

The water quality analysis included in this report contains assumptions, reductions, and treatment efficiencies that are not clearly supported. The City is not making a technical determination on the adequacy of the water quality methodology or nutrient reduction calculations. Final acceptance of the water quality analysis, required treatment volume, and compliance with impaired water body criteria shall be subject to review and approval by the appropriate permitting authority as part of the ERP process. Any discrepancies identified by permitting authority shall be addressed prior to issuance of any construction permit.

For Planning Board
packet

Rose Marina – DEP ERP Modification 08-29-2025

**Prepared for:
Rose Marina
General Manager - Dan High
951 Bald Eagle Drive
Marco Island, Florida 34145
239-394-2502**

The 50% reduction to the required water quality volume is not supported by the City of Marco Island requirements. The required water quality treatment volume shall be based on the greater of the first inch runoff or 2.5 times the impervious, with an additional 50% increase due to impaired receiving waters.

Table of Contents

Project Summary

Drainage Changes

Prepared by:


1250 Tamiami Trail N, Suite 201
Naples, FL 34102
239-851-8239
Chris@HaganEng.com

Christopher D. Hagan, PE
Florida Registration Number 38649
Engineering Business Number 29474

**Christopher
Hagan**

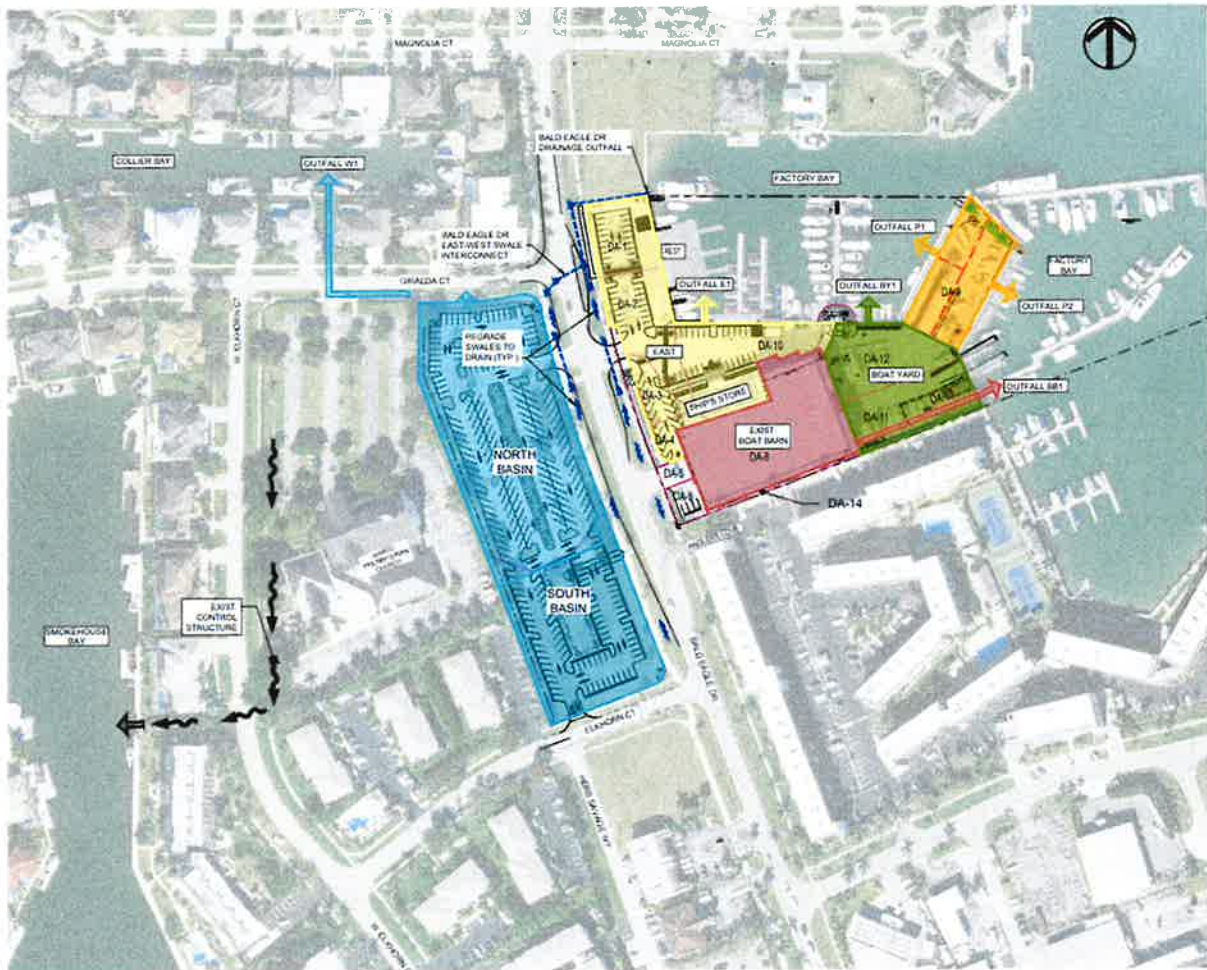
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Project Summary

This project is to accommodate the redevelopment and expansion of the Rose Marina facilities. This project is a functioning Marina with a ship store, boat storage, and other ancillary facilities. The redevelopment plans include removal of damaged facilities impacted by hurricanes (Irma and Ian) and completion of revised phased plans. The maintenance facility is being replaced with dry boat rack storage. The restaurant is being replaced with a new 200 seat restaurant. The west parking is being revised and expanded. The improvements outlined in the engineering report for this project accommodate the changes in different aspects of the project as proposed. Each of the facility drainage changes are outlined below.

Drainage Changes

The water management plan for the Rose Marina SDPA is to upgrade and enhance the existing water quality and discharge characteristics. The project is broken into five major drainage basins on site with each new system upgraded to provide stormwater quality treatment and attenuation prior to discharge. As this is an existing facility, emphasis has been placed on improving water quality and maintaining discharge capacity.



The four on site drainage basins include:

- East Existing Boat Barn/Boat Yard Basin (Red and Green)
- East New Peninsula Basin (Gold)
- East New Restaurant Basin (Yellow)
- West Northern Parking Lot (Aqua)

East Existing Boat Barn/Boat Yard Basin (Red and Green)

The Boat Barn and Boat Yard Basin (DA 8, 11, 12, 13 and 15) are not proposed to be changed in this redevelopment. As there is no change proposed within this basin, no additional drainage construction is proposed. The large boat barn and eastern boatyard have been previously designed and permitted with the 2014 SDP approval and with the DEP ERP. This system is in place and functioning.

East New Peninsula Basin (Gold)

The East New Peninsula Basin (DA 9) was primarily a boat maintenance facility. This included a large, paved area and metal building used for boat and engine maintenance. The building was significantly damaged in the recent hurricanes, and it was determined that the building and pavement would be removed and replaced with an outdoor dry rack boat storage facility. This includes a concrete drive aisle down the middle with boat racks on either side. These boat racks are to be placed on a gravel filled bed to provide for stormwater percolation into the ground prior to discharge. Like the StormTech exfiltration system used elsewhere on the site, this large area of washed gravel will provide several inches of stormwater collection and treatment prior to discharge through existing on-site inlets. As the gravel bed will be several feet above mean high water level, it is expected that the volume will be approximately 2.4 inches of the first stormwater flush prior to discharge. That is over three times the water quality requirements and is a significant improvement in the water quality discharge and a reduction in the off-site flow to Factory Bay. This new work was submitted and approved in the 12/19/2024 – ERP Permit 143569-014E1.

East New Restaurant Basin (Yellow)

The East New Restaurant Basin (DA 1, 2, 3, 4, and 10) connects the existing drainage facilities along the west side of the boat barn and the north side of the ship store and ties them into a new StormTech basin in the New Restaurant parking lot. The basin draining system will collect, treat, and discharge to Factory Bay. The existing drainage facilities in this basin collect the stormwater and send it directly into the boat basin. The revised drainage in the New Restaurant parking lot will provide the collection and movement of stormwater into a StormTech basin and then discharge into Factory Bay. The proposed water management system consists of a northern and southern StormTech drainage exfiltration basin to provide the storage and treatment required. These basins are designed

to provide nearly 0.9 inches of dry retention for the first flush of runoff. This will significantly improve the water quality discharge from the subject site and reduce the runoff from the basin into the bay. The Bald Eagle Drive runoff will be designed and permitted to continue to discharge outside this drainage system.

West Northern Parking Lot (Aqua)

The existing parking lot on the west side of Bald Eagle Drive between Giralda Court and Elkhorn Court serves the existing Marina site. The existing parking lot provides for the collection and movement of stormwater along swales and pipes from the west and discharges into the Giralda Court roadside swale. The proposed water management system consists of an expansion of the dry detention treatment and storage. The basin is designed to provide 1.36 inches of dry detention for the first flush of runoff. This will significantly improve the water quality discharge from the subject site and reduce the runoff from the basin. Treated stormwater will be discharged into the improved Giralda Court roadside swale. Swale and pipe improvements in Giralda Court will be made to accommodate this flow. These calculations are documented in the attached engineering plans.

Bald Eagle Drive Drainage Improvements

The offsite drainage basin is the Bald Eagle Drive roadside drainage. This will need to be modified to accommodate the increased turning lane pavement and reduced swale widths. Review with City of Marco Island Public Works staff provided the recommended drainage piping improvements. These have been added to the plans and the pipe sizing work is included with the updated plans to accommodate the 25-year rainfall event. A ROW permit will be added to the project development plans as we proceed.

Calculations:

The attached drainage calculations for each basin include water quality, stage/storage, flood routings, and nutrient loading. The hydraulic gradient calculations are included on the Site Development Plan Sheets.

Conclusions

This project provides a net water quality benefit by providing dry retention throughout. This also reduces site discharges and accommodates roadway swale improvements. This is all documented in the Site Civil plans and is consistent with the procedure utilized for the FDEP ERP permit.

**Water Management Calculations for Rose Marina East Basin
Build Out Water Management System (Yellow)**

LAND USE SUMMARY

BASIN AREA BREAKDOWN (DA 10)

	IMPERVIOUS AC	%IMPERVIOUS	PERVIOUS AC	%PERVIOUS	BASIN TOTAL AREA (AC)	
PAVEMENT	0.88	100%	0.00	0%	0.88	
SIDEWALK	0.07	100%	0.00	0%	0.07	
BUILDING (ROOF: SHIP STORE)	0.08	100%	0.00	0%	0.08	
LANDSCAPE / OPEN SPACE	0.00	0%	0.31	100%	0.31	
TOTAL:	1.03	77%	0.31	23%	1.34	
DESIGN PARAMETERS						
AVERAGE EXISTING GROUND ELEVATION	3.8	NAVD				
CONTROL ELEVATION	1.0	NAVD				
1 DAY RAINFALL (100 YR.)	10.9	IN.				
1 DAY RAINFALL (5 YR.)	5.7	IN.				
1 DAY RAINFALL (25 YR.)	8.5	IN.	Existing Q = CiA	C	0.70	
Q(Proposed<Existing)	8.0	CFS		i	8.5	IN/HR
SOIL COMPACTION FACTOR	25%			A	1.34	AC
BASIN AREA	1.34	AC		Q	8.0	CFS
PEAK ALLOWABLE DISCHARGE	8.0	CFS				

WATER QUALITY STORAGE VOLUME

1. First inch of Runoff Criteria

Water Quality Vol. = Project Area * 1 in. * (1 ft/12 in.)

Basin Area	1.34	AC
Water Quality Vol :	0.11	AC-FT

2. 2.5% Impervious Criteria

Water Quality Vol. = 2.5" * (1 ft/12 in.) * (basin area - Lakes - Roof)

Basin Lakes	0.00	AC
Roof	0.08	AC
Basin Treatment Area	1.26	AC
Impervious Area	0.96	AC
% Impervious	0.76	%
2.5" x % Impervious	1.89	INCHES
Water Quality Vol :	0.20	AC-FT

Required Larger Water Quality Volume (Ac*Ft):	0.20	AC-FT
50% Reduction for retention of first flush	0.10	AC-FT

Bleed Down Daily Discharge:

Criteria: 1/2" per day = [(0.5 in / 24 hrs) * (1 ft/12 in.) * (43560 SF/acre) * (1 hr/3600 s)] * (Project Area - Roof)

Basin Area - Lake:	1.26	AC
Q(bleed down) =	0.03	CFS

Soil Storage

Average Developed Area Elevation	3.8	NAVD
Control Elevation	1.0	NAVD
Depth	2.8	FEET

Depth to water table:	2.8	FEET
Soil Storage for pervious areas = Sd =	4.33	INCHES

From SFWMD: Basis for Review, Volume IV

S=Site Wide Soil Storage = Sd * %Pervious Area		
S=	0.99	INCHES

Time of Concentration - Longest path run of grassed swale, pavement, pipe and lake

	Build out Basin	
	Distance	MIN.
Distance over land @ 1 ft/s	60	1.00
Distance in pipe @ 2 ft/s	300	2.50
Distance to outfall @ 2 ft/s	20	0.17
TIME OF CONCENTRATION:		3.67

* Minimum Time of Concentration = 10 min

Tailwater for 25 year design storm from tidal high water records

TIME	STAGE (NAVD)
0	0.0
72	1.0
360	0.0

Bleed down weir design

Water Quality Volume	0.10	AC-FT	Min orifice diam	0.0	INCHES
Corresponding elevation	3.20	NAVD	Orifice Area (A)	0.00	SQ FT
			Height (h)	2.20	FT
Orifice flow	Q = 4.81 A h ^{1.5}	0.00	CFS		

Main weir design

Allowable discharge	8.03	CFS	Weir width	3.0	FT
Weir Elevation	3.20	NAVD	Est. Peak stage	4.10	NAVD
Main weir flow at peak stage	Q = 3.13L h ^{1.5}	8.48	CFS		
Orifice flow at peak stage	Q = 4.81 A h ^{1.5}	0.00	CFS		

AREA SUBMERGED

[illegible]

Project Name: Yellow Basin 25 Year

Reviewer: CDH

Project Number: 2014-077

Period Begin: Jan 01, 2000;0000 hr End: Jan 16, 2000;0000 hr Duration: 360 hr

Time Step: 0.2 hr, Iterations: 10

Basin 1: Yellow

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 3day

Design Frequency: 25 year

1 Day Rainfall: 8.5 inches

Area: 1.34 acres

Ground Storage: 4.33 inches

Time of Concentration: 0.166667 hours

Initial Stage: 0.38 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
0.38	0.00
1.05	0.01
2.05	0.06
3.05	0.10
3.30	0.10
3.50	0.16
4.10	0.68
4.50	1.18
5.00	1.86
5.50	2.53
6.00	3.20

Offsite Receiving Body: Offsite

Time (hr)	Stage (ft NGVD)
0.00	0.00
72.00	1.00
360.00	0.00

Structure: 1

From Basin: Yellow

To Basin: Offsite

Structure Type: Gravity

Weir: Sharp Crested, Crest Elev = 3.2 ft NGVD, Length = 3 ft

Bleeder: Circular, Invert Elev = -999 ft NGVD, Diameter = 0 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 2.5 ft, Manning's n = 0.012, Length = 28 ft

