Exhibit D

Preliminary Storm Drainage Report
For: The Bornstedt Views
43-Lot Subdivision

April 25, 2022

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RENEWAL DATE: 12/31/2022

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Table of Contents

Description	Page(s)
Project Summary	1
Hydrograph Parameters	1
Detention Sizing Results	3
Water Quality Design	4
Conclusion	4
Existing Conditions Map	Appendix A
Developed Conditions Map	Appendix B
Basin Analysis, Data, and Detention Pond Design	Appendix C
Water Quality Manhole Details	Appendix D

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Project Summary

Purpose

The purpose of this analysis is to

1. Describe existing and proposed site conditions.
2. Provide detention calculations for the 2-yr, 5-yr, 10-yr, and 25-yr storm events.
3. Provide water quality calculations.

Project Location and Description

The Bornstedt Views Subdivision will be constructed in 1 phase. The site is Tax Lot 100, Map 2S 4E 24C, and is 12.736 acres and is located on the east side of SE Bornstedt Road and just south of Jerger Street. Averill Parkway is currently stubbed to the north line of the subject site near the northeast corner.

The site is bisected by a steep ravine running northwest through the site. There are steep slopes on the property (greater than 35%) that will not be developed. The site is currently wooded on the easterly side and a pasture on the west side. This entire site drains to this ravine and then flows north to Tickle Creek. See the Existing Conditions Map in Appendix A.

Proposed Improvements

The proposed 43-lot subdivision will consist of lots 7,500 sf and greater. A new detention pond will be constructed in the ravine on the south side of Maple Street. The pond will discharge into the existing drainage way on the north side of Maple Street.

The site improvements will include streets, curbs, sidewalks, and utilities. New storm sewer pipes, manholes, and catch basins will be installed to convey storm water to the new public detention systems. See the Developed Conditions Map in Appendix B

The following calculations will demonstrate that the total post-developed release rates from all of the design storm events will not exceed the pre-developed rates as required by the code.

Hydrograph Parameters

Rainfall

The rainfall distribution numbers were taken from the City of Sandy Stormwater Website (http://www.ci.sandy.or.us/Stormwater/)

Storm Recurrence Interval	Rainfall (inches)
2 year	3.50
5 year	4.50
10 year	4.80
25 year	5.50

Soils

The soil data for this site is from *Soil Survey of Clackamas County, Oregon* published by the United Stated Department of Agriculture (USDA). The post-development soil is assumed to be the same as pre-development. Soil Type: 15B,C, and D, Cazadero silty clay loam. Hydrologic Group “C”

Areas

Pre-developed area calculations are based on Existing Conditions Map in Appendix A. Post-developed area calculations are based on proposed designs of streets, curbs, and walkways and the proposed homes as shown on Developed Conditions Map in Appendix B.

Basin	
Pre-Developed	
Total Area	**12.739 ac**
Impervious Area	0.130 ac
Pervious Area	12.609 ac
Post-Developed	
Total Area	**12.739 ac ***
Impervious Area	5.529 ac
Pervious Area	7.210 ac

* The developed impervious area is calculated by taking 100% of the proposed right-of-way to be dedicated and assuming that it is all impervious. There will be some pervious areas with the landscape strips so this is a conservative assumption. The total area also includes 3,500 sf per lot for on-site improvements. The total right-of-way area is 2.659 ac. The total lot impervious area is 2.732 acres (3,500 sf x 32 lots). There will be an extra 6,000 sf of impervious shared driveways and fire-turnarounds on site. The total developed impervious area is 5.529 ac.

Curve Numbers

Curve Numbers are taken from the City of Portland Stormwater Management Manual, and the City of Portland Sewer and Drainage Facilities Design Manual.

Description	CN	Land Use Description
Pre-Developed	79	Soil Type “C” Portland SWMM Table A-8
Post-Developed Pervious Areas	70	Grass Lawn, Soil Group C Portland SDFDM Table 6-5
Impervious Areas	98	Buildings, AC, Sidewalks, etc.

Time of Concentration

The times of concentrations (T_c), were assumed for these preliminary calculations.

Basin	
Pre-Developed	35 minutes (assumed)
Post-Developed	5 minutes (assumed)

Detention Sizing Results

Hydrographs for the drainage basins were determined using a spreadsheet based on the King County, Washington Hydrograph Program, version 4.21B, which uses the Santa Barbara Urban Hydrograph (SBUH) method. The Post-Development flows were routed through the detention facilities and flow control structures were designed to release the water at the Pre-Developed rates for the 2-year, 5-year, 10-year, and 25-year storm events per the City of Sandy Development Code 13.18 and the 2016 City of Portland Stormwater Management Manual standards that were adopted by reference into the Sandy Development Code.

Detention System (Sizing Results)

The detention facility for this project will be a 3-deep detention pond. **The required storage volume is 15,366-cubic feet. The proposed pond shown on the planning maps can hold over 40,000-cubic feet.** At time of final engineering the pond will be graded as needed to match the minimum required storage. The orifices in the flow control manhole were designed to release the Post-Development Peak-Q's at or below the Pre-Developed Peak-Q's.

See Appendix C for more information and the detailed analysis.

Basin, Detention Pond				
Recurrence Interval (years)	Pre-Developed Outflow (cfs)	Developed Outflow (cfs)	Proposed Release Rates (cfs)	Reduction in outflow from Pre-Developed to Proposed
25	6.84	12.13	6.84	0%
10	5.40	9.99	5.39	0%
5	4.79	9.10	4.65	2%
2	2.90	6.27	2.79	4%

Orifice Table Detention Pond (Basin)		
Orifice	**Dia. (inches)**	**Height (feet)**
Bottom	8.18	0
Top	168 deg. Weir	2.1

Water Quality Design

CDS Storm Water Treatment Device

Two CDS manholes by Contech Stormwater Solutions will be designed for water quality for this site, one for each drainage basin, see details in Appendix D. The developed impervious area includes AC pavement, sidewalks, and roofs.

The flow (Q) from this runoff was calculated using the rational method (Q=CIA) where:

Q = flow (cfs)
C = runoff coefficient = 0.90 for Pavement and Roofs
I = Intensity = 0.2 inches per hour (City of Sandy Water Quality Storm for an “on-line facility”)
A = Impervious Area

Basin
Q = (0.90) X (0.2) X (5.529) = 0.995 cfs (total site).

The Contech Stormwater Solutions Treatment Device Model CDS2015-5-C has a treatment capacity of 1.1 cfs and will be used for water quality for this site.

Conclusion

In accordance with the City of Sandy requirements, on-site detention has been designed to maintain existing downstream storm water runoff characteristics and a water quality system has been designed to provide adequate treatment. These calculations demonstrate that the detention and water quality systems are more than adequately sized for the proposed development. Detailed calculations will be completed with the final engineering plans as needed. The final calculations will include an upstream basin analysis to make sure the storm pipes are adequality sized to convey the upstream water through the site.

Appendix A

Existing Conditions Map

SCALE : 1" = 50'

0' 25' 50' 100'

LEGEND

- (E) PROPERTY LINE
- (E) LOT LINE
- (E) CL RIGHT OF WAY
- (E) EASEMENT LINE
- (E) 5' GROUND CONTOUR
- (E) 1' GROUND CONTOUR
- (E) BUILDING WALL
- (E) AC PAVEMENT
- (E) SIDEWALK/CONCRETE
- (E) GRAVEL
- (E) CURB & GUTTER
- (E) FENCE
- (E) WATER LINE
- (E) 6" WATER LINE
- (E) 8" WATER LINE
- (E) 12" WATER LINE
- (E) STORM LINE
- (E) SANITARY LINE
- (E) GAS LINE
- (E) TELEPHONE LINE, CAT
- (E) OVERHEAD POWER LI
- FOUND SURVEY MONUMEN
- (E) STORM MANHOLE
- (E) CATCH BASIN
- (E) WATER METER
- (E) WATER VALVE
- (E) MANHOLE
- (E) GAS VALVE
- (E) LIGHT POLE
- (E) UTILITY POLE
- (E) POLE W/ GUY WIRE
- (E) SIGN
- (E) DECIDUOUS TREE
- (E) CONIFEROUS TREE
- (P) SANITARY LINE
- (P) SANITARY MANHOLE
- (P) STORM LINE
- (P) STORM MANHOLE
- (P) CATCH BASIN
- (P) WATER LINE
- (P) WATER METER
- (P) WATER VALVE
- (P) FIRE HYDRANT
- (P) STREET LIGHT

FSH OVERLAY

PER JASON SMITH, MS CASTLE ROSE ENVIRONMENTAL: DEBRIS ACCUMULATION AT FENCE IS WHAT HAS CREATED A "DAM" EFFECT - ANALOGOUS TO A BEAVER DAM ON A STREAM. WITHOUT THAT DEBRIS AT THE FENCE - THE STREAM WOULD NOT SPREAD OUT AND SLOW DOWN. HOWEVER, WATER STILL VISIBLY FLOWS, INCLUDING UNDERNEATH THE DAM AS STORM FLOWS ABATE. PROPER WAY TO MAP THIS IS AS A TEMPORARY WIDE AREA OF THE STREAM, RATHER THAN A SEPARATE WETLAND, SINCE THE IMPEDIMENT IS NOT A NATURAL FEATURE.

OFF-SITE WETLAND DOES NOT INTRUDE SOUTH

38928 Jerger St, Sandy, 97055

38940 Jerger St, Sandy, 97055

CASCADIA VILLAGE NO. 6 (PLAT NO. 3770)

AVERILL PARKWAY

JERGER ST

LOT 257 LOT 256 LOT 255 LOT 254 LOT 253 LOT 252 LOT 251 LOT 250 LOT 249 LOT 248 LOT 247 LOT 246 LOT 245 LOT 244

NOTE ALL "YELLOW" AND "GRAY" TREES TO BE REMOVED WITH DEVELOPMENT.

NOTE "GREEN" AND "YELLOW" TREES MEET THE TREE RETENTION REQUIREMENTS, SEE ARBORIST REPORT. ALL GREEN TREES WILL BE SAVED. SEE TREE PROTECTION PLAN.

RIM 1026.13'
IE IN S. = 1016.93'
IE IN E. = 1017.63
IE IN N. - 1017.03
IE OUT W. = 1016.93'

RIM 1027.96'
IE OUT N. = 1018.96'

EXISTING FENCE

N89°50'19"E 1326.38'

ORDINARY HIGH WATER MARK

ORDINARY HIGH WATER MARK

SHED

SHED

OLD HOUSE FOUNDATION

S89°45'29"W 1338.71'

SE BORNSTEDT RD

RIM 1011.74'
IE IN S. = 1003.59'
IE OUT N. = 1003.39'

RIM 1034.51'
IE IN S. = 1021.23'
IE OUT N. = 1021.03'

NOTE THE SUBJECT SITE IS PARCEL 3 PARTITION PLAT 2018-045. MONUMENTS WERE FOUND AND HELD AND THE MEASURED DISTANCE MATCH CLOSELY TO THE PLAT. SEE PP 20018-045. THIS PLAT HELD THE CENTERLINE OF THE AS TRAVELED WAY OF SE BORNSTEDT ROAD TO DETERMINE THE RIGHT-OF-WAY. SEE RECORD OF SURVEY SN 2022-026 RECORDED 1-20-22, TO BE USED AS THE BOUNDARY FOR THIS PLAT

PARCEL 4,
PARTITION PLAT 2018-045

TOPOGRAPHIC SURVEY

SCALE: 1" = 50'

SLOPE ANALYSIS LEGEND

- SLOPES OF 0-24.99%
- SLOPES OF 25-34.99%
- SLOPES OF 35% AND GREATER

BENCHMARK
ELEVATIONS ARE BASED ON CITY OF SANDY ELEVATION DATUM

SHEET C3 OF 10

NO.	DATE	REVISION	BY
-	-	-	-

DESIGNED: RLM
DRAWN: RLM
CHECKED: DLH
APPROVED: RLM

REGISTERED PROFESSIONAL ENGINEER 49779 OREGON JULY 21, 1995 RAY L. MOORE

RENEWAL DATE: 12/31/2022

SCALE: VERT: N/A HORIZ: 1" = 50'
DATE: 4-25-22
FILE: 19-268 - Planning.dwg

LEGAL	SECTION	TWP.	RANGE
	24	2S	4E

PROJECT: THE BORNSTEDT VIEWS
TOPOGRAPHIC SURVEY

LOCATION: 19618 BORNSTEDT ROAD, SANDY, OR

Surveyors & Planners, Inc.
Surveying, Planning and Civil Engineering
P.O. Box 955 Sandy, OR 97055
Phone: (503) 668-3151
Fax: (503) 668-4730

DATE OF PLOT 4-25-22

CLIENT:
EVEN BETTER HOMES, INC.
MAC EVEN
PO BOX 2021
GRESHAM, OR 97030
PHONE: (503) 348-5602
EMAIL: mac@evenbetterhomes.com

Appendix B

Developed Conditions Map

CASCADIA VILLAGE NO. 6
(PLAT NO. 3770)

ZION MEADOWS
(PLAT NO. 4483)
TRACT A
TRACT D

MARSHALL RIDGE
(PLAT NO. 4603)

APPROXIMATE LOCATION OF EXISTING HOMES (TYP.)

