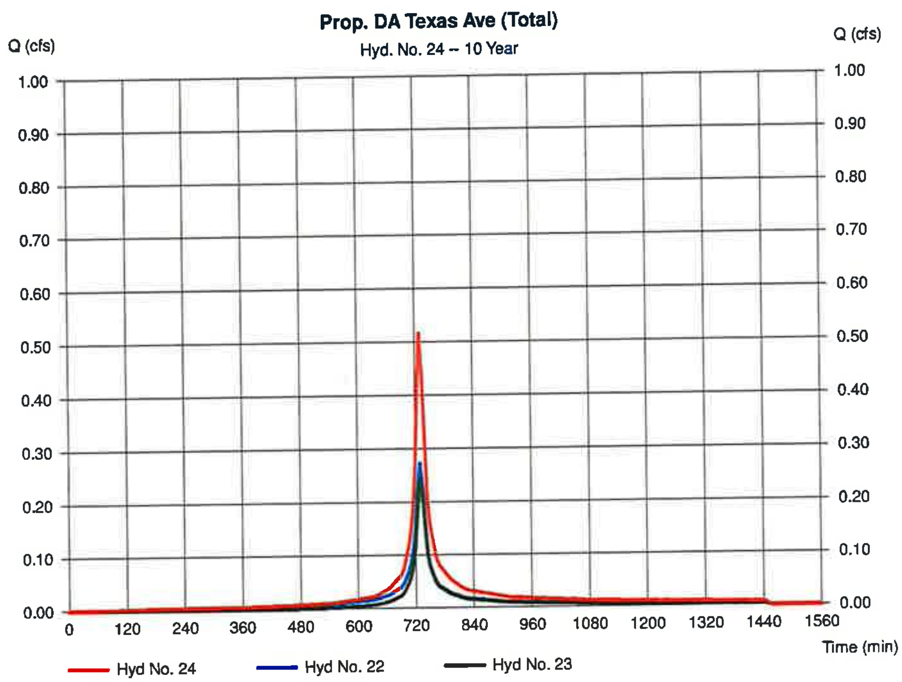
Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Hyd. No. 24

Prop. DA Texas Ave (Total)

Hydrograph type	= Combine	Peak discharge	= 0.517 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,026 cuft
Inflow hyds.	= 22, 23	Contrib. drain. area	= 0.160 ac



Hydrograph Report

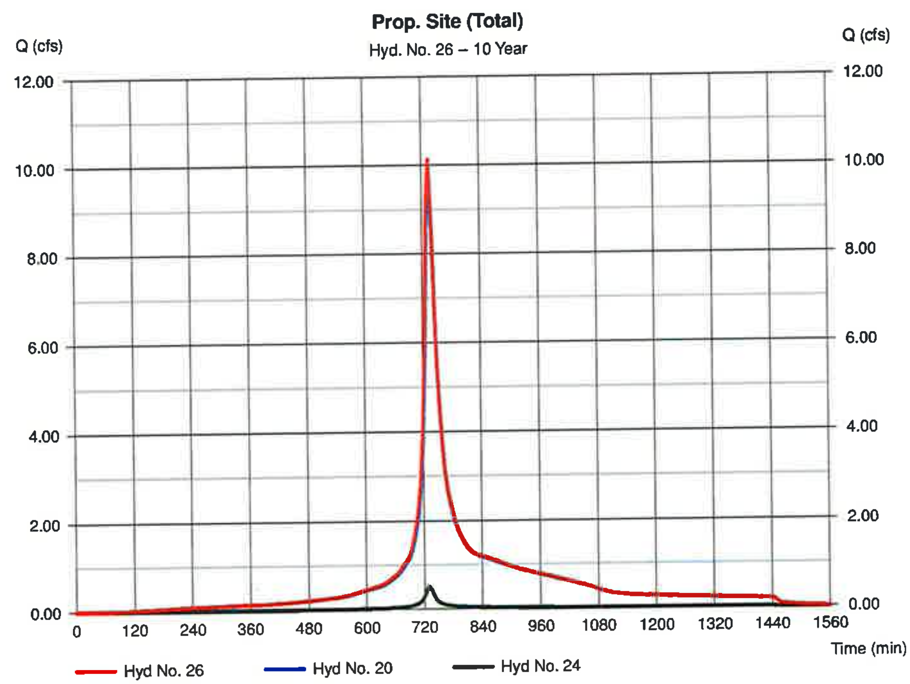
Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Hyd. No. 26

Prop. Site (Total)

Hydrograph type	= Combine	Peak discharge	= 10.14 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 55,617 cuft
Inflow hyds.	= 20, 24	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

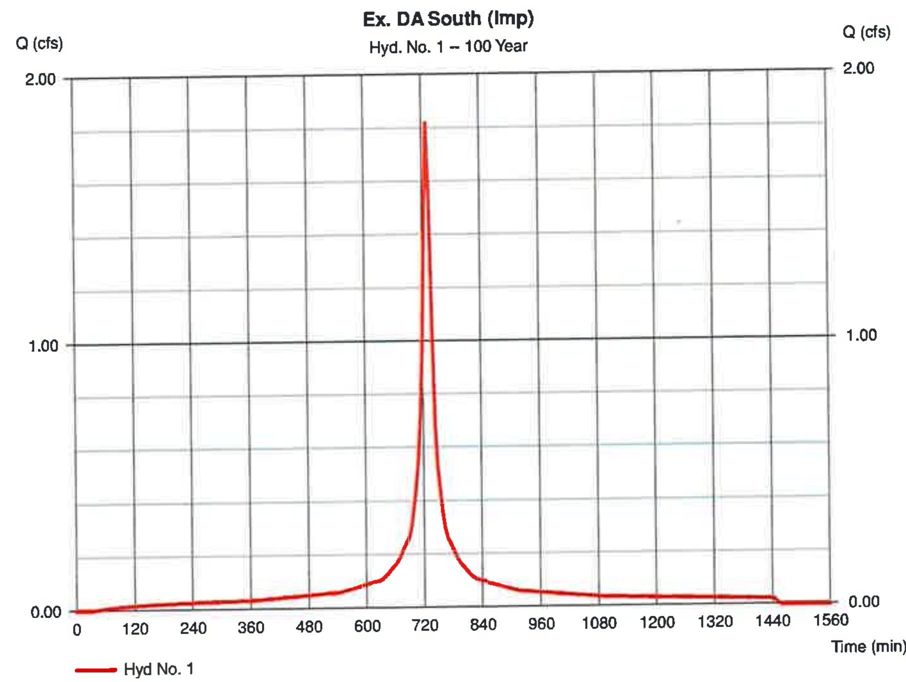
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	1.818	5	730	7,709	----	------	------	Ex. DA South (Imp)
2	SCS Runoff	22.51	5	730	87,561	----	------	------	Ex. DA South (Perv)
3	Combine	24.33	5	730	95,270	1, 2	------	------	Ex. DA South (Total)
5	SCS Runoff	0.844	5	730	3,579	----	------	------	Ex. DA Texas Ave (Imp)
6	SCS Runoff	0.981	5	730	3,817	----	------	------	Ex. DA Texas Ave (Perv)
7	Combine	1.826	5	730	7,396	5, 6	------	------	Ex. DA Texas Ave (Total)
9	Combine	26.15	5	730	102,666	3, 7,	------	------	Ex. Site (Total)
11	SCS Runoff	11.17	5	730	47,354	----	------	------	Prop. DA South (Imp)
12	SCS Runoff	1.360	5	730	5,049	----	------	------	Prop. DA South (Perv)
13	Combine	12.53	5	730	52,403	11, 12	------	------	Prop. DA South (Total)
14	Reservoir	8.731	5	740	52,395	13	61.47	11,660	Post Route UG Basin
16	SCS Runoff	2.403	5	730	10,187	----	------	------	Prop. DA South Und (Imp)
17	SCS Runoff	9.467	5	730	35,144	----	------	------	Prop. DA South Und (Perv)
18	Combine	11.87	5	730	45,330	16, 17	------	------	Prop. DA South Und (Total)
20	Combine	19.11	5	730	97,726	14, 18,	------	------	Prop DA South (Total)
22	SCS Runoff	0.455	5	730	1,927	----	------	------	Prop. DA Texas Ave (Imp)
23	SCS Runoff	0.490	5	730	1,818	----	------	------	Prop. DA Texas Ave (Perv)
24	Combine	0.944	5	730	3,745	22, 23	------	------	Prop. DA Texas Ave (Total)
26	Combine	20.05	5	730	101,471	20, 24,	------	------	Prop. Site (Total)

Hydrograph Report

Hyd. No. 1

Ex. DA South (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.818 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 7,709 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

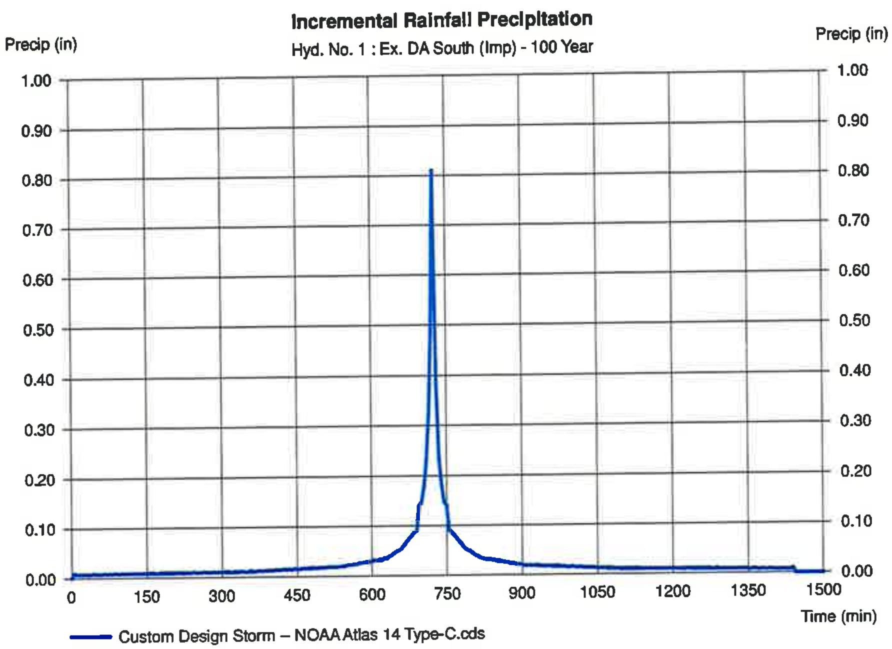


Precipitation Report

Hyd. No. 1

Ex. DA South (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

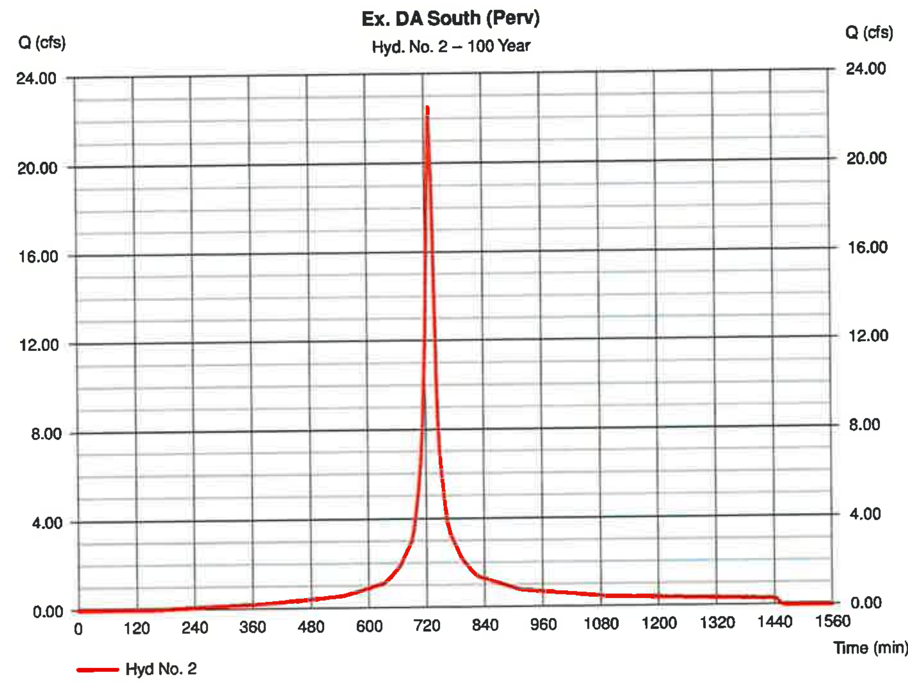


Hydrograph Report

Hyd. No. 2

Ex. DA South (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 22.51 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 87,561 cuft
Drainage area	= 3.670 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

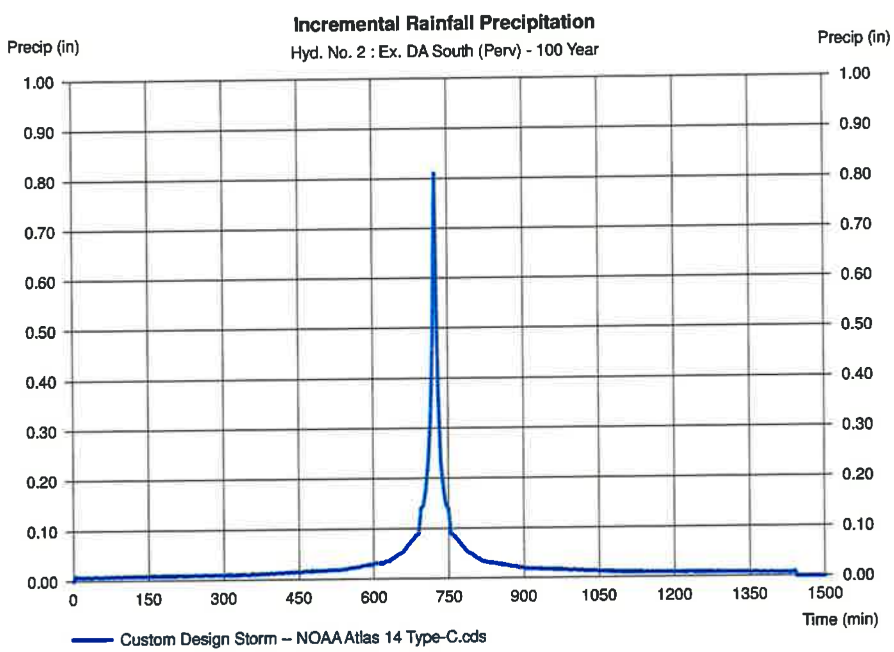


Precipitation Report

Hyd. No. 2

Ex. DA South (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

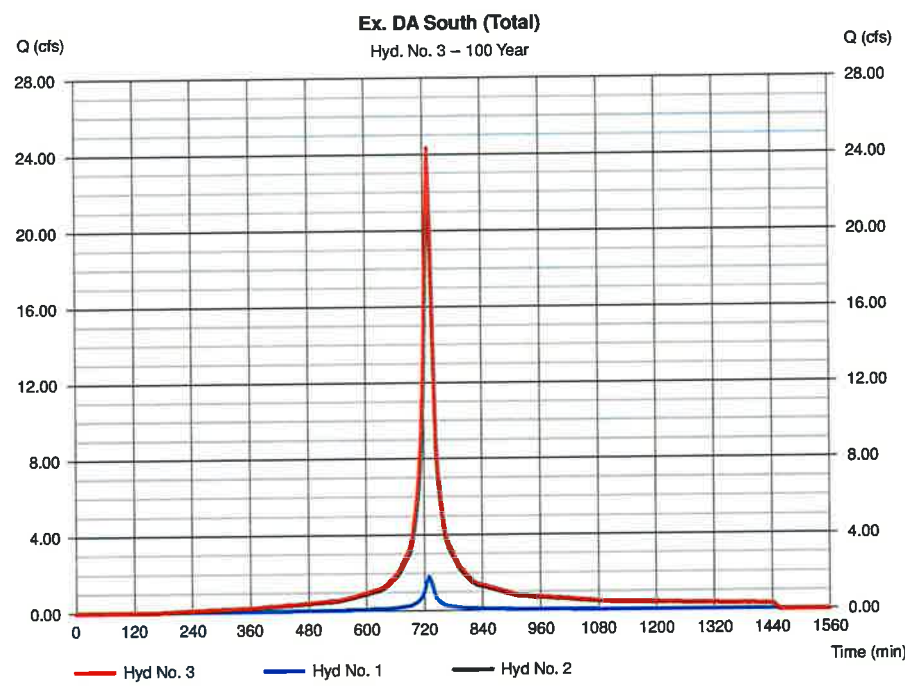


Hydrograph Report

Hyd. No. 3

Ex. DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 24.33 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 95,270 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.950 ac

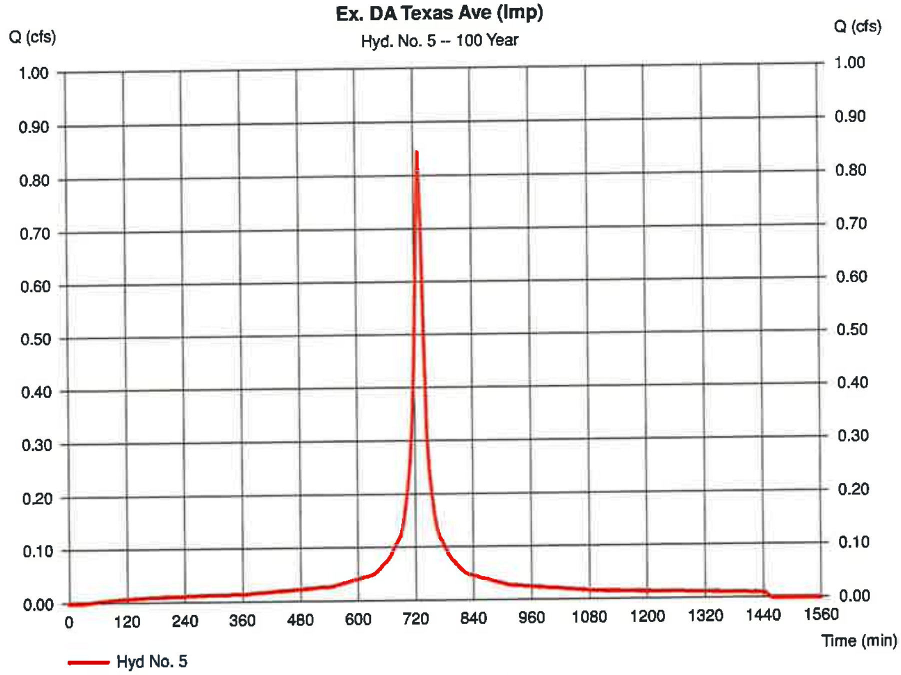


Hydrograph Report

Hyd. No. 5

Ex. DA Texas Ave (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.844 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 3,579 cuft
Drainage area	= 0.130 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