US Invert Elev = 1.08 ft NGVD, DS Invert Elev = -1.58 ft NGVD, flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	0.38	0.00
1.00	0.05	0.00	0.00	0.00	0.38	0.01
2.00	0.10	0.00	0.00	0.00	0.38	0.03
3.00	0.16	0.00	0.00	0.00	0.38	0.04
4.00	0.21	0.00	0.00	0.00	0.38	0.06
5.00	0.26	0.00	0.00	0.00	0.38	0.07
6.00	0.31	0.00	0.00	0.00	0.38	0.08
7.00	0.36	0.00	0.00	0.00	0.38	0.10
8.00	0.41	0.00	0.00	0.00	0.38	0.11
9.00	0.47	0.00	0.00	0.00	0.38	0.12
10.00	0.52	0.00	0.00	0.00	0.38	0.14

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
11.00	0.57	0.00	0.00	0.00	0.38	0.15
12.00	0.62	0.00	0.00	0.00	0.38	0.17
13.00	0.67	0.00	0.00	0.00	0.38	0.18
14.00	0.72	0.00	0.00	0.00	0.38	0.19
15.00	0.78	0.00	0.00	0.00	0.38	0.21
16.00	0.83	0.00	0.00	0.00	0.38	0.22
17.00	0.88	0.00	0.00	0.00	0.38	0.24
18.00	0.93	0.00	0.00	0.00	0.39	0.25
19.00	0.98	0.00	0.00	0.00	0.40	0.26
20.00	1.03	0.00	0.00	0.00	0.42	0.28
21.00	1.09	0.01	0.00	0.00	0.45	0.29
22.00	1.14	0.01	0.00	0.00	0.49	0.31
23.00	1.19	0.01	0.00	0.00	0.54	0.32
24.00	1.24	0.01	0.00	0.00	0.59	0.33
25.00	1.32	0.02	0.00	0.00	0.68	0.35
26.00	1.39	0.02	0.00	0.00	0.78	0.36
27.00	1.47	0.02	0.00	0.00	0.90	0.38
28.00	1.54	0.03	0.00	0.00	1.04	0.39
29.00	1.62	0.03	0.00	0.00	1.09	0.40
30.00	1.69	0.03	0.00	0.00	1.14	0.42
31.00	1.77	0.03	0.00	0.00	1.19	0.43
32.00	1.84	0.03	0.00	0.00	1.24	0.44
33.00	1.92	0.04	0.00	0.00	1.30	0.46
34.00	2.00	0.04	0.00	0.00	1.36	0.47
35.00	2.07	0.04	0.00	0.00	1.42	0.49
36.00	2.15	0.04	0.00	0.00	1.49	0.50
37.00	2.22	0.04	0.00	0.00	1.56	0.51
38.00	2.30	0.04	0.00	0.00	1.63	0.53
39.00	2.37	0.05	0.00	0.00	1.70	0.54
40.00	2.45	0.05	0.00	0.00	1.78	0.56
41.00	2.52	0.05	0.00	0.00	1.86	0.57
42.00	2.60	0.05	0.00	0.00	1.94	0.58
43.00	2.67	0.05	0.00	0.00	2.02	0.60
44.00	2.75	0.05	0.00	0.00	2.12	0.61
45.00	2.83	0.05	0.00	0.00	2.23	0.62
46.00	2.90	0.05	0.00	0.00	2.34	0.64
47.00	2.98	0.06	0.00	0.00	2.46	0.65
48.00	3.05	0.06	0.00	0.00	2.57	0.67
49.00	3.14	0.07	0.00	0.00	2.70	0.68
50.00	3.22	0.07	0.00	0.00	2.84	0.69
51.00	3.32	0.08	0.00	0.00	3.00	0.71
52.00	3.43	0.10	0.00	0.01	3.30	0.72
53.00	3.58	0.13	0.32	0.02	3.31	0.74
54.00	3.76	0.16	0.00	0.03	3.30	0.75
55.00	3.97	0.20	0.33	0.04	3.31	0.76
56.00	4.22	0.23	0.00	0.06	3.31	0.78
57.00	4.50	0.29	0.36	0.08	3.31	0.79
58.00	4.86	0.36	0.35	0.11	3.31	0.81
59.00	5.34	0.54	0.44	0.14	3.33	0.82
60.00	8.63	6.23	2.31	0.24	3.59	0.83
61.00	9.57	0.83	2.05	0.44	3.56	0.85
62.00	10.00	0.48	0.96	0.56	3.42	0.86
63.00	10.28	0.31	0.47	0.61	3.34	0.88
64.00	10.53	0.31	0.35	0.64	3.31	0.89
65.00	10.68	0.19	0.00	0.66	3.31	0.90
66.00	10.84	0.19	0.00	0.67	3.31	0.92
67.00	10.99	0.19	0.00	0.69	3.30	0.93
68.00	11.14	0.19	0.00	0.70	3.30	0.94
69.00	11.25	0.13	0.00	0.71	3.31	0.96
70.00	11.35	0.13	0.00	0.72	3.31	0.97
71.00	11.45	0.13	0.00	0.73	3.31	0.99
72.00	11.55	0.13	0.00	0.74	3.31	1.00
73.00	11.55	0.00	0.00	0.75	3.03	1.00
74.00	11.55	0.00	0.00	0.75	3.03	0.99
75.00	11.55	0.00	0.00	0.75	3.03	0.99
76.00	11.55	0.00	0.00	0.75	3.03	0.99

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
77.00	11.55	0.00	0.00	0.75	3.03	0.98
78.00	11.55	0.00	0.00	0.75	3.03	0.98
79.00	11.55	0.00	0.00	0.75	3.03	0.98
80.00	11.55	0.00	0.00	0.75	3.03	0.97
81.00	11.55	0.00	0.00	0.75	3.03	0.97
82.00	11.55	0.00	0.00	0.75	3.03	0.97
83.00	11.55	0.00	0.00	0.75	3.03	0.96
84.00	11.55	0.00	0.00	0.75	3.03	0.96
85.00	11.55	0.00	0.00	0.75	3.03	0.95
86.00	11.55	0.00	0.00	0.75	3.03	0.95
87.00	11.55	0.00	0.00	0.75	3.03	0.95
88.00	11.55	0.00	0.00	0.75	3.03	0.94
89.00	11.55	0.00	0.00	0.75	3.03	0.94
90.00	11.55	0.00	0.00	0.75	3.03	0.94
91.00	11.55	0.00	0.00	0.75	3.03	0.93
92.00	11.55	0.00	0.00	0.75	3.03	0.93
93.00	11.55	0.00	0.00	0.75	3.03	0.93
94.00	11.55	0.00	0.00	0.75	3.03	0.92
95.00	11.55	0.00	0.00	0.75	3.03	0.92
96.00	11.55	0.00	0.00	0.75	3.03	0.92
97.00	11.55	0.00	0.00	0.75	3.03	0.91
98.00	11.55	0.00	0.00	0.75	3.03	0.91
99.00	11.55	0.00	0.00	0.75	3.03	0.91
100.00	11.55	0.00	0.00	0.75	3.03	0.90
101.00	11.55	0.00	0.00	0.75	3.03	0.90
102.00	11.55	0.00	0.00	0.75	3.03	0.90
103.00	11.55	0.00	0.00	0.75	3.03	0.89
104.00	11.55	0.00	0.00	0.75	3.03	0.89
105.00	11.55	0.00	0.00	0.75	3.03	0.89
106.00	11.55	0.00	0.00	0.75	3.03	0.88
107.00	11.55	0.00	0.00	0.75	3.03	0.88
108.00	11.55	0.00	0.00	0.75	3.03	0.88
109.00	11.55	0.00	0.00	0.75	3.03	0.87
110.00	11.55	0.00	0.00	0.75	3.03	0.87
111.00	11.55	0.00	0.00	0.75	3.03	0.86
112.00	11.55	0.00	0.00	0.75	3.03	0.86
113.00	11.55	0.00	0.00	0.75	3.03	0.86
114.00	11.55	0.00	0.00	0.75	3.03	0.85
115.00	11.55	0.00	0.00	0.75	3.03	0.85
116.00	11.55	0.00	0.00	0.75	3.03	0.85
117.00	11.55	0.00	0.00	0.75	3.03	0.84
118.00	11.55	0.00	0.00	0.75	3.03	0.84
119.00	11.55	0.00	0.00	0.75	3.03	0.84
120.00	11.55	0.00	0.00	0.75	3.03	0.83
121.00	11.55	0.00	0.00	0.75	3.03	0.83
122.00	11.55	0.00	0.00	0.75	3.03	0.83
123.00	11.55	0.00	0.00	0.75	3.03	0.82
124.00	11.55	0.00	0.00	0.75	3.03	0.82
125.00	11.55	0.00	0.00	0.75	3.03	0.82
126.00	11.55	0.00	0.00	0.75	3.03	0.81
127.00	11.55	0.00	0.00	0.75	3.03	0.81
128.00	11.55	0.00	0.00	0.75	3.03	0.81
129.00	11.55	0.00	0.00	0.75	3.03	0.80
130.00	11.55	0.00	0.00	0.75	3.03	0.80
131.00	11.55	0.00	0.00	0.75	3.03	0.80
132.00	11.55	0.00	0.00	0.75	3.03	0.79
133.00	11.55	0.00	0.00	0.75	3.03	0.79
134.00	11.55	0.00	0.00	0.75	3.03	0.78
135.00	11.55	0.00	0.00	0.75	3.03	0.78
136.00	11.55	0.00	0.00	0.75	3.03	0.78
137.00	11.55	0.00	0.00	0.75	3.03	0.77
138.00	11.55	0.00	0.00	0.75	3.03	0.77
139.00	11.55	0.00	0.00	0.75	3.03	0.77
140.00	11.55	0.00	0.00	0.75	3.03	0.76
141.00	11.55	0.00	0.00	0.75	3.03	0.76
142.00	11.55	0.00	0.00	0.75	3.03	0.76

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
143.00	11.55	0.00	0.00	0.75	3.03	0.75
144.00	11.55	0.00	0.00	0.75	3.03	0.75
145.00	11.55	0.00	0.00	0.75	3.03	0.75
146.00	11.55	0.00	0.00	0.75	3.03	0.74
147.00	11.55	0.00	0.00	0.75	3.03	0.74
148.00	11.55	0.00	0.00	0.75	3.03	0.74
149.00	11.55	0.00	0.00	0.75	3.03	0.73
150.00	11.55	0.00	0.00	0.75	3.03	0.73
151.00	11.55	0.00	0.00	0.75	3.03	0.73
152.00	11.55	0.00	0.00	0.75	3.03	0.72
153.00	11.55	0.00	0.00	0.75	3.03	0.72
154.00	11.55	0.00	0.00	0.75	3.03	0.72
155.00	11.55	0.00	0.00	0.75	3.03	0.71
156.00	11.55	0.00	0.00	0.75	3.03	0.71
157.00	11.55	0.00	0.00	0.75	3.03	0.70
158.00	11.55	0.00	0.00	0.75	3.03	0.70
159.00	11.55	0.00	0.00	0.75	3.03	0.70
160.00	11.55	0.00	0.00	0.75	3.03	0.69
161.00	11.55	0.00	0.00	0.75	3.03	0.69
162.00	11.55	0.00	0.00	0.75	3.03	0.69
163.00	11.55	0.00	0.00	0.75	3.03	0.68
164.00	11.55	0.00	0.00	0.75	3.03	0.68
165.00	11.55	0.00	0.00	0.75	3.03	0.68
166.00	11.55	0.00	0.00	0.75	3.03	0.67
167.00	11.55	0.00	0.00	0.75	3.03	0.67
168.00	11.55	0.00	0.00	0.75	3.03	0.67
169.00	11.55	0.00	0.00	0.75	3.03	0.66
170.00	11.55	0.00	0.00	0.75	3.03	0.66
171.00	11.55	0.00	0.00	0.75	3.03	0.66
172.00	11.55	0.00	0.00	0.75	3.03	0.65
173.00	11.55	0.00	0.00	0.75	3.03	0.65
174.00	11.55	0.00	0.00	0.75	3.03	0.65
175.00	11.55	0.00	0.00	0.75	3.03	0.64
176.00	11.55	0.00	0.00	0.75	3.03	0.64
177.00	11.55	0.00	0.00	0.75	3.03	0.64
178.00	11.55	0.00	0.00	0.75	3.03	0.63
179.00	11.55	0.00	0.00	0.75	3.03	0.63
180.00	11.55	0.00	0.00	0.75	3.03	0.62
181.00	11.55	0.00	0.00	0.75	3.03	0.62
182.00	11.55	0.00	0.00	0.75	3.03	0.62
183.00	11.55	0.00	0.00	0.75	3.03	0.61
184.00	11.55	0.00	0.00	0.75	3.03	0.61
185.00	11.55	0.00	0.00	0.75	3.03	0.61
186.00	11.55	0.00	0.00	0.75	3.03	0.60
187.00	11.55	0.00	0.00	0.75	3.03	0.60
188.00	11.55	0.00	0.00	0.75	3.03	0.60
189.00	11.55	0.00	0.00	0.75	3.03	0.59
190.00	11.55	0.00	0.00	0.75	3.03	0.59
191.00	11.55	0.00	0.00	0.75	3.03	0.59
192.00	11.55	0.00	0.00	0.75	3.03	0.58
193.00	11.55	0.00	0.00	0.75	3.03	0.58
194.00	11.55	0.00	0.00	0.75	3.03	0.58
195.00	11.55	0.00	0.00	0.75	3.03	0.57
196.00	11.55	0.00	0.00	0.75	3.03	0.57
197.00	11.55	0.00	0.00	0.75	3.03	0.57
198.00	11.55	0.00	0.00	0.75	3.03	0.56
199.00	11.55	0.00	0.00	0.75	3.03	0.56
200.00	11.55	0.00	0.00	0.75	3.03	0.56
201.00	11.55	0.00	0.00	0.75	3.03	0.55
202.00	11.55	0.00	0.00	0.75	3.03	0.55
203.00	11.55	0.00	0.00	0.75	3.03	0.55
204.00	11.55	0.00	0.00	0.75	3.03	0.54
205.00	11.55	0.00	0.00	0.75	3.03	0.54
206.00	11.55	0.00	0.00	0.75	3.03	0.53
207.00	11.55	0.00	0.00	0.75	3.03	0.53
208.00	11.55	0.00	0.00	0.75	3.03	0.53