JERGER ST

AVERILL PARKWAY

MAPLE ST.

STREET A

STREET B

SE BORNSTEDT RD

RIM 1011.74'
IE IN S. = 1003.59'
IE OUT N. = 1003.39'

RIM 991.23'
IE IN (E) = XXX'

NEW MH RIM = XXX
IN OUT (W) 988.8'
IN IN (S) 989.1'

RIM 1002.21'
IE OUT (W) = XXX'

RIM 1027.96'
IE OUT N. = 1018.96'
IE IN S. = 1019.16'

38' PUBLIC STORM EASEMENT

EXT. 10' EASE

8" SANITARY SEWER MAIN SLOPE 1.0% MAIN TO BE BORED IN EXISTING EASEMENT

IE=990.26

IE=990.55

SLOPE =0.44%

15' SAN EASEMENT

RIP-RAP OUTFALL = XXX'

FLOW CONTROL MH
RIM= XXX'
IE= XXX'

WATER QUALITY MH

IE=991.4

R=20' (TYP)

RIM ±1121.2'
IE = ±1011.8'

RIM ±1011'
IE = ±1012.1

RIM ±1024'
IE = ±1013.6'

RIM ±1034.51'
IE IN S. = 1021.23'
IE OUT N. = 1021.03'

RIM ±1025'
IE = ±1014.3'

DETENTION POND
BOTTOM = 986'
MAX WATER = 990'

10' PRIVATE SAN SEWER EASEMENT

TEMP FIRE DEPARTMENT TURN-AROUND

20' ACCESS EASEMENT TO LOT 27

RIP-RAP OUTFALL = XXX'

15' PUBLIC DRAINAGE EASEMENT

15' PUBLIC DRAINAGE EASEMENT

20' PUBLIC STORM AND SANITARY SEWER EASEMENT

FIELD INLET TO COLLECT DRAINAGE FROM EAST

6' - 8' TALL RETAINING WALL AS NEED AT END OF THE ROAD OR GRADE AT 2:1 AND PAY A FEE-IN-LIEU FOR STREET CONSTRUCTION TO PROPERTY LINE.

FUTURE ROW

PARCEL 4,
PARTITION PLAT 2018-045

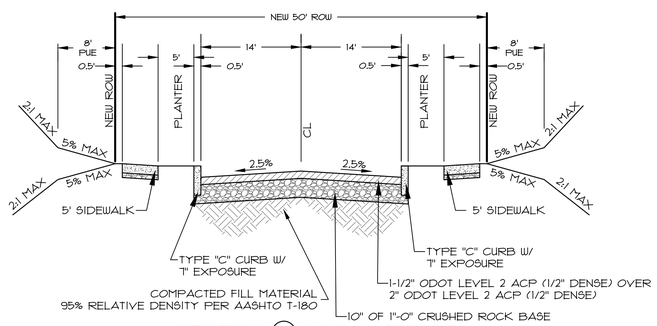
LOT 1 1,142 S.F.
LOT 2 8,133 S.F.
LOT 3 8,125 S.F.
LOT 4 8,125 S.F.
LOT 5 8,125 S.F.
LOT 6 8,125 S.F.
LOT 7 8,125 S.F.
LOT 8 8,125 S.F.
LOT 9 8,411 S.F.
LOT 10 14,998 S.F.
LOT 11 14,947 S.F.
LOT 12 9,926 S.F.
LOT 13 8,584 S.F.
LOT 14 8,111 S.F.
LOT 15 7,510 S.F.
LOT 16 7,500 S.F.
LOT 17 7,500 S.F.
LOT 18 7,991 S.F.
LOT 19 11,992 S.F.
LOT 20 9,038 S.F.
LOT 21 10,425 S.F.
LOT 22 7,502 S.F.
LOT 23 8,433 S.F.
LOT 24 7,518 S.F.
LOT 25 7,121 S.F.
LOT 26 7,520 S.F.
LOT 27 43,175 S.F.
TRACT A 34,370 S.F.
LOT 28 8,263 S.F.
LOT 29 8,280 S.F.
LOT 30 8,280 S.F.
LOT 31 7,582 S.F.
LOT 32 7,682 S.F.
LOT 33 7,560 S.F.
LOT 34 7,560 S.F.
LOT 35 7,543 S.F.
LOT 36 7,614 S.F.
LOT 37 7,500 S.F.
LOT 38 7,500 S.F.
LOT 39 7,599 S.F.
LOT 40 8,187 S.F.
LOT 41 8,048 S.F.
LOT 42 9,610 S.F.
LOT 43 11,597 S.F.

LOT 257
LOT 256
LOT 255
LOT 254
LOT 253
LOT 252
LOT 251
LOT 250
LOT 249
LOT 248
LOT 247
LOT 246
LOT 245
LOT 244

12% 9% 8% 4% 1% 2% 3%

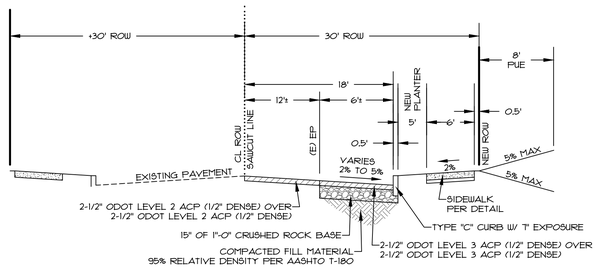
SECTION (A) LOCAL STREET

(PARKING ON BOTH SIDES)
NTS



SECTION (B) (MIN 60' ROW)

BORNSTEDT RD.
MINOR ARTERIAL
NTS



SCALE : 1" = 50'
0' 25' 50' 100'

BY	REVISION	NO.	DATE
-	-	-	-

SHEET C8 OF 10

DESIGNED:	RLM
DRAWN:	RLM
CHECKED:	DLH
APPROVED:	RLM

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 29, 1977
RAY L. MOORE
RENEWAL DATE: 12/31/2022

SCALE	VERT: N/A HORIZ: 1" = 50'
DATE:	4-25-22
FILE:	19-268 – Planning.dwg

LEGAL	
SECTION	24
TWP.	2S
RANGE	4E

DATE OF PLOT 4-25-22

PROJECT:
THE BORNSTEDT VIEWS
STREET AND UTILITY PLAN

LOCATION:
19618 BORNSTEDT ROAD, SANDY, OR

Surveyors & Planners, Inc.
Surveying, Planning and Civil Engineering
P.O. Box 955 Sandy, OR 97055
Phone: (503) 668-3151
Fax: (503) 668-4730

CLIENT:
EVEN BETTER HOMES, INC.
MAC EVEN
PO BOX 2021
GRESHAM, OR 97030
PHONE: (503) 348-5602
EMAIL: mac@evenbetterhomes.com

Appendix C

Basin Analysis, Data, and Detention Pond Design

Project Name: The Bornstedt Views - Pond
Hydrograph Analysis Summary

Job # 19-268
Date: 4/25/2022

Rainfall (year)	Rainfall (inches)
2	3.50
5	4.50
10	4.80
25	5.50
100	0.00

Pre-Developed
Pervious
Area = 12.609 acres
CN = 79 na
Impervious
Area = 0.13 acres
CN = 98 na
Tc = 35 min
Total A = 12.739 acres

Developed
Pervious
Area = 7.21 acres
CN = 70 na
Impervious
Area = 5.529 acres
CN = 98 na
Tc = 5 min
Total A = 12.739 acres

Note: The hydrographs shown are based on the S.C.S. Type - 1A, 24 hour storm using the SBUH method based on the King County Model.