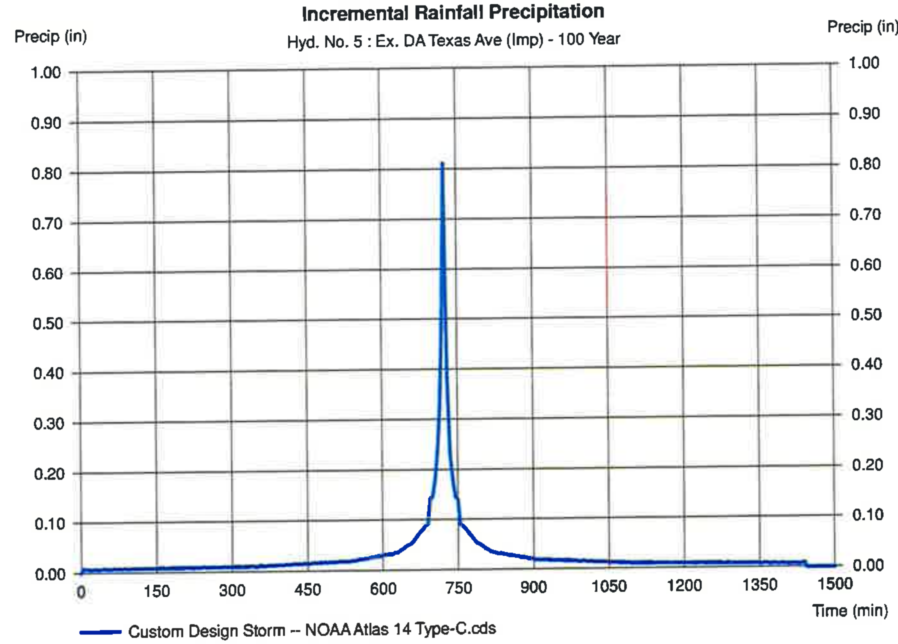


Precipitation Report

Hyd. No. 5

Ex. DA Texas Ave (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

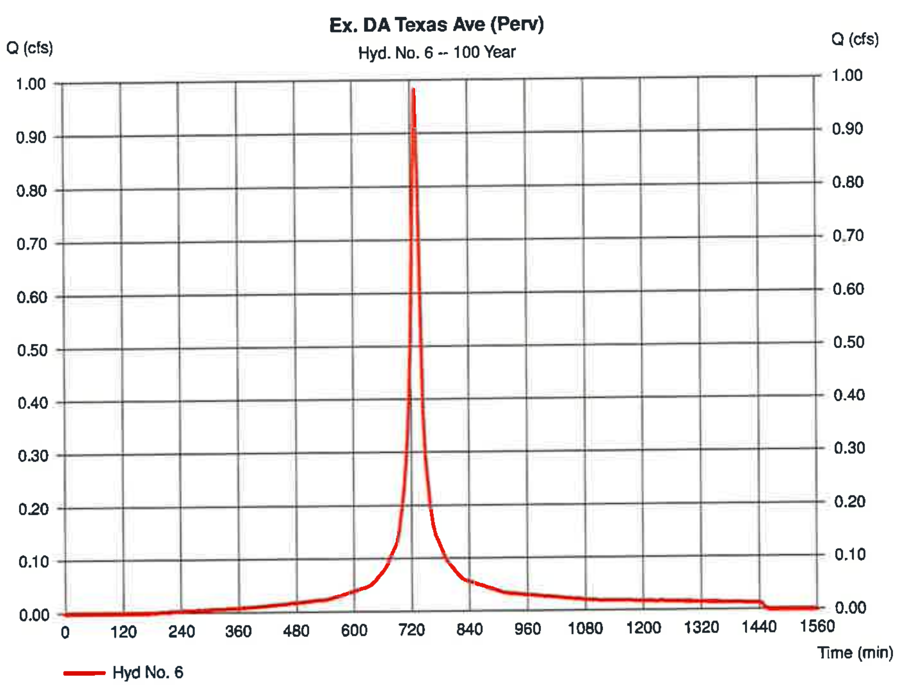


Hydrograph Report

Hyd. No. 6

Ex. DA Texas Ave (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.981 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 3,817 cuft
Drainage area	= 0.160 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

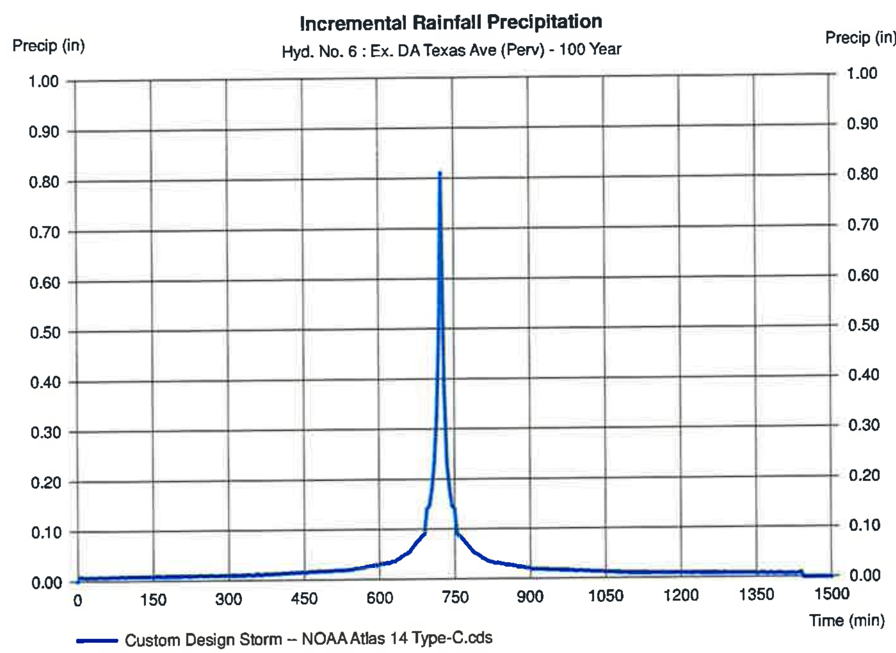


Precipitation Report

Hyd. No. 6

Ex. DA Texas Ave (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



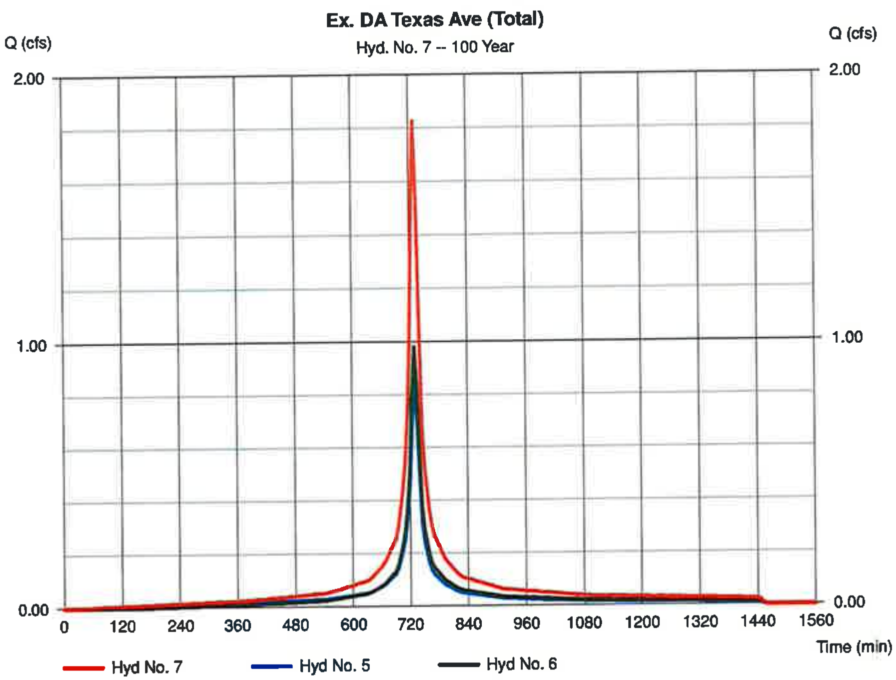
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 7

Ex. DA Texas Ave (Total)

Hydrograph type	= Combine	Peak discharge	= 1.826 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 7,396 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.290 ac



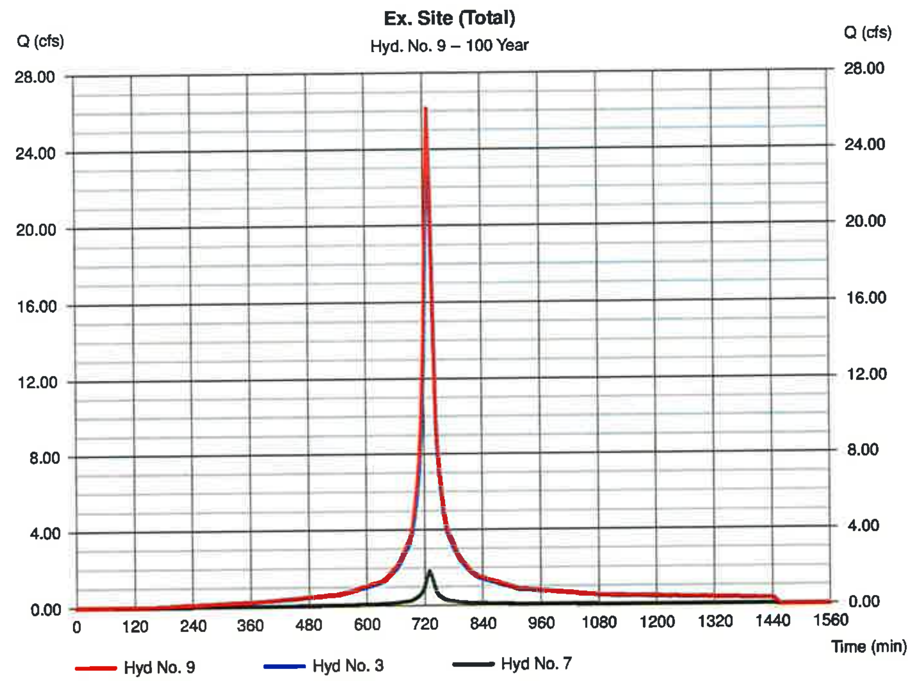
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 9

Ex. Site (Total)

Hydrograph type	= Combine	Peak discharge	= 26.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 102,666 cuft
Inflow hyds.	= 3, 7	Contrib. drain. area	= 0.000 ac

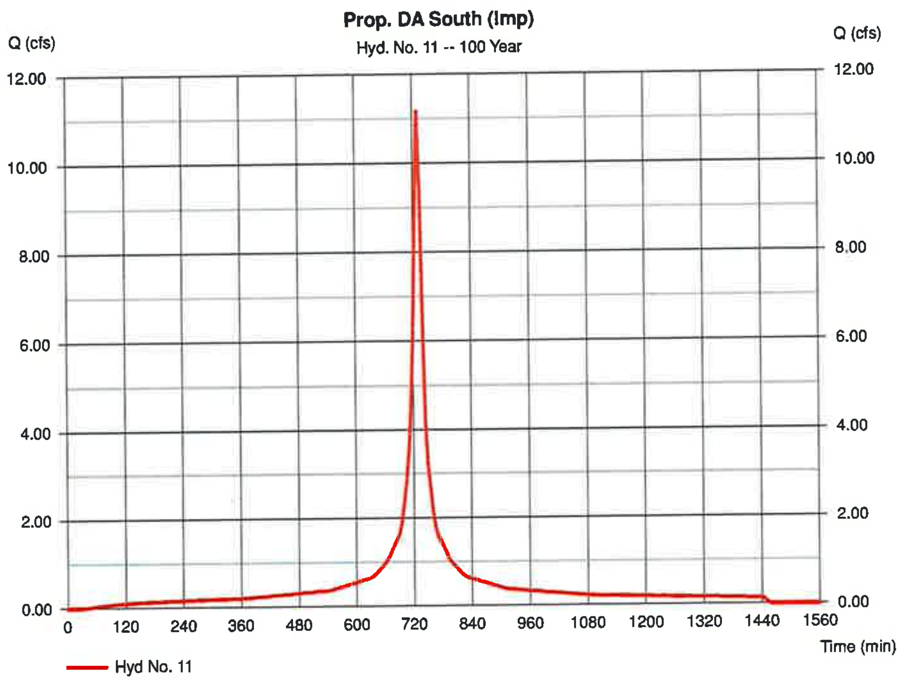


Hydrograph Report

Hyd. No. 11

Prop. DA South (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 11.17 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 47,354 cuft
Drainage area	= 1.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

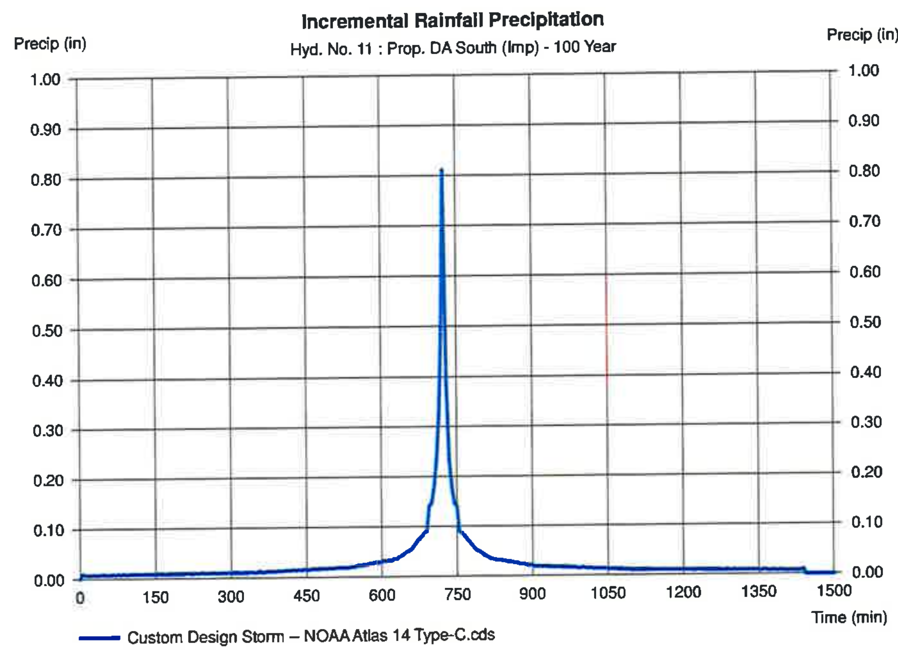


Precipitation Report

Hyd. No. 11

Prop. DA South (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

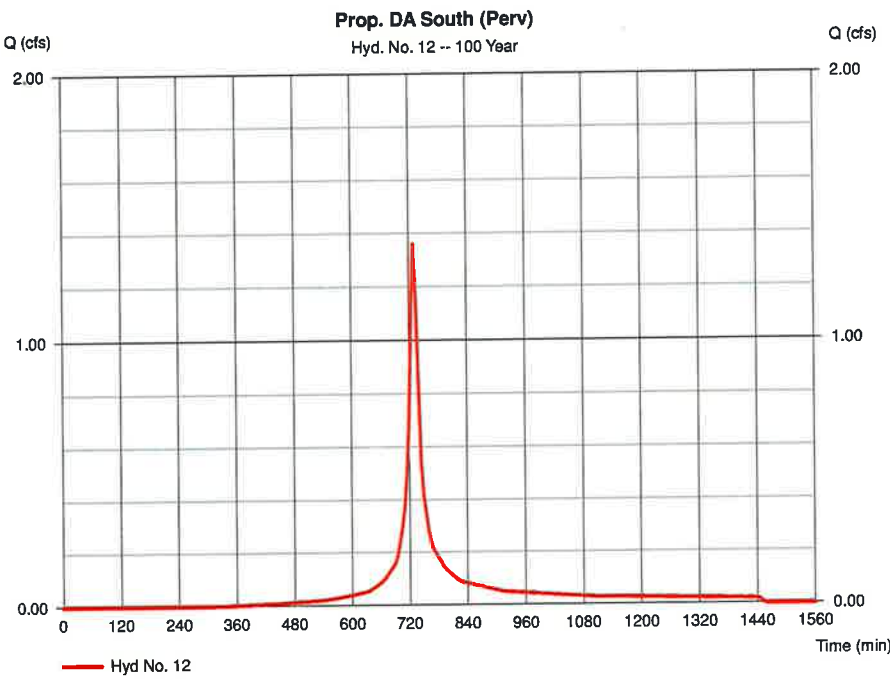


Hydrograph Report

Hyd. No. 12

Prop. DA South (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.360 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 5,049 cuft
Drainage area	= 0.250 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

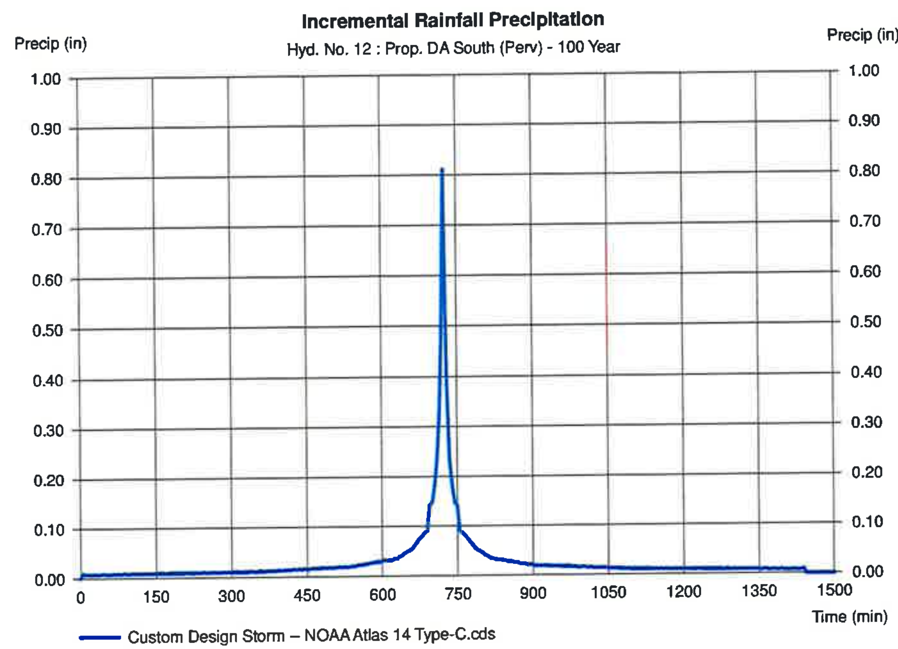


Precipitation Report

Hyd. No. 12

Prop. DA South (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



Hydrograph Report

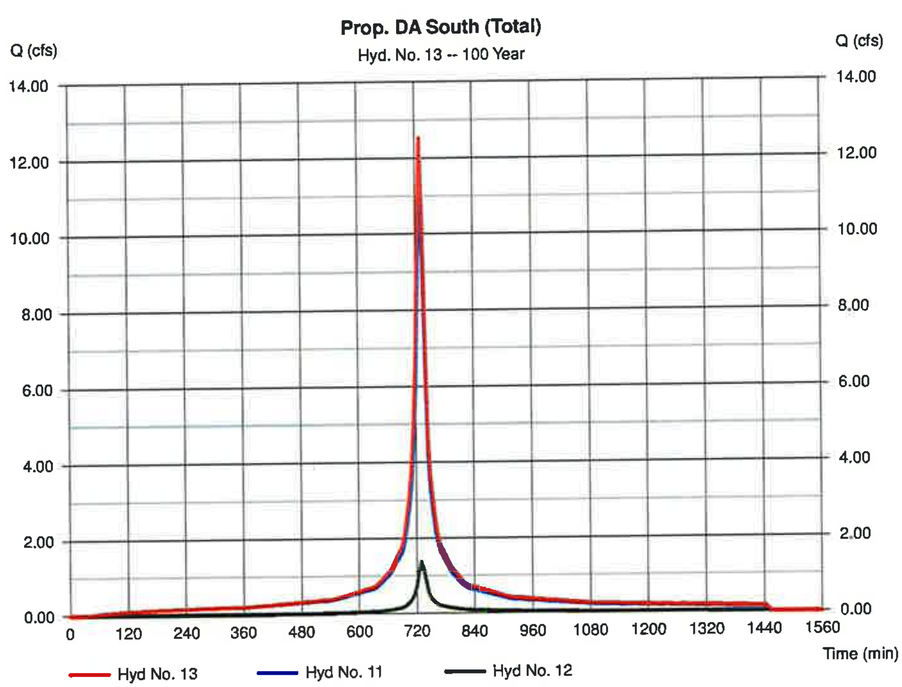
Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Hyd. No. 13

Prop. DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 12.53 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 52,403 cuft
Inflow hyds.	= 11, 12	Contrib. drain. area	= 1.970 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

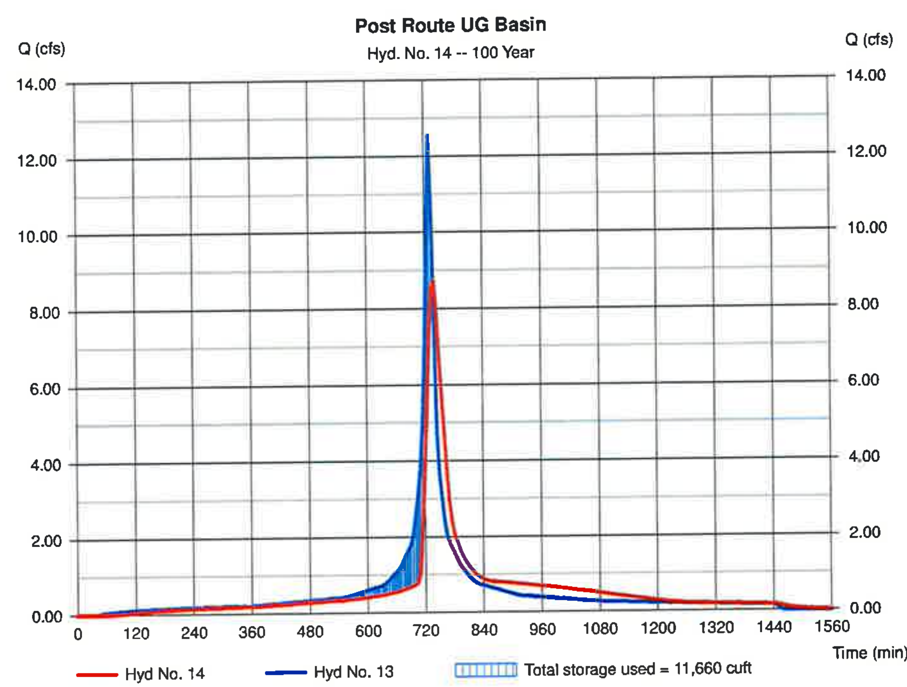
Friday, Oct 9, 2020

Hyd. No. 14

Post Route UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 8.731 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 52,395 cuft
Inflow hyd. No.	= 13 - Prop. DA South (Total)	Max. Elevation	= 61.47 ft
Reservoir name	= UG Det Basin	Max. Storage	= 11,660 cuft

Storage Indication method used.