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
209.00	11.55	0.00	0.00	0.75	3.03	0.52
210.00	11.55	0.00	0.00	0.75	3.03	0.52
211.00	11.55	0.00	0.00	0.75	3.03	0.52
212.00	11.55	0.00	0.00	0.75	3.03	0.51
213.00	11.55	0.00	0.00	0.75	3.03	0.51
214.00	11.55	0.00	0.00	0.75	3.03	0.51
215.00	11.55	0.00	0.00	0.75	3.03	0.50
216.00	11.55	0.00	0.00	0.75	3.03	0.50
217.00	11.55	0.00	0.00	0.75	3.03	0.50
218.00	11.55	0.00	0.00	0.75	3.03	0.49
219.00	11.55	0.00	0.00	0.75	3.03	0.49
220.00	11.55	0.00	0.00	0.75	3.03	0.49
221.00	11.55	0.00	0.00	0.75	3.03	0.48
222.00	11.55	0.00	0.00	0.75	3.03	0.48
223.00	11.55	0.00	0.00	0.75	3.03	0.48
224.00	11.55	0.00	0.00	0.75	3.03	0.47
225.00	11.55	0.00	0.00	0.75	3.03	0.47
226.00	11.55	0.00	0.00	0.75	3.03	0.47
227.00	11.55	0.00	0.00	0.75	3.03	0.46
228.00	11.55	0.00	0.00	0.75	3.03	0.46
229.00	11.55	0.00	0.00	0.75	3.03	0.45
230.00	11.55	0.00	0.00	0.75	3.03	0.45
231.00	11.55	0.00	0.00	0.75	3.03	0.45
232.00	11.55	0.00	0.00	0.75	3.03	0.44
233.00	11.55	0.00	0.00	0.75	3.03	0.44
234.00	11.55	0.00	0.00	0.75	3.03	0.44
235.00	11.55	0.00	0.00	0.75	3.03	0.43
236.00	11.55	0.00	0.00	0.75	3.03	0.43
237.00	11.55	0.00	0.00	0.75	3.03	0.43
238.00	11.55	0.00	0.00	0.75	3.03	0.42
239.00	11.55	0.00	0.00	0.75	3.03	0.42
240.00	11.55	0.00	0.00	0.75	3.03	0.42
241.00	11.55	0.00	0.00	0.75	3.03	0.41
242.00	11.55	0.00	0.00	0.75	3.03	0.41
243.00	11.55	0.00	0.00	0.75	3.03	0.41
244.00	11.55	0.00	0.00	0.75	3.03	0.40
245.00	11.55	0.00	0.00	0.75	3.03	0.40
246.00	11.55	0.00	0.00	0.75	3.03	0.40
247.00	11.55	0.00	0.00	0.75	3.03	0.39
248.00	11.55	0.00	0.00	0.75	3.03	0.39
249.00	11.55	0.00	0.00	0.75	3.03	0.39
250.00	11.55	0.00	0.00	0.75	3.03	0.38
251.00	11.55	0.00	0.00	0.75	3.03	0.38
252.00	11.55	0.00	0.00	0.75	3.03	0.38
253.00	11.55	0.00	0.00	0.75	3.03	0.37
254.00	11.55	0.00	0.00	0.75	3.03	0.37
255.00	11.55	0.00	0.00	0.75	3.03	0.36
256.00	11.55	0.00	0.00	0.75	3.03	0.36
257.00	11.55	0.00	0.00	0.75	3.03	0.36
258.00	11.55	0.00	0.00	0.75	3.03	0.35
259.00	11.55	0.00	0.00	0.75	3.03	0.35
260.00	11.55	0.00	0.00	0.75	3.03	0.35
261.00	11.55	0.00	0.00	0.75	3.03	0.34
262.00	11.55	0.00	0.00	0.75	3.03	0.34
263.00	11.55	0.00	0.00	0.75	3.03	0.34
264.00	11.55	0.00	0.00	0.75	3.03	0.33
265.00	11.55	0.00	0.00	0.75	3.03	0.33
266.00	11.55	0.00	0.00	0.75	3.03	0.33
267.00	11.55	0.00	0.00	0.75	3.03	0.32
268.00	11.55	0.00	0.00	0.75	3.03	0.32
269.00	11.55	0.00	0.00	0.75	3.03	0.32
270.00	11.55	0.00	0.00	0.75	3.03	0.31
271.00	11.55	0.00	0.00	0.75	3.03	0.31
272.00	11.55	0.00	0.00	0.75	3.03	0.31
273.00	11.55	0.00	0.00	0.75	3.03	0.30
274.00	11.55	0.00	0.00	0.75	3.03	0.30

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
275.00	11.55	0.00	0.00	0.75	3.03	0.30
276.00	11.55	0.00	0.00	0.75	3.03	0.29
277.00	11.55	0.00	0.00	0.75	3.03	0.29
278.00	11.55	0.00	0.00	0.75	3.03	0.28
279.00	11.55	0.00	0.00	0.75	3.03	0.28
280.00	11.55	0.00	0.00	0.75	3.03	0.28
281.00	11.55	0.00	0.00	0.75	3.03	0.27
282.00	11.55	0.00	0.00	0.75	3.03	0.27
283.00	11.55	0.00	0.00	0.75	3.03	0.27
284.00	11.55	0.00	0.00	0.75	3.03	0.26
285.00	11.55	0.00	0.00	0.75	3.03	0.26
286.00	11.55	0.00	0.00	0.75	3.03	0.26
287.00	11.55	0.00	0.00	0.75	3.03	0.25
288.00	11.55	0.00	0.00	0.75	3.03	0.25
289.00	11.55	0.00	0.00	0.75	3.03	0.25
290.00	11.55	0.00	0.00	0.75	3.03	0.24
291.00	11.55	0.00	0.00	0.75	3.03	0.24
292.00	11.55	0.00	0.00	0.75	3.03	0.24
293.00	11.55	0.00	0.00	0.75	3.03	0.23
294.00	11.55	0.00	0.00	0.75	3.03	0.23
295.00	11.55	0.00	0.00	0.75	3.03	0.23
296.00	11.55	0.00	0.00	0.75	3.03	0.22
297.00	11.55	0.00	0.00	0.75	3.03	0.22
298.00	11.55	0.00	0.00	0.75	3.03	0.22
299.00	11.55	0.00	0.00	0.75	3.03	0.21
300.00	11.55	0.00	0.00	0.75	3.03	0.21
301.00	11.55	0.00	0.00	0.75	3.03	0.20
302.00	11.55	0.00	0.00	0.75	3.03	0.20
303.00	11.55	0.00	0.00	0.75	3.03	0.20
304.00	11.55	0.00	0.00	0.75	3.03	0.19
305.00	11.55	0.00	0.00	0.75	3.03	0.19
306.00	11.55	0.00	0.00	0.75	3.03	0.19
307.00	11.55	0.00	0.00	0.75	3.03	0.18
308.00	11.55	0.00	0.00	0.75	3.03	0.18
309.00	11.55	0.00	0.00	0.75	3.03	0.18
310.00	11.55	0.00	0.00	0.75	3.03	0.17
311.00	11.55	0.00	0.00	0.75	3.03	0.17
312.00	11.55	0.00	0.00	0.75	3.03	0.17
313.00	11.55	0.00	0.00	0.75	3.03	0.16
314.00	11.55	0.00	0.00	0.75	3.03	0.16
315.00	11.55	0.00	0.00	0.75	3.03	0.16
316.00	11.55	0.00	0.00	0.75	3.03	0.15
317.00	11.55	0.00	0.00	0.75	3.03	0.15
318.00	11.55	0.00	0.00	0.75	3.03	0.15
319.00	11.55	0.00	0.00	0.75	3.03	0.14
320.00	11.55	0.00	0.00	0.75	3.03	0.14
321.00	11.55	0.00	0.00	0.75	3.03	0.14
322.00	11.55	0.00	0.00	0.75	3.03	0.13
323.00	11.55	0.00	0.00	0.75	3.03	0.13
324.00	11.55	0.00	0.00	0.75	3.03	0.12
325.00	11.55	0.00	0.00	0.75	3.03	0.12
326.00	11.55	0.00	0.00	0.75	3.03	0.12
327.00	11.55	0.00	0.00	0.75	3.03	0.11
328.00	11.55	0.00	0.00	0.75	3.03	0.11
329.00	11.55	0.00	0.00	0.75	3.03	0.11
330.00	11.55	0.00	0.00	0.75	3.03	0.10
331.00	11.55	0.00	0.00	0.75	3.03	0.10
332.00	11.55	0.00	0.00	0.75	3.03	0.10
333.00	11.55	0.00	0.00	0.75	3.03	0.09
334.00	11.55	0.00	0.00	0.75	3.03	0.09
335.00	11.55	0.00	0.00	0.75	3.03	0.09
336.00	11.55	0.00	0.00	0.75	3.03	0.08
337.00	11.55	0.00	0.00	0.75	3.03	0.08
338.00	11.55	0.00	0.00	0.75	3.03	0.08
339.00	11.55	0.00	0.00	0.75	3.03	0.07
340.00	11.55	0.00	0.00	0.75	3.03	0.07

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
341.00	11.55	0.00	0.00	0.75	3.03	0.07
342.00	11.55	0.00	0.00	0.75	3.03	0.06
343.00	11.55	0.00	0.00	0.75	3.03	0.06
344.00	11.55	0.00	0.00	0.75	3.03	0.06
345.00	11.55	0.00	0.00	0.75	3.03	0.05
346.00	11.55	0.00	0.00	0.75	3.03	0.05
347.00	11.55	0.00	0.00	0.75	3.03	0.05
348.00	11.55	0.00	0.00	0.75	3.03	0.04
349.00	11.55	0.00	0.00	0.75	3.03	0.04
350.00	11.55	0.00	0.00	0.75	3.03	0.03
351.00	11.55	0.00	0.00	0.75	3.03	0.03
352.00	11.55	0.00	0.00	0.75	3.03	0.03
353.00	11.55	0.00	0.00	0.75	3.03	0.02
354.00	11.55	0.00	0.00	0.75	3.03	0.02
355.00	11.55	0.00	0.00	0.75	3.03	0.02
356.00	11.55	0.00	0.00	0.75	3.03	0.01
357.00	11.55	0.00	0.00	0.75	3.03	0.01
358.00	11.55	0.00	0.00	0.75	3.03	0.01
359.00	11.55	0.00	0.00	0.75	3.03	0.00
360.00	11.55	0.00	0.00	0.75	3.03	0.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	2.67	60.20	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Yellow	3.63	60.20	0.38	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Yellow	0.85	0.00	0.75	0.00	0.10	0.00

Project Name: Yellow Basin 100 Year

Reviewer: CDH

Project Number: 2014-077

Period Begin: Jan 01, 2000;0000 hr End: Jan 16, 2000;0000 hr Duration: 360 hr

Time Step: 0.2 hr, Iterations: 10

Basin 1: Yellow

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 3day

Design Frequency: 100 year

1 Day Rainfall: 10.9 inches

Area: 1.34 acres

Ground Storage: 4.33 inches

Time of Concentration: 0.166667 hours

Initial Stage: 0.38 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
0.38	0.00
1.05	0.01
2.05	0.06
3.05	0.10
3.30	0.10
3.50	0.16
4.10	0.68
4.50	1.18
5.00	1.86
5.50	2.53
6.00	3.20

Offsite Receiving Body: Offsite

Time (hr)	Stage (ft NGVD)
0.00	0.00
72.00	1.00
360.00	0.00

Structure: 1

From Basin: Yellow

To Basin: Offsite

Structure Type: Gravity

Weir: Sharp Crested, Crest Elev = 3.2 ft NGVD, Length = 3 ft

Bleeder: Circular, Invert Elev = -999 ft NGVD, Diameter = 0 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 2.5 ft, Manning's n = 0.012, Length = 28 ft

US Invert Elev = 1.08 ft NGVD, DS Invert Elev = -1.58 ft NGVD, flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	0.38	0.00
1.00	0.07	0.00	0.00	0.00	0.38	0.01
2.00	0.13	0.00	0.00	0.00	0.38	0.03
3.00	0.20	0.00	0.00	0.00	0.38	0.04
4.00	0.27	0.00	0.00	0.00	0.38	0.06
5.00	0.33	0.00	0.00	0.00	0.38	0.07
6.00	0.40	0.00	0.00	0.00	0.38	0.08
7.00	0.46	0.00	0.00	0.00	0.38	0.10
8.00	0.53	0.00	0.00	0.00	0.38	0.11
9.00	0.60	0.00	0.00	0.00	0.38	0.12
10.00	0.66	0.00	0.00	0.00	0.38	0.14

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
11.00	0.73	0.00	0.00	0.00	0.38	0.15
12.00	0.80	0.00	0.00	0.00	0.38	0.17
13.00	0.86	0.00	0.00	0.00	0.38	0.18
14.00	0.93	0.00	0.00	0.00	0.38	0.19
15.00	0.99	0.00	0.00	0.00	0.40	0.21
16.00	1.06	0.01	0.00	0.00	0.44	0.22
17.00	1.13	0.01	0.00	0.00	0.48	0.24
18.00	1.19	0.01	0.00	0.00	0.54	0.25
19.00	1.26	0.01	0.00	0.00	0.61	0.26
20.00	1.33	0.02	0.00	0.00	0.69	0.28
21.00	1.39	0.02	0.00	0.00	0.79	0.29
22.00	1.46	0.02	0.00	0.00	0.89	0.31
23.00	1.53	0.02	0.00	0.00	1.01	0.32
24.00	1.59	0.02	0.00	0.00	1.08	0.33
25.00	1.69	0.04	0.00	0.00	1.13	0.35
26.00	1.78	0.04	0.00	0.00	1.20	0.36
27.00	1.88	0.04	0.00	0.00	1.27	0.38
28.00	1.98	0.05	0.00	0.00	1.34	0.39
29.00	2.08	0.05	0.00	0.00	1.42	0.40
30.00	2.17	0.05	0.00	0.00	1.51	0.42
31.00	2.27	0.06	0.00	0.00	1.60	0.43
32.00	2.37	0.06	0.00	0.00	1.69	0.44
33.00	2.46	0.06	0.00	0.00	1.79	0.46
34.00	2.56	0.06	0.00	0.00	1.89	0.47
35.00	2.66	0.06	0.00	0.00	2.00	0.49
36.00	2.75	0.07	0.00	0.00	2.12	0.50
37.00	2.85	0.07	0.00	0.00	2.26	0.51
38.00	2.95	0.07	0.00	0.00	2.41	0.53
39.00	3.04	0.07	0.00	0.00	2.55	0.54
40.00	3.14	0.07	0.00	0.00	2.71	0.56
41.00	3.24	0.08	0.00	0.00	2.86	0.57
42.00	3.33	0.08	0.00	0.00	3.02	0.58
43.00	3.43	0.08	0.00	0.01	3.05	0.60
44.00	3.53	0.08	0.00	0.01	3.30	0.61
45.00	3.62	0.08	0.00	0.02	3.31	0.62
46.00	3.72	0.08	0.00	0.03	3.03	0.64
47.00	3.82	0.08	0.00	0.03	3.30	0.65
48.00	3.91	0.09	0.30	0.04	3.30	0.67
49.00	4.02	0.10	0.00	0.05	3.30	0.68
50.00	4.13	0.10	0.31	0.06	3.30	0.69
51.00	4.26	0.12	0.00	0.06	3.31	0.71
52.00	4.40	0.14	0.00	0.07	3.31	0.72
53.00	4.59	0.19	0.34	0.09	3.31	0.74
54.00	4.82	0.23	0.00	0.10	3.31	0.75
55.00	5.09	0.28	0.00	0.13	3.31	0.76
56.00	5.41	0.33	0.34	0.15	3.31	0.78
57.00	5.78	0.41	0.37	0.18	3.32	0.79
58.00	6.23	0.51	0.45	0.22	3.33	0.81
59.00	6.85	0.76	0.61	0.26	3.36	0.82
60.00	11.06	8.42	2.97	0.39	3.66	0.83
61.00	12.27	1.10	2.66	0.65	3.63	0.85
62.00	12.83	0.64	1.61	0.82	3.51	0.86
63.00	13.18	0.42	0.66	0.89	3.37	0.88
64.00	13.51	0.41	0.47	0.94	3.34	0.89
65.00	13.70	0.25	0.32	0.97	3.31	0.90
66.00	13.90	0.25	0.31	0.99	3.30	0.92
67.00	14.09	0.25	0.00	1.01	3.31	0.93
68.00	14.29	0.25	0.35	1.03	3.31	0.94
69.00	14.42	0.17	0.33	1.04	3.31	0.96
70.00	14.55	0.17	0.00	1.06	3.31	0.97
71.00	14.68	0.17	0.33	1.07	3.31	0.99
72.00	14.81	0.17	0.00	1.08	3.31	1.00
73.00	14.81	0.00	0.00	1.09	3.04	1.00
74.00	14.81	0.00	0.00	1.09	3.04	0.99
75.00	14.81	0.00	0.00	1.09	3.04	0.99
76.00	14.81	0.00	0.00	1.09	3.04	0.99