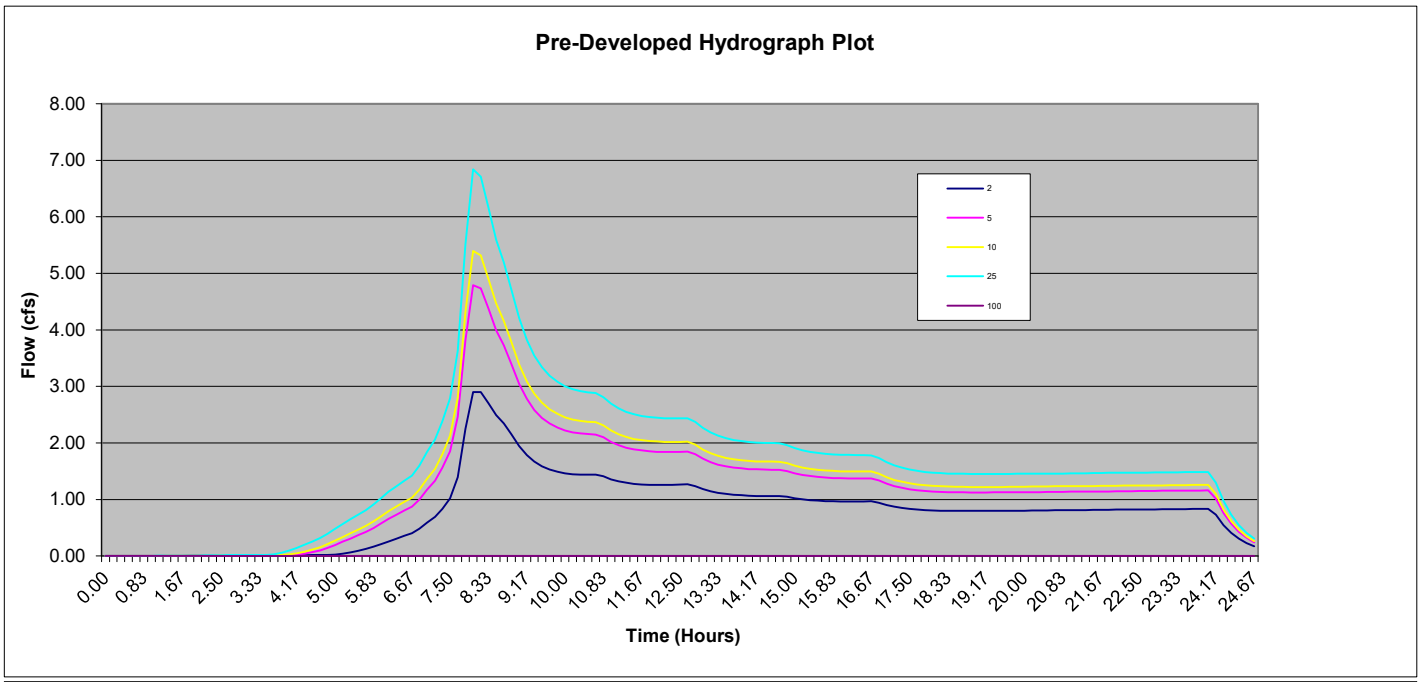
		Pre-Developed Hydrographs					Developed Hydrographs				
Year ========>		**2**	**5**	**10**	**25**	**100**	**2**	**5**	**10**	**25**	**100**
Qpeak	cfs =>	**2.90**	**4.79**	**5.40**	**6.84**	**0.00**	**6.27**	**9.10**	**9.99**	**12.13**	**0.00**
Volume	cf =>	72,867	110,298	122,016	150,004	-	91,905	129,334	140,981	168,740	-
Tpeak	min =>	490	480	480	480	10	470	470	470	470	10
Tpeak	hr =>	8.17	8.00	8.00	8.00	0.17	7.83	7.83	7.83	7.83	0.17
Hydrograph Name=>		2	5	10	25	100	2	5	10	25	100
Time (min)	Time (hr)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.05	0.00
40	0.67	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.09	0.15	0.00
50	0.83	0.00	0.00	0.00	0.00	0.00	0.06	0.15	0.18	0.25	0.00
60	1.00	0.00	0.00	0.00	0.00	0.00	0.11	0.21	0.24	0.32	0.00
70	1.17	0.00	0.00	0.00	0.00	0.00	0.15	0.26	0.30	0.38	0.00
80	1.33	0.00	0.00	0.00	0.01	0.00	0.18	0.30	0.34	0.43	0.00
90	1.50	0.00	0.01	0.01	0.01	0.00	0.21	0.34	0.37	0.47	0.00
100	1.67	0.00	0.01	0.01	0.01	0.00	0.23	0.36	0.40	0.50	0.00
110	1.83	0.00	0.01	0.01	0.01	0.00	0.29	0.44	0.49	0.60	0.00
120	2.00	0.01	0.01	0.01	0.01	0.00	0.35	0.52	0.57	0.69	0.00
130	2.17	0.01	0.01	0.01	0.01	0.00	0.37	0.54	0.60	0.72	0.00
140	2.33	0.01	0.01	0.01	0.01	0.00	0.39	0.57	0.62	0.74	0.00
150	2.50	0.01	0.01	0.01	0.01	0.00	0.41	0.59	0.64	0.76	0.00
160	2.67	0.01	0.01	0.01	0.02	0.00	0.43	0.60	0.65	0.78	0.00
170	2.83	0.01	0.01	0.01	0.02	0.00	0.48	0.68	0.74	0.87	0.00
180	3.00	0.01	0.01	0.02	0.02	0.00	0.54	0.76	0.82	0.97	0.00
190	3.17	0.01	0.02	0.02	0.02	0.00	0.56	0.77	0.83	0.98	0.00
200	3.33	0.01	0.02	0.02	0.02	0.00	0.57	0.78	0.85	0.99	0.00
210	3.50	0.01	0.02	0.02	0.02	0.00	0.58	0.79	0.86	1.00	0.00
220	3.67	0.01	0.02	0.02	0.03	0.00	0.59	0.80	0.87	1.01	0.00
230	3.83	0.01	0.02	0.02	0.06	0.00	0.65	0.88	0.95	1.11	0.00
240	4.00	0.01	0.02	0.03	0.10	0.00	0.71	0.96	1.03	1.20	0.00
250	4.17	0.01	0.03	0.05	0.15	0.00	0.72	0.96	1.04	1.21	0.00
260	4.33	0.02	0.04	0.08	0.20	0.00	0.73	0.97	1.05	1.22	0.00
270	4.50	0.02	0.07	0.12	0.26	0.00	0.73	0.98	1.05	1.22	0.00
280	4.67	0.02	0.10	0.16	0.32	0.00	0.74	0.98	1.06	1.23	0.00
290	4.83	0.02	0.14	0.21	0.39	0.00	0.81	1.08	1.15	1.34	0.00
300	5.00	0.03	0.20	0.27	0.48	0.00	0.88	1.17	1.25	1.46	0.00
310	5.17	0.04	0.25	0.34	0.57	0.00	0.89	1.17	1.26	1.50	0.00
320	5.33	0.07	0.31	0.41	0.65	0.00	0.89	1.18	1.26	1.54	0.00
330	5.50	0.09	0.37	0.47	0.73	0.00	0.90	1.18	1.28	1.58	0.00
340	5.67	0.13	0.43	0.53	0.81	0.00	0.90	1.19	1.31	1.62	0.00
350	5.83	0.16	0.50	0.61	0.91	0.00	0.98	1.31	1.45	1.80	0.00
360	6.00	0.21	0.58	0.71	1.03	0.00	1.05	1.44	1.60	1.98	0.00
370	6.17	0.26	0.66	0.79	1.14	0.00	1.06	1.48	1.64	2.02	0.00
380	6.33	0.31	0.73	0.88	1.24	0.00	1.06	1.52	1.68	2.07	0.00
390	6.50	0.36	0.81	0.96	1.33	0.00	1.06	1.55	1.72	2.12	0.00
400	6.67	0.40	0.87	1.03	1.42	0.00	1.07	1.59	1.75	2.16	0.00
410	6.83	0.48	1.00	1.17	1.60	0.00	1.32	1.95	2.16	2.65	0.00
420	7.00	0.59	1.18	1.37	1.85	0.00	1.58	2.33	2.57	3.16	0.00
430	7.17	0.69	1.33	1.54	2.06	0.00	1.62	2.39	2.64	3.23	0.00
440	7.33	0.84	1.56	1.80	2.38	0.00	1.97	2.90	3.19	3.90	0.00
450	7.50	1.02	1.86	2.13	2.79	0.00	2.33	3.42	3.76	4.59	0.00
460	7.67	1.40	2.46	2.80	3.63	0.00	3.51	5.13	5.64	6.87	0.00
470	7.83	2.25	3.82	4.32	5.52	0.00	6.27	9.10	9.99	12.13	0.00
480	8.00	2.90	4.79	5.40	6.84	0.00	6.00	8.68	9.51	11.52	0.00
490	8.17	2.90	4.74	5.32	6.71	0.00	3.48	5.00	5.48	6.62	0.00
500	8.33	2.70	4.37	4.90	6.16	0.00	2.48	3.56	3.89	4.69	0.00
510	8.50	2.49	4.00	4.47	5.60	0.00	2.15	3.08	3.36	4.05	0.00
520	8.67	2.34	3.73	4.16	5.19	0.00	2.18	3.11	3.40	4.09	0.00

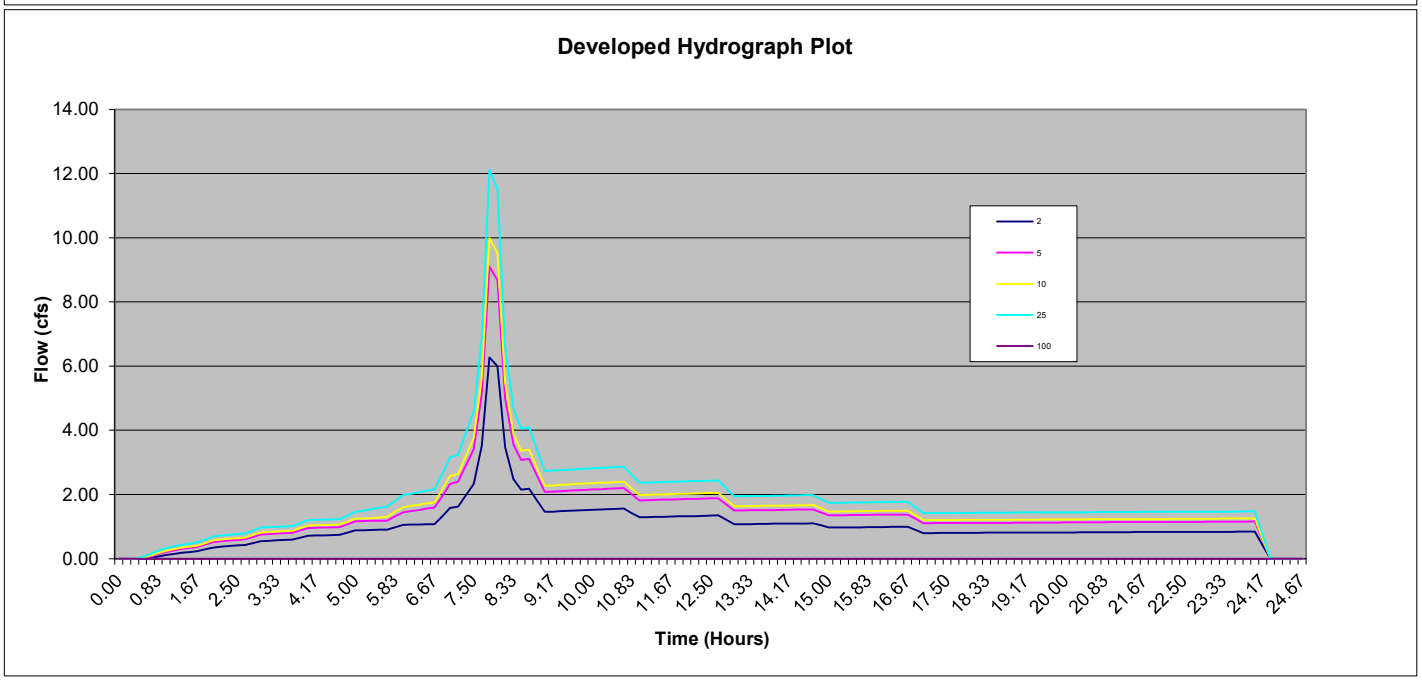
		Pre-Developed Hydrographs					Developed Hydrographs				
Year =======>		2	5	10	25	100	2	5	10	25	100
Qpeak	cfs =>	2.90	4.79	5.40	6.84	0.00	6.27	9.10	9.99	12.13	0.00
Volume	cf =>	72,867	110,298	122,016	150,004	-	91,905	129,334	140,981	168,740	-
Tpeak	min =>	490	480	480	480	10	470	470	470	470	10
Tpeak	hr =>	8.17	8.00	8.00	8.00	0.17	7.83	7.83	7.83	7.83	0.17
Hydrograph Name=>		2	5	10	25	100	2	5	10	25	100
Time (min)	Time (hr)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)
530	8.83	2.16	3.41	3.80	4.72	0.00	1.82	2.60	2.84	3.42	0.00
540	9.00	1.94	3.05	3.39	4.21	0.00	1.46	2.08	2.27	2.73	0.00
550	9.17	1.78	2.78	3.09	3.83	0.00	1.47	2.09	2.28	2.74	0.00
560	9.33	1.67	2.59	2.87	3.55	0.00	1.48	2.10	2.30	2.76	0.00
570	9.50	1.59	2.44	2.71	3.34	0.00	1.49	2.12	2.31	2.77	0.00
580	9.67	1.53	2.34	2.59	3.19	0.00	1.50	2.13	2.32	2.79	0.00
590	9.83	1.49	2.27	2.51	3.08	0.00	1.51	2.14	2.34	2.80	0.00
600	10.00	1.46	2.22	2.45	3.01	0.00	1.52	2.15	2.35	2.82	0.00
610	10.17	1.45	2.19	2.42	2.95	0.00	1.53	2.17	2.36	2.83	0.00
620	10.33	1.44	2.17	2.39	2.92	0.00	1.54	2.18	2.38	2.84	0.00
630	10.50	1.44	2.16	2.38	2.90	0.00	1.55	2.19	2.39	2.86	0.00
640	10.67	1.44	2.15	2.37	2.88	0.00	1.56	2.20	2.40	2.87	0.00
650	10.83	1.41	2.10	2.31	2.81	0.00	1.42	2.01	2.19	2.62	0.00
660	11.00	1.36	2.02	2.22	2.70	0.00	1.29	1.82	1.98	2.36	0.00
670	11.17	1.32	1.96	2.15	2.61	0.00	1.29	1.82	1.99	2.37	0.00
680	11.33	1.30	1.92	2.11	2.55	0.00	1.30	1.83	1.99	2.38	0.00
690	11.50	1.28	1.89	2.07	2.51	0.00	1.31	1.84	2.00	2.39	0.00
700	11.67	1.27	1.87	2.05	2.48	0.00	1.31	1.84	2.01	2.40	0.00
710	11.83	1.26	1.85	2.03	2.46	0.00	1.32	1.85	2.02	2.40	0.00
720	12.00	1.26	1.85	2.03	2.45	0.00	1.32	1.86	2.02	2.41	0.00
730	12.17	1.26	1.84	2.02	2.44	0.00	1.33	1.86	2.03	2.42	0.00
740	12.33	1.26	1.84	2.02	2.43	0.00	1.33	1.87	2.04	2.42	0.00
750	12.50	1.26	1.84	2.02	2.43	0.00	1.34	1.88	2.04	2.43	0.00
760	12.67	1.27	1.85	2.02	2.44	0.00	1.34	1.88	2.05	2.44	0.00
770	12.83	1.24	1.80	1.97	2.38	0.00	1.21	1.69	1.84	2.19	0.00
780	13.00	1.19	1.72	1.89	2.27	0.00	1.07	1.50	1.63	1.94	0.00
790	13.17	1.15	1.66	1.82	2.19	0.00	1.07	1.50	1.63	1.94	0.00
800	13.33	1.12	1.62	1.77	2.13	0.00	1.08	1.51	1.64	1.95	0.00
810	13.50	1.10	1.59	1.74	2.09	0.00	1.08	1.51	1.64	1.95	0.00
820	13.67	1.08	1.57	1.71	2.06	0.00	1.08	1.51	1.65	1.96	0.00
830	13.83	1.07	1.55	1.70	2.03	0.00	1.09	1.52	1.65	1.96	0.00
840	14.00	1.07	1.54	1.68	2.02	0.00	1.09	1.52	1.65	1.96	0.00
850	14.17	1.07	1.53	1.68	2.01	0.00	1.09	1.52	1.66	1.97	0.00
860	14.33	1.06	1.53	1.67	2.00	0.00	1.10	1.53	1.66	1.97	0.00
870	14.50	1.06	1.53	1.67	2.00	0.00	1.10	1.53	1.66	1.98	0.00
880	14.67	1.06	1.53	1.67	2.00	0.00	1.10	1.53	1.67	1.98	0.00
890	14.83	1.05	1.50	1.64	1.96	0.00	1.04	1.44	1.57	1.86	0.00
900	15.00	1.02	1.46	1.60	1.91	0.00	0.97	1.35	1.47	1.74	0.00
910	15.17	1.00	1.44	1.57	1.87	0.00	0.97	1.35	1.47	1.74	0.00
920	15.33	0.99	1.41	1.54	1.84	0.00	0.98	1.36	1.47	1.75	0.00
930	15.50	0.98	1.40	1.53	1.82	0.00	0.98	1.36	1.48	1.75	0.00
940	15.67	0.97	1.39	1.51	1.81	0.00	0.98	1.36	1.48	1.75	0.00
950	15.83	0.97	1.38	1.51	1.80	0.00	0.98	1.36	1.48	1.75	0.00
960	16.00	0.97	1.38	1.50	1.79	0.00	0.98	1.37	1.48	1.76	0.00
970	16.17	0.97	1.37	1.50	1.79	0.00	0.99	1.37	1.49	1.76	0.00
980	16.33	0.97	1.37	1.50	1.78	0.00	0.99	1.37	1.49	1.76	0.00
990	16.50	0.97	1.37	1.50	1.78	0.00	0.99	1.37	1.49	1.76	0.00
1000	16.67	0.97	1.37	1.50	1.78	0.00	0.99	1.38	1.49	1.77	0.00
1010	16.83	0.94	1.34	1.46	1.74	0.00	0.89	1.24	1.35	1.59	0.00
1020	17.00	0.90	1.28	1.39	1.66	0.00	0.80	1.10	1.20	1.42	0.00
1030	17.17	0.87	1.24	1.35	1.60	0.00	0.80	1.11	1.20	1.42	0.00
1040	17.33	0.85	1.20	1.31	1.56	0.00	0.80	1.11	1.20	1.42	0.00
1050	17.50	0.83	1.18	1.29	1.53	0.00	0.80	1.11	1.20	1.42	0.00
1060	17.67	0.82	1.16	1.27	1.51	0.00	0.80	1.11	1.20	1.42	0.00
1070	17.83	0.81	1.15	1.25	1.49	0.00	0.80	1.11	1.20	1.42	0.00
1080	18.00	0.81	1.14	1.24	1.48	0.00	0.80	1.11	1.21	1.43	0.00
1090	18.17	0.80	1.13	1.23	1.47	0.00	0.81	1.11	1.21	1.43	0.00
1100	18.33	0.80	1.13	1.23	1.46	0.00	0.81	1.11	1.21	1.43	0.00
1110	18.50	0.80	1.13	1.23	1.46	0.00	0.81	1.12	1.21	1.43	0.00
1120	18.67	0.80	1.13	1.22	1.45	0.00	0.81	1.12	1.21	1.43	0.00
1130	18.83	0.80	1.12	1.22	1.45	0.00	0.81	1.12	1.21	1.43	0.00
1140	19.00	0.80	1.12	1.22	1.45	0.00	0.81	1.12	1.21	1.44	0.00
1150	19.17	0.80	1.12	1.22	1.45	0.00	0.81	1.12	1.22	1.44	0.00
1160	19.33	0.80	1.13	1.22	1.45	0.00	0.81	1.12	1.22	1.44	0.00
1170	19.50	0.80	1.13	1.22	1.45	0.00	0.81	1.12	1.22	1.44	0.00
1180	19.67	0.80	1.13	1.22	1.45	0.00	0.82	1.13	1.22	1.44	0.00
1190	19.83	0.80	1.13	1.23	1.45	0.00	0.82	1.13	1.22	1.44	0.00
1200	20.00	0.80	1.13	1.23	1.46	0.00	0.82	1.13	1.22	1.44	0.00
1210	20.17	0.81	1.13	1.23	1.46	0.00	0.82	1.13	1.22	1.44	0.00
1220	20.33	0.81	1.13	1.23	1.46	0.00	0.82	1.13	1.22	1.45	0.00
1230	20.50	0.81	1.13	1.23	1.46	0.00	0.82	1.13	1.23	1.45	0.00