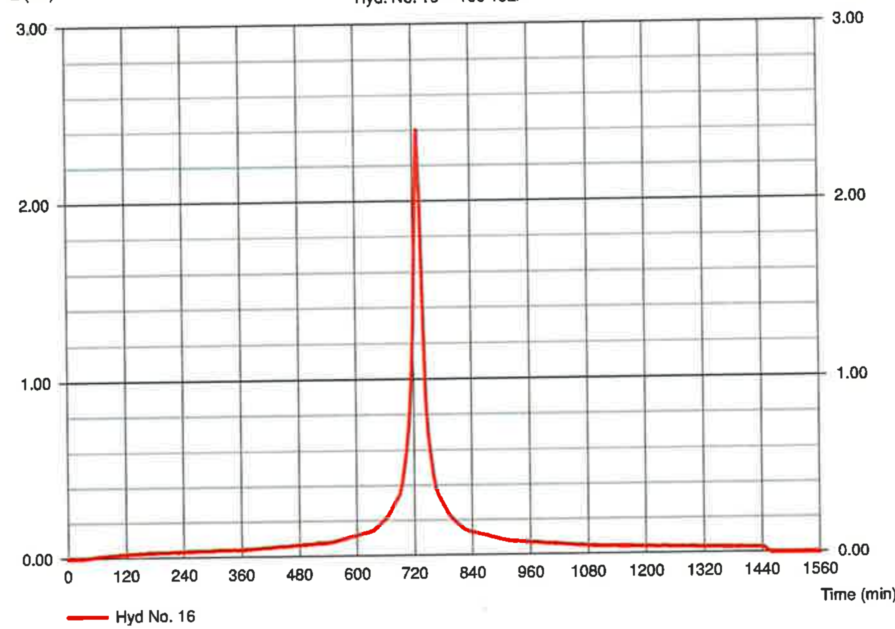


Hydrograph Report

Hyd. No. 16

Prop. DA South Und (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.403 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 10,187 cuft
Drainage area	= 0.370 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

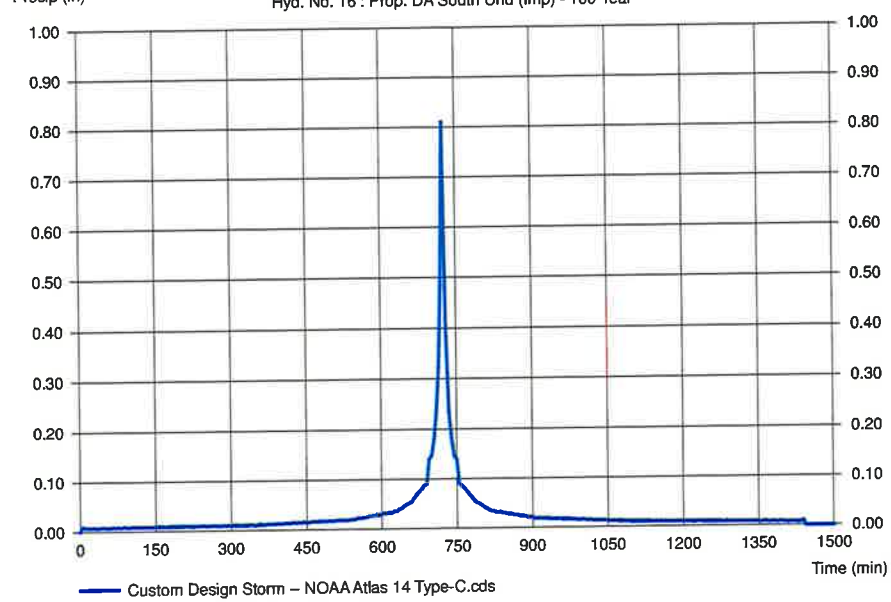


Precipitation Report

Hyd. No. 16

Prop. DA South Und (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

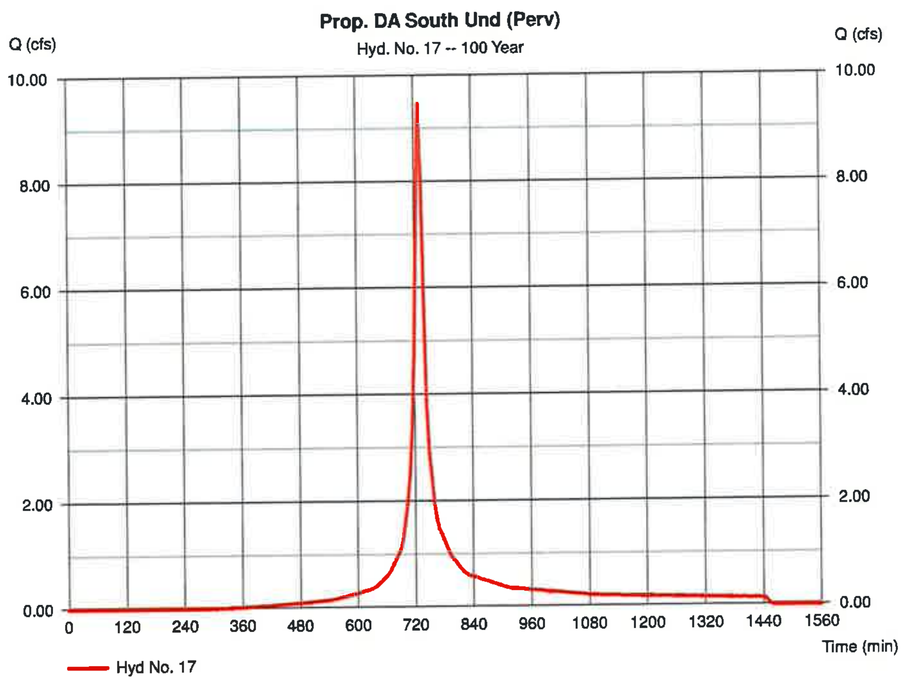


Hydrograph Report

Hyd. No. 17

Prop. DA South Und (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 9.467 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 35,144 cuft
Drainage area	= 1.740 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

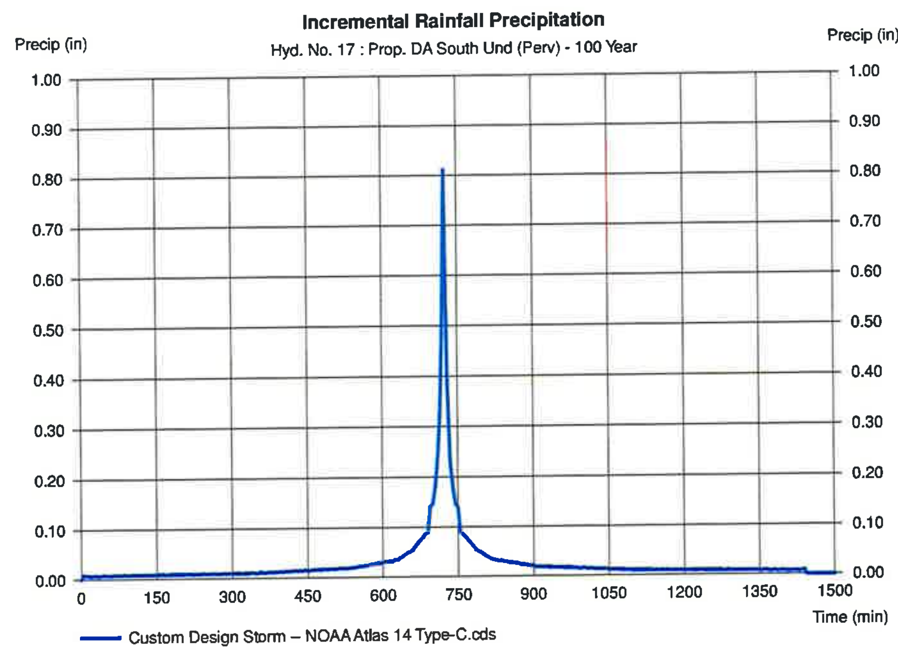


Precipitation Report

Hyd. No. 17

Prop. DA South Und (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



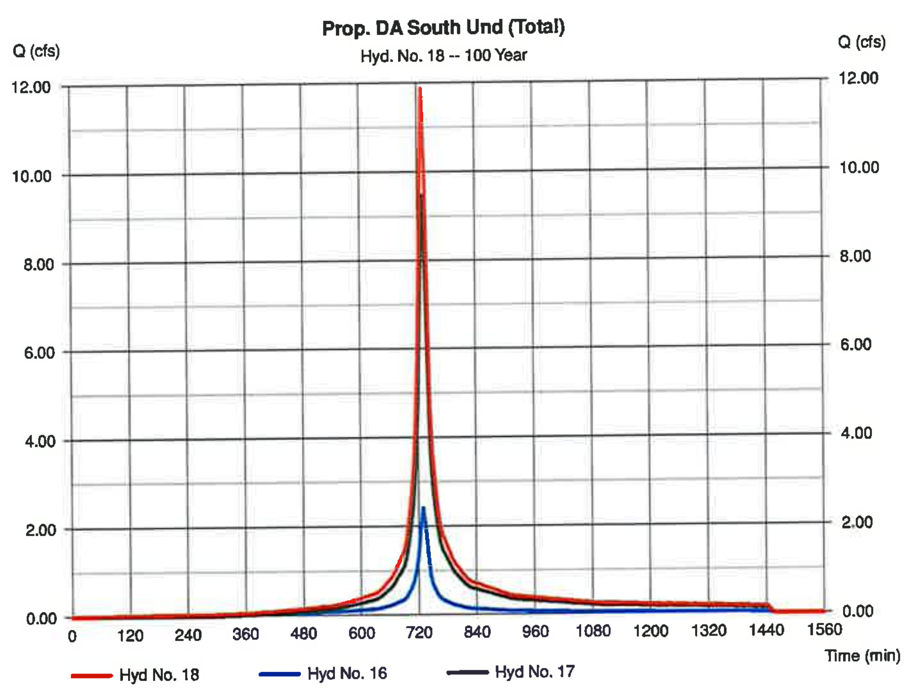
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 18

Prop. DA South Und (Total)

Hydrograph type	= Combine	Peak discharge	= 11.87 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 45,330 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 2.110 ac



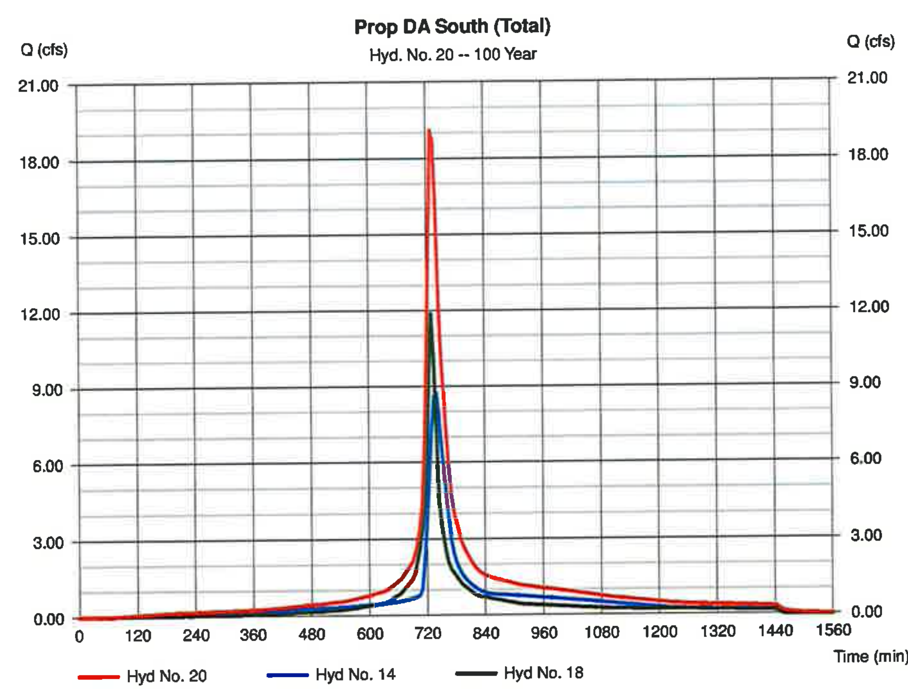
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Oct 9, 2020

Hyd. No. 20

Prop DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 19.11 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 97,726 cuft
Inflow hyds.	= 14, 18	Contrib. drain. area	= 0.000 ac

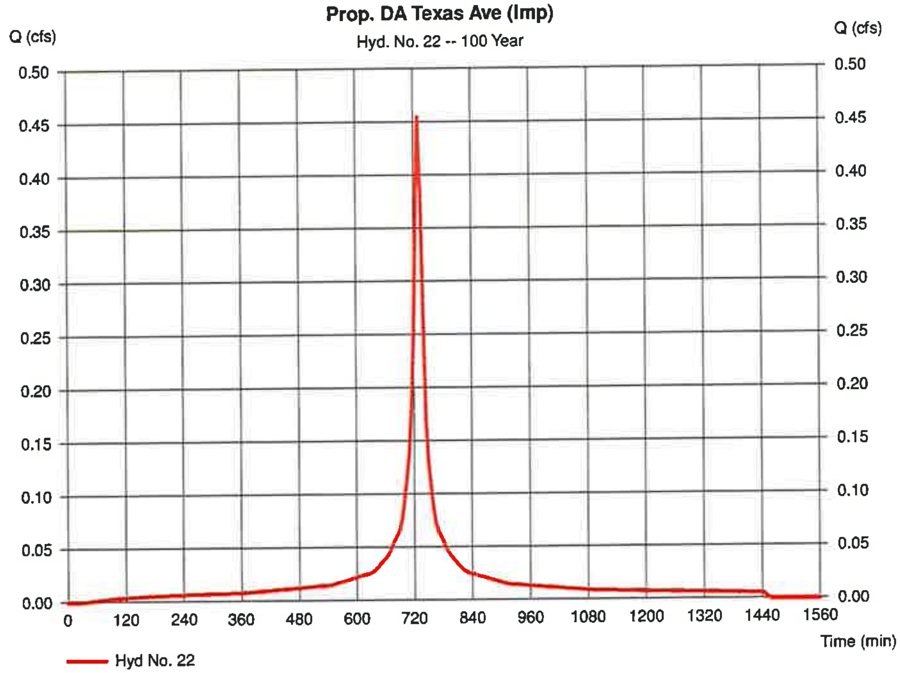


Hydrograph Report

Hyd. No. 22

Prop. DA Texas Ave (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.455 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,927 cuft
Drainage area	= 0.070 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

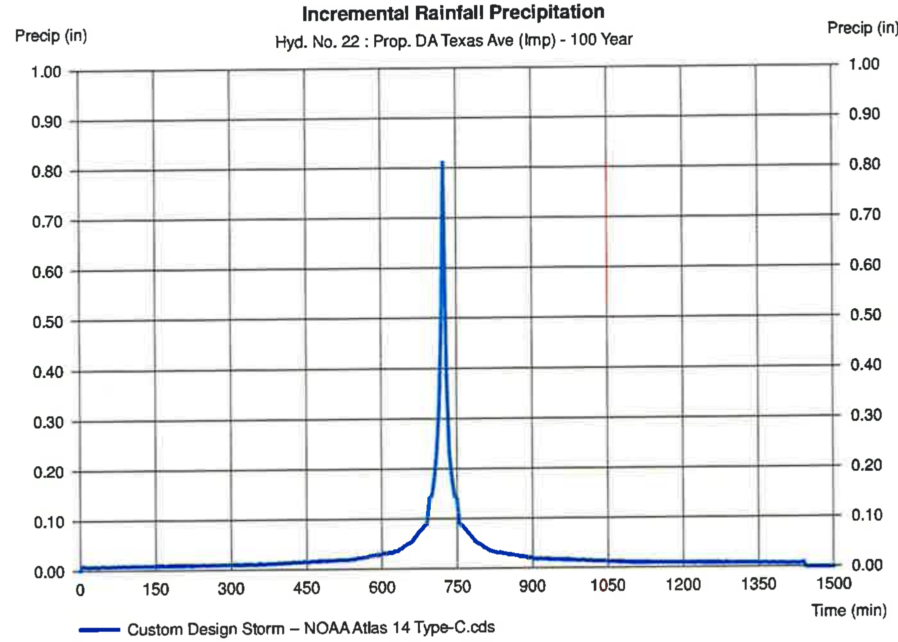


Precipitation Report

Hyd. No. 22

Prop. DA Texas Ave (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

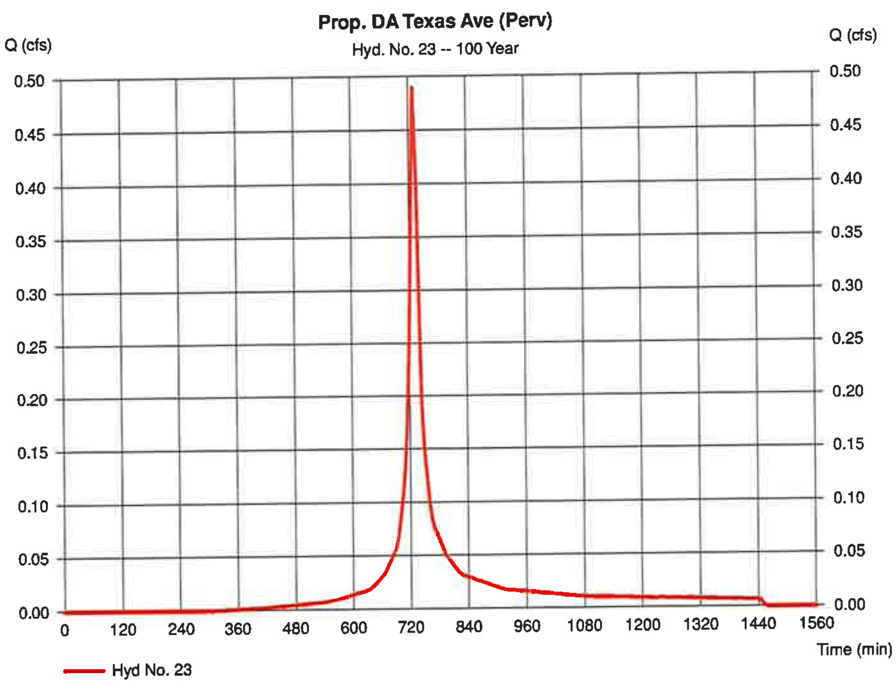


Hydrograph Report

Hyd. No. 23

Prop. DA Texas Ave (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.490 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,818 cuft
Drainage area	= 0.090 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.33 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