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
77.00	14.81	0.00	0.00	1.09	3.04	0.98
78.00	14.81	0.00	0.00	1.09	3.04	0.98
79.00	14.81	0.00	0.00	1.09	3.04	0.98
80.00	14.81	0.00	0.00	1.09	3.04	0.97
81.00	14.81	0.00	0.00	1.09	3.04	0.97
82.00	14.81	0.00	0.00	1.09	3.04	0.97
83.00	14.81	0.00	0.00	1.09	3.04	0.96
84.00	14.81	0.00	0.00	1.09	3.04	0.96
85.00	14.81	0.00	0.00	1.09	3.04	0.95
86.00	14.81	0.00	0.00	1.09	3.04	0.95
87.00	14.81	0.00	0.00	1.09	3.04	0.95
88.00	14.81	0.00	0.00	1.09	3.04	0.94
89.00	14.81	0.00	0.00	1.09	3.04	0.94
90.00	14.81	0.00	0.00	1.09	3.04	0.94
91.00	14.81	0.00	0.00	1.09	3.04	0.93
92.00	14.81	0.00	0.00	1.09	3.04	0.93
93.00	14.81	0.00	0.00	1.09	3.04	0.93
94.00	14.81	0.00	0.00	1.09	3.04	0.92
95.00	14.81	0.00	0.00	1.09	3.04	0.92
96.00	14.81	0.00	0.00	1.09	3.04	0.92
97.00	14.81	0.00	0.00	1.09	3.04	0.91
98.00	14.81	0.00	0.00	1.09	3.04	0.91
99.00	14.81	0.00	0.00	1.09	3.04	0.91
100.00	14.81	0.00	0.00	1.09	3.04	0.90
101.00	14.81	0.00	0.00	1.09	3.04	0.90
102.00	14.81	0.00	0.00	1.09	3.04	0.90
103.00	14.81	0.00	0.00	1.09	3.04	0.89
104.00	14.81	0.00	0.00	1.09	3.04	0.89
105.00	14.81	0.00	0.00	1.09	3.04	0.89
106.00	14.81	0.00	0.00	1.09	3.04	0.88
107.00	14.81	0.00	0.00	1.09	3.04	0.88
108.00	14.81	0.00	0.00	1.09	3.04	0.88
109.00	14.81	0.00	0.00	1.09	3.04	0.87
110.00	14.81	0.00	0.00	1.09	3.04	0.87
111.00	14.81	0.00	0.00	1.09	3.04	0.86
112.00	14.81	0.00	0.00	1.09	3.04	0.86
113.00	14.81	0.00	0.00	1.09	3.04	0.86
114.00	14.81	0.00	0.00	1.09	3.04	0.85
115.00	14.81	0.00	0.00	1.09	3.04	0.85
116.00	14.81	0.00	0.00	1.09	3.04	0.85
117.00	14.81	0.00	0.00	1.09	3.04	0.84
118.00	14.81	0.00	0.00	1.09	3.04	0.84
119.00	14.81	0.00	0.00	1.09	3.04	0.84
120.00	14.81	0.00	0.00	1.09	3.04	0.83
121.00	14.81	0.00	0.00	1.09	3.04	0.83
122.00	14.81	0.00	0.00	1.09	3.04	0.83
123.00	14.81	0.00	0.00	1.09	3.04	0.82
124.00	14.81	0.00	0.00	1.09	3.04	0.82
125.00	14.81	0.00	0.00	1.09	3.04	0.82
126.00	14.81	0.00	0.00	1.09	3.04	0.81
127.00	14.81	0.00	0.00	1.09	3.04	0.81
128.00	14.81	0.00	0.00	1.09	3.04	0.81
129.00	14.81	0.00	0.00	1.09	3.04	0.80
130.00	14.81	0.00	0.00	1.09	3.04	0.80
131.00	14.81	0.00	0.00	1.09	3.04	0.80
132.00	14.81	0.00	0.00	1.09	3.04	0.79
133.00	14.81	0.00	0.00	1.09	3.04	0.79
134.00	14.81	0.00	0.00	1.09	3.04	0.78
135.00	14.81	0.00	0.00	1.09	3.04	0.78
136.00	14.81	0.00	0.00	1.09	3.04	0.78
137.00	14.81	0.00	0.00	1.09	3.04	0.77
138.00	14.81	0.00	0.00	1.09	3.04	0.77
139.00	14.81	0.00	0.00	1.09	3.04	0.77
140.00	14.81	0.00	0.00	1.09	3.04	0.76
141.00	14.81	0.00	0.00	1.09	3.04	0.76
142.00	14.81	0.00	0.00	1.09	3.04	0.76

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
143.00	14.81	0.00	0.00	1.09	3.04	0.75
144.00	14.81	0.00	0.00	1.09	3.04	0.75
145.00	14.81	0.00	0.00	1.09	3.04	0.75
146.00	14.81	0.00	0.00	1.09	3.04	0.74
147.00	14.81	0.00	0.00	1.09	3.04	0.74
148.00	14.81	0.00	0.00	1.09	3.04	0.74
149.00	14.81	0.00	0.00	1.09	3.04	0.73
150.00	14.81	0.00	0.00	1.09	3.04	0.73
151.00	14.81	0.00	0.00	1.09	3.04	0.73
152.00	14.81	0.00	0.00	1.09	3.04	0.72
153.00	14.81	0.00	0.00	1.09	3.04	0.72
154.00	14.81	0.00	0.00	1.09	3.04	0.72
155.00	14.81	0.00	0.00	1.09	3.04	0.71
156.00	14.81	0.00	0.00	1.09	3.04	0.71
157.00	14.81	0.00	0.00	1.09	3.04	0.70
158.00	14.81	0.00	0.00	1.09	3.04	0.70
159.00	14.81	0.00	0.00	1.09	3.04	0.70
160.00	14.81	0.00	0.00	1.09	3.04	0.69
161.00	14.81	0.00	0.00	1.09	3.04	0.69
162.00	14.81	0.00	0.00	1.09	3.04	0.69
163.00	14.81	0.00	0.00	1.09	3.04	0.68
164.00	14.81	0.00	0.00	1.09	3.04	0.68
165.00	14.81	0.00	0.00	1.09	3.04	0.68
166.00	14.81	0.00	0.00	1.09	3.04	0.67
167.00	14.81	0.00	0.00	1.09	3.04	0.67
168.00	14.81	0.00	0.00	1.09	3.04	0.67
169.00	14.81	0.00	0.00	1.09	3.04	0.66
170.00	14.81	0.00	0.00	1.09	3.04	0.66
171.00	14.81	0.00	0.00	1.09	3.04	0.66
172.00	14.81	0.00	0.00	1.09	3.04	0.65
173.00	14.81	0.00	0.00	1.09	3.04	0.65
174.00	14.81	0.00	0.00	1.09	3.04	0.65
175.00	14.81	0.00	0.00	1.09	3.04	0.64
176.00	14.81	0.00	0.00	1.09	3.04	0.64
177.00	14.81	0.00	0.00	1.09	3.04	0.64
178.00	14.81	0.00	0.00	1.09	3.04	0.63
179.00	14.81	0.00	0.00	1.09	3.04	0.63
180.00	14.81	0.00	0.00	1.09	3.04	0.62
181.00	14.81	0.00	0.00	1.09	3.04	0.62
182.00	14.81	0.00	0.00	1.09	3.04	0.62
183.00	14.81	0.00	0.00	1.09	3.04	0.61
184.00	14.81	0.00	0.00	1.09	3.04	0.61
185.00	14.81	0.00	0.00	1.09	3.04	0.61
186.00	14.81	0.00	0.00	1.09	3.04	0.60
187.00	14.81	0.00	0.00	1.09	3.04	0.60
188.00	14.81	0.00	0.00	1.09	3.04	0.60
189.00	14.81	0.00	0.00	1.09	3.04	0.59
190.00	14.81	0.00	0.00	1.09	3.04	0.59
191.00	14.81	0.00	0.00	1.09	3.04	0.59
192.00	14.81	0.00	0.00	1.09	3.04	0.58
193.00	14.81	0.00	0.00	1.09	3.04	0.58
194.00	14.81	0.00	0.00	1.09	3.04	0.58
195.00	14.81	0.00	0.00	1.09	3.04	0.57
196.00	14.81	0.00	0.00	1.09	3.04	0.57
197.00	14.81	0.00	0.00	1.09	3.04	0.57
198.00	14.81	0.00	0.00	1.09	3.04	0.56
199.00	14.81	0.00	0.00	1.09	3.04	0.56
200.00	14.81	0.00	0.00	1.09	3.04	0.56
201.00	14.81	0.00	0.00	1.09	3.04	0.55
202.00	14.81	0.00	0.00	1.09	3.04	0.55
203.00	14.81	0.00	0.00	1.09	3.04	0.55
204.00	14.81	0.00	0.00	1.09	3.04	0.54
205.00	14.81	0.00	0.00	1.09	3.04	0.54
206.00	14.81	0.00	0.00	1.09	3.04	0.53
207.00	14.81	0.00	0.00	1.09	3.04	0.53
208.00	14.81	0.00	0.00	1.09	3.04	0.53

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
209.00	14.81	0.00	0.00	1.09	3.04	0.52
210.00	14.81	0.00	0.00	1.09	3.04	0.52
211.00	14.81	0.00	0.00	1.09	3.04	0.52
212.00	14.81	0.00	0.00	1.09	3.04	0.51
213.00	14.81	0.00	0.00	1.09	3.04	0.51
214.00	14.81	0.00	0.00	1.09	3.04	0.51
215.00	14.81	0.00	0.00	1.09	3.04	0.50
216.00	14.81	0.00	0.00	1.09	3.04	0.50
217.00	14.81	0.00	0.00	1.09	3.04	0.50
218.00	14.81	0.00	0.00	1.09	3.04	0.49
219.00	14.81	0.00	0.00	1.09	3.04	0.49
220.00	14.81	0.00	0.00	1.09	3.04	0.49
221.00	14.81	0.00	0.00	1.09	3.04	0.48
222.00	14.81	0.00	0.00	1.09	3.04	0.48
223.00	14.81	0.00	0.00	1.09	3.04	0.48
224.00	14.81	0.00	0.00	1.09	3.04	0.47
225.00	14.81	0.00	0.00	1.09	3.04	0.47
226.00	14.81	0.00	0.00	1.09	3.04	0.47
227.00	14.81	0.00	0.00	1.09	3.04	0.46
228.00	14.81	0.00	0.00	1.09	3.04	0.46
229.00	14.81	0.00	0.00	1.09	3.04	0.45
230.00	14.81	0.00	0.00	1.09	3.04	0.45
231.00	14.81	0.00	0.00	1.09	3.04	0.45
232.00	14.81	0.00	0.00	1.09	3.04	0.44
233.00	14.81	0.00	0.00	1.09	3.04	0.44
234.00	14.81	0.00	0.00	1.09	3.04	0.44
235.00	14.81	0.00	0.00	1.09	3.04	0.43
236.00	14.81	0.00	0.00	1.09	3.04	0.43
237.00	14.81	0.00	0.00	1.09	3.04	0.43
238.00	14.81	0.00	0.00	1.09	3.04	0.42
239.00	14.81	0.00	0.00	1.09	3.04	0.42
240.00	14.81	0.00	0.00	1.09	3.04	0.42
241.00	14.81	0.00	0.00	1.09	3.04	0.41
242.00	14.81	0.00	0.00	1.09	3.04	0.41
243.00	14.81	0.00	0.00	1.09	3.04	0.41
244.00	14.81	0.00	0.00	1.09	3.04	0.40
245.00	14.81	0.00	0.00	1.09	3.04	0.40
246.00	14.81	0.00	0.00	1.09	3.04	0.40
247.00	14.81	0.00	0.00	1.09	3.04	0.39
248.00	14.81	0.00	0.00	1.09	3.04	0.39
249.00	14.81	0.00	0.00	1.09	3.04	0.39
250.00	14.81	0.00	0.00	1.09	3.04	0.38
251.00	14.81	0.00	0.00	1.09	3.04	0.38
252.00	14.81	0.00	0.00	1.09	3.04	0.38
253.00	14.81	0.00	0.00	1.09	3.04	0.37
254.00	14.81	0.00	0.00	1.09	3.04	0.37
255.00	14.81	0.00	0.00	1.09	3.04	0.36
256.00	14.81	0.00	0.00	1.09	3.04	0.36
257.00	14.81	0.00	0.00	1.09	3.04	0.36
258.00	14.81	0.00	0.00	1.09	3.04	0.35
259.00	14.81	0.00	0.00	1.09	3.04	0.35
260.00	14.81	0.00	0.00	1.09	3.04	0.35
261.00	14.81	0.00	0.00	1.09	3.04	0.34
262.00	14.81	0.00	0.00	1.09	3.04	0.34
263.00	14.81	0.00	0.00	1.09	3.04	0.34
264.00	14.81	0.00	0.00	1.09	3.04	0.33
265.00	14.81	0.00	0.00	1.09	3.04	0.33
266.00	14.81	0.00	0.00	1.09	3.04	0.33
267.00	14.81	0.00	0.00	1.09	3.04	0.32
268.00	14.81	0.00	0.00	1.09	3.04	0.32
269.00	14.81	0.00	0.00	1.09	3.04	0.32
270.00	14.81	0.00	0.00	1.09	3.04	0.31
271.00	14.81	0.00	0.00	1.09	3.04	0.31
272.00	14.81	0.00	0.00	1.09	3.04	0.31
273.00	14.81	0.00	0.00	1.09	3.04	0.30
274.00	14.81	0.00	0.00	1.09	3.04	0.30