		Pre-Developed Hydrographs					Developed Hydrographs				
Year ========>		2	5	10	25	100	2	5	10	25	100
Qpeak	cfs =>	2.90	4.79	5.40	6.84	0.00	6.27	9.10	9.99	12.13	0.00
Volume	cf =>	72,867	110,298	122,016	150,004	-	91,905	129,334	140,981	168,740	-
Tpeak	min =>	490	480	480	480	10	470	470	470	470	10
Tpeak	hr =>	8.17	8.00	8.00	8.00	0.17	7.83	7.83	7.83	7.83	0.17
Hydrograph Name=>		2	5	10	25	100	2	5	10	25	100
Time (min)	Time (hr)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)	Hyd (cfs)
1240	20.67	0.81	1.13	1.23	1.46	0.00	0.82	1.13	1.23	1.45	0.00
1250	20.83	0.81	1.14	1.23	1.46	0.00	0.82	1.13	1.23	1.45	0.00
1260	21.00	0.81	1.14	1.24	1.46	0.00	0.82	1.14	1.23	1.45	0.00
1270	21.17	0.81	1.14	1.24	1.46	0.00	0.83	1.14	1.23	1.45	0.00
1280	21.33	0.81	1.14	1.24	1.47	0.00	0.83	1.14	1.23	1.45	0.00
1290	21.50	0.82	1.14	1.24	1.47	0.00	0.83	1.14	1.23	1.45	0.00
1300	21.67	0.82	1.14	1.24	1.47	0.00	0.83	1.14	1.23	1.46	0.00
1310	21.83	0.82	1.14	1.24	1.47	0.00	0.83	1.14	1.24	1.46	0.00
1320	22.00	0.82	1.15	1.24	1.47	0.00	0.83	1.14	1.24	1.46	0.00
1330	22.17	0.82	1.15	1.24	1.47	0.00	0.83	1.14	1.24	1.46	0.00
1340	22.33	0.82	1.15	1.25	1.47	0.00	0.83	1.14	1.24	1.46	0.00
1350	22.50	0.82	1.15	1.25	1.48	0.00	0.83	1.15	1.24	1.46	0.00
1360	22.67	0.83	1.15	1.25	1.48	0.00	0.83	1.15	1.24	1.46	0.00
1370	22.83	0.83	1.15	1.25	1.48	0.00	0.84	1.15	1.24	1.46	0.00
1380	23.00	0.83	1.15	1.25	1.48	0.00	0.84	1.15	1.24	1.47	0.00
1390	23.17	0.83	1.15	1.25	1.48	0.00	0.84	1.15	1.24	1.47	0.00
1400	23.33	0.83	1.16	1.25	1.48	0.00	0.84	1.15	1.25	1.47	0.00
1410	23.50	0.83	1.16	1.26	1.48	0.00	0.84	1.15	1.25	1.47	0.00
1420	23.67	0.83	1.16	1.26	1.48	0.00	0.84	1.15	1.25	1.47	0.00
1430	23.83	0.83	1.16	1.26	1.49	0.00	0.84	1.15	1.25	1.47	0.00
1440	24.00	0.84	1.16	1.26	1.49	0.00	0.84	1.16	1.25	1.47	0.00
1450	24.17	0.73	1.02	1.10	1.30	0.00	0.42	0.58	0.63	0.74	0.00
1460	24.33	0.55	0.76	0.83	0.98	0.00	0.00	0.00	0.00	0.00	0.00
1470	24.50	0.41	0.57	0.62	0.73	0.00	0.00	0.00	0.00	0.00	0.00
1480	24.67	0.31	0.43	0.46	0.55	0.00	0.00	0.00	0.00	0.00	0.00
1490	24.67	0.23	0.32	0.35	0.41	0.00	0.00	0.00	0.00	0.00	0.00
1500	24.67	0.17	0.24	0.26	0.31	0.00	0.00	0.00	0.00	0.00	0.00

	Pre-Developed Hydrographs				
Year =======>	2	5	10	25	100
Qpeak cfs =>	**2.90**	**4.79**	**5.40**	**6.84**	**0.00**
Volume cf =>	72,867	110,298	122,016	150,004	-
Tpeak min =>	490	480	480	480	10
Tpeak hr =>	8.17	8.00	8.00	8.00	0.17
Hydrograph Name=>	2	5	10	25	100
Time Time	Hyd	Hyd	Hyd	Hyd	Hyd
(min) (hr)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

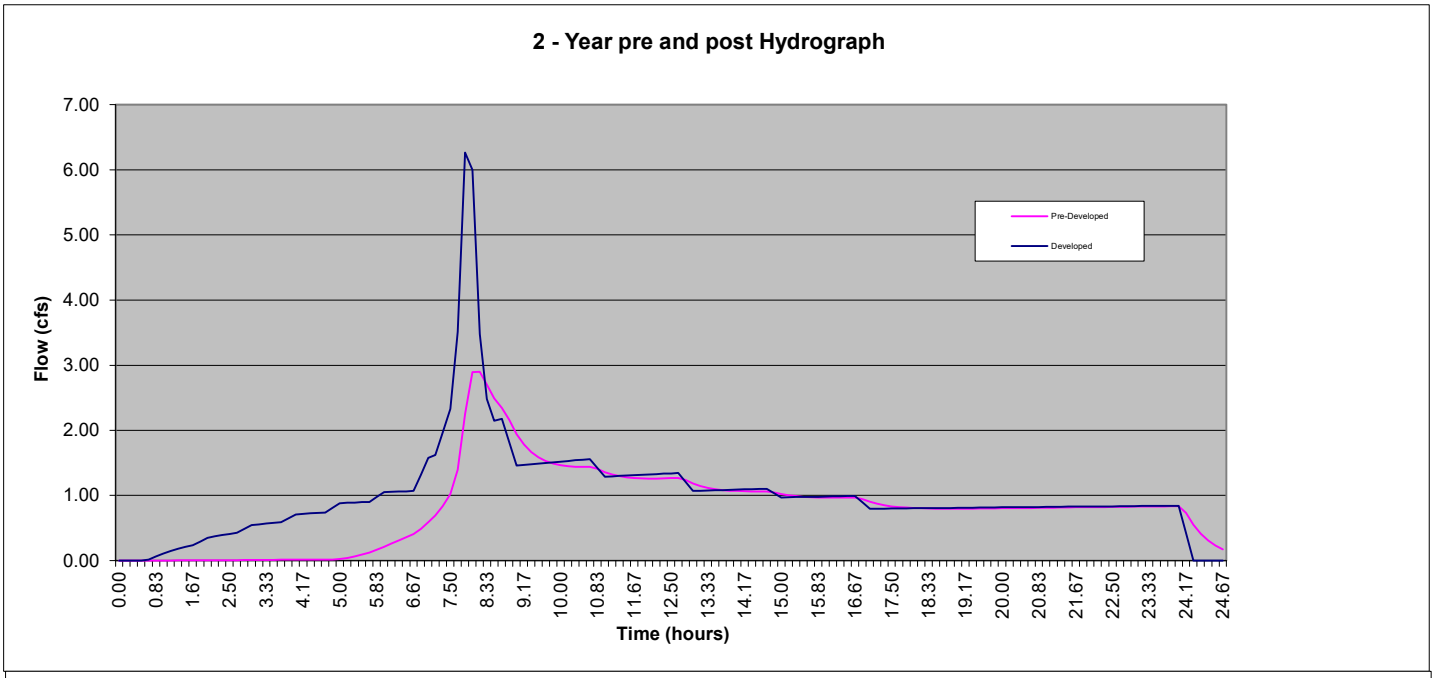
Developed Hydrographs				
2	5	10	25	100
6.27	**9.10**	**9.99**	**12.13**	**0.00**
91,905	129,334	140,981	168,740	-
470	470	470	470	10
7.83	7.83	7.83	7.83	0.17
2	5	10	25	100
Hyd	Hyd	Hyd	Hyd	Hyd
(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