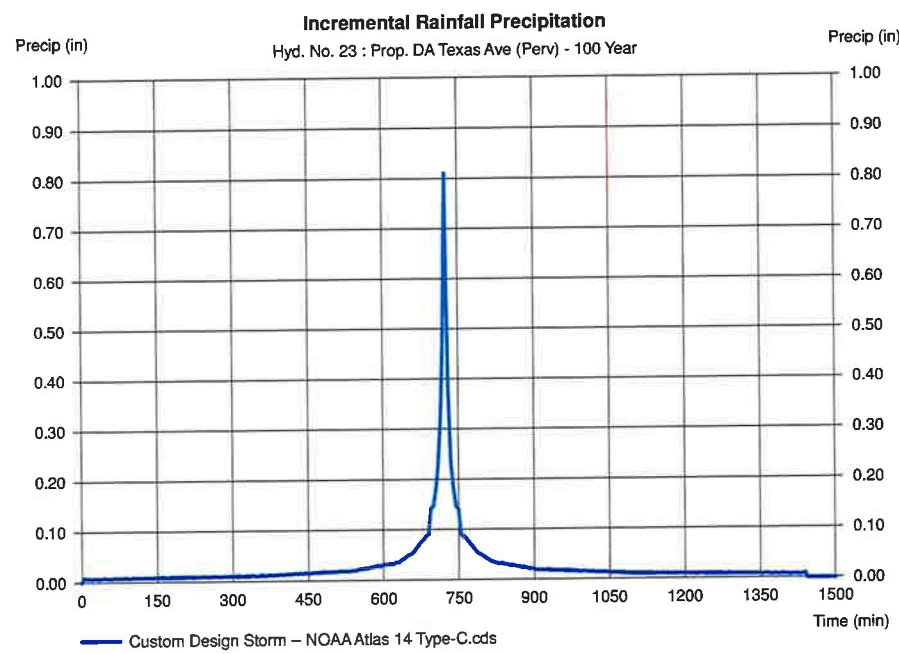


Precipitation Report

Hyd. No. 23

Prop. DA Texas Ave (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.3300 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		



Hydrograph Report

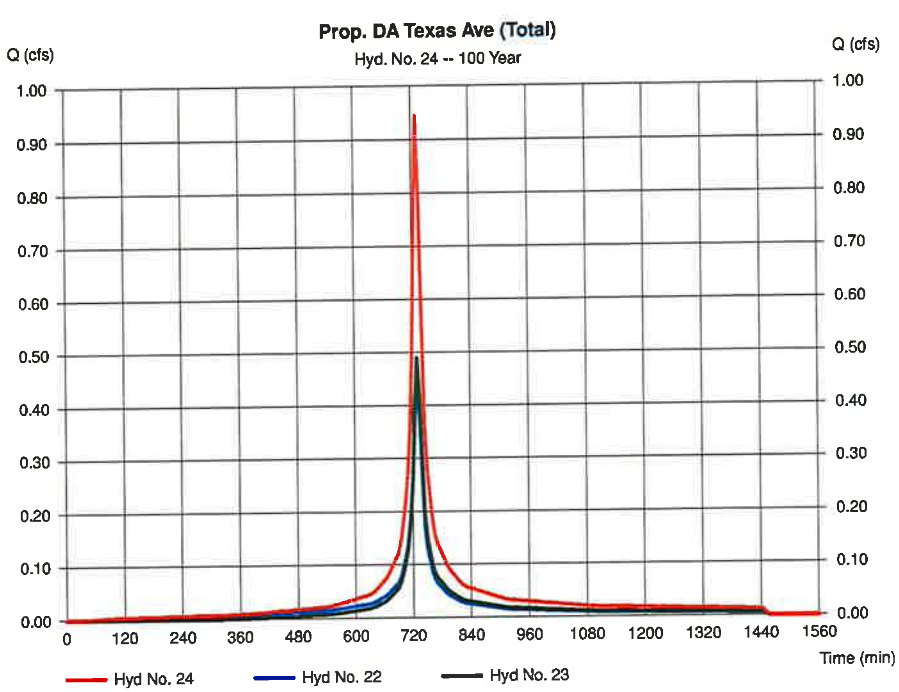
Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Hyd. No. 24

Prop. DA Texas Ave (Total)

Hydrograph type	= Combine	Peak discharge	= 0.944 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 3,745 cuft
Inflow hyds.	= 22, 23	Contrib. drain. area	= 0.160 ac



Hydrograph Report

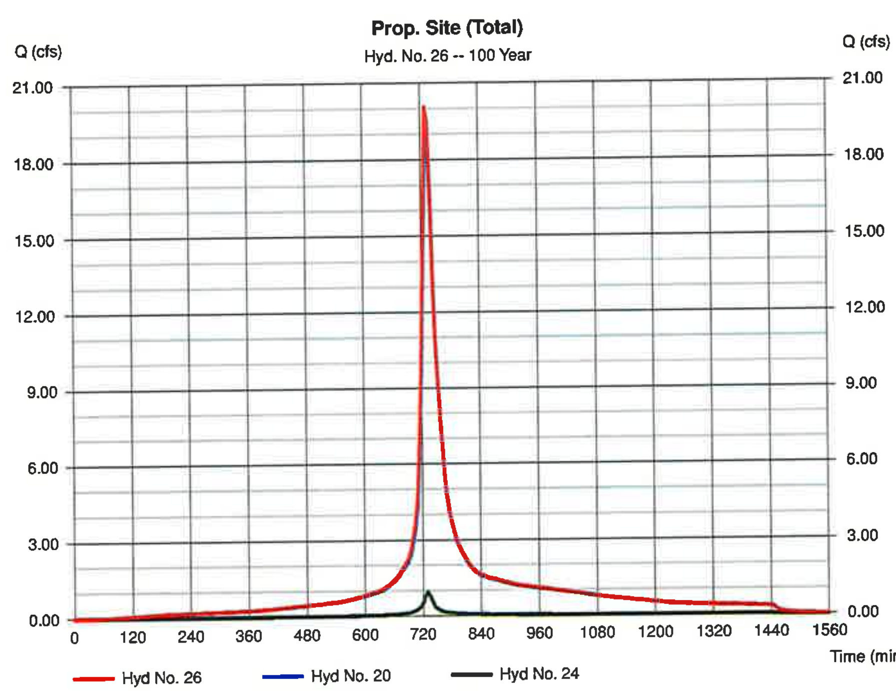
Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Hyd. No. 26

Prop. Site (Total)

Hydrograph type	= Combine	Peak discharge	= 20.05 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 101,471 cuft
Inflow hyds.	= 20, 24	Contrib. drain. area	= 0.000 ac



Hydraflow Rainfall Report

Hydraflow Hydrographs by Intelisolve v9.1

Friday, Oct 9, 2020

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA) B	D	E	(N/A)
1	39.0824	9.5000	0.8528	-------
2	45.6943	10.7000	0.8185	-------
3	0.0000	0.0000	0.0000	-------
5	99.7061	14.8000	0.9304	-------
10	249.7597	21.8001	1.0961	-------
25	115.7547	14.9000	0.8980	-------
50	7.3699	0.1000	0.2544	-------
100	403.8513	25.1001	1.1108	-------

File name: TRENTON.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr) 5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.00	3.10	2.55	2.18	1.91	1.70	1.54	1.40	1.29	1.20	1.12	1.05
2	4.80	3.83	3.21	2.77	2.45	2.20	2.00	1.84	1.70	1.59	1.49	1.40
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.20	5.03	4.24	3.67	3.24	2.90	2.63	2.40	2.22	2.06	1.92	1.80
10	6.80	5.63	4.80	4.17	3.69	3.30	2.98	2.72	2.50	2.31	2.14	2.00
25	7.89	6.45	5.47	4.76	4.23	3.80	3.46	3.17	2.93	2.73	2.55	2.40
50	4.87	4.09	3.69	3.44	3.25	3.10	2.98	2.88	2.80	2.72	2.66	2.60
100	9.20	7.76	6.69	5.87	5.22	4.70	4.27	3.91	3.60	3.33	3.10	2.90

Tc = time in minutes. Values may exceed 60.

Precip. file name: Mercer County.pcp

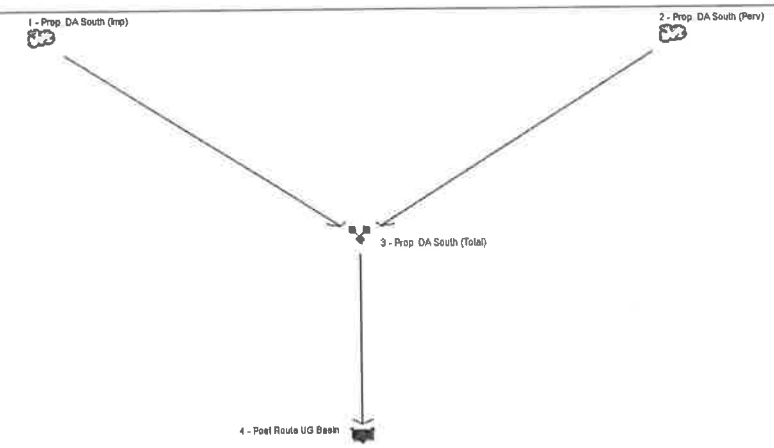
Storm Distribution	Rainfall Precipitation Table (in) 1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.31	0.00	0.00	5.01	6.19	0.00	8.33
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.31	0.00	0.00	5.01	6.19	0.00	8.33

HYDROGRAPH SUMMARY REPORTS – WATER QUALITY STORM

Hydraflow Table of Contents

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	Prop. DA South (Imp)
2	SCS Runoff	Prop. DA South (Perv)
3	Combine	Prop. DA South (Total)
4	Reservoir	Post Route UG Basin

Project: 2020-10 WQ - LPG.gpw

Friday, Oct 9, 2020

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	3.813	------	------	------	------	------	------	------	Prop. DA South (Imp)
2	SCS Runoff	------	0.078	------	------	------	------	------	------	------	Prop. DA South (Perv)
3	Combine	1, 2	3.882	------	------	------	------	------	------	------	Prop. DA South (Total)
4	Reservoir	3	0.701	------	------	------	------	------	------	------	Post Route UG Basin

Hydrograph Summary Report

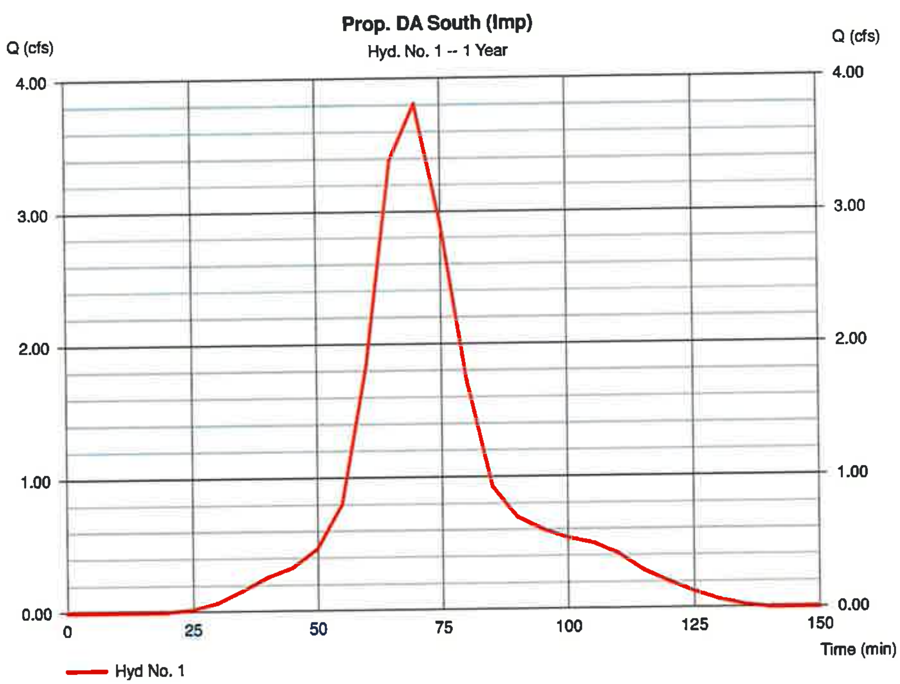
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	3.813	5	70	6,053	----	------	------	Prop. DA South (Imp)
2	SCS Runoff	0.078	5	75	142	----	------	------	Prop. DA South (Perv)
3	Combine	3.882	5	70	6,196	1, 2	------	------	Prop. DA South (Total)
4	Reservoir	0.701	5	90	6,188	3	60.01	4,029	Post Route UG Basin

Hydrograph Report

Hyd. No. 1

Prop. DA South (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.813 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 6,053 cuft
Drainage area	= 1.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

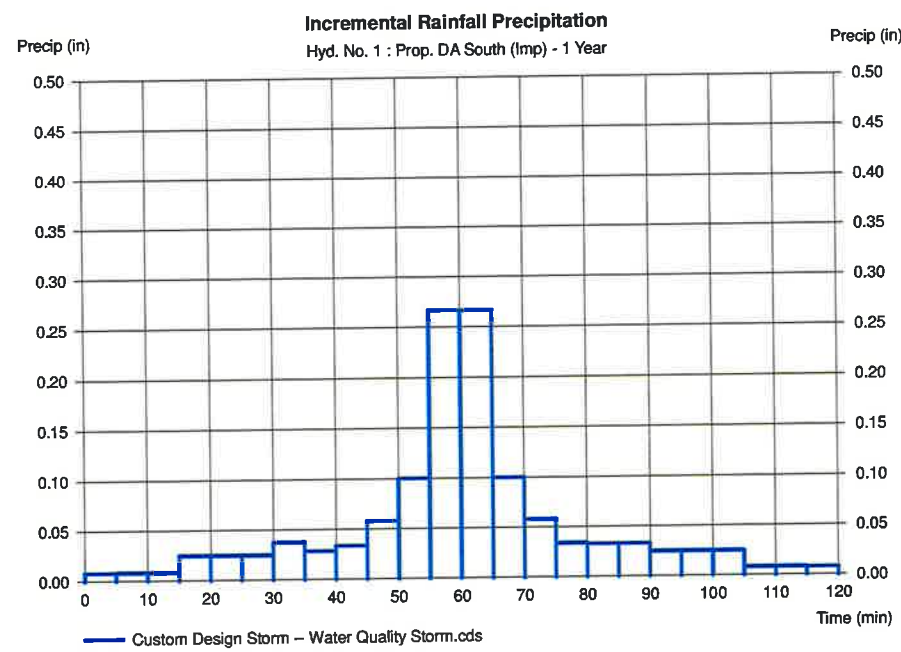


Precipitation Report

Hyd. No. 1

Prop. DA South (Imp)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

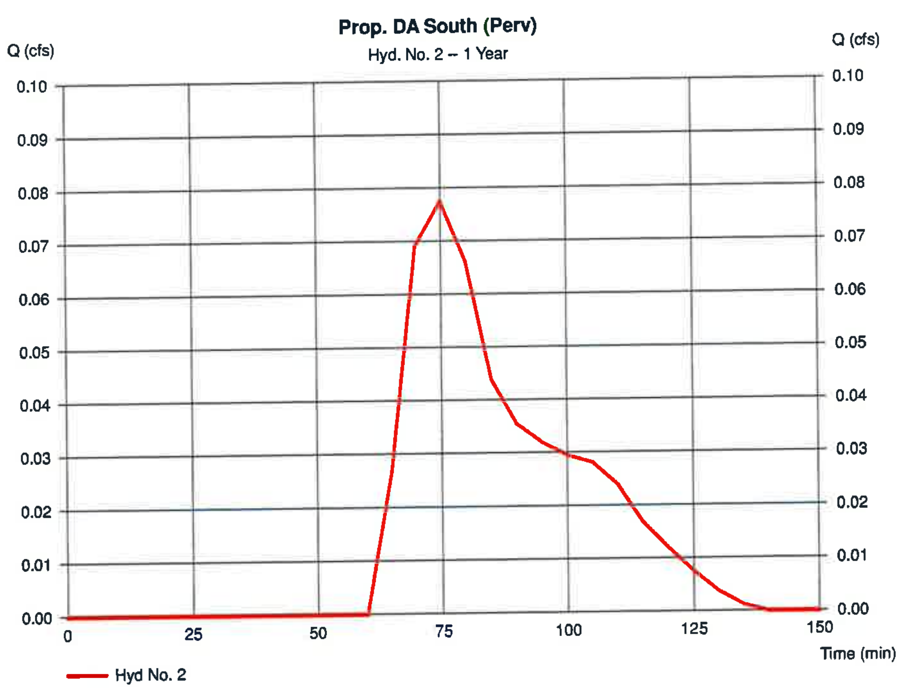


Hydrograph Report

Hyd. No. 2

Prop. DA South (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.078 cfs
Storm frequency	= 1 yrs	Time to peak	= 75 min
Time interval	= 5 min	Hyd. volume	= 142 cuft
Drainage area	= 0.250 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