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
275.00	14.81	0.00	0.00	1.09	3.04	0.30
276.00	14.81	0.00	0.00	1.09	3.04	0.29
277.00	14.81	0.00	0.00	1.09	3.04	0.29
278.00	14.81	0.00	0.00	1.09	3.04	0.28
279.00	14.81	0.00	0.00	1.09	3.04	0.28
280.00	14.81	0.00	0.00	1.09	3.04	0.28
281.00	14.81	0.00	0.00	1.09	3.04	0.27
282.00	14.81	0.00	0.00	1.09	3.04	0.27
283.00	14.81	0.00	0.00	1.09	3.04	0.27
284.00	14.81	0.00	0.00	1.09	3.04	0.26
285.00	14.81	0.00	0.00	1.09	3.04	0.26
286.00	14.81	0.00	0.00	1.09	3.04	0.26
287.00	14.81	0.00	0.00	1.09	3.04	0.25
288.00	14.81	0.00	0.00	1.09	3.04	0.25
289.00	14.81	0.00	0.00	1.09	3.04	0.25
290.00	14.81	0.00	0.00	1.09	3.04	0.24
291.00	14.81	0.00	0.00	1.09	3.04	0.24
292.00	14.81	0.00	0.00	1.09	3.04	0.24
293.00	14.81	0.00	0.00	1.09	3.04	0.23
294.00	14.81	0.00	0.00	1.09	3.04	0.23
295.00	14.81	0.00	0.00	1.09	3.04	0.23
296.00	14.81	0.00	0.00	1.09	3.04	0.22
297.00	14.81	0.00	0.00	1.09	3.04	0.22
298.00	14.81	0.00	0.00	1.09	3.04	0.22
299.00	14.81	0.00	0.00	1.09	3.04	0.21
300.00	14.81	0.00	0.00	1.09	3.04	0.21
301.00	14.81	0.00	0.00	1.09	3.04	0.20
302.00	14.81	0.00	0.00	1.09	3.04	0.20
303.00	14.81	0.00	0.00	1.09	3.04	0.20
304.00	14.81	0.00	0.00	1.09	3.04	0.19
305.00	14.81	0.00	0.00	1.09	3.04	0.19
306.00	14.81	0.00	0.00	1.09	3.04	0.19
307.00	14.81	0.00	0.00	1.09	3.04	0.18
308.00	14.81	0.00	0.00	1.09	3.04	0.18
309.00	14.81	0.00	0.00	1.09	3.04	0.18
310.00	14.81	0.00	0.00	1.09	3.04	0.17
311.00	14.81	0.00	0.00	1.09	3.04	0.17
312.00	14.81	0.00	0.00	1.09	3.04	0.17
313.00	14.81	0.00	0.00	1.09	3.04	0.16
314.00	14.81	0.00	0.00	1.09	3.04	0.16
315.00	14.81	0.00	0.00	1.09	3.04	0.16
316.00	14.81	0.00	0.00	1.09	3.04	0.15
317.00	14.81	0.00	0.00	1.09	3.04	0.15
318.00	14.81	0.00	0.00	1.09	3.04	0.15
319.00	14.81	0.00	0.00	1.09	3.04	0.14
320.00	14.81	0.00	0.00	1.09	3.04	0.14
321.00	14.81	0.00	0.00	1.09	3.04	0.14
322.00	14.81	0.00	0.00	1.09	3.04	0.13
323.00	14.81	0.00	0.00	1.09	3.04	0.13
324.00	14.81	0.00	0.00	1.09	3.04	0.12
325.00	14.81	0.00	0.00	1.09	3.04	0.12
326.00	14.81	0.00	0.00	1.09	3.04	0.12
327.00	14.81	0.00	0.00	1.09	3.04	0.11
328.00	14.81	0.00	0.00	1.09	3.04	0.11
329.00	14.81	0.00	0.00	1.09	3.04	0.11
330.00	14.81	0.00	0.00	1.09	3.04	0.10
331.00	14.81	0.00	0.00	1.09	3.04	0.10
332.00	14.81	0.00	0.00	1.09	3.04	0.10
333.00	14.81	0.00	0.00	1.09	3.04	0.09
334.00	14.81	0.00	0.00	1.09	3.04	0.09
335.00	14.81	0.00	0.00	1.09	3.04	0.09
336.00	14.81	0.00	0.00	1.09	3.04	0.08
337.00	14.81	0.00	0.00	1.09	3.04	0.08
338.00	14.81	0.00	0.00	1.09	3.04	0.08
339.00	14.81	0.00	0.00	1.09	3.04	0.07
340.00	14.81	0.00	0.00	1.09	3.04	0.07

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
341.00	14.81	0.00	0.00	1.09	3.04	0.07
342.00	14.81	0.00	0.00	1.09	3.04	0.06
343.00	14.81	0.00	0.00	1.09	3.04	0.06
344.00	14.81	0.00	0.00	1.09	3.04	0.06
345.00	14.81	0.00	0.00	1.09	3.04	0.05
346.00	14.81	0.00	0.00	1.09	3.04	0.05
347.00	14.81	0.00	0.00	1.09	3.04	0.05
348.00	14.81	0.00	0.00	1.09	3.04	0.04
349.00	14.81	0.00	0.00	1.09	3.04	0.04
350.00	14.81	0.00	0.00	1.09	3.04	0.03
351.00	14.81	0.00	0.00	1.09	3.04	0.03
352.00	14.81	0.00	0.00	1.09	3.04	0.03
353.00	14.81	0.00	0.00	1.09	3.04	0.02
354.00	14.81	0.00	0.00	1.09	3.04	0.02
355.00	14.81	0.00	0.00	1.09	3.04	0.02
356.00	14.81	0.00	0.00	1.09	3.04	0.01
357.00	14.81	0.00	0.00	1.09	3.04	0.01
358.00	14.81	0.00	0.00	1.09	3.04	0.01
359.00	14.81	0.00	0.00	1.09	3.04	0.00
360.00	14.81	0.00	0.00	1.09	3.04	0.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	3.52	60.20	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Yellow	3.72	60.20	0.38	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Yellow	1.19	0.00	1.09	0.00	0.10	0.00

Flood Routing Results for Basin

25 Year 3 Day Storm Routing

Peak Stage	3.63	NAVD	
Peak Discharge (CFS)	2.69	CFS	No orifice and weir
Allowable discharge	8.00	CFS	Minimum is acceptable
Calculated Minimum Perimeter Berm Elevation	4.00	NAVD	Sea wall at 4.19 NAVD - OK

100 Year 3 Day Storm Routing

Peak Stage	3.72	NAVD	Sea wall at 4.19 NAVD - OK
Peak Discharge (CFS)	3.63	CFS	
Minimum Finished Floor Elevation	6.00	NAVD	Existing Ship Store

2.67

3.52

Flood Plain Calculations

Pre-Development Stage-Storage

Elevation (NAVD)	Area submerged (AC)	Incremental Volume (AC-FT)	Cummulative Volume (AC-FT)	
0.38	0.00	0.00	0.00	
1.1	0.00	0.00	0.00	
2.1	0.00	0.00	0.00	
3.1	0.00	0.00	0.00	
3.3	0.00	0.00	0.00	
3.5	0.54	0.05	0.05	
4.1	1.20	0.52	0.58	
4.5	1.30	0.50	1.08	
5.0	1.30	0.65	1.73	
5.5	1.30	0.65	2.38	
6.0	1.30	0.65	3.03	

0.58 AC-FT @ 4.1 NAVD

Pre-Development Site Run-off

Soil Storage

Average Pre-Development Area Elevation	3.5	NAVD
Wet Season Water Elevation	1	NAVD
Depth	2.5	FEET
Total Basin Area	1.34	AC

Weighted Depth to water table: 2.50 FEET
Soil Storage for undeveloped pervious areas 4.01 INCHES

SFWMD: Basis for Review, Volume IV

Soil Storage for undeveloped pervious areas 0.1 AC-FT

S = Soil Storage/ Site Area 0.92 INCHES
P = 100 Year / 3 Day Rainfall 15 INCHES

Q = Run-off for undeveloped site $\frac{(P - (2 \cdot S))^2}{(P - (8 \cdot S))}$ 15.39 INCHES

Run-off for Volume for undeveloped site 1.72 AC-FT

Pre-Development Site Storage

100 Year Peak Stage 4.1 NAVD

Volume from Pre-Development Stage-Storage 0.58 AC-FT

Importer/Exporter

Storage minus Runoff 1.14 AC-FT Exporter (if positive)

Post-Development Stage-Storage

Elevation (NAVD)	Incremental Volume (AC-FT)	Cummulative Volume (AC-FT)
0.38	0.00	0.00
1.1	0.01	0.01
2.1	0.06	0.06
3.1	0.10	0.16
3.3	0.10	0.26
3.5	0.05	0.31
4.1	0.52	0.83
4.5	0.51	1.34
5.0	0.67	2.01
5.5	0.67	2.68
6.0	0.67	3.35

Post-Development Site Run-off (from Cascade Routings)

Soil Storage

Average Post-Development Area Elevation	3.8	NAVD
Wet Season Water Elevation	1	NAVD
Depth	2.8	FEET
Total Basin Area	1.34	AC

Run-off Volume for Developed site 1.19 AC-FT Cumulative Discharge from 100 year Flood Routing

Post-Development Site Storage (from Cascade Routings)

100 Year Peak Stage 4.10 NAVD

Volume from Post-Development Stage-Storage 0.83 AC-FT

Importer/Exporter

Runoff minus Available Storage 0.36 AC-FT Exporter (if positive)

*This development will result in a net decrease in exported 100 year run-off discharge (1.72 AC-FT pre and 1.19 AC-FT post) of 0.53 AC-FT

Rose Marina - Yellow Basin

Total Treatment Summary

Pre-Development Loading			
Total TN Loading=	22.7	kg TN/yr	
Total TP Loading=	3.3	kg TP/yr	
Post Development Loading (After Dry Retention)			
Total TN Loading=	3.1	kg TN/yr	
Total TP Loading=	0.5	kg TP/yr	
Net Nutrient Reduction From Pre-Developed Condition			% Change
Annual TN Reduction=	19.6	kg TN/yr	86%
Annual TP Reduction=	2.8	kg TP/yr	85%
Summary:			
The addition of dry retention treatment results in a significant decrease of Nitrogen and Phosphorus, as a result of the proposed marina redevelopment.			

PRE-DEVELOPMENT CONDITIONS

1. Land Use

1.34 acres	Existing Marina
0.00 acres	Other
1.34 acres	TOTAL

* Off-site basin area = 0.00 acres. No loading change anticipated for off-site basin area

2. Ground Cover Soil Types

(HSG) A Urban land-Aquents complex, organic substratum

3. Impervious Areas:

77% Impervious

77% Directly Connected Impervious Area

4. Estimation of Pre-Development Loadings:

A. Pre-Development Runoff Loading

95	CN for	Marina
95	CN for	Other

$$\text{CN}(\text{weighted}) = \frac{(\text{CN1} * \text{Area1}) + (\text{CN2} * \text{Area2})}{(\text{Area1} + \text{Area2})} = 95$$

From Appendix C, Zone 4, the annual runoff coefficient for:

DCIA = 95%, CN = 95 = 0.803

Annual Runoff Volume (Area x Rainfall x Runoff C):

Area	1.34 acres
Rainfall	52.5 in/yr from Appendix A-3, Harper 2007
Runoff Coefficient	0.803
Total Runoff Volume=	4.7 ac-ft/yr

B. Total Nitrogen:

	mg/l from historical water quality data for
Total N Concentration=	2.40 nearby monitoring sites
Annual TN Loading =	13.9 kg TN/yr

TN =	13.9	kg TN/yr
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C. Total Phosphorus:

	mg/l from historical water quality data for
Total P Concentration=	0.35 nearby monitoring sites
Annual TP Loading =	2.0 kg TP/yr

TP =	2.0	kg TP/yr
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POST-DEVELOPMENT CONDITIONS

1. Land Use for

1.34	acres	Marina
1.34		SUBTOTAL
0.31	acres	Landscaped areas
1.65		TOTAL (Excludes Preserve Wetland)

2. Ground Cover Soil Types

(HSG) A Urban land-Aquents complex, organic substratum

3. Impervious Areas:

Total Impervious:	2.1 Acres	=	124.2%
Directly Connected Impervious Area:	0.0 Acres	=	0.0%

4. Non-DCIA Curve Number:

Curve Number for Pervious Areas, Lnadscape, (HSG) A =	61	Table 4-22 Harper 2007
Pervious Area =	-0.4	Acres
Curve Number for Impervious Areas =	91	General Assumption
Impervious Area which is not DCIA =	2.1	Acres

Non-DCIA Curve Number = 98.3

5. Annual Runoff Volume:

From Appendix C, Zone 4, the annual runoff coefficient for:

$$\text{DCIA} = .\%, \text{CN} = 98.3 \quad = \quad 0.299$$

Annual Runoff Volume (Area x Rainfall x Runoff C):

Area	1.34 acres
Rainfall	52.5 in/yr from Appendix A-3, Harper 2007
Runoff Coefficient	0.299
Total Runoff Volume=	1.75 ac-ft/yr

6. Post-Development Loading:

A. Total Nitrogen:

Total N Concentration = 2.400 mg/l from Table 4-17
High intensity commercial

Annual TN Loading = 5.2 kg TN/yr

B. Total Phosphorus:

Total P Concentration = 0.345 mg/l from Table 4-17
High intensity commercial

Annual TP Loading = 0.7 kg TP/yr

DRY RETENTION REMOVAL CHARACTERISTICS

Dry Retention Volume

DCIA Percentage = 0.0%

All stormwater is run through retention system

Non - DCIA CN = 100.0%

Appendix D (Zone 4) Finds that 55.7% efficiency is achieved at 0.75 inches.

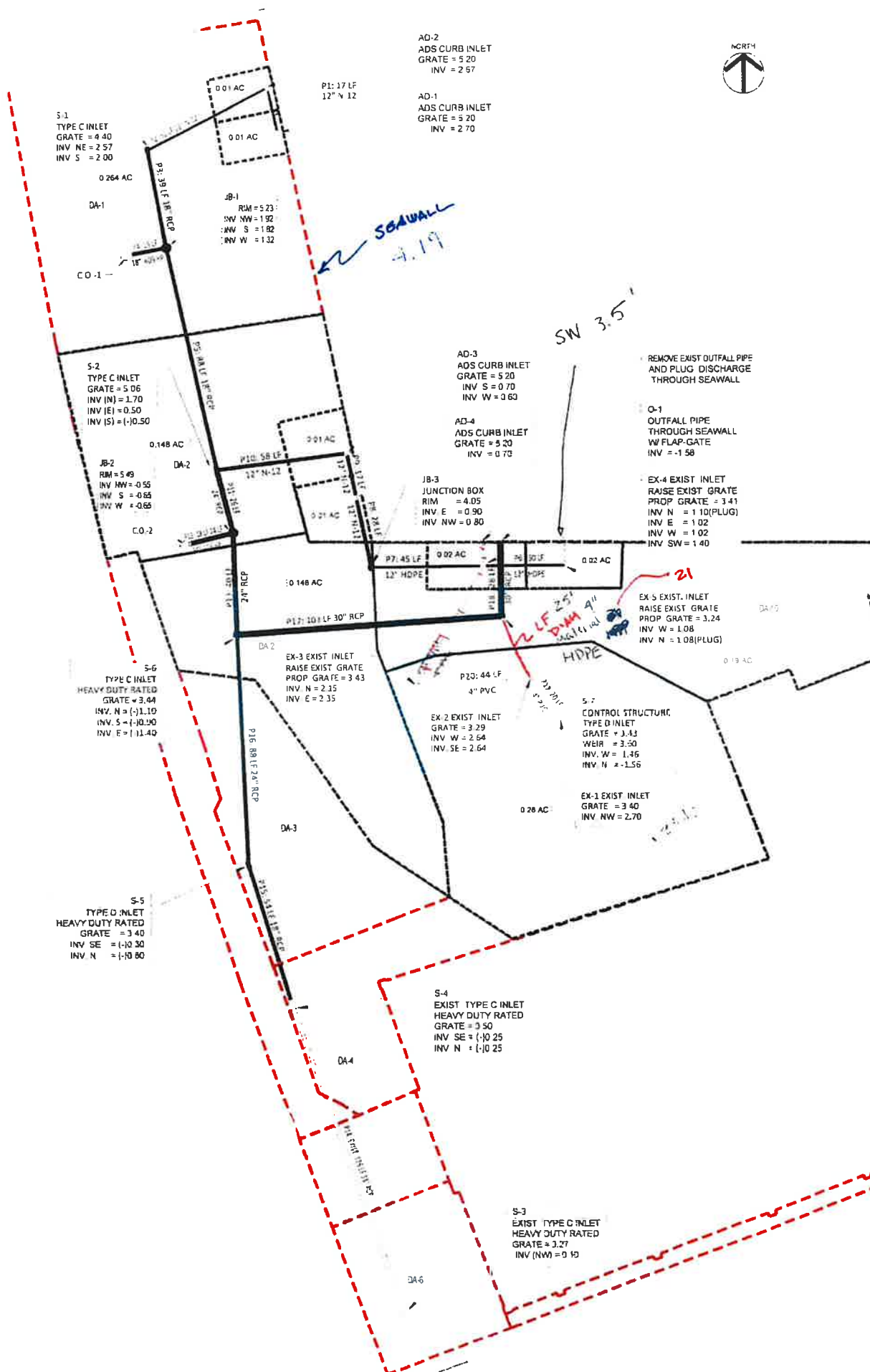
Dry retention removal

7.0 kg TN/yr with 55.7% removal yields a loading rate of 3.1 TN/yr

1.1 kg TP/yr with 55.7% removal yields a loading rate of 0.5 TN/yr

YELLOW BASIN PIPE CALCULATIONS

West Side Run	PIPE			DRAINAGE BASIN					PIPE CONDITIONS					FLOW HYDRAULICS					HYDRAULIC GRADIENT						
	Units	Formula	Site Conditions	Pipe	From	To	FROM STR. Acres	I (Rainfall) In/hr	C (Runoff Coefficient) Unitless	Q (Increment CFS) Q=CIA	LENGTH ft	DIA in	TYPE	n Unitless	P ft	A sq ft	Rh Unitless Rh=AP	Q (cum.) CFS Sum Q	V (Q/A) FTS Sum Q/A	FRICTION LOSS FT	ENTREXIT LOSS FT	TOTAL HEAD FT	DOWNSTREAM ELEVATION	UPSTREAM ELEVATION	UPSTREAM INLET
																	</								