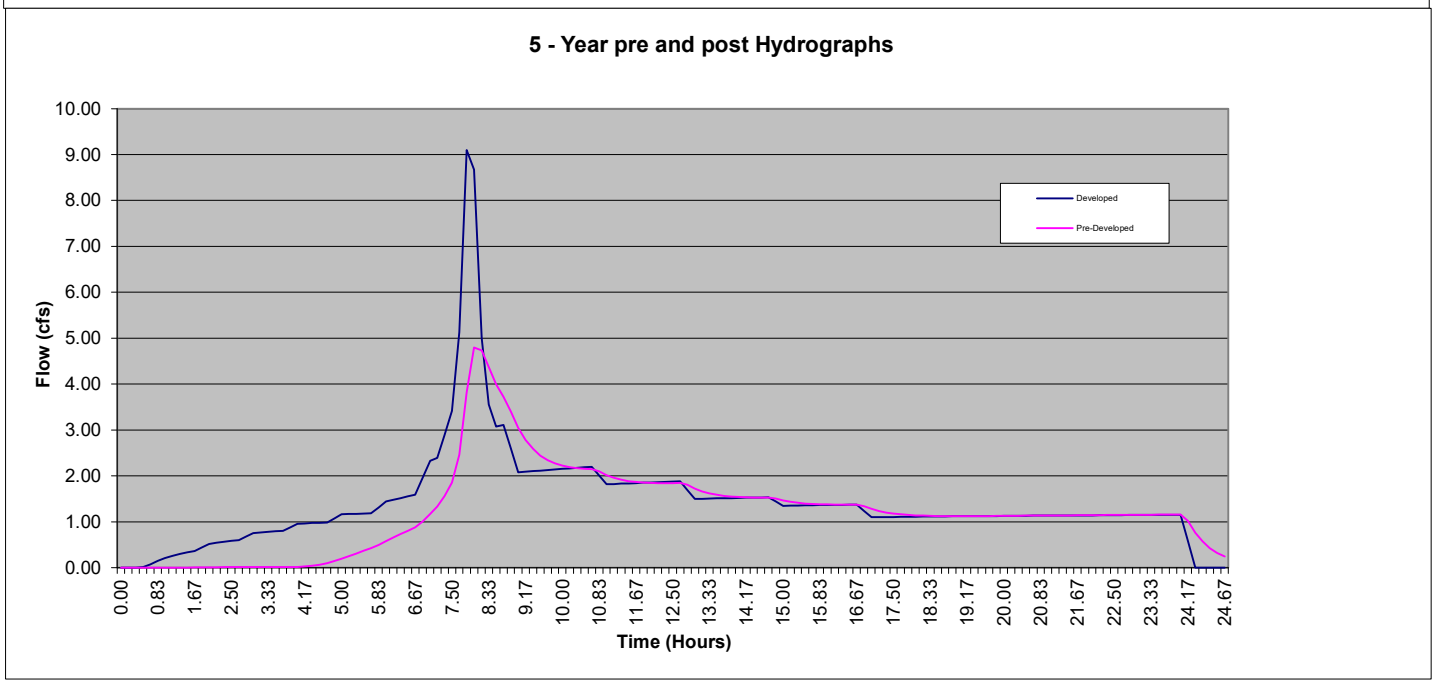




	Pre-Developed Hydrographs				
Year =======>	2	5	10	25	100
Qpeak cfs =>	**2.90**	**4.79**	**5.40**	**6.84**	**0.00**
Volume cf =>	72,867	110,298	122,016	150,004	-
Tpeak min =>	490	480	480	480	10
Tpeak hr =>	8.17	8.00	8.00	8.00	0.17
Hydrograph Name=>	2	5	10	25	100
Time Time	Hyd	Hyd	Hyd	Hyd	Hyd
(min) (hr)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

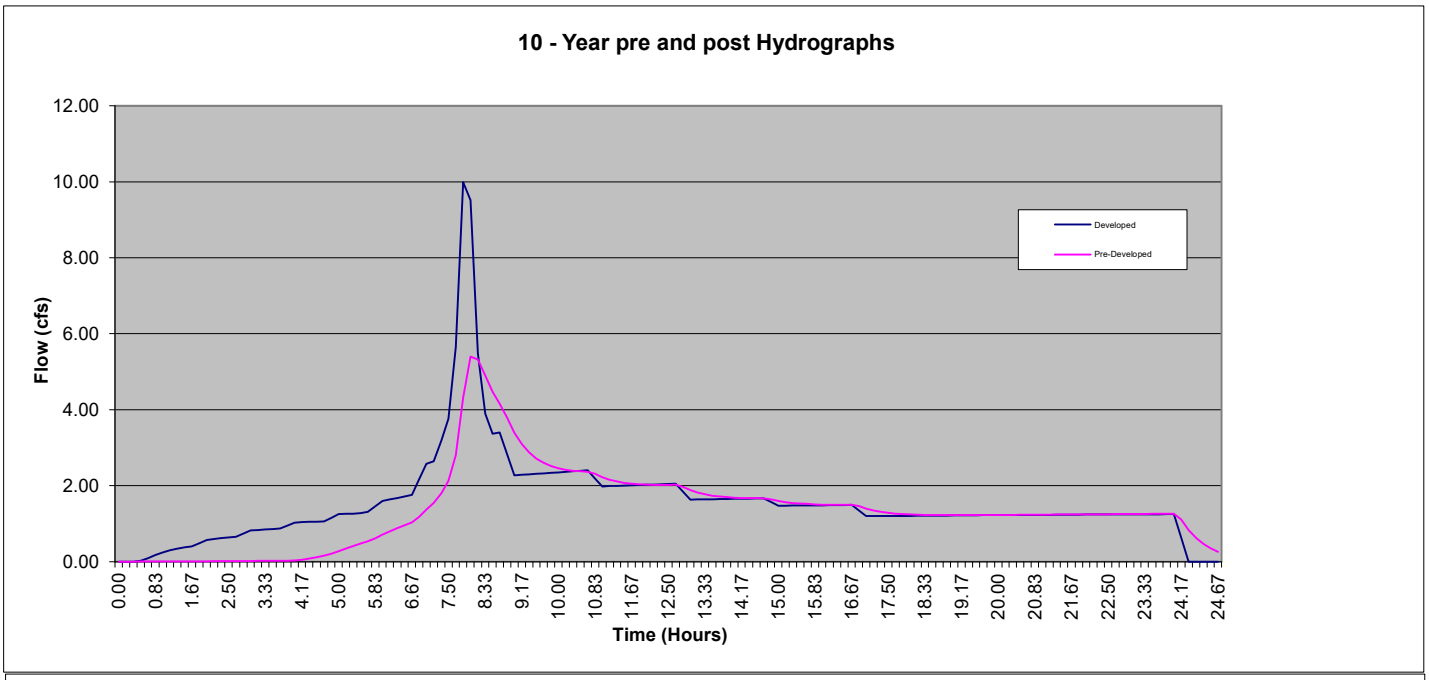
Developed Hydrographs				
2	5	10	25	100
6.27	**9.10**	**9.99**	**12.13**	**0.00**
91,905	129,334	140,981	168,740	-
470	470	470	470	10
7.83	7.83	7.83	7.83	0.17
2	5	10	25	100
Hyd	Hyd	Hyd	Hyd	Hyd
(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

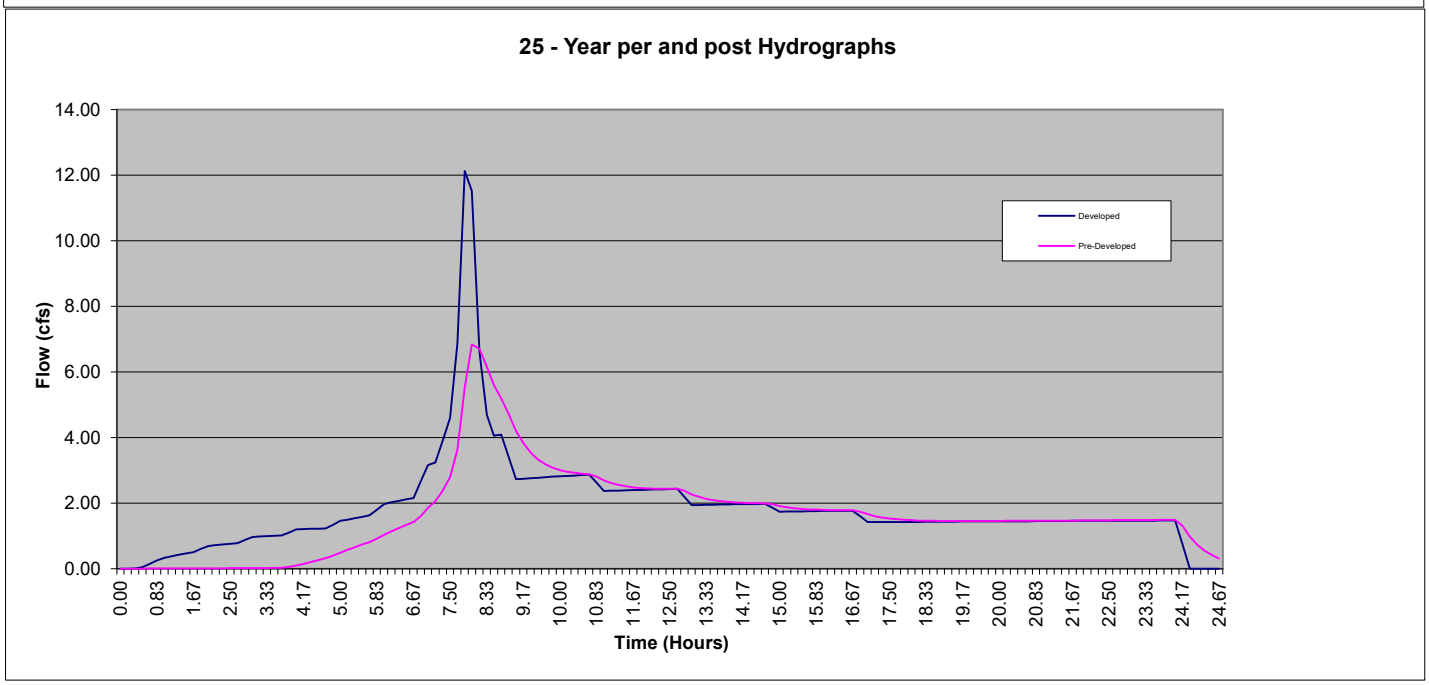




	Pre-Developed Hydrographs				
Year =======>	2	5	10	25	100
Qpeak cfs =>	**2.90**	**4.79**	**5.40**	**6.84**	**0.00**
Volume cf =>	72,867	110,298	122,016	150,004	-
Tpeak min =>	490	480	480	480	10
Tpeak hr =>	8.17	8.00	8.00	8.00	0.17
Hydrograph Name=>	2	5	10	25	100
Time Time	Hyd	Hyd	Hyd	Hyd	Hyd
(min) (hr)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

Developed Hydrographs				
2	5	10	25	100
6.27	**9.10**	**9.99**	**12.13**	**0.00**
91,905	129,334	140,981	168,740	-
470	470	470	470	10
7.83	7.83	7.83	7.83	0.17
2	5	10	25	100
Hyd	Hyd	Hyd	Hyd	Hyd
(cfs)	(cfs)	(cfs)	(cfs)	(cfs)





Project Name:	The Bornstedt Views - Pond
Detention System Summary	
Job #	19-268
Date:	4/25/2022

Note: The detention system design is based on the King County Model "Facility Design Routine".