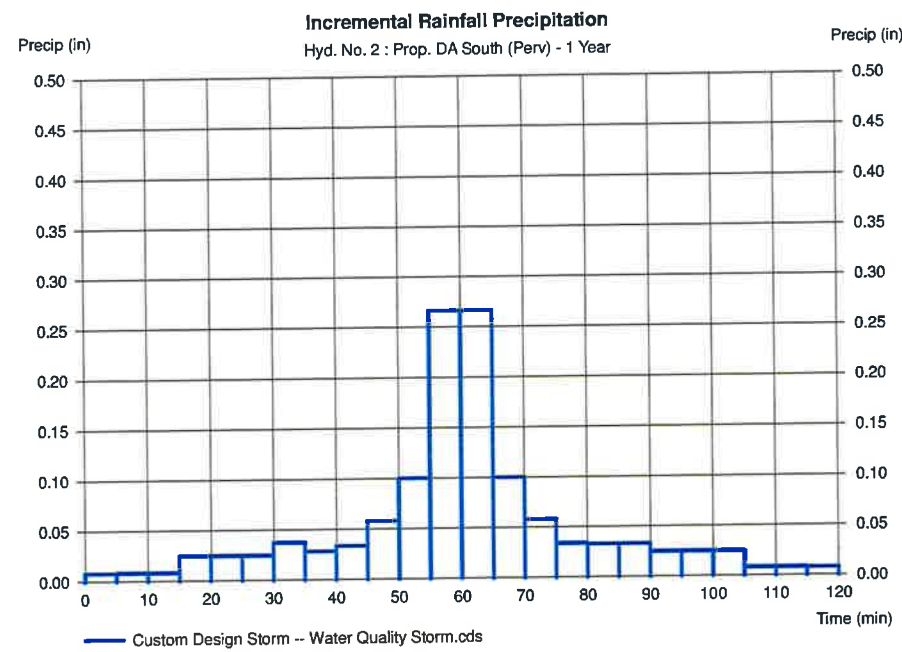


Precipitation Report

Hyd. No. 2

Prop. DA South (Perv)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

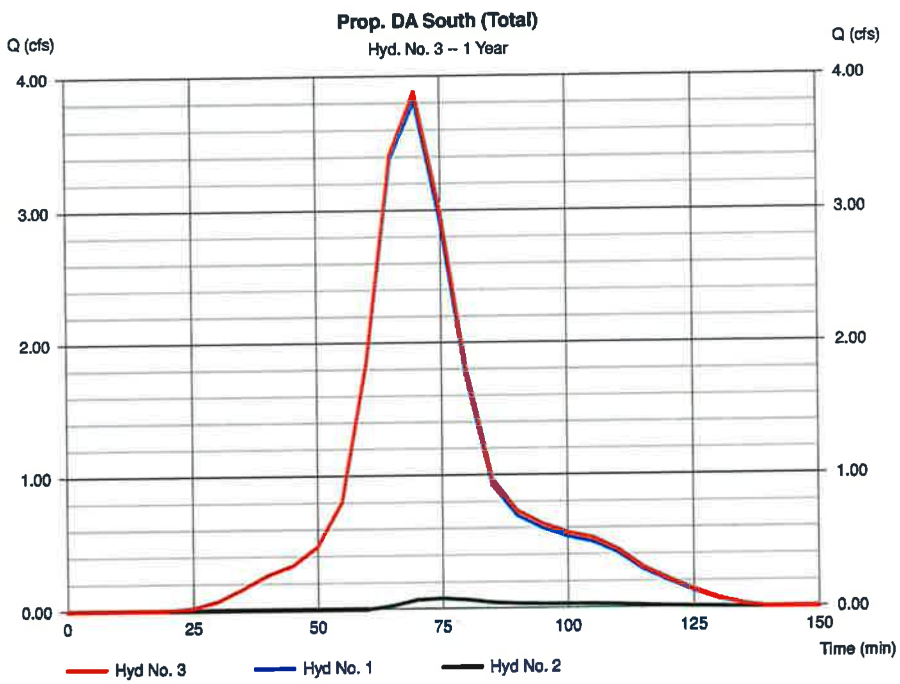


Hydrograph Report

Hyd. No. 3

Prop. DA South (Total)

Hydrograph type	= Combine	Peak discharge	= 3.882 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 6,196 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.970 ac



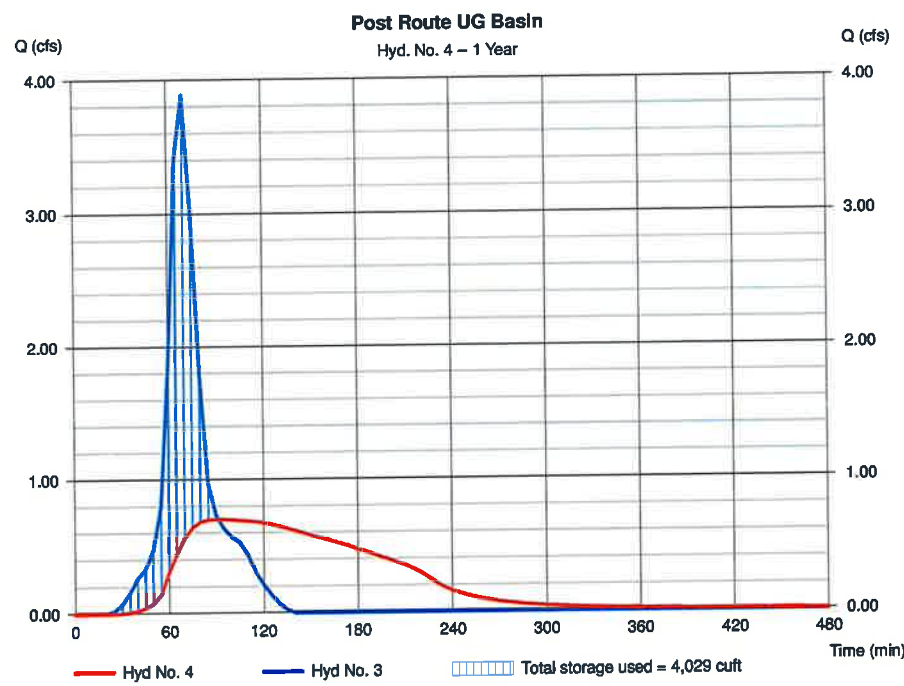
Hydrograph Report

Hyd. No. 4

Post Route UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.701 cfs
Storm frequency	= 1 yrs	Time to peak	= 90 min
Time interval	= 5 min	Hyd. volume	= 6,188 cuft
Inflow hyd. No.	= 3 - Prop. DA South (Total)	Max. Elevation	= 60.01 ft
Reservoir name	= UG Det Basin	Max. Storage	= 4,029 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - UG Det Basin

Pond Data

UG Chambers - Invert elev. = 59.00 ft, Rise x Span = 3.00 x 3.00 ft, Barrel Len = 230.00 ft, No. Barrels = 8, Slope = 0.00%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	59.00	n/a	0	0
0.30	59.30	n/a	702	702
0.60	59.60	n/a	1,220	1,923
0.90	59.90	n/a	1,484	3,407
1.20	60.20	n/a	1,635	5,042
1.50	60.50	n/a	1,708	6,750
1.80	60.80	n/a	1,708	8,458
2.10	61.10	n/a	1,634	10,092
2.40	61.40	n/a	1,484	11,576
2.70	61.70	n/a	1,219	12,795
3.00	62.00	n/a	701	13,497

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	4.00	5.00	0.00
Span (in)	= 36.00	6.00	44.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 58.95	59.00	60.30	0.00
Length (ft)	= 60.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.50	0.00	0.00	0.00
Crest El. (ft)	= 60.80	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	—	—	—
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	59.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.30	702	59.30	0.29 ic	0.28 ic	0.00	---	0.00	---	---	---	---	---	0.28
0.60	1,923	59.60	0.51 ic	0.51 ic	0.00	---	0.00	---	---	---	---	---	0.51
0.90	3,407	59.90	0.67 ic	0.65 ic	0.00	---	0.00	---	---	---	---	---	0.65
1.20	5,042	60.20	0.81 ic	0.78 ic	0.00	---	0.00	---	---	---	---	---	0.78
1.50	6,750	60.50	2.02 ic	0.82 ic	1.12 ic	---	0.00	---	---	---	---	---	1.94
1.80	8,458	60.80	4.92 oc	0.81 ic	3.97 ic	---	0.00	---	---	---	---	---	4.78
2.10	10,092	61.10	6.98 oc	0.84 ic	5.66 ic	---	0.27	---	---	---	---	---	6.77
2.40	11,576	61.40	8.80 oc	0.88 ic	6.95 ic	---	0.77	---	---	---	---	---	8.60
2.70	12,795	61.70	10.46 oc	0.93 ic	8.03 ic	---	1.42	---	---	---	---	---	10.38
3.00	13,497	62.00	12.14 oc	0.98 ic	8.95 ic	---	2.19	---	---	---	---	---	12.11

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA) B	D	E	(N/A)
1	39.0824	9.5000	0.8528	-----
2	45.6943	10.7000	0.8165	-----
3	0.0000	0.0000	0.0000	-----
5	99.7061	14.8000	0.9304	-----
10	249.7597	21.8001	1.0961	-----
25	115.7547	14.9000	0.8980	-----
50	7.3699	0.1000	0.2544	-----
100	403.8513	25.1001	1.1108	-----

File name: TRENTON.idf

Intensity = B / (Tc + D)^E

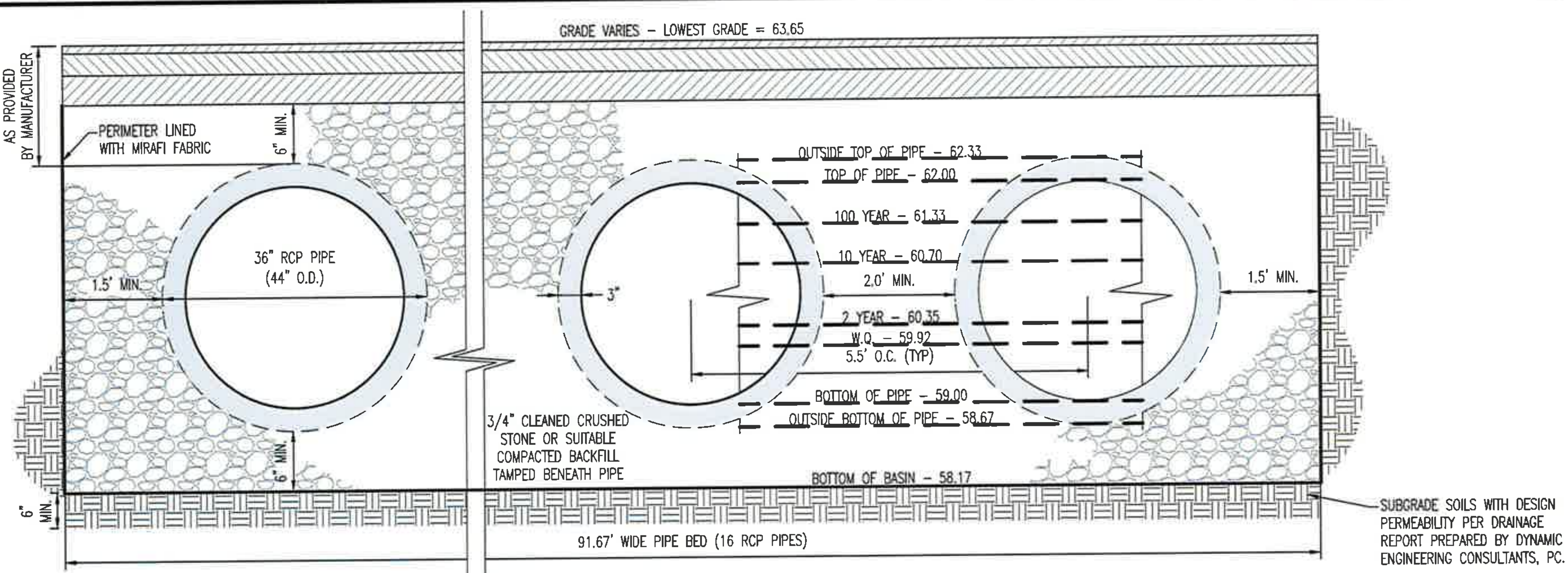
Return Period (Yrs)	Intensity Values (in/hr) 5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.00	3.10	2.55	2.18	1.91	1.70	1.54	1.40	1.29	1.20	1.12	1.05
2	4.80	3.83	3.21	2.77	2.45	2.20	2.00	1.84	1.70	1.59	1.49	1.40
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.20	5.03	4.24	3.67	3.24	2.90	2.63	2.40	2.22	2.06	1.92	1.80
10	6.80	5.63	4.80	4.17	3.69	3.30	2.98	2.72	2.50	2.31	2.14	2.00
25	7.89	6.45	5.47	4.76	4.23	3.80	3.46	3.17	2.93	2.73	2.55	2.40
50	4.87	4.09	3.69	3.44	3.25	3.10	2.98	2.88	2.80	2.72	2.66	2.60
100	9.20	7.76	6.69	5.87	5.22	4.70	4.27	3.91	3.60	3.33	3.10	2.90

Tc = time in minutes. Values may exceed 60.

Precip. file name: Mercer County.pcp

Storm Distribution	Rainfall Precipitation Table (in) 1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.31	0.00	0.00	5.01	6.19	0.00	8.33
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.31	0.00	0.00	5.01	6.19	0.00	8.33

UNDERGROUND DETENTION BASIN DETAIL



NOTES:

1. BASIN CONSTRUCTION MUST NOT OVER COMPACT OR SMEAR SOILS BELOW BASIN BOTTOM.
2. OWNER SHALL CONTACT AND ENGAGE DYNAMIC EARTH, LLC. TO TEST SOIL PERMEABILITY AND PROVIDE CONSTRUCTION PHASE INSPECTIONS OF THE BASIN BOTTOM SOILS AND FILL MATERIALS WITHIN ANY PROPOSED INFILTRATION OR RETENTION BASIN TO COMPARE RESULTS TO DESIGN CRITERIA. CONTRACTOR SHALL CONTACT DYNAMIC EARTH AT (908) 879-7095 (WWW.DYNAMIC-EARTH.COM) AT ONSET OF PROJECT TO CONFIRM REQUIREMENTS AND COORDINATE INSPECTIONS.
3. TOPSOIL AND UNSUITABLE MATERIALS (INCLUDING ANY SOILS WITH INSUFFICIENT PERMEABILITY) ARE TO BE STRIPPED FROM BASIN BOTTOM AREA AND REPLACED WITH SUITABLE MATERIAL PROVIDING PERMEABILITY RATES MEETING THE DESIGN CRITERIA. CONTRACTOR SHALL SUBMIT PROPOSED REPLACEMENT MATERIAL USED AND ITS CORRESPONDING PERMEABILITY RATE FOR APPROVAL BY DYNAMIC EARTH. REFER TO THE TEST PIT AND/OR SOIL BORING RECORDS AND STORMWATER MANAGEMENT REPORT TO CONFIRM THE DEPTH OF THE ZONE OF INFILTRATION.

36" RCP SCHEMATIC UNDERGROUND BASIN DETAIL

NOT TO SCALE

STORMFILTER SIZING SUMMARY & NJDEP CERTIFICATION

StormFilter Design Summary

RPM
Lawrence, NJ
2/27/20

Information Provided by Engineer (Dynamic Engineering):

- Required TSS removal rate = 80%
- Water quality flow rate = 1.048 cfs
- 100-YR peak flow rate = 15.34 cfs
- Impervious drainage area = 1.69 acres
- Presiding agency = NJDEP

StormFilter Information and Cartridge Data:

The Stormwater Management StormFilter® is a passive, siphon-actuated, flow-through stormwater filtration system consisting of a precast concrete structure that houses rechargeable, media-filled filter cartridges. The StormFilter works by passing stormwater through the media-filled cartridges, which trap particulates and adsorb pollutants such as dissolved metals, nutrients, and hydrocarbons. **The StormFilter has received final certification from the NJDEP for 80% TSS removal as a stand-alone treatment system.**

- StormFilter cartridge filter media = Perlite
- StormFilter cartridge media height = 27 inches (nominal)
- StormFilter cartridge surface area = 10.61 square feet (nominal)
- StormFilter cartridge specific treatment flow rate = 2.12 gallons/minute per square foot (nominal)
- StormFilter cartridge treatment flow = 22.5 gpm
- **Hydraulic head required: 3.05 feet** (with 27 inch cartridge)
- Minimum physical drop between inlet and outlet pipe = 6 inches

Design Summary:

The StormFilter is sized based on the NJDEP certification, which lists an approved treatment flow rate and maximum impervious acreage limit per cartridge in Table 1. The number of cartridges required based on the impervious drainage area is compared with the number of cartridges required based on the treatment flow rate; the larger number of cartridges governs the sizing.

The StormFilter for this site was sized to provide **21 cartridges** in order to meet the hydraulic load requirement (calculations shown below). To house this number of cartridges, Contech Engineered Solutions recommends an 8' x 16' precast Peak Diversion StormFilter.

$$N_{cartridges\ hyd.load} = \frac{Q_{treat}\ X\ 449\ {}^{gpm}/_{cfs}}{Q_{cartridge}} = \frac{1.048\ cfs\ X\ 449\ {}^{gpm}/_{cfs}}{22.5\ {}^{gpm}/_{cartridge}} = 20.91 \Rightarrow (21)\ 27"\ Cartridges$$

$$N_{cartridges\ mass\ load} = \frac{Area_{site}}{Max\ Area_{cartridge}} = \frac{1.69\ acre}{0.136\ {}^{acres}/_{cartridge}} = 12.42 \Rightarrow (13)\ 27"\ Cartridges$$

CONTECH ENGINEERED SOLUTIONS

StormFilter Design Summary

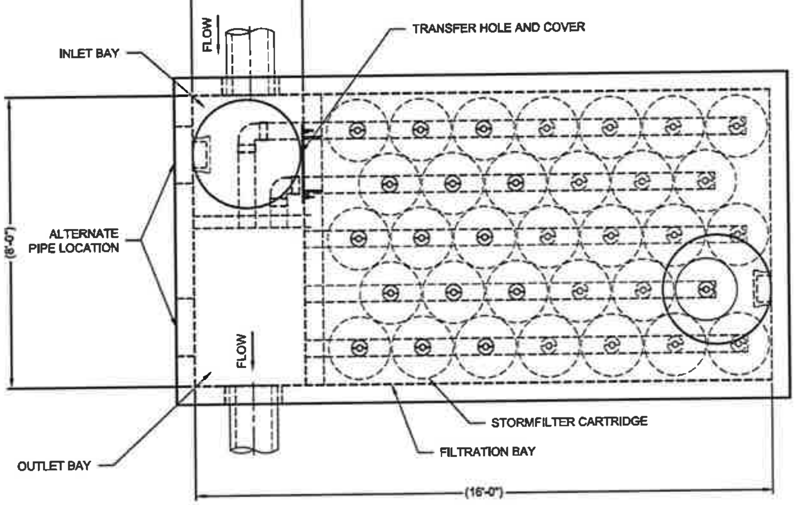
Maintenance:

Maintenance of Stormwater best management practices is required per the New Jersey Administrative Code 7:8-5.8. Recommendations for maintenance are included in chapters 8 & 9 of the New Jersey Stormwater Best Management Practices Manual. To comply with requirements, CONTECH offers a network of Preferred Service Providers that have the capability to perform all necessary inspections, compliance reporting and cleaning services. CONTECH recommends inspecting the system annually and maintaining the system at the recommendation of the annual inspection. Full maintenance is typically required every 24-36 months. Disposal of material should be handled in accordance with local regulations. Please contact CONTECH's Maintenance Department for all questions regarding maintenance at (503) 258-3157 or visit our website at www.conteches.com/maintenance.

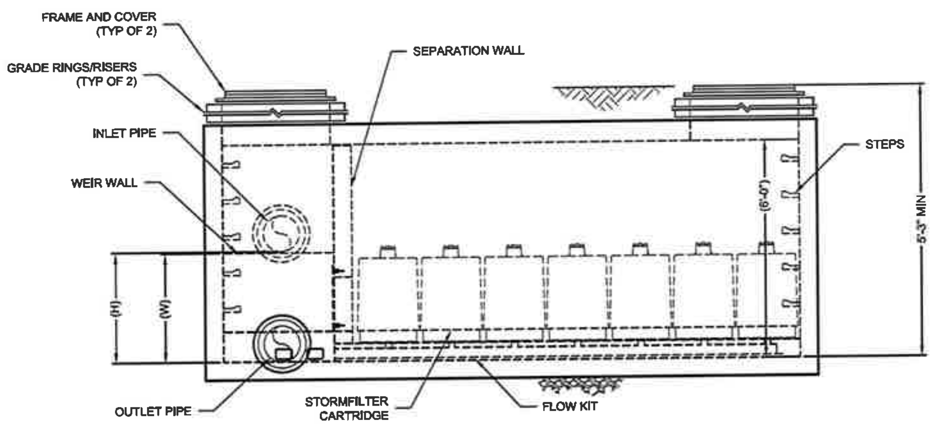
Thank you for the opportunity to present this information to you and your client. If you have any questions, please call me at (443-457-1529).