**Water Management Calculations for Rose Marina Aqua Basin
Build Out Water Management System**

LAND USE SUMMARY

BASIN AREA BREAKDOWN

	IMPERVIOUS AC	%IMPERVIOUS	PERVIOUS AC	%PERVIOUS	BASIN TOTAL AREA (AC)
PAVEMENT	1.69	100%	0.00	0%	
BUILDING (ROOF)	0.00	100%	0.00	0%	
LANDSCAPE / OPEN SPACE	0.00	0%	1.13	100%	
DRY DETENTION	0.00	0%	0.29	100%	
TOTAL:	1.69	54%	1.42	46%	3.11
DESIGN PARAMETERS					
AVERAGE EXISTING GROUND ELEVATION	4.0	NAVD			
CONTROL ELEVATION	1.0	NAVD			
3 DAY RAINFALL (100 YR.)	16.0	IN.			
1 DAY RAINFALL (5 YR.)	5.7	IN.			
3 DAY RAINFALL (25 YR.)	12.75	IN.	Existing Q = CiA	C	0.70
Q(Proposed<Existing)	18.6	CFS		i	8.5 IN/HR
SOIL COMPACTION FACTOR	25%			A	3.11 AC
BASIN AREA	3.11	AC		Q	18.6 CFS
PEAK ALLOWABLE DISCHARGE	18.6	CFS			

WATER QUALITY STORAGE VOLUME

1. First inch of Runoff Criteria

Water Quality Vol. = Project Area * 1 in. * (1 ft/12 in.)		
Basin Area	3.11	AC
Water Quality Vol.:	0.26	AC-FT

2. 2.5% Impervious Criteria

Water Quality Vol. = 2.5" * (1 ft/12 in.) * (basin area - Lakes - Roof)		
Basin Lakes	0.00	AC
Roof	0.00	AC
Basin Treatment Area	3.11	AC
Impervious Area	1.69	AC
% Impervious	0.54	%
2.5" x % Impervious	1.36	INCHES
Water Quality Vol.:	0.35	AC-FT

Required Larger Water Quality Volume (Ac*Ft): 0.35 AC-FT **15337 CF**

Dry Detention Calculations

Area available for treatment	0.29	AC	
Depth available for treatment	2.2	FT	Between elevation 2.0 and 4.2
Stage storage for 0.35 Ac-FT	3.30	NAVD	

Bleed Down Daily Discharge:

Criteria: 1/2" per day = [(0.5 in / 24 hrs.) * (1 ft/12 in.) * (43560 SF/acre)] * (1 hr/3600 s) * (Project Area - Lake)

Basin Area - Lake	3.11	AC
Q(bleed down) =	0.07	CFS

Soil Storage

Average Developed Area Elevation	5	NAVD
Control Elevation	2.8	NAVD
Depth	2.25	FEET
Depth to water table:	2.25	FEET
Soil Storage for pervious areas = Sd =	3	INCHES

From SFWMD; Basis for Review, Volume IV

S=Site Wide Soil Storage = Sd * %Pervious Area

S= 1.37 INCHES

Time of Concentration - Longest path run of grassed swale, pavement, pipe and lake

	Build out Basin	
	Distance	MIN.
Distance over land @ 1 ft/s	482	8.03
Distance in pipe @ 2 ft/s	159	1.33
Distance to outfall @ 2 ft/s	95	0.79
TIME OF CONCENTRATION:		10.15

* Minimum Time of Concentration = 10 min.

Tallwater for 25 year design storm from tidal high water records

TIME	STAGE (NAVD)
0	2.75
72	3.25
360	2.75

Bleed down weir design

Water Quality Volume	0.35	AC-FT	Min orifice diam	3.0	INCHES
Corresponding elevation	4.10	NAVD	Orifice Area (A)	0.05	SQ FT
			Height (h)	2.98	FT
Orifice flow	Q = 4.81 A h ⁵	0.41	CFS		

Main weir design

Allowable discharge	18.63	CFS	Weir width	10.4	FT
Weir Elevation	4.10	NAVD	water over wier	0.50	FT
Main weir flow	Q = 3.13L h ^{1.5}	11.51	CFS		

AREA SUBMERGED

		0.29 AC		1.69 AC		1.13 AC		3.11 AC				
		DRY DETENTION		PAVEMENT		GRASS		TOTAL		VOLUME (AC*FT)		
STAGE (NAVD)		%	AC	%	AC	%	AC	%	AC	INCR.	CUMM.	
2.0		0%	0.00	0%	0.00	0%	0.00	0%	0.00	0.00	0.00	WATER QUALITY ELEVATION
2.5		30%	0.09	0%	0.00	0%	0.00	3%	0.09	0.02	0.02	
3.0		50%	0.15	0%	0.00	0%	0.00	5%	0.15	0.06	0.08	0.35 AC-FT @ 3.90 NAVD
3.5		60%	0.17	5%	0.08	5%	0.06	10%	0.32	0.12	0.19	
4.0		70%	0.20	10%	0.17	10%	0.11	16%	0.49	0.20	0.39	
4.3		75%	0.22	20%	0.34	20%	0.23	25%	0.78	0.19	0.58	
4.5		80%	0.23	30%	0.51	30%	0.34	35%	1.08	0.19	0.77	
4.6		85%	0.25	40%	0.68	40%	0.45	44%	1.37	0.12	0.89	
4.7		90%	0.26	50%	0.85	50%	0.57	54%	1.67	0.15	1.05	
4.8		95%	0.28	60%	1.01	60%	0.68	63%	1.97	0.18	1.23	
5.0		100%	0.29	75%	1.27	75%	0.85	77%	2.41	0.44	1.66	
5.2		100%	0.29	90%	1.52	90%	1.02	91%	2.83	0.52	2.19	
5.3		100%	0.29	100%	1.69	100%	1.13	100%	3.11	0.30	2.48	

Project Name: Rose Marina - Aqua Basin 25 Year

Reviewer: CDH

Project Number: 2014-077

Period Begin: Jan 01, 2000;0000 hr End: Jan 15, 2000;0000 hr Duration: 360 hr

Time Step: 0.2 hr, Iterations: 10

Basin 1: Aqua

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 3day

Design Frequency: 25 year

1 Day Rainfall: 8.5 inches

Area: 3.11 acres

Ground Storage: 1.37 inches

Time of Concentration: 0.17 hours

Initial Stage: 2 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
2.00	0.00
2.50	0.02
3.00	0.08
3.50	0.19
4.00	0.39
4.30	0.58
4.50	0.77
4.60	0.89
4.70	1.05
4.80	1.23
5.00	1.66
5.20	2.19
5.30	2.48

Offsite Receiving Body: Offsitel

Time (hr)	Stage (ft NGVD)
0.00	2.75
72.00	3.25
360.00	2.75

Structure: 1

From Basin: Aqua

To Basin: Offsitel

Structure Type: Gravity

Weir: Sharp Crested, Crest Elev = 4.1 ft NGVD, Length = 10.4 ft

Bleeder: Circular, Invert Elev = 3.9 ft NGVD, Diameter = 0.25 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 2 ft, Manning's n = 0.012, Length = 48 ft

US Invert Elev = -1 ft NGVD, DS Invert Elev = 0.1 ft NGVD, flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	2.00	2.75
1.00	0.05	0.00	0.00	0.00	2.00	2.76
2.00	0.10	0.00	0.00	0.00	2.00	2.76
3.00	0.16	0.00	0.00	0.00	2.00	2.77
4.00	0.21	0.00	0.00	0.00	2.00	2.78
5.00	0.26	0.00	0.00	0.00	2.00	2.78
6.00	0.31	0.01	0.00	0.00	2.00	2.79
7.00	0.36	0.02	0.00	0.00	2.03	2.80
8.00	0.41	0.03	0.00	0.00	2.07	2.81
9.00	0.47	0.04	0.00	0.00	2.14	2.81

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
10.00	0.52	0.04	0.00	0.00	2.22	2.82
11.00	0.57	0.05	0.00	0.00	2.32	2.83
12.00	0.62	0.06	0.00	0.00	2.43	2.83
13.00	0.67	0.06	0.00	0.00	2.52	2.84
14.00	0.72	0.07	0.00	0.00	2.56	2.85
15.00	0.78	0.07	0.00	0.00	2.61	2.85
16.00	0.83	0.08	0.00	0.00	2.67	2.86
17.00	0.88	0.08	0.00	0.00	2.72	2.87
18.00	0.93	0.09	0.00	0.00	2.78	2.88
19.00	0.98	0.09	0.00	0.00	2.84	2.88
20.00	1.03	0.09	0.00	0.00	2.91	2.89
21.00	1.09	0.10	0.00	0.00	2.97	2.90
22.00	1.14	0.10	0.00	0.00	3.02	2.90
23.00	1.19	0.10	0.00	0.00	3.06	2.91
24.00	1.24	0.11	0.00	0.00	3.10	2.92
25.00	1.32	0.16	0.00	0.00	3.16	2.92
26.00	1.39	0.16	0.00	0.00	3.22	2.93
27.00	1.47	0.17	0.00	0.00	3.28	2.94
28.00	1.54	0.17	0.00	0.00	3.34	2.94
29.00	1.62	0.18	0.00	0.00	3.41	2.95
30.00	1.69	0.18	0.00	0.00	3.47	2.96
31.00	1.77	0.18	0.00	0.00	3.52	2.97
32.00	1.84	0.18	0.00	0.00	3.56	2.97
33.00	1.92	0.19	0.00	0.00	3.60	2.98
34.00	2.00	0.19	0.00	0.00	3.64	2.99
35.00	2.07	0.19	0.00	0.00	3.68	2.99
36.00	2.15	0.19	0.00	0.00	3.72	3.00
37.00	2.22	0.20	0.00	0.00	3.76	3.01
38.00	2.30	0.20	0.00	0.00	3.80	3.01
39.00	2.37	0.20	0.00	0.00	3.84	3.02
40.00	2.45	0.20	0.00	0.00	3.88	3.03
41.00	2.52	0.20	0.00	0.00	3.92	3.03
42.00	2.60	0.20	0.01	0.00	3.96	3.04
43.00	2.67	0.21	0.02	0.00	4.00	3.05
44.00	2.75	0.21	0.03	0.00	4.03	3.06
45.00	2.83	0.21	0.04	0.01	4.05	3.06
46.00	2.90	0.21	0.04	0.01	4.07	3.07
47.00	2.98	0.21	0.05	0.01	4.09	3.08
48.00	3.05	0.21	0.10	0.02	4.11	3.08
49.00	3.14	0.24	0.18	0.03	4.12	3.09
50.00	3.22	0.24	0.22	0.05	4.13	3.10
51.00	3.32	0.29	0.26	0.07	4.13	3.10
52.00	3.43	0.34	0.30	0.09	4.14	3.11
53.00	3.58	0.43	0.38	0.12	4.14	3.12
54.00	3.76	0.54	0.48	0.16	4.15	3.12
55.00	3.97	0.64	0.58	0.20	4.16	3.13
56.00	4.22	0.74	0.69	0.25	4.17	3.14
57.00	4.50	0.89	0.82	0.32	4.18	3.15
58.00	4.86	1.10	1.01	0.39	4.19	3.15
59.00	5.34	1.60	1.37	0.49	4.21	3.16
60.00	8.63	16.58	9.69	0.86	4.54	3.17
61.00	9.57	2.14	4.35	1.47	4.36	3.17
62.00	10.00	1.23	1.63	1.67	4.23	3.18
63.00	10.28	0.80	0.96	1.77	4.19	3.19
64.00	10.53	0.79	0.81	1.84	4.18	3.19
65.00	10.68	0.47	0.56	1.89	4.16	3.20
66.00	10.84	0.47	0.49	1.93	4.15	3.21
67.00	10.99	0.47	0.48	1.97	4.15	3.22
68.00	11.14	0.47	0.47	2.01	4.15	3.22
69.00	11.25	0.32	0.37	2.04	4.14	3.23
70.00	11.35	0.32	0.33	2.07	4.14	3.24
71.00	11.45	0.32	0.32	2.10	4.14	3.24
72.00	11.55	0.32	0.32	2.13	4.14	3.25
73.00	11.55	0.00	0.14	2.14	4.12	3.25
74.00	11.55	0.00	0.07	2.15	4.10	3.25
75.00	11.55	0.00	0.06	2.16	4.10	3.24
76.00	11.55	0.00	0.05	2.16	4.09	3.24