1) Detention Facility Design Input:

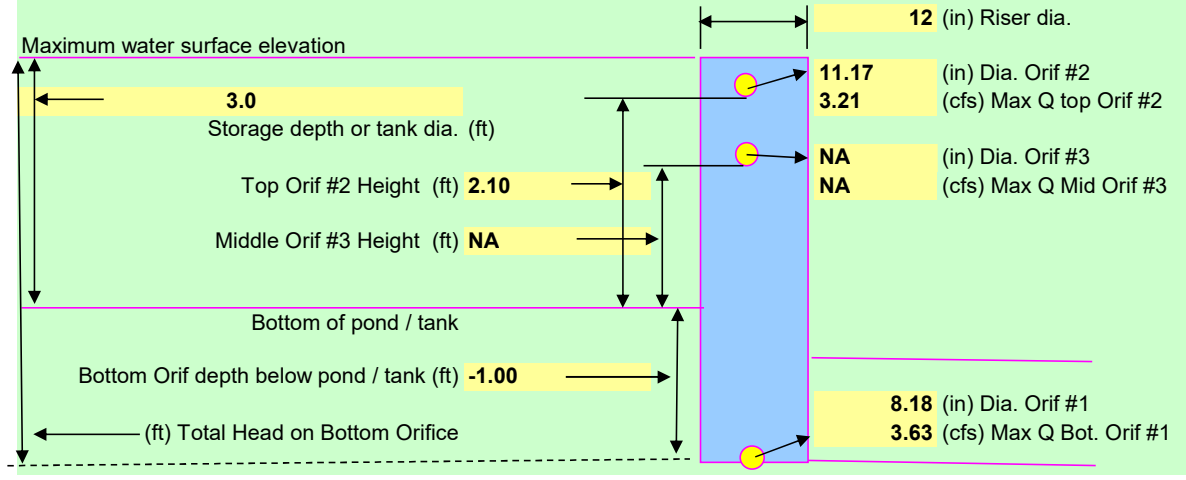
2) Type of facility:		DETENTION POND	
3) Pond side slopes:	3	to 1	
4) Pond storage depth:	**3**	**ft (from bottom of pond to overflow)**	
5) Vertical permeability	0	min/in	
6) Number of orifices:	2		
7) Riser dia. =>	12	in	
8) Orifice coefficient	0.62	(typically 0.62)	
9) IE - bottom orifice:	-1	ft (distance below bottom of pond - Negative #)	
10) Max Q Bottom Orif. #1	3.63	cfs	
11) Top Orif #2 Height =	2.1	ft	
12) Max Q Mid Orif. #3	0.00	cfs	Orifice not being used
13) Mid Orif #3 Height =	0.00	ft	Orifice not being used

Detention Facility Design Results:

Performance year	Developed Inflow cfs	Pre-Developed Outflow cfs	**Actual Outflow cfs**	Peak Stage ft	Storage cf
100	0	0	**0**	0	-
25	12.13	6.84	**6.84**	3.00	15,366
10	9.99	5.40	**5.39**	2.46	11,995
5	9.10	4.79	**4.65**	2.26	10,873
2	6.27	2.90	**2.79**	1.36	6,017
			Required Storage ====		15,366

	Bottom Orif.	Middle Orif.	Top Orif.	Optional Weir Design
Total Q =	3.63	0.00	3.21	(for top orifice)
Head (ft) =	4.00	0.00	0.90	1.47 La (ft)
Dist. from bottom of pond (ft) =	-1.00	NA	2.10	168.54 < deg.
Orif. Dia. (in) =	8.18	0.00	11.17	Must Use Weir

FLOW CONTROL STRUCTURE SCHEMATIC



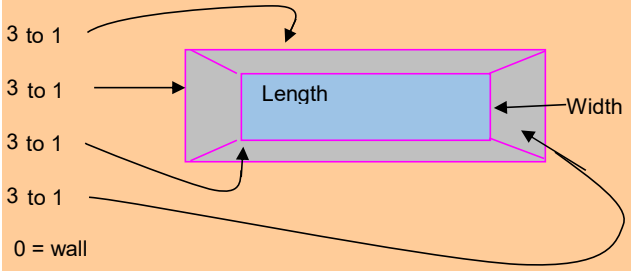
Project Name:	The Bornstedt Views - Pond
Detention Facility Type	
Job #	19-268
Date:	4/25/2022

Detention Facility Type:

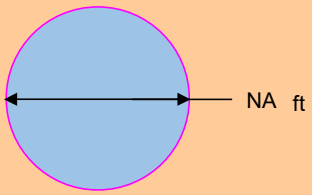
DETENTION POND

L =	**62.4**	**ft**
W =	**62.4**	**ft**
D =	**3.0**	**ft**
Pond Area =	**3,891**	**sf**