Sincerely,

Taylor Murdock
Contech Engineered Solutions LLC



PLAN



ELEVATION

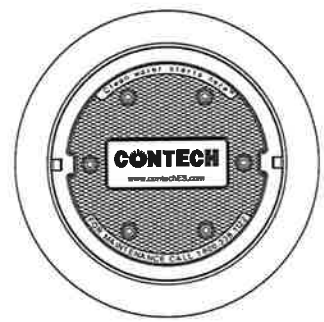
STORMFILTER DESIGN NOTES

- THE 8' x 16' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"			18"			LOW DROP		
RECOMMENDED HYDRAULIC DROP (H)	3.05'			2.3'			1.8'		
HEIGHT OF WEIR (W)	3.00'			2.25'			1.75'		
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf
CARTRIDGE FLOW RATE (gpm)	22.5	18.79	11.25	15	12.53	7.5	10	8.35	5

* 1.67 gpm/sf SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
CARTRIDGE HEIGHT (27", 18", LOW DROP(LD))	*
NUMBER OF CARTRIDGES REQUIRED	*
CARTRIDGE FLOW RATE	*
MEDIA TYPE (PERLITE, ZPG, PSORB)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

UPSTREAM RIM ELEVATION	*
DOWNSTREAM RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

PERFORMANCE SPECIFICATION
FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES.** FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **38 SECONDS.** SPECIFIC FLOW RATE SHALL BE 2 **GPM/SF (MAXIMUM).** SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.contechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH®
ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

THE STORMWATER MANAGEMENT STORMFILTER 8' x 16' PEAK DIVERSION STORMFILTER STANDARD DETAIL

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
Mail Code 401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 14, 2016

Derek M. Berg
Director - Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Laboratory Certification
Stormwater Management StormFilter® (StormFilter) by Contech Engineered Solutions LLC
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions LLC has requested a Laboratory Certification for the StormFilter System.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the StormFilter System by Contech Engineered Solutions LLC at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 2.12 gpm/sf of effective filtration treatment area.

2. The StormFilter System shall be installed using the same configuration as the unit tested by NJCAT, and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the StormFilter, which is attached to this document. However, it is recommended to review the maintenance website at http://www.conteches.com/DesktopModules/Bring2mind/DMX/Download.aspx?EntryId=2813&PortalId=0&DownloadMethod=attachment for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for a StormFilter System.

   Example: A 0.25 acre impervious site is to be treated to 80% TSS removal using a StormFilter System. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The calculation of the minimum number of cartridges for use in the StormFilter System is based upon both the MTFR and the maximum inflow drainage area. It is necessary to calculate the required cartridges using both methods and to rely on the method that results in the highest minimum number of cartridges determined by the two methods.

   Inflow Drainage Area Evaluation:

   The drainage area to the StormFilter System in this example is 0.25 acres. Based upon the information in Table 1 below, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the maximum drainage area:

1. Five (5) 12" cartridges,
2. Three (3) 18" cartridges, or
3. Two (2) 27" cartridges

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c=0.99 (runoff coefficient for impervious)
Q=ciA=0.99x3.2x0.25=0.79 cfs=0.79x448.83 gpm=354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the MTFR:

1. Thirty-six (36) 12" cartridges,
2. Twenty-four (24) 18" cartridges, or
3. Sixteen (16) 27" cartridges

The MTFR Evaluation results will be used since that method results in the higher minimum number of cartridges determined by the two methods.

The sizing table corresponding to the available system models are noted below:

TABLE 1 STORMFILTER CARTRIDGE HEIGHTS AND NEW JERSEY TREATMENT CAPACITIES

StormFilter Cartridge Heights and New Jersey Treatment Capacities				
StormFilter Cartridge Height	**Filtration Surface Area (sq.ft)**	**MTFR[1] (GPM)**	**Mass Capture Capacity (lbs)**	**Maximum Allowable Inflow Area[2] (acres)**
Low Drop (12")	4.71	10	36.3	0.061
18"	7.07	15	54.5	0.09
27"	10.61	22.5	81.8	0.136

Notes:
1. *MTFR calculated based on 4.72x10-3 cfs/sf (2.12 gpm/sf) of effective filtration treatment area.*
2. *Based upon the equation found in the NJDEP Filter Protocol Maximum Inflow Drainage Area (acres) = weight of TSS before 10% loss in MTFR (lbs)/600 lbs/acre of drainage area annually.*

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Shashi Nayak of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP - BNPC

CONTECH
ENGINEERED SOLUTIONS

StormFilter Inspection and Maintenance Procedures

The Stormwater Management
StormFilter

Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

1. **Inspection**
   - Inspection of the vault interior to determine the need for maintenance.
2. **Maintenance**
   - Cartridge replacement
   - Sediment removal

Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.

In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/ maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..

Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

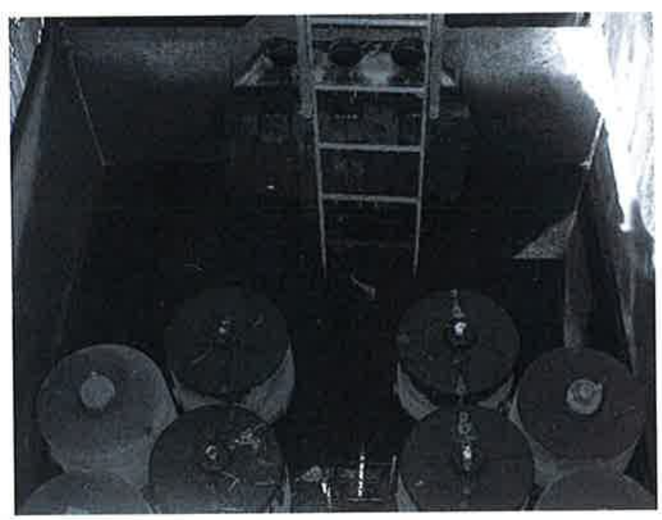
Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to weather or not maintenance is needed.

Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered)

1. Sediment loading on the vault floor.
   a. If >4" of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
   a. If >1/4" of accumulation, maintenance is required.
3. Submerged cartridges.
   a. If >4" of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
   a. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
   a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
   a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
   a. If pronounced scum line (say ≥ 1/4" thick) is present above top cap, maintenance is required.



Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

Warning: In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

Method 1:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

B. Remove the used cartridges (up to 250 lbs. each) from the vault.

Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

C. Set the used cartridge aside or load onto the hauling truck.

D. Continue steps a through c until all cartridges have been removed.

Method 2:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

B. Unscrew the cartridge cap.

C. Remove the cartridge hood and float.

D. At location under structure access, tip the cartridge on its side.

E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.

F. Set the empty, used cartridge aside or load onto the hauling truck.

G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

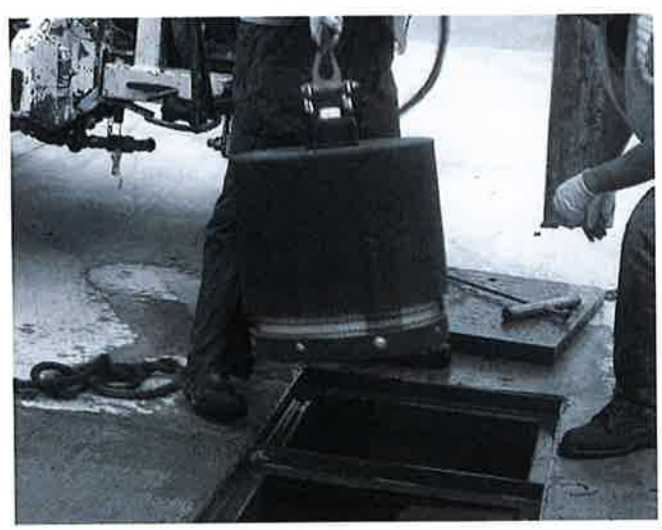
In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.



Inspection Report

Date: Personnel:

Location: ____________________ System Size: ____________________

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

Date: ____________

Sediment Thickness in Forebay: ____________________

Sediment Depth on Vault Floor: ____________________

Structural Damage: ____________________

Estimated Flow from Drainage Pipes (if available): ____________________

Cartridges Submerged: Yes ☐ No ☐ Depth of Standing Water: ____________________

StormFilter Maintenance Activities (check off if done and give description)

☐ Trash and Debris Removal: ____________________

☐ Minor Structural Repairs: ____________________

☐ Drainage Area Report ____________________

Excessive Oil Loading: Yes ☐ No ☐ Source: ____________________

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: ____________________

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: ____________________

Items Needing Further Work: ____________________

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

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Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: ______________________ Personnel: ____

Location: ______________________ System Size: ____

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

List Safety Procedures and Equipment Used: ____

____

____

System Observations

Months in Service:

Oil in Forebay (if present): Yes ☐ No ☐

Sediment Depth in Forebay (if present): ____

Sediment Depth on Vault Floor: ____

Structural Damage: ____

Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source: ______________________

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: ______________________

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: ______________________

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes ☐ No ☐ Details: ______________________

Replace Cartridges: Yes ☐ No ☐ Details: ______________________

Sediment Removed: Yes ☐ No ☐ Details: ______________________

Quantity of Sediment Removed (estimate?):

Minor Structural Repairs: Yes ☐ No ☐ Details: ______________________

Residuals (debris, sediment) Disposal Methods: ____

Notes:

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RECYCLED PAPER

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit contech-cpi.com or call 800.338.1122.

Support

- **Drawings and specifications are available at www.conteches.com.**
- **Site-specific design support is available from our engineers.**

800.338.1122
www.conteches.com

STORMWATER COLLECTION SYSTEM CALCULATIONS (PIPE SIZING)

DYNAMIC ENGINEERING

Inlet Area Summary and Average Coefficient (C) Calculations

Project:	Proposed Residential Development	Computed By:	LPG
Job #:	1279-99-010	Checked By:	RMD
Location:	Township of Lawrence	Date:	10/9/2020

Drainage Area	Impervious Area (sf)	Coefficient (C) Used	Open Space (SF)	Coefficient (C) Used	Average Coefficient (C) Used	Total Area (SF)	Total Area (acres)
IA 1	6547	0.95	1410	0.35	0.84	7957	0.18
IA 2	7388	0.95	491	0.35	0.91	7879	0.18
IA 11	4955	0.95	0	0.35	0.95	4955	0.11
IA 12	2026	0.95	888	0.35	0.77	2914	0.07
IA 31	3947	0.95	2918	0.35	0.69	6865	0.16
IA 41	4577	0.95	1130	0.35	0.83	5707	0.13
IA 51	12726	0.95	2197	0.35	0.86	14923	0.34

DYNAMIC ENGINEERING

Stormwater Collection System Calculations

Project: Proposed Residential Development
Job #: 1279-99-010
Location: Township of Lawrence
Design Storm: 25 Yr

Computed By: LPG
Checked By: RMD
Date: 10/9/2020

NOTES:
1) Design method used is Rational Method, unless otherwise noted.
2) Refer to Weighted Runoff Coefficient table for calculation of incremental areas and C values

PIPE SECTION		SUBCATCHMENT AREA	INCREMENTAL		CUMULATIVE	TIME OF CONCENTRATION			I	PEAK RUNOFF		PIPING INPUT			PIPING DATA		
FROM	TO	Area (Acres)	"C"	A x C Ac	A x C (acres)	Tc to Inlet (min)	Tc in Pipe (min.)	Final Tc (min)	(In/Hr)	Q to Inlet (CFS)	Q cum. for Pipe (CFS)	Dia. (In)	Length (Ft)	Man. "n"	Slope (ft/ft)	Pipe Capacity (cfs)	Pipe Velocity (fps)
Inlet 1	Inlet 2	0.18	0.84	0.15	0.15	10.00	0.58	10.00	6.80	1.02	1.02	15	126.0	0.013	0.0047	4.43	3.61
Inlet 2	MH 3	0.18	0.91	0.16	0.31	10.00	0.23	10.58	6.68	1.07	2.07	15	51.0	0.013	0.0050	4.57	3.73
Inlet 11	Inlet 12	0.11	0.95	0.10	0.10	10.00	0.23	10.00	6.80	0.68	0.68	15	51.0	0.013	0.0050	4.57	3.73
Inlet 12	MH 13	0.07	0.77	0.05	0.15	10.00	0.41	10.23	6.80	0.34	1.02	15	91.0	0.013	0.0050	4.57	3.73
Inlet 31	MH 32	0.16	0.69	0.11	0.11	10.00	0.15	10.00	6.80	0.75	0.75	15	95.0	0.013	0.0393	12.80	10.44
Inlet 41	MH 42	0.13	0.83	0.11	0.11	10.00	0.27	10.00	6.80	0.75	0.75	15	60.0	0.013	0.0050	4.57	3.73
Inlet 51	MH 52	0.34	0.86	0.29	0.29	10.00	0.11	10.00	6.80	1.97	1.97	15	24.0	0.013	0.0050	4.57	3.73
OCS 61	Headwall	0.93	0.92	0.86	0.86	10.00	0.16	10.00	6.80	5.85	5.85	36	63.0	0.013	0.0050	47.16	6.68

RIP RAP CALCULATIONS

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 10/9/2020
Project: PM Developme
Project No: 1279-99-010

Calculated By: TAZ
Checked By: LPG

Conduit Outlet Protection Calculations

Rip Rap Pad # 1

Design Parameters:

Design Storm Flow for 25 Year, Q	6.20	cfs
Vertical Dimension of Outlet Pipe, D_o	36	in
Horizontal Dimension of Outlet Pipe, W_o	36	in
Tailwater Depth, TW^1	1.46	ft

Apron Dimension Calculations:

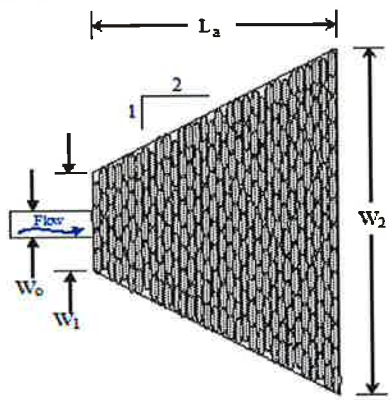
Unit Dicharge, $q = Q/D_o =$ 2.07 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \dfrac{1.8q}{D_o^{1/2}} + 7D_o =$ 23.15 ft or $L_a =$ **24 ft**

Width, $W_1 = 3W_o =$ 9. ft or $W_1 =$ **9 ft**

Width, $W_2 = 3W_o + L_a$ = 32.15 ft or $W_2 =$ **33 ft**

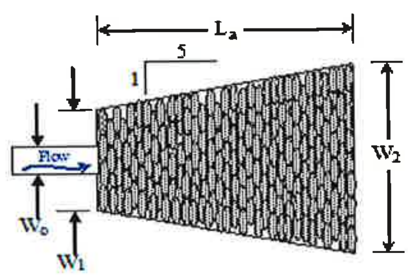


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \dfrac{3q}{D_o^{1/2}} =$ $L_a =$

Width, $W_1 = 3W_o =$ $W_1 =$

Width, $W_2 = 3W_o + 0.4L_a$ = $W_2 =$



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \dfrac{0.02q^{1.33}}{TW}$ = 0.43 in $d_{50} =$ **6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

STORMWATER BASIN AREA INVESTIGATION REPORT, PREPARED BY DYNAMIC EARTH, LLC

STORMWATER BASIN AREA INVESTIGATION REPORT

PROPOSED SITE DEVELOPMENT
2495 Brunswick Pike
Block 2001, Lots 2, 3, 4, 5 & 68
Lawrence Township, Mercer County, New Jersey

Prepared for:

RPM DEVELOPMENT GROUP
77 Park Street
Montclair, New Jersey 07042

Prepared by:

DYNAMIC EARTH

245 Main Street, Suite 110
Chester, New Jersey 07930

Peter H. Howell, P.E.
Principal
NJ PE License No. 24GE04728700

Patrick J. Granitzki, PE
Principal
NJ PE License No. 24GE05355900

Project #1279-99-010E
March 6, 2020

STORMWATER BASIN AREA INVESTIGATION REPORT

Proposed Site Development
2495 Brunswick Pike
Block 2001, Lots 2, 3, 4, 5 & 68
Lawrence Township, Mercer County, New Jersey

TABLE OF CONTENTS

APPENDICES

1.0 LOCATION AND DESCRIPTION

Dynamic Earth, LLC (Dynamic Earth) has completed an exploration and evaluation for the proposed stormwater management facility for the site development to be located at 2495 Brunswick Pike in Lawrence Township, Mercer County, New Jersey. The site is identified as Block 2001, Lots 2, 3, 4, 5 and 68. The subject site is shown on the *Test Location Plan* attached within the appendix of this report.

At the time of Dynamic Earth's investigation, the area of the proposed stormwater management facility was grass covered. The subject site is bound to the north by Texas Avenue and residential property beyond; to the east by the existing shopping center with Brunswick Pike beyond; to the south by the existing shopping center; and to the west by the residential property.

At the time of Dynamic Earth's investigation conceptual site plans were not developed; however, we understand that the proposed site development will be located within the northern portion of the site near Texas Avenue. Proposed site development plans are expected to include the construction of a Multi-Family Development with associated stormwater management facilities.

Topographic information was provided on a June 6, 2019 *Topographic Survey* prepared by Dynamic Survey, LLC. Existing site grades range between approximately 69 feet within the norther portion of the site and 57 feet within the southern portion of the site.

2.0 SCOPE OF SERVICES

Dynamic Earth's scope of services pertaining to this report included evaluating the subsurface conditions at soil profile pit locations to estimate the apparent seasonal high groundwater level and collecting samples for laboratory permeability testing. Eight soil profile pits (identified as SPP-1 through SPP-8) were performed as part of our investigation.

The test locations were excavated with a rubber-tire backhoe within the area of anticipated stormwater management facilities. The test locations were backfilled to the surface with excavated soils at. The test locations are shown on the attached *Supplemental Soil Profile Pit Location Plan.*

The soils encountered were classified in general conformance with the Field Book for Describing and Sampling Soils (Version 3), published by the National Soil Survey Center, Natural Resources Conservation Service, U.S. Department of Agriculture (USDA). Observations were made for groundwater and/or redoximorphic features indicative of zones of saturation or seasonal high groundwater. Soil logs are included in the Appendix of this report.

Undisturbed tube permeability tests were collected in general accordance with New Jersey Department of Environmental Protection (N.J.D.E.P.) *Stormwater Best Practices Manual – Appendix E* test methods on representative samples obtained from anticipated stormwater management facility infiltration depths.

3.0 UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) SOIL SURVEY

Based on a review of the United States Department of Agriculture – Natural Resources Conservation Services (USDA-NRCS) soil survey the following soil resources are mapped underlying the site within the area of the proposed site improvements and are described below:

Udorthents, stratified substratum, zero to eight percent slopes (UdstB): Udorthents stratified substratum with zero to eight percent slopes is mapped within the majority of the proposed stormwater management facility. The typical soil profile of this series soil (as reported in the soil survey) consists of sand to a depth of 10 inches underlain by gravelly coarse sand to a depth of 72 inches below the natural ground surface (limit of report). The depth to the water table is reported to be more than 80 inches below the natural ground surface.

Othello silt loams, zero to two percent slopes, northern coastal plain (OthA): Orthello silt loams with zero to two percent slopes is mapped within the southwestern portion of the proposed stormwater management facility. The typical soil profile of this series soil (as reported in the soil survey) consists of silt loam to a depth of 29 inches, with a sandy loam to a depth of 34 inches, underlain by loamy sand to a depth of 80 inches below the natural ground surface (limit of report). The depth to the water table is reported to be more between 10 and 20 inches below the natural ground surface.

4.0 RESULTS

Detailed descriptions of the subsurface conditions encountered are presented on the *Records of Subsurface Investigation* included herein. The subsurface conditions encountered in the soil profile pits consisted of the following generalized strata in order of increasing depth and were generally consistent with the USDA soil series detailed above.