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
77.00	11.55	0.00	0.05	2.16	4.08	3.24
78.00	11.55	0.00	0.05	2.17	4.08	3.24
79.00	11.55	0.00	0.04	2.17	4.07	3.24
80.00	11.55	0.00	0.04	2.17	4.06	3.24
81.00	11.55	0.00	0.04	2.18	4.06	3.23
82.00	11.55	0.00	0.04	2.18	4.05	3.23
83.00	11.55	0.00	0.04	2.18	4.05	3.23
84.00	11.55	0.00	0.03	2.19	4.05	3.23
85.00	11.55	0.00	0.03	2.19	4.04	3.23
86.00	11.55	0.00	0.03	2.19	4.04	3.23
87.00	11.55	0.00	0.03	2.19	4.03	3.22
88.00	11.55	0.00	0.03	2.20	4.03	3.22
89.00	11.55	0.00	0.03	2.20	4.03	3.22
90.00	11.55	0.00	0.02	2.20	4.02	3.22
91.00	11.55	0.00	0.02	2.20	4.02	3.22
92.00	11.55	0.00	0.02	2.21	4.02	3.22
93.00	11.55	0.00	0.02	2.21	4.01	3.21
94.00	11.55	0.00	0.02	2.21	4.01	3.21
95.00	11.55	0.00	0.02	2.21	4.01	3.21
96.00	11.55	0.00	0.02	2.21	4.01	3.21
97.00	11.55	0.00	0.02	2.21	4.00	3.21
98.00	11.55	0.00	0.02	2.21	4.00	3.20
99.00	11.55	0.00	0.02	2.22	4.00	3.20
100.00	11.55	0.00	0.02	2.22	4.00	3.20
101.00	11.55	0.00	0.01	2.22	3.99	3.20
102.00	11.55	0.00	0.01	2.22	3.99	3.20
103.00	11.55	0.00	0.01	2.22	3.99	3.20
104.00	11.55	0.00	0.01	2.22	3.98	3.19
105.00	11.55	0.00	0.01	2.22	3.98	3.19
106.00	11.55	0.00	0.01	2.22	3.98	3.19
107.00	11.55	0.00	0.01	2.22	3.98	3.19
108.00	11.55	0.00	0.01	2.23	3.97	3.19
109.00	11.55	0.00	0.01	2.23	3.97	3.19
110.00	11.55	0.00	0.01	2.23	3.97	3.18
111.00	11.55	0.00	0.01	2.23	3.97	3.18
112.00	11.55	0.00	0.01	2.23	3.97	3.18
113.00	11.55	0.00	0.01	2.23	3.97	3.18
114.00	11.55	0.00	0.01	2.23	3.96	3.18
115.00	11.55	0.00	0.01	2.23	3.96	3.18
116.00	11.55	0.00	0.01	2.23	3.96	3.17
117.00	11.55	0.00	0.01	2.23	3.96	3.17
118.00	11.55	0.00	0.01	2.23	3.96	3.17
119.00	11.55	0.00	0.01	2.23	3.96	3.17
120.00	11.55	0.00	0.01	2.23	3.96	3.17
121.00	11.55	0.00	0.01	2.23	3.96	3.16
122.00	11.55	0.00	0.01	2.23	3.95	3.16
123.00	11.55	0.00	0.01	2.23	3.95	3.16
124.00	11.55	0.00	0.00	2.23	3.95	3.16
125.00	11.55	0.00	0.00	2.24	3.95	3.16
126.00	11.55	0.00	0.00	2.24	3.95	3.16
127.00	11.55	0.00	0.00	2.24	3.95	3.15
128.00	11.55	0.00	0.00	2.24	3.95	3.15
129.00	11.55	0.00	0.00	2.24	3.95	3.15
130.00	11.55	0.00	0.00	2.24	3.95	3.15
131.00	11.55	0.00	0.00	2.24	3.95	3.15
132.00	11.55	0.00	0.00	2.24	3.95	3.15
133.00	11.55	0.00	0.00	2.24	3.94	3.14
134.00	11.55	0.00	0.00	2.24	3.94	3.14
135.00	11.55	0.00	0.00	2.24	3.94	3.14
136.00	11.55	0.00	0.00	2.24	3.94	3.14
137.00	11.55	0.00	0.00	2.24	3.94	3.14
138.00	11.55	0.00	0.00	2.24	3.94	3.14
139.00	11.55	0.00	0.00	2.24	3.94	3.13
140.00	11.55	0.00	0.00	2.24	3.94	3.13
141.00	11.55	0.00	0.00	2.24	3.94	3.13
142.00	11.55	0.00	0.00	2.24	3.94	3.13
143.00	11.55	0.00	0.00	2.24	3.94	3.13

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
144.00	11.55	0.00	0.00	2.24	3.94	3.12
145.00	11.55	0.00	0.00	2.24	3.94	3.12
146.00	11.55	0.00	0.00	2.24	3.94	3.12
147.00	11.55	0.00	0.00	2.24	3.94	3.12
148.00	11.55	0.00	0.00	2.24	3.94	3.12
149.00	11.55	0.00	0.00	2.24	3.93	3.12
150.00	11.55	0.00	0.00	2.24	3.93	3.11
151.00	11.55	0.00	0.00	2.24	3.93	3.11
152.00	11.55	0.00	0.00	2.24	3.93	3.11
153.00	11.55	0.00	0.00	2.24	3.93	3.11
154.00	11.55	0.00	0.00	2.24	3.93	3.11
155.00	11.55	0.00	0.00	2.24	3.93	3.11
156.00	11.55	0.00	0.00	2.24	3.93	3.10
157.00	11.55	0.00	0.00	2.24	3.93	3.10
158.00	11.55	0.00	0.00	2.24	3.93	3.10
159.00	11.55	0.00	0.00	2.24	3.93	3.10
160.00	11.55	0.00	0.00	2.24	3.93	3.10
161.00	11.55	0.00	0.00	2.24	3.93	3.10
162.00	11.55	0.00	0.00	2.24	3.93	3.09
163.00	11.55	0.00	0.00	2.24	3.93	3.09
164.00	11.55	0.00	0.00	2.24	3.93	3.09
165.00	11.55	0.00	0.00	2.24	3.93	3.09
166.00	11.55	0.00	0.00	2.24	3.93	3.09
167.00	11.55	0.00	0.00	2.24	3.93	3.09
168.00	11.55	0.00	0.00	2.24	3.93	3.08
169.00	11.55	0.00	0.00	2.24	3.93	3.08
170.00	11.55	0.00	0.00	2.24	3.93	3.08
171.00	11.55	0.00	0.00	2.24	3.93	3.08
172.00	11.55	0.00	0.00	2.24	3.93	3.08
173.00	11.55	0.00	0.00	2.25	3.93	3.07
174.00	11.55	0.00	0.00	2.25	3.93	3.07
175.00	11.55	0.00	0.00	2.25	3.93	3.07
176.00	11.55	0.00	0.00	2.25	3.93	3.07
177.00	11.55	0.00	0.00	2.25	3.93	3.07
178.00	11.55	0.00	0.00	2.25	3.93	3.07
179.00	11.55	0.00	0.00	2.25	3.93	3.06
180.00	11.55	0.00	0.00	2.25	3.92	3.06
181.00	11.55	0.00	0.00	2.25	3.92	3.06
182.00	11.55	0.00	0.00	2.25	3.92	3.06
183.00	11.55	0.00	0.00	2.25	3.92	3.06
184.00	11.55	0.00	0.00	2.25	3.92	3.06
185.00	11.55	0.00	0.00	2.25	3.92	3.05
186.00	11.55	0.00	0.00	2.25	3.92	3.05
187.00	11.55	0.00	0.00	2.25	3.92	3.05
188.00	11.55	0.00	0.00	2.25	3.92	3.05
189.00	11.55	0.00	0.00	2.25	3.92	3.05
190.00	11.55	0.00	0.00	2.25	3.92	3.05
191.00	11.55	0.00	0.00	2.25	3.92	3.04
192.00	11.55	0.00	0.00	2.25	3.92	3.04
193.00	11.55	0.00	0.00	2.25	3.92	3.04
194.00	11.55	0.00	0.00	2.25	3.92	3.04
195.00	11.55	0.00	0.00	2.25	3.92	3.04
196.00	11.55	0.00	0.00	2.25	3.92	3.03
197.00	11.55	0.00	0.00	2.25	3.92	3.03
198.00	11.55	0.00	0.00	2.25	3.92	3.03
199.00	11.55	0.00	0.00	2.25	3.92	3.03
200.00	11.55	0.00	0.00	2.25	3.92	3.03
201.00	11.55	0.00	0.00	2.25	3.92	3.03
202.00	11.55	0.00	0.00	2.25	3.92	3.02
203.00	11.55	0.00	0.00	2.25	3.92	3.02
204.00	11.55	0.00	0.00	2.25	3.92	3.02
205.00	11.55	0.00	0.00	2.25	3.92	3.02
206.00	11.55	0.00	0.00	2.25	3.92	3.02
207.00	11.55	0.00	0.00	2.25	3.92	3.02
208.00	11.55	0.00	0.00	2.25	3.92	3.01
209.00	11.55	0.00	0.00	2.25	3.92	3.01
210.00	11.55	0.00	0.00	2.25	3.92	3.01

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
211.00	11.55	0.00	0.00	2.25	3.92	3.01
212.00	11.55	0.00	0.00	2.25	3.92	3.01
213.00	11.55	0.00	0.00	2.25	3.92	3.01
214.00	11.55	0.00	0.00	2.25	3.92	3.00
215.00	11.55	0.00	0.00	2.25	3.92	3.00
216.00	11.55	0.00	0.00	2.25	3.92	3.00
217.00	11.55	0.00	0.00	2.25	3.92	3.00
218.00	11.55	0.00	0.00	2.25	3.92	3.00
219.00	11.55	0.00	0.00	2.25	3.92	2.99
220.00	11.55	0.00	0.00	2.25	3.92	2.99
221.00	11.55	0.00	0.00	2.25	3.92	2.99
222.00	11.55	0.00	0.00	2.25	3.92	2.99
223.00	11.55	0.00	0.00	2.25	3.92	2.99
224.00	11.55	0.00	0.00	2.25	3.92	2.99
225.00	11.55	0.00	0.00	2.25	3.92	2.98
226.00	11.55	0.00	0.00	2.25	3.92	2.98
227.00	11.55	0.00	0.00	2.25	3.92	2.98
228.00	11.55	0.00	0.00	2.25	3.92	2.98
229.00	11.55	0.00	0.00	2.25	3.92	2.98
230.00	11.55	0.00	0.00	2.25	3.92	2.98
231.00	11.55	0.00	0.00	2.25	3.92	2.97
232.00	11.55	0.00	0.00	2.25	3.92	2.97
233.00	11.55	0.00	0.00	2.25	3.92	2.97
234.00	11.55	0.00	0.00	2.25	3.92	2.97
235.00	11.55	0.00	0.00	2.25	3.92	2.97
236.00	11.55	0.00	0.00	2.25	3.92	2.97
237.00	11.55	0.00	0.00	2.25	3.92	2.96
238.00	11.55	0.00	0.00	2.25	3.92	2.96
239.00	11.55	0.00	0.00	2.25	3.92	2.96
240.00	11.55	0.00	0.00	2.25	3.92	2.96
241.00	11.55	0.00	0.00	2.25	3.92	2.96
242.00	11.55	0.00	0.00	2.25	3.92	2.96
243.00	11.55	0.00	0.00	2.25	3.92	2.96
244.00	11.55	0.00	0.00	2.25	3.92	2.96
245.00	11.55	0.00	0.00	2.25	3.92	2.96
246.00	11.55	0.00	0.00	2.25	3.92	2.96
247.00	11.55	0.00	0.00	2.25	3.92	2.96
248.00	11.55	0.00	0.00	2.25	3.92	2.94
249.00	11.55	0.00	0.00	2.25	3.92	2.94
250.00	11.55	0.00	0.00	2.25	3.91	2.94
251.00	11.55	0.00	0.00	2.25	3.91	2.94
252.00	11.55	0.00	0.00	2.25	3.91	2.94
253.00	11.55	0.00	0.00	2.25	3.91	2.94
254.00	11.55	0.00	0.00	2.25	3.91	2.93
255.00	11.55	0.00	0.00	2.25	3.91	2.93
256.00	11.55	0.00	0.00	2.25	3.91	2.93
257.00	11.55	0.00	0.00	2.25	3.91	2.93
258.00	11.55	0.00	0.00	2.25	3.91	2.93
259.00	11.55	0.00	0.00	2.25	3.91	2.93
260.00	11.55	0.00	0.00	2.25	3.91	2.92
261.00	11.55	0.00	0.00	2.25	3.91	2.92
262.00	11.55	0.00	0.00	2.25	3.91	2.92
263.00	11.55	0.00	0.00	2.25	3.91	2.92
264.00	11.55	0.00	0.00	2.25	3.91	2.92
265.00	11.55	0.00	0.00	2.25	3.91	2.91
266.00	11.55	0.00	0.00	2.25	3.91	2.91
267.00	11.55	0.00	0.00	2.25	3.91	2.91
268.00	11.55	0.00	0.00	2.25	3.91	2.91
269.00	11.55	0.00	0.00	2.25	3.91	2.91
270.00	11.55	0.00	0.00	2.25	3.91	2.91
271.00	11.55	0.00	0.00	2.25	3.91	2.90
272.00	11.55	0.00	0.00	2.25	3.91	2.90
273.00	11.55	0.00	0.00	2.25	3.91	2.90
274.00	11.55	0.00	0.00	2.25	3.91	2.90
275.00	11.55	0.00	0.00	2.25	3.91	2.90
276.00	11.55	0.00	0.00	2.25	3.91	2.90
277.00	11.55	0.00	0.00	2.25	3.91	2.89

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
278.00	11.55	0.00	0.00	2.25	3.91	2.89
279.00	11.55	0.00	0.00	2.25	3.91	2.89
280.00	11.55	0.00	0.00	2.25	3.91	2.89
281.00	11.55	0.00	0.00	2.25	3.91	2.89
282.00	11.55	0.00	0.00	2.25	3.91	2.89
283.00	11.55	0.00	0.00	2.25	3.91	2.88
284.00	11.55	0.00	0.00	2.25	3.91	2.88
285.00	11.55	0.00	0.00	2.25	3.91	2.88
286.00	11.55	0.00	0.00	2.25	3.91	2.88
287.00	11.55	0.00	0.00	2.25	3.91	2.88
288.00	11.55	0.00	0.00	2.25	3.91	2.88
289.00	11.55	0.00	0.00	2.25	3.91	2.87
290.00	11.55	0.00	0.00	2.25	3.91	2.87
291.00	11.55	0.00	0.00	2.25	3.91	2.87
292.00	11.55	0.00	0.00	2.25	3.91	2.87
293.00	11.55	0.00	0.00	2.25	3.91	2.87
294.00	11.55	0.00	0.00	2.25	3.91	2.86
295.00	11.55	0.00	0.00	2.25	3.91	2.86
296.00	11.55	0.00	0.00	2.25	3.91	2.86
297.00	11.55	0.00	0.00	2.25	3.91	2.86
298.00	11.55	0.00	0.00	2.25	3.91	2.86
299.00	11.55	0.00	0.00	2.25	3.91	2.86
300.00	11.55	0.00	0.00	2.25	3.91	2.85
301.00	11.55	0.00	0.00	2.25	3.91	2.85
302.00	11.55	0.00	0.00	2.25	3.91	2.85
303.00	11.55	0.00	0.00	2.25	3.91	2.85
304.00	11.55	0.00	0.00	2.25	3.91	2.85
305.00	11.55	0.00	0.00	2.25	3.91	2.85
306.00	11.55	0.00	0.00	2.25	3.91	2.84
307.00	11.55	0.00	0.00	2.25	3.91	2.84
308.00	11.55	0.00	0.00	2.25	3.91	2.84
309.00	11.55	0.00	0.00	2.25	3.91	2.84
310.00	11.55	0.00	0.00	2.25	3.91	2.84
311.00	11.55	0.00	0.00	2.25	3.91	2.84
312.00	11.55	0.00	0.00	2.25	3.91	2.83
313.00	11.55	0.00	0.00	2.25	3.91	2.83
314.00	11.55	0.00	0.00	2.25	3.91	2.83
315.00	11.55	0.00	0.00	2.25	3.91	2.83
316.00	11.55	0.00	0.00	2.25	3.91	2.83
317.00	11.55	0.00	0.00	2.25	3.91	2.82
318.00	11.55	0.00	0.00	2.25	3.91	2.82
319.00	11.55	0.00	0.00	2.25	3.91	2.82
320.00	11.55	0.00	0.00	2.25	3.91	2.82
321.00	11.55	0.00	0.00	2.25	3.91	2.82
322.00	11.55	0.00	0.00	2.25	3.91	2.82
323.00	11.55	0.00	0.00	2.25	3.91	2.81
324.00	11.55	0.00	0.00	2.25	3.91	2.81
325.00	11.55	0.00	0.00	2.25	3.91	2.81
326.00	11.55	0.00	0.00	2.25	3.91	2.81
327.00	11.55	0.00	0.00	2.25	3.91	2.81
328.00	11.55	0.00	0.00	2.25	3.91	2.81
329.00	11.55	0.00	0.00	2.25	3.91	2.80
330.00	11.55	0.00	0.00	2.25	3.91	2.80
331.00	11.55	0.00	0.00	2.25	3.91	2.80
332.00	11.55	0.00	0.00	2.25	3.91	2.80
333.00	11.55	0.00	0.00	2.25	3.91	2.80
334.00	11.55	0.00	0.00	2.25	3.91	2.80
335.00	11.55	0.00	0.00	2.25	3.91	2.79
336.00	11.55	0.00	0.00	2.25	3.91	2.79
337.00	11.55	0.00	0.00	2.25	3.91	2.79
338.00	11.55	0.00	0.00	2.25	3.91	2.79
339.00	11.55	0.00	0.00	2.25	3.91	2.79
340.00	11.55	0.00	0.00	2.25	3.91	2.78
341.00	11.55	0.00	0.00	2.25	3.91	2.78
342.00	11.55	0.00	0.00	2.25	3.91	2.78
343.00	11.55	0.00	0.00	2.25	3.91	2.78
344.00	11.55	0.00	0.00	2.25	3.91	2.78