DETENTION POND



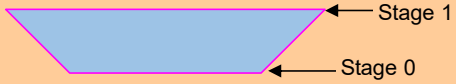
DETENTION TANK
NA

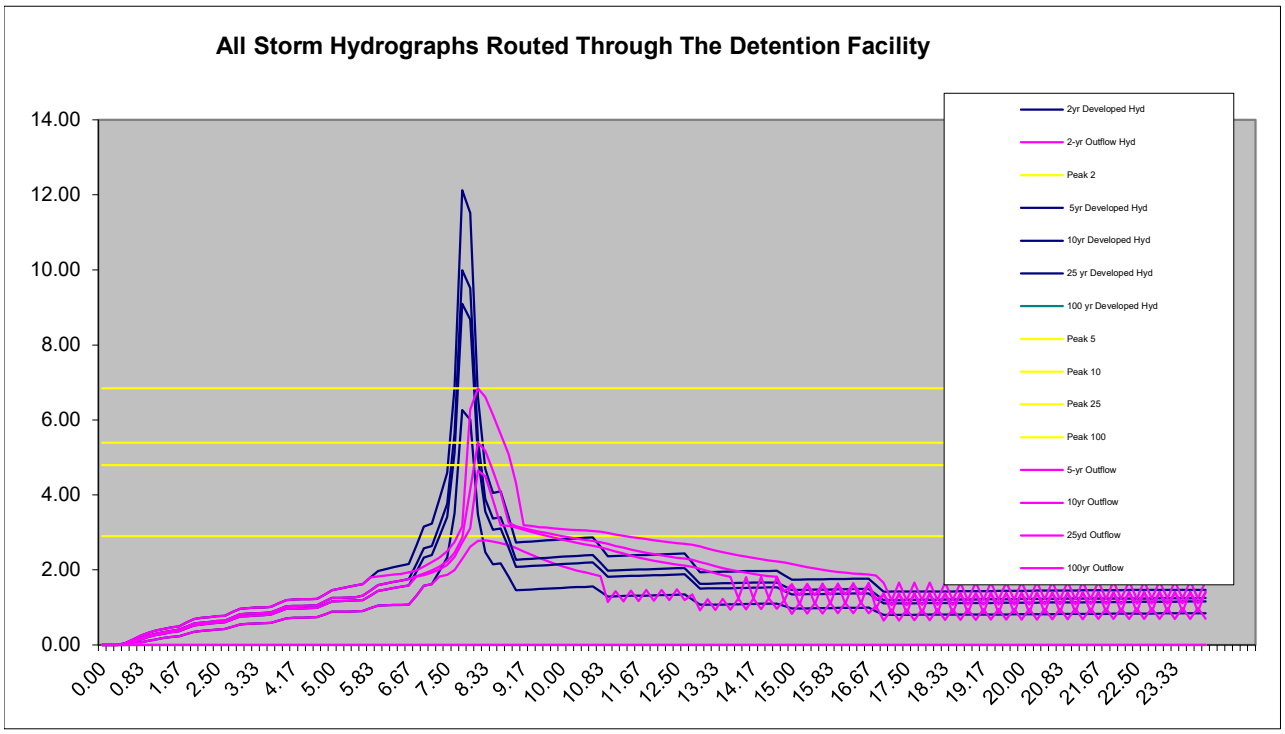


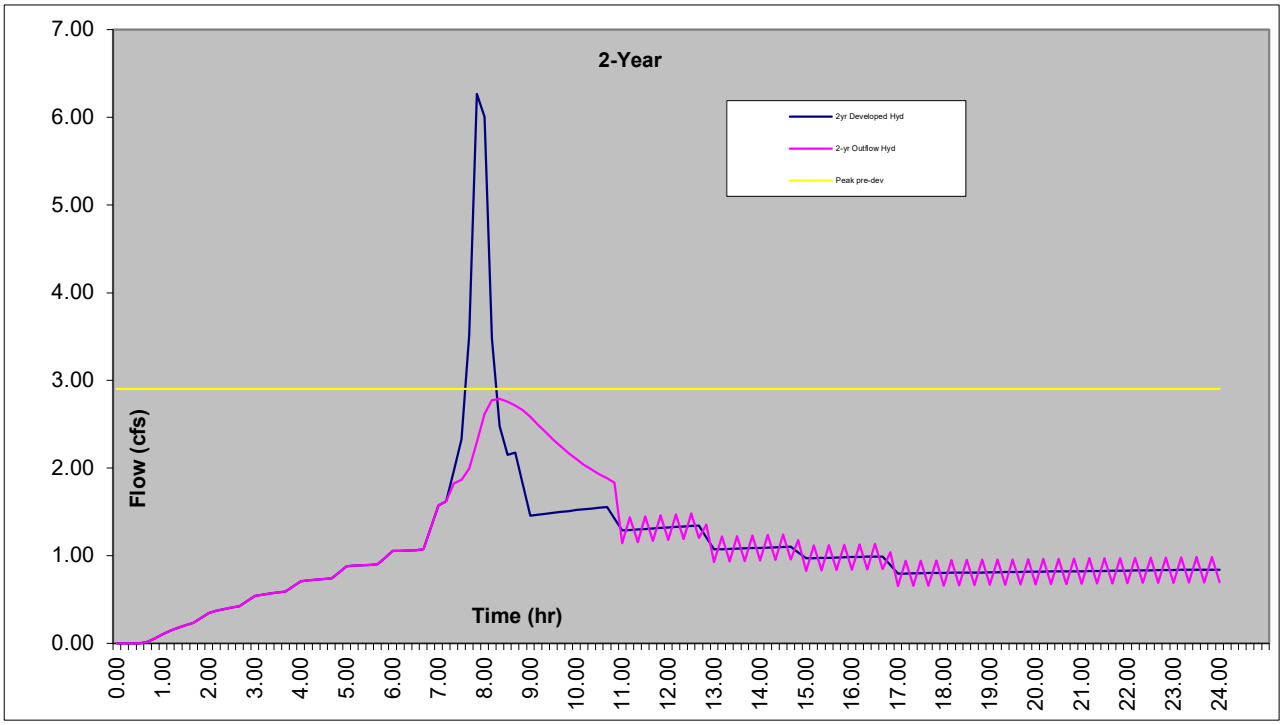
USER DEFINED POND
NA

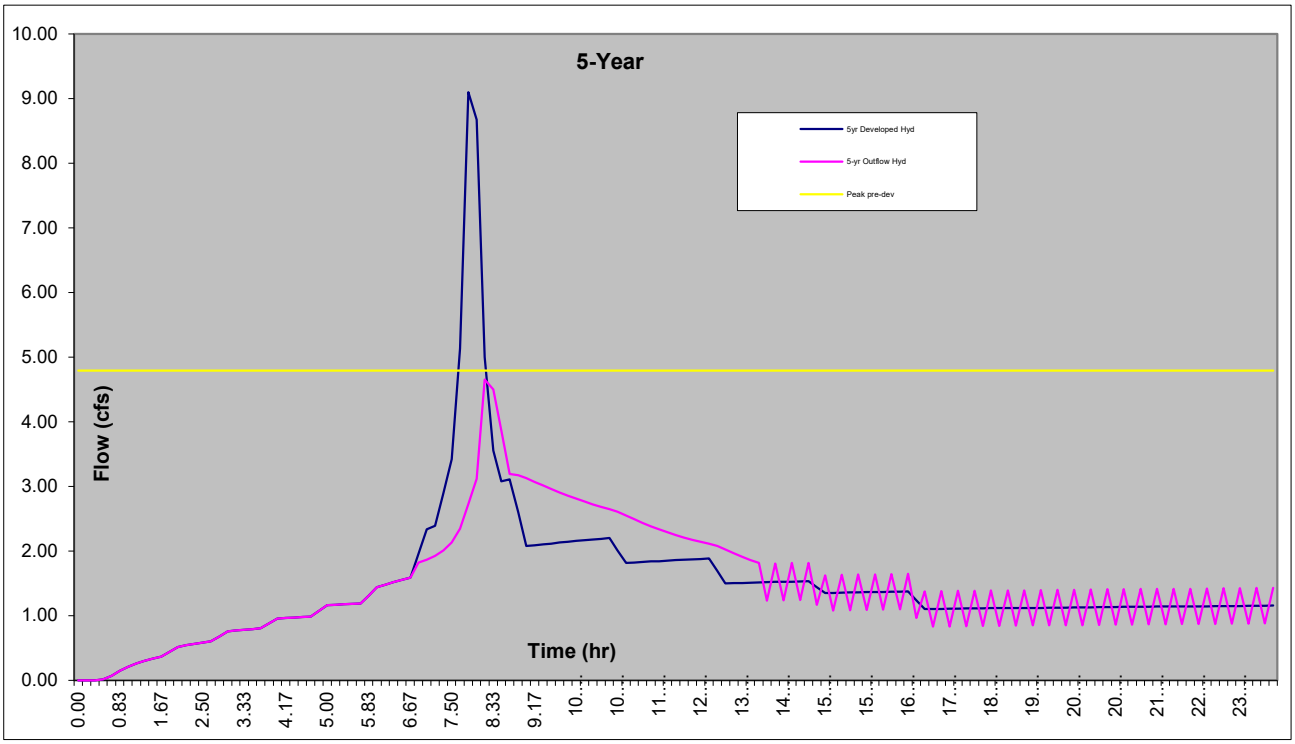
Pond Geometry

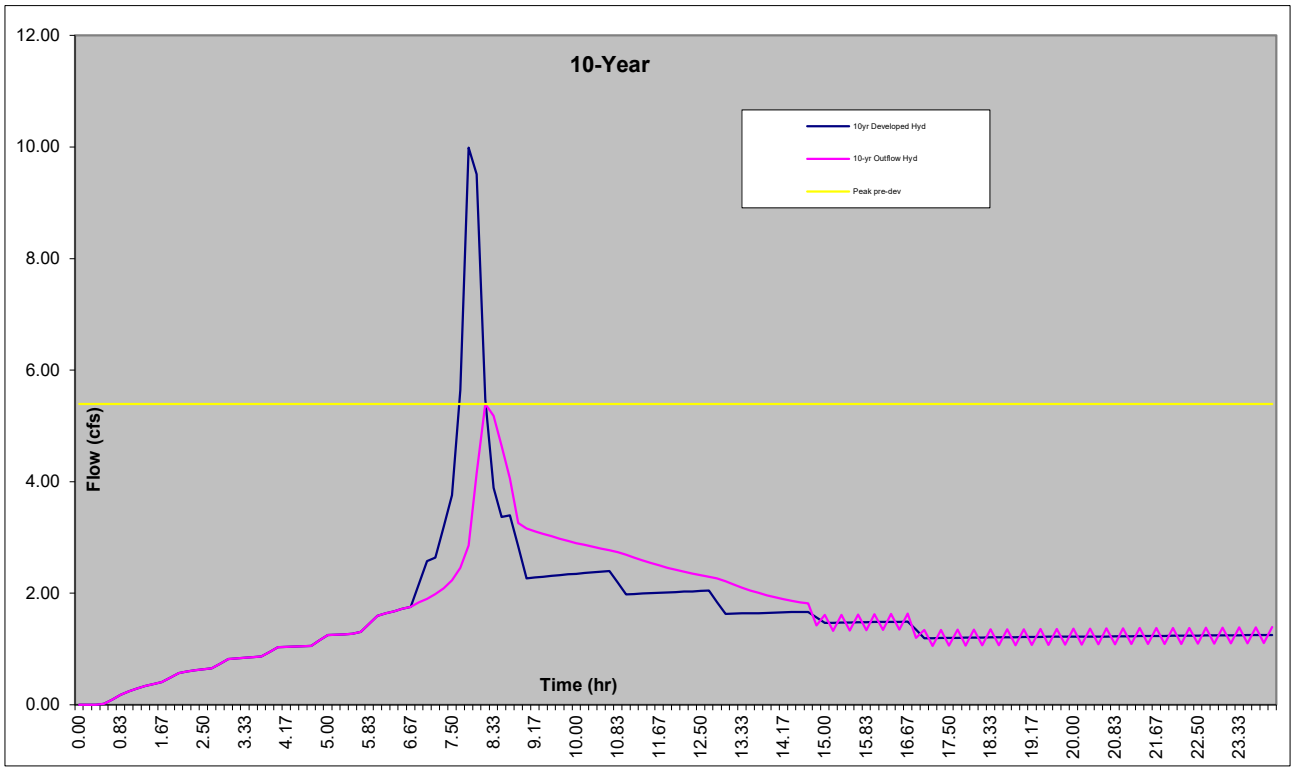
Stage (ft)	Area (sf)
0	NA
1	NA
2	NA
3	NA
4	NA
5	NA
6	NA
7	NA
8	NA
9	NA
10	NA
11	NA
12	NA
13	NA
14	NA
15	NA

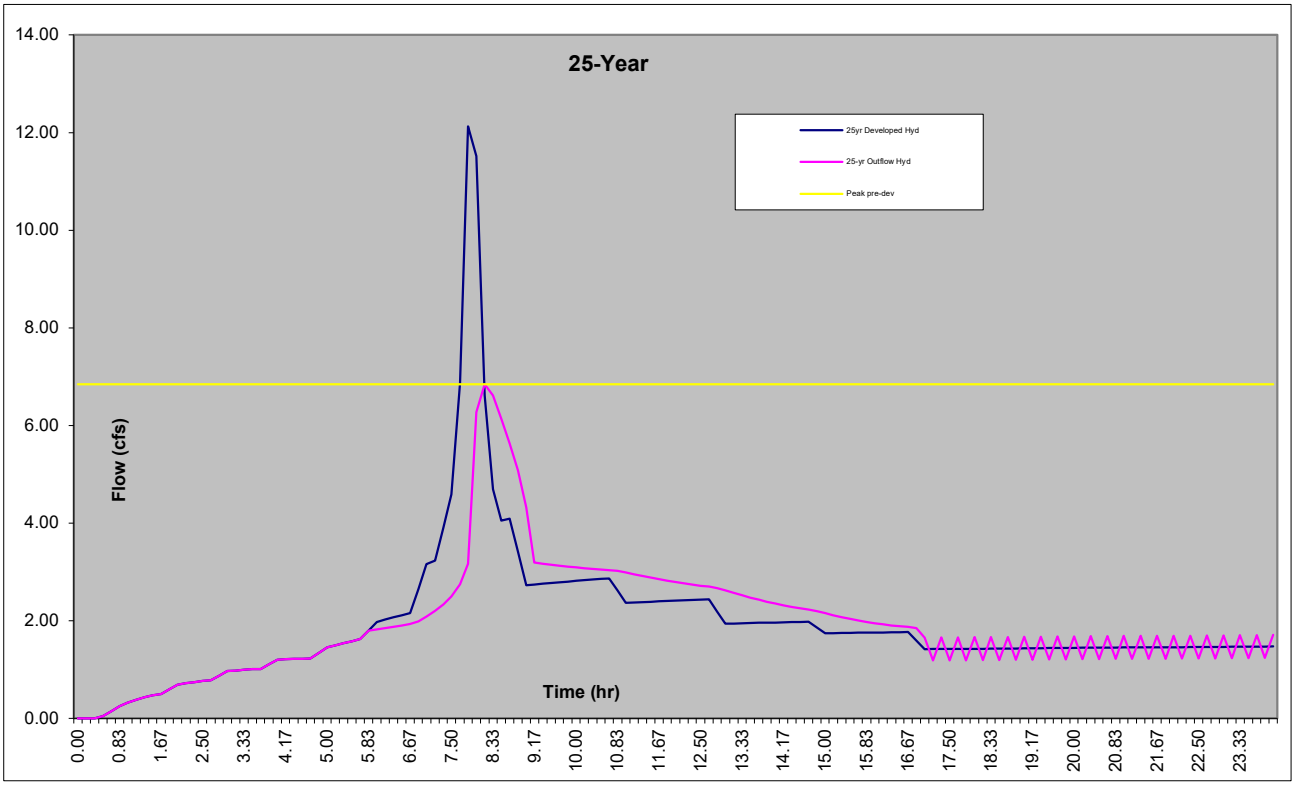



All Storm Hydrographs Routed Through The Detention Facility
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00 0.83 1.67 2.50 3.33 4.17 5.00 5.83 6.67 7.50 8.33 9.17 10.00 10.83 11.67 12.50 13.33 14.17 15.00 15.83 16.67 17.50 18.33 19.17 20.00 20.83 21.67 22.50 23.33
2yr Developed Hyd
2-yr Outflow Hyd
Peak 2
5yr Developed Hyd
10yr Developed Hyd
25 yr Developed Hyd
100 yr Developed Hyd
Peak 5
Peak 10
Peak 25
Peak 100
5-yr Outflow
10yr Outflow
25yd Outflow
100yr Outflow


2-Year
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Flow (cfs)
Time (hr)
0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 20.00 21.00 22.00 23.00 24.00
2yr Developed Hyd
2-yr Outflow Hyd
Peak pre-dev


5-Year
5yr Developed Hyd
5-yr Outflow Hyd
Peak pre-dev
Flow (cfs)
Time (hr)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
0.83
1.67
2.50
3.33
4.17
5.00
5.83
6.67
7.50
8.33
9.17
10...
10...
11...
12...
13...
14...
15...
15...
16...
17...
18...
19...
20...
20...
21...
22...
23...


10-Year
10yr Developed Hyd
10-yr Outflow Hyd
Peak pre-dev
Flow (cfs)
Time (hr)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00
0.83
1.67
2.50
3.33
4.17
5.00
5.83
6.67
7.50
8.33
9.17
10.00
10.83
11.67
12.50
13.33
14.17
15.00
15.83
16.67
17.50
18.33
19.17
20.00
20.83
21.67
22.50
23.33


25-Year
25yr Developed Hyd
25-yr Outflow Hyd
Peak pre-dev
Flow (cfs)
Time (hr)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00
0.83
1.67
2.50
3.33
4.17
5.00
5.83
6.67
7.50
8.33
9.17
10.00
10.83
11.67
12.50
13.33
14.17
15.00
15.83
16.67
17.50
18.33
19.17
20.00
20.83
21.67
22.50
23.33

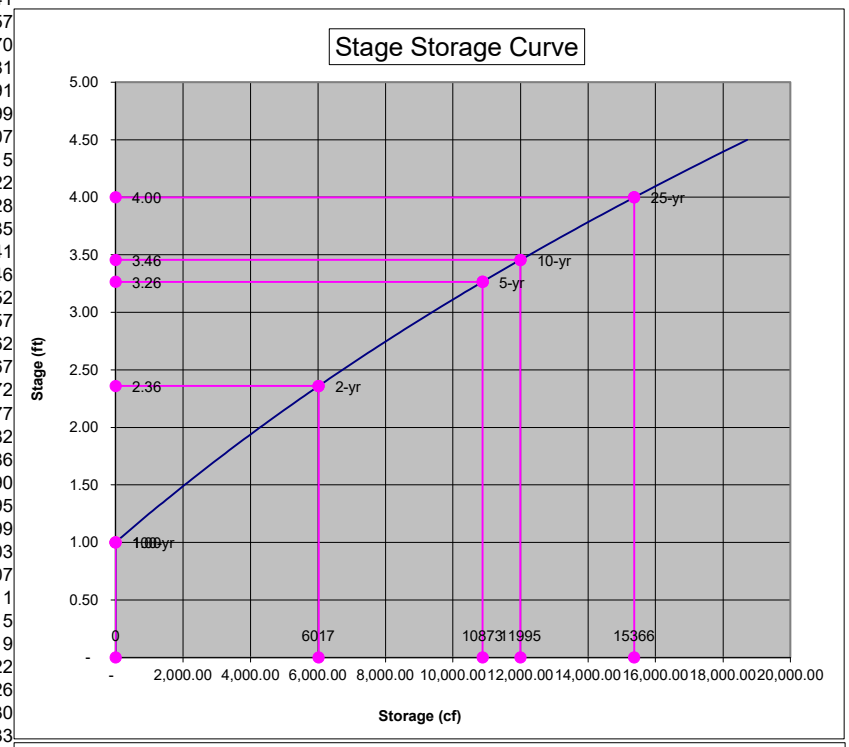
Project Name: The Bornstedt Views - Pond