4.1 Subsurface Soil Profile

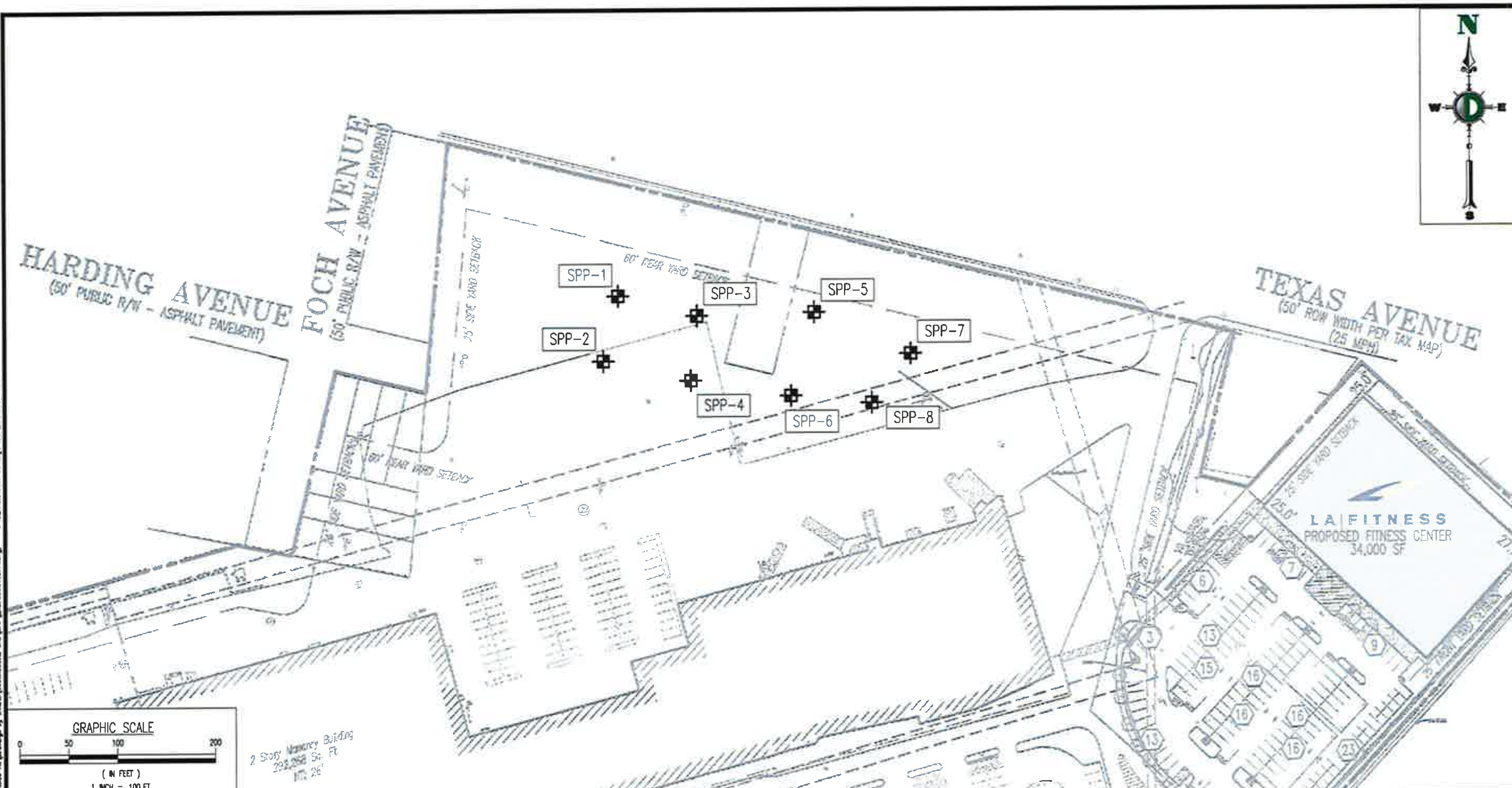
The soil profile pits were performed within existing grass areas and encountered between approximately three inches and 24 inches of topsoil fill at the surface. Debris encountered within the topsoil layer included porcelain tile fragments. Beneath the surficial cover, natural residual soils were encountered that consisted of sand, sandy loam, loamy sand, silt loam, silt, silty clay, and silty clay loam with variable amounts of gravel. The natural soils were encountered to termination/refusal depths ranging between approximately four feet and 11.3 feet below the ground surface; corresponding to elevations ranging between 53.4 feet and 57.9 feet.

4.2 Seasonal High Groundwater and Permeability Testing

Groundwater or evidence of seasonal high groundwater was encountered within planned stormwater management locations at depths ranging from 0.4 feet and five feet below the ground surface; corresponding to elevations ranging between 58.1 feet and 54.6 feet. Groundwater levels are expected to fluctuate seasonally and following significant periods of precipitation. Permeability testing was not requested as part of this investigation. A summary of the seasonal high groundwater levels and permeability test results is presented in the following table:

SEASONAL HIGH GROUNDWATER AND PERMEABILITY TEST SUMMARY			
Location	Surface Elevation (mse)	Estimated Seasonal High Groundwater	
		Depth (Feet)	Elevation (Feet)
SPP-1	60.1	5.0	55.1
SPP-2	60.1	2.9	57.2
SPP-3	59.2	3.3	55.9
SPP-4	58.4	3.2	55.2
SPP-5	58.5	0.4	58.1
SPP-6	56.6	2.0	54.6
SPP-7	57.1	0.8	56.3
SPP-8	57.4	2.7	54.7

Test Location Plan



SCALE: (H) 1"=100 (V)	JOB No: 1279-99-010E	TITLE: TEST LOCAION PLAN	
SHEET No: 1 OF 1	DRAWN BY: KFG	PROJECT: **RPM DEVELOPMENT** *PROPOSED MULTIFAMILY DEVELOPMENT* BLOCK 2001, LOTS 3, 60-66 & 68 2495 BRUNSWICK PIKE TOWNSHIP OF LAWRENCE, MERCER COUNTY, NEW JERSEY	
	DESIGNED BY: DR		
	CHECKED BY: PG		
	DATE: 05/09/19	Rev. # 0	DEC Client Code: 1279

LEGEND:

SPP-X — APPROXIMATE SOIL PROFILE PIT LOCATION

NOTES:
1. THIS PLAN HAS BEEN PREPARED BASED ON A OVERALL SITE PLAN EXHIBIT PREPARED ON 06/20/18, LAST REVISED 12/17/18 BY DYNAMIC ENGINEERING, LLC.
2. THIS PLAN IS NOT FOR CONSTRUCTION AND WAS PREPARED TO ILLUSTRATE TEST LOCATIONS ONLY, AND MAY NOT REFLECT THE MOST CURRENT REVISION OF THE BASE PLAN.

DYNAMIC EARTH, LLC
245 Main Street - Suite 110
Chester, NJ 07930
T: 908.879.7095 - F: 908.879.0222
www.dynamic-earth.com

Records of Subsurface Exploration

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP-1

Project: Proposed Multifamily Development
Project No.: 1279-99-010E
Location: 2465 Brunswick Pike, Township of Lawrence, Mercer County, New Jersey
Client: RPM Development

Surface Elevation (ft):		Date Started:	5/6/19
Termination Depth (ft):	11.0	Date Completed:	5/6/19
Proposed Location:	SWM	Logged by:	D. Richardson
Excavation / Test Method:	Visual Observation	Contractor:	Pennyweight
		Rig Type:	Case 510L

Groundwater Data	Depth (ft)	EL (msl)	Groundwater Comments
Seepage	8.5	-8.5	Iron accumulation approximately five feet below the ground surface.
Groundwater	6.0	-6.0	
Seasonal High Groundwater	5.0	-5.0	

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
			GRAVEL	COBBLES	STONES	BOULDERS	Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
0 - 22	FILL Strong Brown (7.5YR 5/6)	SILT LOAM	15	5			MASSIVE	STRUCTURELESS		WET	SOFT	SLIGHTLY STICKY	SLIGHTLY PLASTIC	ABRUPT <1"	WAVY	CMN (20% MAX)	FINE	NONE			BAG	5	S-1	
22 - 60	Brown (7.5YR 6/3)	LOAMY SAND	5				SINGLE GRAIN	STRUCTURELESS		MOIST	LOOSE	SLIGHTLY STICKY	NONPLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	NONE			BAG TUBE	36	S-2 T-1	
60 - 72	Brown (7.5YR 5/3)	LOAMY SAND	5				SINGLE GRAIN	STRUCTURELESS		MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	60	S-3	
72 - 103	Light Brownish Grey (10YR 6/2)	LOAMY SAND	5				SINGLE GRAIN	STRUCTURELESS		WET	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	103	S-4	
103 - 132	Brown (7.5YR 6/3)	LOAMY SAND	10	<5			SINGLE GRAIN	STRUCTURELESS		WET	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	132	S-5	

Additional Remarks: S-1 encountered debris at the surface. Debris included porcelain tile and polyvinyl chloride. SPP-1 was terminated approximately at 11.3 feet below the ground surface. SPP-1 encountered wet-cave-in to a depth of 6.3 feet below the ground surface.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP-2

Project:	Proposed Multifamily Development	Project No.:	1279-99-010E
Location:	2465 Brunswick Pike, Township of Lawrence, Mercer County, New Jersey	Client:	RPM Development
Surface Elevation (ft):		Date Started:	5/6/19
Termination Depth (ft):	11.3	Date Completed:	5/6/19
Proposed Location:	SWM	Logged by:	D. Richardson
Excavation / Test Method:	Visual Observation	Contractor:	Pennyweight
		Rig Type:	Case 610L

Groundwater Data	Depth (ft)	EL (msl)	Groundwater Comments
Seepage	10.5	-10.5	
Groundwater	4.4	-4.4	Iron accumulation approximately 2.9 feet below the ground surface.
Seasonal High Groundwater	2.9	-2.9	

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%) GRAVEL	COBBLES	STONES	BOULDERS	STRUCTURE Shape	Grade	Size	WATER CONTENT	CONSISTENCY Resistance to Rupture	Stickiness	Plasticity	BOUNDARY Distinctness	Topography	ROOTS		MOTTLING Quantity	Size	Contrast	SAMPLING Type	Depth (in)	No.	LAB RESULTS
0 - 8	FILL Strong Brown (7.5YR 5/8)	SILT LOAM	15	5			MASSIVE	STRUCTURELESS		WET	SOFT	SLIGHTLY STICKY	SLIGHTLY PLASTIC	ABRUPT <1"	WAVY	CMN (20% MAX)	FINE	NONE			BAG	5	S-1	
8 - 35	Reddish Brown (5YR 4/3)	SILTY CLAY LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	NONE			BAG TUBE	30	S-2 T-1	
35 - 53	Reddish Brown (5YR 4/3)	SILT LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	53	S-3	
53 - 126	Reddish Brown (5YR 4/3)	SANDY LOAM	10	<5			SUBANGULAR BLOCKY	MODERATE	MEDIUM	WET	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	96	S-4	
126 - 136	Reddish Brown (5YR 4/3)	LOAMY SAND	15	5			SINGLE GRAIN	STRUCTURELESS		WET	LOOSE	NONSTICKY	NONPLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	136	S-5	

Additional Remarks: S-1 encountered debris at the surface. Debris included porcelain tile and polyvinyl chloride. SPP-2 was terminated approximately at 11.3 feet below the ground surface.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Project:	Proposed Multifamily Development	Project No.:	1279-99-010E
Location:	2495 Brunswick Pike, Township of Lawrence, Mercer County, New Jersey	Client:	RPM Development

Surface Elevation (ft):		Date Started:	5/6/19	Groundwater Data	Depth (ft)	EL (msl)
Termination Depth (ft):	11.3	Date Completed:	5/6/19			
Proposed Location:	SWM	Logged by:	D. Richardson	Seepage	NE	#VALUE!
Excavation / Test Method:	Visual Observation	Contractor:	Pennyweight	Groundwater	4.0	-4.0
		Rig Type:	Case 510L	Seasonal High Groundwater	3.3	-3.3

Groundwater Comments: Iron accumulation approximately 3.25 feet below the ground surface.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%) GRAVEL	COBBLES	STONES	BOULDERS	STRUCTURE Shape	Grade	Size	WATER CONTENT	CONSISTENCY Resistance to Rupture	Stickiness	Plasticity	BOUNDARY Distinctness	Topography	ROOTS		MOTTLING Quantity	Size	Contrast	SAMPLING Type	Depth (in)	No.	LAB RESULTS
0 - 8	FILL Strong Brown (7.5YR 5/8)	SILT LOAM	15	5			MASSIVE	STRUCTURELESS		WET	SOFT	SLIGHTLY STICKY	SLIGHTLY PLASTIC	ABRUPT <1"	WAVY	CMN (20% MAX)	FINE	NONE			BAG	2	S-1	
8 - 28	Reddish Brown (5YR 4/3)	SILTY CLAY LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	NONE			BAG TUBE	28	S-2 T-1	
28 - 48	Reddish Brown (5YR 4/3)	SILT LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	NONE	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	48	S-3	
48 - 126	Reddish Brown (5YR 4/3)	SANDY LOAM	10	<5			SUBANGULAR BLOCKY	WEAK	FINE	WET	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	96	S-4	

Additional Remarks: S-1 encountered debris at the surface. Debris included porcelain tile and polyvinyl chloride. SPP-3 encountered refusal approximately at 10.5 feet below the ground surface.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Project: Proposed Multifamily Development		Project No.:	1279-89-010E
Location: 2495 Brunswick Pike, Township of Lawrence, Mercer County, New Jersey		Client:	RPM Development

				Groundwater Data	Depth (ft)	EL (msl)	Groundwater Comments
Surface Elevation (ft):		Date Started:	5/6/19				
Termination Depth (ft):	5.4	Date Completed:	5/6/19	Seepage	NE	#VALUE!	Iron accumulation approximately 2.9 feet below the ground surface.
Proposed Location:	SWM	Logged by:	D. Richardson	Groundwater	4.3	-4.3	
Excavation / Test Method:	Visual Observation	Contractor:	Pennyweight	Seasonal High Groundwater	3.2	-3.2	
		Rig Type:	Case 510L				

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%) GRAVEL	COBBLES	STONES	BOULDERS	STRUCTURE Shape	Grade	Size	WATER CONTENT	CONSISTENCY Resistance to Rupture	Stickiness	Plasticity	BOUNDARY Distinctness	Topography	ROOTS		MOTTLING Quantity	Size	Contrast	SAMPLING Type	Depth (in)	No.	LAB RESULTS
0 - 8	FILL Strong Brown (7.5YR 5/8)	SILT LOAM	15	5			MASSIVE	STRUCTURELESS		WET	SOFT	SLIGHTLY STICKY	SLIGHTLY PLASTIC	ABRUPT <1"	WAVY	CMN (20% MAX)	FINE	NONE			BAG	2	S -1	
8 - 38	Reddish Brown (5YR 4/3)	SILTY CLAY LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	NONE			BAG TUBE	30	S-2 T-1	
38 - 51	Reddish Brown (5YR 4/3)	SILT LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	40	S-3	
51 - 60	Brown (7.5YR 5/3)	SILTY CLAY	10	<5			SUBANGULAR BLOCKY	MODERATE	FINE	WET	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	55	S-4	
60 - 65	Brown (7.5YR 5/3)	SILT LOAM	15	5			PLATY	MODERATE	FINE	WET	HARD	NONSTICKY	NONPLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	65	S-5	

Additional Remarks: S-1 encountered debris at the surface. Debris included porcelain tile and polyvinyl chloride. SPP-3 encountered refusal approximately at 5.4 feet below the ground surface.

SOIL PROFILE PIT LOG

DYNAMIC EARTH

Project: Proposed Multifamily Development | Project No.: 1279-99-010E

Location: 2495 Brunswick Pike, Township of Lawrence, Mercer County, New Jersey | Client: RPM Development

Surface Elevation (ft):		Date Started:	5/6/19	Groundwater Data	Depth (ft)	El. (rmd)	Groundwater Comments
Termination Depth (ft):	4.7	Date Completed:	5/6/19	Seepage	4.0	-4.0	Iron accumulation approximately 0.5 feet below the ground surface.
Proposed Location:	SWM	Logged by:	D. Richardson	Groundwater	3.0	-3.0	
Excavation / Test Method:	Visual Observation	Contractor:	Pennyweight	Seasonal High Groundwater	0.4	-0.4	
		Rig Type:	Case 510L				

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%) GRAVEL	COBBLES	STONES	BOULDERS	STRUCTURE Shape	Grade	Size	WATER CONTENT	CONSISTENCY Resistance to Rupture	Stickiness	Plasticity	BOUNDARY Distinctness	Topography	ROOTS		MOTTLING Quantity	Size	Contrast	SAMPLING Type	Depth (in)	No.	LAB RESULTS
0 - 3	TOPSOIL Dark Brown (7.5YR 3/3)	SILT LOAM	15	5			MASSIVE	STRUCTURELESS		WET	SOFT	SLIGHTLY STICKY	SLIGHTLY PLASTIC	ABRUPT <1"	WAVY	CMN (20% MAX)	FINE	NONE			BAG	1	S-1	
3 - 6	Reddish Brown (5YR 4/3)	SILTY CLAY LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	NONE			BAG TUBE	5	S-2 T-1	
6 - 28	Reddish Brown (5YR 4/3)	SILT LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	23	S-3	
28 - 36	Light Brownish Gray (10YR 6/2)	SILT LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	36	S-4	
36 - 42	Brown (7.5YR 5/3)	SILT LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	WET	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	42	S-5	
42 - 56	Brown (7.5YR 5/3)	LOAMY SAND	15	5			SINGLE GRAIN	STRUCTURELESS		WET	LOOSE	NONSTICKY	NONPLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	56	S-6	

Additional Remarks: SPP-5 was terminated approximately at 4.7 feet below the ground surface.

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 6

Page 1 of 1

Project:	Proposed Multifamily Development	Project No.:	1279-99-010E
Location:	2495 Brunswick Pike, Township of Lawrence, Mercer County, New Jersey	Client:	RPM Development
Surface Elevation (ft):		Date Started:	5/6/19
Termination Depth (ft):	5.5	Date Completed:	5/6/19
Proposed Location:	SWM	Logged by:	D. Richardson
Excavation / Test Method:	Visual Observation	Contractor:	Pennyweight
		Rig Type:	Case 610L

Groundwater Data	Depth (ft)	EL (msl)	Groundwater Comments
Seepage	3.0	-3.0	Iron accumulation approximately two feet below the ground surface.
Groundwater	4.0	-4.0	
Seasonal High Groundwater	2.0	-2.0	

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%) GRAVEL	COBBLES	STONES	BOULDERS	STRUCTURE Shape	Grade	Size	WATER CONTENT	CONSISTENCY Resistance to Rupture	Stickiness	Plasticity	BOUNDARY Distinctness	Topography	ROOTS		MOTTLING Quantity	Size	Contrast	SAMPLING Type	Depth (in)	No.	LAB RESULTS
0 - 9	FILL Strong Brown (7.5YR 5/8)	SILT LOAM	15	5			MASSIVE	STRUCTURELESS		WET	SOFT	SLIGHTLY STICKY	SLIGHTLY PLASTIC	ABRUPT <1"	WAVY	CMN (20% MAX)	FINE	NONE			BAG	1	S-1	
9 - 24	Brown (7.5YR 5/3)	SILT LOAM	5	5			SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	NONE			BAG TUBE	20	S-2 T-1	
24 - 39	Brown (7.5YR 5/3)	SILT LOAM	5				SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	30	S-3	
39 - 48	Brown (7.5YR 5/3)	SILT	10	<5			SUBANGULAR BLOCKY	MODERATE	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	WAVY	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	40	S-4	
48 - 66	Brown (7.5YR 5/3)	SANDY LOAM	15	5			PLATY	MODERATE	FINE	WET	HARD	NONSTICKY	NONPLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	60	S-5	

Additional Remarks: S-1 encountered debris at the surface. Debris included porcelain tile and polyvinyl chloride. SPP-6 encountered refusal approximately at 5.5 feet below the ground surface.

SOIL PROFILE PIT LOG

DYNAMIC EARTH

Soil Profile Pit: SPP- 7

Project: Proposed Multifamily Development
Project No.: 1279-99-010E
Location: 2495 Brunswick Pike, Township of Lawrence, Mercer County, New Jersey
Client: RPM Development

Surface Elevation (ft):		Date Started:	5/6/19
Termination Depth (ft):	4.3	Date Completed:	5/6/19
Proposed Location:	SWM	Logged by:	D. Richardson
Excavation / Test Method:	Visual Observation	Contractor:	Pennyweight
		Rig Type:	Case 510L

Groundwater Data	Depth (ft)	El. (msl)
Seepage	4.0	-4.0
Groundwater	3.0	-3.0
Seasonal High Groundwater	0.5	-0.5

Groundwater Comments: Iron accumulation approximately 0.83 feet below the ground surface.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%) GRAVEL	COBBLES	STONES	BOULDERS	STRUCTURE Shape	Grade	Size	WATER CONTENT	CONSISTENCY Resistance to Rupture	Stickiness	Plasticity	BOUNDARY Distinctness	Topography	ROOTS		MOTTLING Quantity	Size	Contrast	SAMPLING Type	Depth (in)	No.	LAB RESULTS
0 - 5	TOPSOIL Dark Brown (7.5YR 3/3)	SILT LOAM	15	5			MASSIVE	STRUCTURELESS		MOIST	SOFT	SLIGHTLY STICKY	SLIGHTLY PLASTIC	ABRUPT <1"	WAVY	CMN (20% MAX)	FINE	NONE			BAG	2	S -1	
5 - 10	Brown (7.5YR 5/3)	LOAM	5				SUBANGULAR BLOCKY	MODERATE	FINE	MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	NONE			BAG TUBE	7	S-2 T-1	
10 - 36	Brown (7.5YR 5/3)	LOAM	5				SUBANGULAR BLOCKY	MODERATE	FINE	MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	10	S-3	
36 - 52	Brown (7.5YR 5/3)	LOAMY SAND	5				SINGLE GRAIN	STRUCTURELESS		WET	LOOSE	NONSTICKY	NONPLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	48	S-4	

Additional Remarks: SPP-1 was terminated approximately at 4.3 feet below the ground surface.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 6

Page 1 of 1

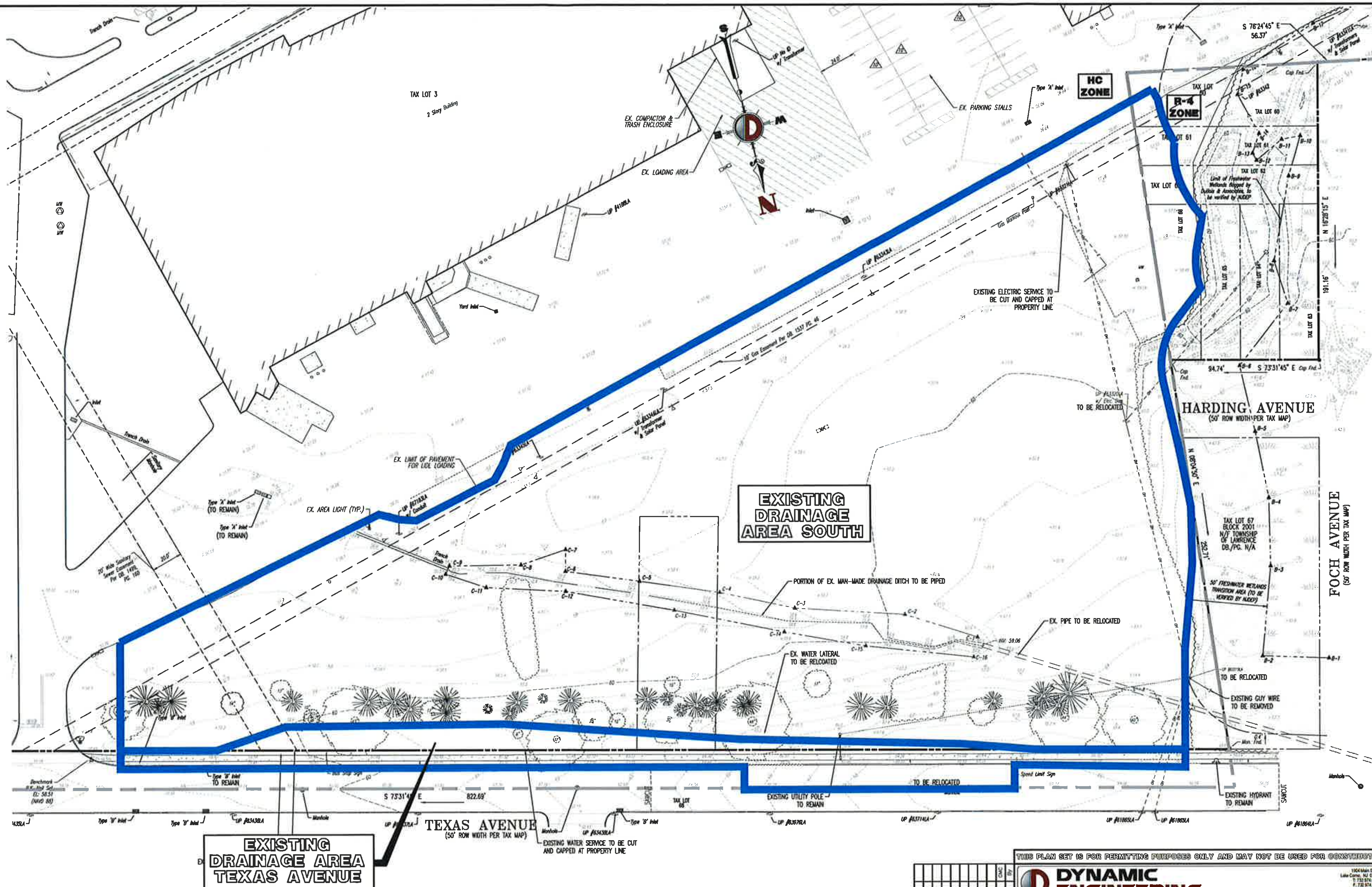
Project:	Proposed Multifamily Development	Project No.:	1279-99-010E
Location:	2495 Brunswick Pike, Township of Lawrence, Mercer County, New Jersey	Client:	RPM Development
Surface Elevation (ft):		Date Started:	5/6/19
Termination Depth (ft):	4.0	Date Completed:	5/6/19
Proposed Location:	SWM	Logged by:	D. Richardson
Excavation / Test Method:	Visual Observation	Contractor:	Pennyweight
		Rig Type:	Case 510L

Groundwater Data	Depth (ft)	EL (msl)	Groundwater Comments
Seepage	3.3	-3.3	Iron accumulation approximately 2.7 feet below the ground surface.
Groundwater	3.3	-3.3	
Seasonal High Groundwater	2.7	-2.7	

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%) GRAVEL	COBBLES	STONES	BOULDERS	STRUCTURE Shape	Grade	Size	WATER CONTENT	CONSISTENCY Resistance to Rupture	Stickiness	Plasticity	BOUNDARY Distinctness	Topography	ROOTS		MOTTLING Quantity	Size	Contrast	SAMPLING Type	Depth (in)	No.	LAB RESULTS
0 - 24	TOPSOIL Dark Brown (7.5YR 3/3)	SILT LOAM	15	5			MASSIVE	STRUCTURELESS		MOIST	SOFT	SLIGHTLY STICKY	SLIGHTLY PLASTIC	ABRUPT <1"	WAVY	CMN (20% MAX)	FINE	NONE			BAG	2	S-1	
24 - 32	Brown (7.5YR 5/3)	SAND	5				SINGLE GRAIN	STRUCTURELESS		MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	NONE			BAG TUBE	28	S-2 T-1	
32 - 38	Brown (7.5YR 5/3)	SAND	5				SINGLE GRAIN	STRUCTURELESS		MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	FINE	CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	32	S-3	
38 - 48	Brown (7.5YR 5/3)	SAND	5				SINGLE GRAIN	STRUCTURELESS		WET	LOOSE	NONSTICKY	NONPLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	PROMINENT	BAG	48	S-4	

Additional Remarks: SPP-1 was terminated approximately at four feet below the ground surface.

DRAINAGE AREA MAPS



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Rev.	Date	Comments	By
1	10/09/20	REV. PER TOWNSHIP COMMENTS	GMC

DYNAMIC ENGINEERING

LAND DEVELOPMENT CONSULTING • PERMITTING • GEOTECHNICAL • ENVIRONMENTAL • SURVEY • PLANNING & ZONING

TITLE: **EXISTING DRAINAGE AREA MAP**

PROJECT: **RPM DEVELOPMENT, LLC**
PROPOSED RESIDENTIAL DEVELOPMENT
BLOCK 2001, LOTS 3, 60–66, & 68
2495 BRUNSWICK PIKE (A.K.A. ALT ROUTE 1)
TOWNSHIP OF LAWRENCE, MERCER COUNTY, NEW JERSEY

JOB No: 1279-99-010
DATE: 03/31/2020
DRAWN BY: GMC
DESIGNED BY: LPG
CHECKED BY: TJM
CHECKED BY: –
SCALE: (H) 1"=30' (V)
SHEET No: 1 OF 3
Rev # 1

JOHN A. PALUS
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 41975

THOMAS J. MULLER
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 52178

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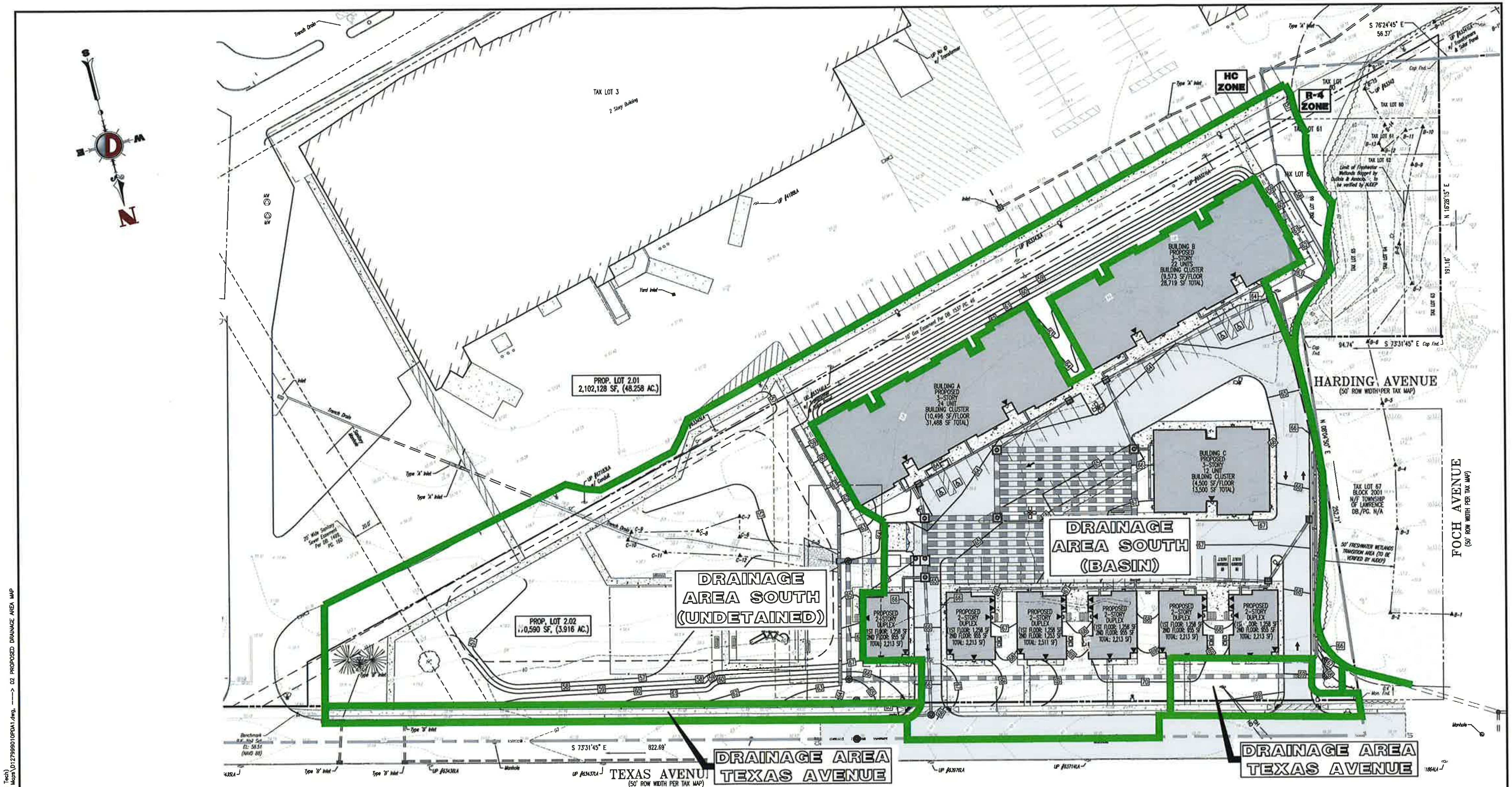

GRAPHIC SCALE

(IN FEET)
1 INCH = 30 FT.

THIS PLAN SET IS FOR PERMITTING PURPOSES ONLY AND MAY NOT BE USED FOR CONSTRUCTION

Rev.	Date	Comments	By
1	10/09/20	REV. PER TOWNSHIP COMMENTS	GMC

DYNAMIC ENGINEERING

LAND DEVELOPMENT CONSULTING • PERMITTING • GEOTECHNICAL • ENVIRONMENTAL • SURVEY • PLANNING & ZONING

TITLE:

PROPOSED DRAINAGE AREA MAP

PROJECT: **RPM DEVELOPMENT, LLC**
PROPOSED RESIDENTIAL DEVELOPMENT
BLOCK 2001, LOTS 3, 60–66, & 68
2495 BRUNSWICK PIKE (A.K.A. ALT ROUTE 1)
TOWNSHIP OF LAWRENCE, MERCER COUNTY, NEW JERSEY

JOB No:	1279-99-010
DATE:	03/31/2020
DRAWN BY:	GMC
SCALE: (H)	1"=30'
(V)	
DESIGNED BY:	LPG
CHECKED BY:	TJM
CHECKED BY:	--
SHEET No:	2 OF 3
Rev. #	1

JOHN A. PALUS
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 41975

THOMAS J. MULLER
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 52179

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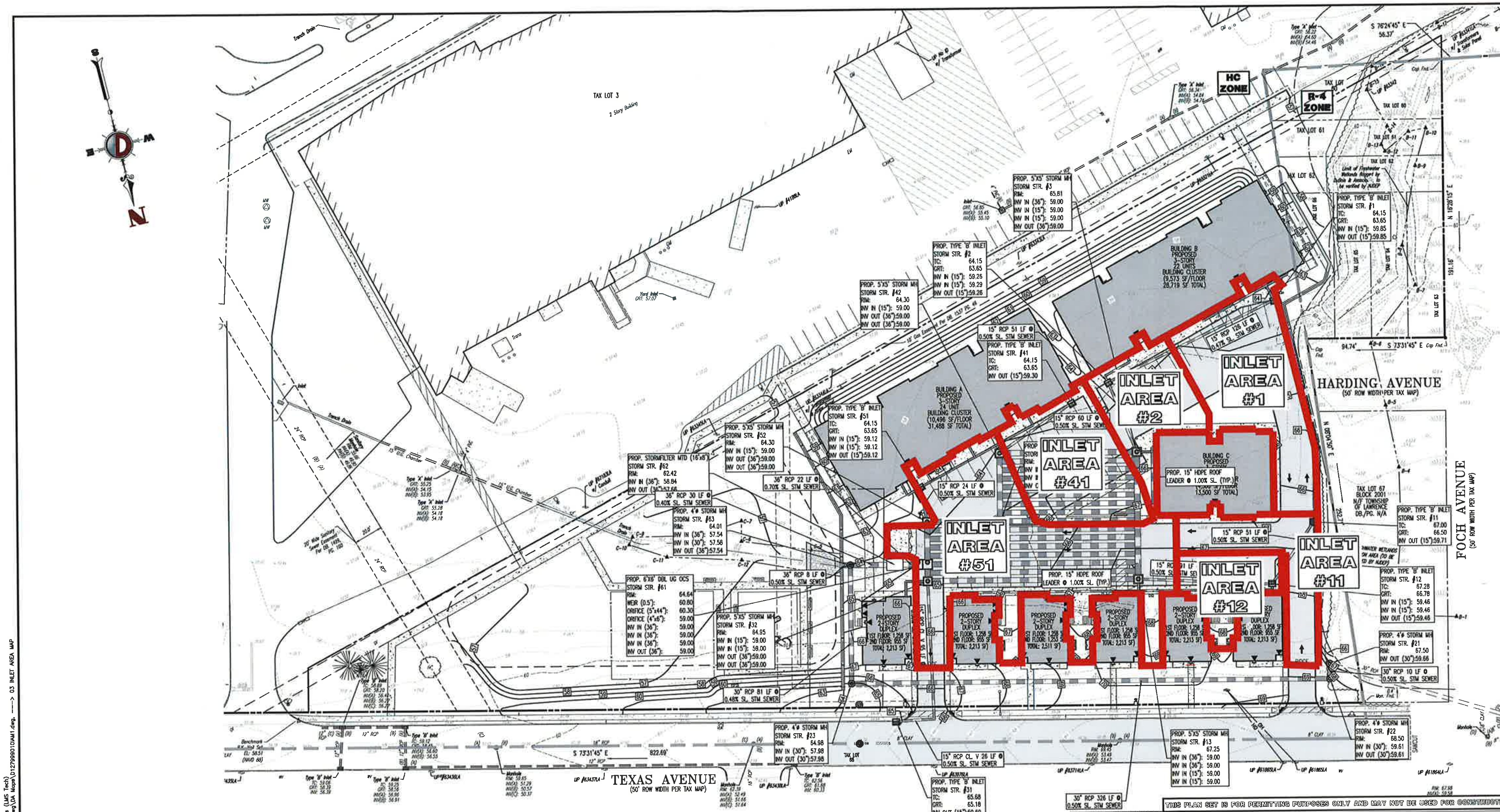

THIS PLAN SET IS FOR PERMITTING PURPOSES ONLY AND MAY NOT BE USED FOR CONSTRUCTION

Rev.	Date	Comments	By
1	10/09/20	REV. PER TOWNSHIP COMMENTS	GMC

DYNAMIC ENGINEERING
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1904 Main Street
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T: 732.974.0198
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www.dynamicec.com

TITLE: INLET AREA MAP

PROJECT: **RPM DEVELOPMENT, LLC**
PROPOSED RESIDENTIAL DEVELOPMENT
BLOCK 2001, LOTS 3, 60-66, & 68
2495 BRUNSWICK PIKE (A.K.A. ALT ROUTE 1)
TOWNSHIP OF LAWRENCE, MERCER COUNTY, NEW JERSEY

JOB No: 1279-99-010
DATE: 03/31/2020
DRAWN BY: GMC
SCALE: (H) 1"=30' (V)
DESIGNED BY: LPG
CHECKED BY: TJM
CHECKED BY: –
SHEET No: 3 OF 3
Rev # 1

JOHN A. PALUS
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 41975

THOMAS J. MULLER
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 52179