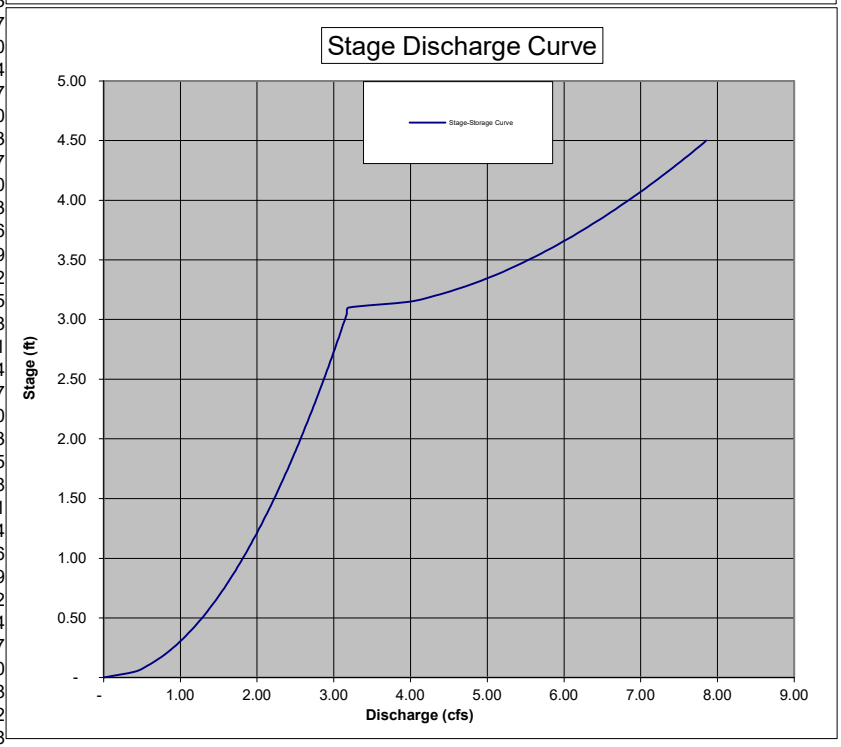
Stage Storage Summary

Job # 19-268

Date: 4/25/2022

Stage ft	Storage cf	Discharge cfs
-	-	-
0.05	-	0.41
0.10	-	0.57
0.15	-	0.70
0.20	-	0.81
0.25	-	0.91
0.30	-	0.99
0.35	-	1.07
0.40	-	1.15
0.45	-	1.22
0.50	-	1.28
0.55	-	1.35
0.60	-	1.41
0.65	-	1.46
0.70	-	1.52
0.75	-	1.57
0.80	-	1.62
0.85	-	1.67
0.90	-	1.72
0.95	-	1.77
1.00	-	1.82
1.05	195.50	1.86
1.10	392.88	1.90
1.15	592.15	1.95
1.20	793.32	1.99
1.25	996.39	2.03
1.30	1,201.38	2.07
1.35	1,408.30	2.11
1.40	1,617.15	2.15
1.45	1,827.94	2.19
1.50	2,040.69	2.22
1.55	2,255.40	2.26
1.60	2,472.08	2.30
1.65	2,690.73	2.33
1.70	2,911.38	2.37
1.75	3,134.02	2.40
1.80	3,358.67	2.44
1.85	3,585.34	2.47
1.90	3,814.03	2.50
1.95	4,044.75	2.53
2.00	4,277.52	2.57
2.05	4,512.34	2.60
2.10	4,749.21	2.63
2.15	4,988.16	2.66
2.20	5,229.19	2.69
2.25	5,472.30	2.72
2.30	5,717.51	2.75
2.35	5,964.82	2.78
2.40	6,214.25	2.81
2.45	6,465.80	2.84
2.50	6,719.49	2.87
2.55	6,975.31	2.90
2.60	7,233.29	2.93
2.65	7,493.43	2.95
2.70	7,755.73	2.98
2.75	8,020.21	3.01
2.80	8,286.88	3.04
2.85	8,555.74	3.06
2.90	8,826.81	3.09
2.95	9,100.09	3.12
3.00	9,375.60	3.14
3.05	9,653.33	3.17
3.10	9,933.31	3.20
3.15	10,215.53	3.98
3.20	10,500.01	4.32
3.25	10,786.76	4.58





Stage ft	Storage cf	Discharge cfs
3.30	11,075.79	4.81
3.35	11,367.10	5.01
3.40	11,660.71	5.20
3.45	11,956.62	5.37
3.50	12,254.84	5.54
3.55	12,555.39	5.69
3.60	12,858.26	5.84
3.65	13,163.47	5.98
3.70	13,471.04	6.11
3.75	13,780.96	6.24
3.80	14,093.24	6.37
3.85	14,407.90	6.49
3.90	14,724.95	6.61
3.95	15,044.39	6.73
4.00	15,366.23	6.84

Project Name: The Bornstedt Views - Pond
Rectangular, Sharp Crested Weir Calculations

Job # 19-268
Date: 4/25/2022

Weir Equation: $Q = C(L-0.2H)H^{3/2}$

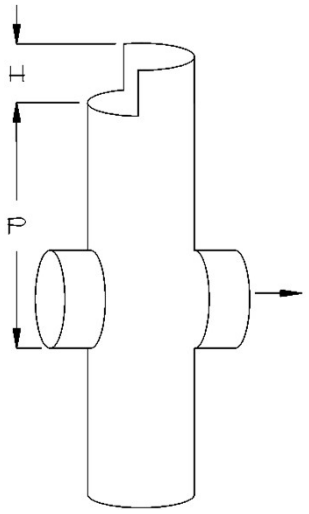
Q	= Flow over weir (cfs)
C	= 3.27 + 0.40 H/P (ft)
L	= Adjusted length of weir (La - 0.1H x 2) this is to account for side constraints
La	= Actual length of weir along pipes interior circumference (ft)
H	= Distance from bottom of weir to maximum head (ft)
P	= Distance from bottom of weir to outfall invert elevation (ft)
D	= Inside riser pipe diameter (in)
<	= Angle of opening for weir (maximum 180 degrees)

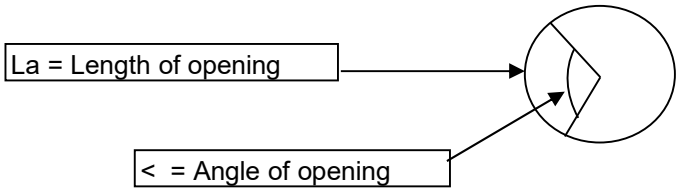
Given:

Q	3.21	cfs
H	0.90	ft
P	3.10	ft
D	12	in

Find:

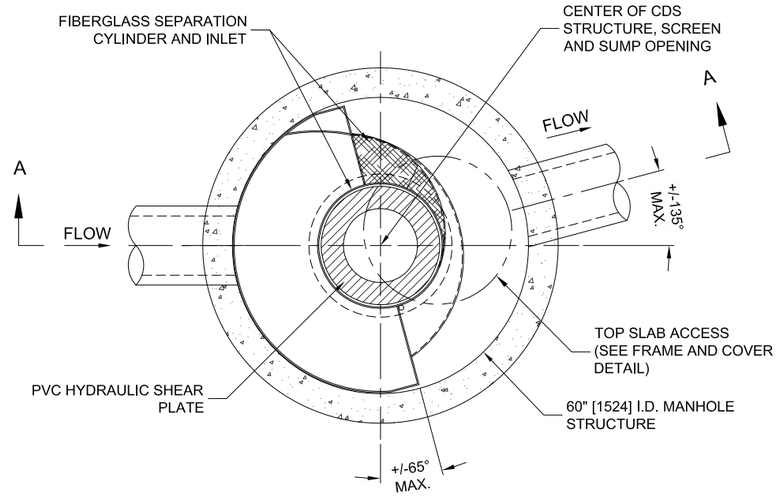
C	3.39	ft
L	1.29	ft
La	**1.47**	**ft**
<	**169**	**degrees**



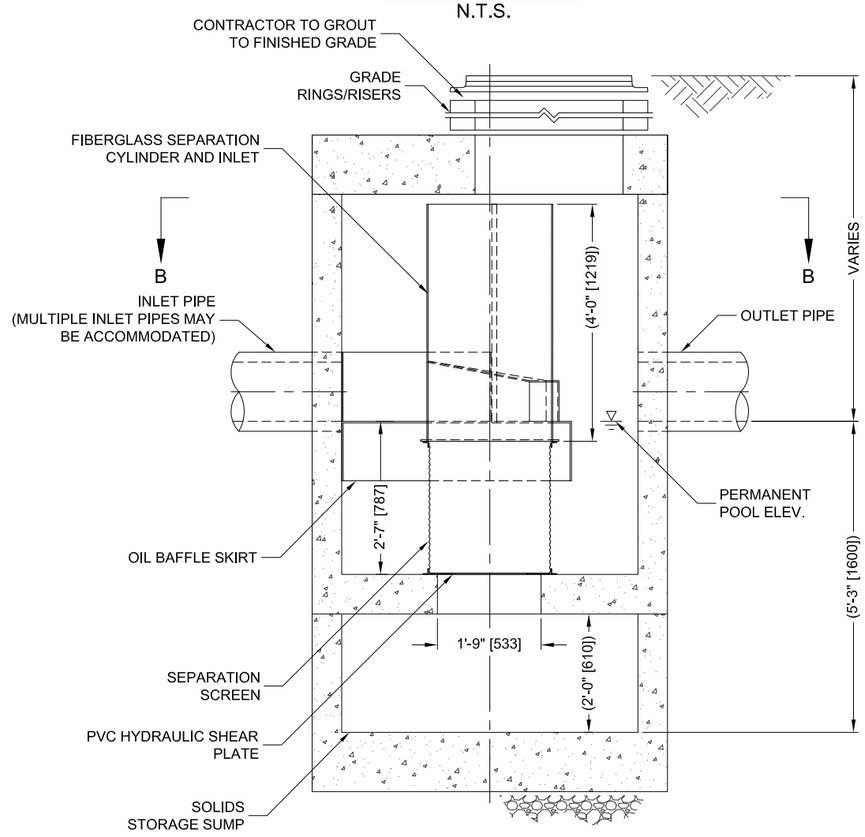


Appendix D

Water Quality Manhole Detail



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.

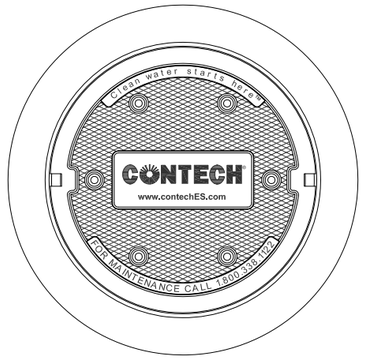
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,595; 6,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CDS2020-5-C DESIGN NOTES

CDS2020-5-C RATED TREATMENT CAPACITY IS 1.1 CFS [31.2 L/s], OR PER LOCAL REGULATIONS. MAXIMUM HYDRAULIC INTERNAL BYPASS CAPACITY IS 14.0 CFS [396 L/s]. IF THE SITE CONDITIONS EXCEED 14.0 CFS [396 L/s], AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

THE STANDARD CDS2020-5-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS



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

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CDS 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.
4. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', 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..
5. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
6. CDS STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

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 CDS MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

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

CDS2020-5-C
ONLINE CDS
STANDARD DETAIL

I:\CAD.CONTECH-CPI.COM\ROOT\COMMON\CAD\TREATMENT\22 CDS\40 STANDARD DRAWINGS\ONLINE (CDS-C)\DWG\CDS2020-5-C-DTL.DWG 9/25/2015 8:17 AM