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
345.00	11.55	0.00	0.00	2.25	3.91	2.78
346.00	11.55	0.00	0.00	2.25	3.91	2.77
347.00	11.55	0.00	0.00	2.25	3.91	2.77
348.00	11.55	0.00	0.00	2.25	3.91	2.77
349.00	11.55	0.00	0.00	2.25	3.91	2.77
350.00	11.55	0.00	0.00	2.25	3.91	2.77
351.00	11.55	0.00	0.00	2.25	3.91	2.77
352.00	11.55	0.00	0.00	2.25	3.91	2.76
353.00	11.55	0.00	0.00	2.25	3.91	2.76
354.00	11.55	0.00	0.00	2.25	3.91	2.76
355.00	11.55	0.00	0.00	2.25	3.91	2.76
356.00	11.55	0.00	0.00	2.25	3.91	2.76
357.00	11.55	0.00	0.00	2.25	3.91	2.76
358.00	11.55	0.00	0.00	2.25	3.91	2.75
359.00	11.55	0.00	0.00	2.25	3.91	2.75
360.00	11.55	0.00	0.00	2.25	3.91	2.75

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	10.61	60.20	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Aqua	4.57	60.20	2.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Aqua	2.61	0.00	2.25	0.00	0.35	0.00

Project Name: Rose Marina - Aqua Basin 100 Year

Reviewer: CDH

Project Number: 2014-077

Period Begin: Jan 01, 2000;0000 hr End: Jan 15, 2000;0000 hr Duration: 360 hr

Time Step: 0.2 hr, Iterations: 10

Basin 1: Aqua

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 3day

Design Frequency: 100 year

3 Day Rainfall: 16 inches

Area: 3.11 acres

Ground Storage: 1.37 inches

Time of Concentration: 0.17 hours

Initial Stage: 2 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
2.00	0.00
2.50	0.02
3.00	0.08
3.50	0.19
4.00	0.39
4.30	0.58
4.50	0.77
4.60	0.89
4.70	1.05
4.80	1.23
5.00	1.66
5.20	2.19
5.30	2.48

Offsite Receiving Body: Offsitel

Time (hr)	Stage (ft NGVD)
0.00	2.75
72.00	3.25
360.00	2.75

Structure: 1

From Basin: Aqua

To Basin: Offsitel

Structure Type: Gravity

Weir: Sharp Crested, Crest Elev = 4.1 ft NGVD, Length = 10.4 ft

Bleeder: Circular, Invert Elev = 3.9 ft NGVD, Diameter = 0.25 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 2 ft, Manning's n = 0.012, Length = 48 ft

US Invert Elev = -1 ft NGVD, DS Invert Elev = 0.1 ft NGVD, flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	2.00	2.75
1.00	0.07	0.00	0.00	0.00	2.00	2.76
2.00	0.14	0.00	0.00	0.00	2.00	2.76
3.00	0.21	0.00	0.00	0.00	2.00	2.77
4.00	0.29	0.00	0.00	0.00	2.00	2.78
5.00	0.36	0.02	0.00	0.00	2.02	2.78
6.00	0.43	0.04	0.00	0.00	2.09	2.79
7.00	0.50	0.06	0.00	0.00	2.19	2.80
8.00	0.57	0.07	0.00	0.00	2.32	2.81
9.00	0.64	0.08	0.00	0.00	2.48	2.81

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
10.00	0.72	0.09	0.00	0.00	2.55	2.82
11.00	0.79	0.10	0.00	0.00	2.62	2.83
12.00	0.86	0.11	0.00	0.00	2.70	2.83
13.00	0.93	0.12	0.00	0.00	2.78	2.84
14.00	1.00	0.13	0.00	0.00	2.86	2.85
15.00	1.07	0.13	0.00	0.00	2.95	2.85
16.00	1.15	0.14	0.00	0.00	3.03	2.85
17.00	1.22	0.14	0.00	0.00	3.08	2.87
18.00	1.29	0.15	0.00	0.00	3.13	2.88
19.00	1.36	0.15	0.00	0.00	3.19	2.88
20.00	1.43	0.16	0.00	0.00	3.25	2.89
21.00	1.50	0.16	0.00	0.00	3.31	2.90
22.00	1.58	0.16	0.00	0.00	3.37	2.90
23.00	1.65	0.17	0.00	0.00	3.43	2.91
24.00	1.72	0.17	0.00	0.00	3.50	2.92
25.00	1.82	0.25	0.00	0.00	3.55	2.92
26.00	1.93	0.26	0.00	0.00	3.60	2.93
27.00	2.03	0.26	0.00	0.00	3.65	2.94
28.00	2.14	0.27	0.00	0.00	3.71	2.94
29.00	2.24	0.27	0.00	0.00	3.77	2.95
30.00	2.35	0.28	0.00	0.00	3.82	2.96
31.00	2.45	0.28	0.00	0.00	3.88	2.97
32.00	2.55	0.28	0.00	0.00	3.94	2.97
33.00	2.66	0.28	0.01	0.00	3.99	2.98
34.00	2.76	0.29	0.03	0.00	4.03	2.99
35.00	2.87	0.29	0.04	0.01	4.06	2.99
36.00	2.97	0.29	0.06	0.01	4.09	3.00
37.00	3.08	0.29	0.16	0.02	4.12	3.01
38.00	3.18	0.29	0.25	0.04	4.13	3.01
39.00	3.29	0.30	0.28	0.06	4.13	3.02
40.00	3.39	0.30	0.29	0.08	4.14	3.03
41.00	3.50	0.30	0.30	0.11	4.14	3.03
42.00	3.60	0.30	0.30	0.13	4.14	3.04
43.00	3.70	0.30	0.30	0.16	4.14	3.05
44.00	3.81	0.30	0.30	0.18	4.14	3.06
45.00	3.91	0.30	0.30	0.21	4.14	3.06
46.00	4.02	0.30	0.30	0.23	4.14	3.07
47.00	4.12	0.30	0.30	0.26	4.14	3.08
48.00	4.23	0.31	0.30	0.28	4.14	3.08
49.00	4.34	0.35	0.33	0.31	4.14	3.09
50.00	4.46	0.35	0.34	0.34	4.14	3.10
51.00	4.60	0.42	0.39	0.37	4.15	3.10
52.00	4.76	0.48	0.44	0.40	4.15	3.11
53.00	4.96	0.63	0.55	0.44	4.16	3.12
54.00	5.20	0.77	0.70	0.50	4.17	3.12
55.00	5.50	0.91	0.84	0.56	4.18	3.13
56.00	5.84	1.06	0.99	0.64	4.19	3.14
57.00	6.24	1.27	1.18	0.73	4.20	3.15
58.00	6.73	1.56	1.46	0.84	4.22	3.15
59.00	7.39	2.26	1.97	0.98	4.25	3.16
60.00	11.95	23.23	13.20	1.50	4.64	3.17
61.00	13.26	2.99	6.12	2.35	4.42	3.17
62.00	13.86	1.71	2.31	2.63	4.27	3.18
63.00	14.23	1.11	1.31	2.76	4.21	3.19
64.00	14.59	1.10	1.12	2.86	4.20	3.19
65.00	14.80	0.66	0.76	2.93	4.18	3.20
66.00	15.01	0.66	0.68	2.99	4.17	3.21
67.00	15.22	0.66	0.66	3.05	4.17	3.22
68.00	15.43	0.66	0.66	3.10	4.17	3.22
69.00	15.58	0.44	0.50	3.15	4.15	3.23
70.00	15.72	0.44	0.45	3.19	4.15	3.24
71.00	15.86	0.44	0.44	3.22	4.15	3.24
72.00	16.00	0.44	0.44	3.26	4.15	3.25
73.00	16.00	0.00	0.17	3.28	4.12	3.25
74.00	16.00	0.00	0.08	3.29	4.11	3.25
75.00	16.00	0.00	0.06	3.30	4.10	3.24
76.00	16.00	0.00	0.05	3.30	4.09	3.24

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
77.00	16.00	0.00	0.05	3.31	4.08	3.24
78.00	16.00	0.00	0.05	3.31	4.08	3.24
79.00	16.00	0.00	0.04	3.31	4.07	3.24
80.00	16.00	0.00	0.04	3.32	4.07	3.24
81.00	16.00	0.00	0.04	3.32	4.06	3.23
82.00	16.00	0.00	0.04	3.32	4.06	3.23
83.00	16.00	0.00	0.04	3.33	4.05	3.23
84.00	16.00	0.00	0.03	3.33	4.05	3.23
85.00	16.00	0.00	0.03	3.33	4.04	3.23
86.00	16.00	0.00	0.03	3.33	4.04	3.23
87.00	16.00	0.00	0.03	3.34	4.03	3.22
88.00	16.00	0.00	0.03	3.34	4.03	3.22
89.00	16.00	0.00	0.03	3.34	4.03	3.22
90.00	16.00	0.00	0.02	3.34	4.02	3.22
91.00	16.00	0.00	0.02	3.35	4.02	3.22
92.00	16.00	0.00	0.02	3.35	4.02	3.22
93.00	16.00	0.00	0.02	3.35	4.01	3.21
94.00	16.00	0.00	0.02	3.35	4.01	3.21
95.00	16.00	0.00	0.02	3.35	4.01	3.21
96.00	16.00	0.00	0.02	3.35	4.01	3.21
97.00	16.00	0.00	0.02	3.36	4.00	3.21
98.00	16.00	0.00	0.02	3.36	4.00	3.20
99.00	16.00	0.00	0.02	3.36	4.00	3.20
100.00	16.00	0.00	0.02	3.36	4.00	3.20
101.00	16.00	0.00	0.01	3.36	3.99	3.20
102.00	16.00	0.00	0.01	3.36	3.99	3.20
103.00	16.00	0.00	0.01	3.36	3.99	3.20
104.00	16.00	0.00	0.01	3.36	3.98	3.19
105.00	16.00	0.00	0.01	3.37	3.98	3.19
106.00	16.00	0.00	0.01	3.37	3.98	3.19
107.00	16.00	0.00	0.01	3.37	3.98	3.19
108.00	16.00	0.00	0.01	3.37	3.98	3.19
109.00	16.00	0.00	0.01	3.37	3.97	3.19
110.00	16.00	0.00	0.01	3.37	3.97	3.18
111.00	16.00	0.00	0.01	3.37	3.97	3.18
112.00	16.00	0.00	0.01	3.37	3.97	3.18
113.00	16.00	0.00	0.01	3.37	3.97	3.18
114.00	16.00	0.00	0.01	3.37	3.96	3.18
115.00	16.00	0.00	0.01	3.37	3.96	3.18
116.00	16.00	0.00	0.01	3.37	3.96	3.17
117.00	16.00	0.00	0.01	3.37	3.96	3.17
118.00	16.00	0.00	0.01	3.37	3.96	3.17
119.00	16.00	0.00	0.01	3.38	3.96	3.17
120.00	16.00	0.00	0.01	3.38	3.96	3.17
121.00	16.00	0.00	0.01	3.38	3.96	3.16
122.00	16.00	0.00	0.01	3.38	3.95	3.16
123.00	16.00	0.00	0.01	3.38	3.95	3.16
124.00	16.00	0.00	0.00	3.38	3.95	3.16
125.00	16.00	0.00	0.00	3.38	3.95	3.16
126.00	16.00	0.00	0.00	3.38	3.95	3.16
127.00	16.00	0.00	0.00	3.38	3.95	3.15
128.00	16.00	0.00	0.00	3.38	3.95	3.15
129.00	16.00	0.00	0.00	3.38	3.95	3.15
130.00	16.00	0.00	0.00	3.38	3.95	3.15
131.00	16.00	0.00	0.00	3.38	3.95	3.15
132.00	16.00	0.00	0.00	3.38	3.95	3.15
133.00	16.00	0.00	0.00	3.38	3.94	3.14
134.00	16.00	0.00	0.00	3.38	3.94	3.14
135.00	16.00	0.00	0.00	3.38	3.94	3.14
136.00	16.00	0.00	0.00	3.38	3.94	3.14
137.00	16.00	0.00	0.00	3.38	3.94	3.14
138.00	16.00	0.00	0.00	3.38	3.94	3.14
139.00	16.00	0.00	0.00	3.38	3.94	3.13
140.00	16.00	0.00	0.00	3.38	3.94	3.13
141.00	16.00	0.00	0.00	3.38	3.94	3.13
142.00	16.00	0.00	0.00	3.38	3.94	3.13
143.00	16.00	0.00	0.00	3.38	3.94	3.13

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
144.00	16.00	0.00	0.00	3.38	3.94	3.12
145.00	16.00	0.00	0.00	3.38	3.94	3.12
146.00	16.00	0.00	0.00	3.38	3.94	3.12
147.00	16.00	0.00	0.00	3.38	3.94	3.12
148.00	16.00	0.00	0.00	3.38	3.94	3.12
149.00	16.00	0.00	0.00	3.38	3.94	3.12
150.00	16.00	0.00	0.00	3.38	3.93	3.11
151.00	16.00	0.00	0.00	3.38	3.93	3.11
152.00	16.00	0.00	0.00	3.38	3.93	3.11
153.00	16.00	0.00	0.00	3.39	3.93	3.11
154.00	16.00	0.00	0.00	3.39	3.93	3.11
155.00	16.00	0.00	0.00	3.39	3.93	3.11
156.00	16.00	0.00	0.00	3.39	3.93	3.10
157.00	16.00	0.00	0.00	3.39	3.93	3.10
158.00	16.00	0.00	0.00	3.39	3.93	3.10
159.00	16.00	0.00	0.00	3.39	3.93	3.10
160.00	16.00	0.00	0.00	3.39	3.93	3.10
161.00	16.00	0.00	0.00	3.39	3.93	3.10
162.00	16.00	0.00	0.00	3.39	3.93	3.09
163.00	16.00	0.00	0.00	3.39	3.93	3.09
164.00	16.00	0.00	0.00	3.39	3.93	3.09
165.00	16.00	0.00	0.00	3.39	3.93	3.09
166.00	16.00	0.00	0.00	3.39	3.93	3.09
167.00	16.00	0.00	0.00	3.39	3.93	3.09
168.00	16.00	0.00	0.00	3.39	3.93	3.08
169.00	16.00	0.00	0.00	3.39	3.93	3.08
170.00	16.00	0.00	0.00	3.39	3.93	3.08
171.00	16.00	0.00	0.00	3.39	3.93	3.08
172.00	16.00	0.00	0.00	3.39	3.93	3.08
173.00	16.00	0.00	0.00	3.39	3.93	3.07
174.00	16.00	0.00	0.00	3.39	3.93	3.07
175.00	16.00	0.00	0.00	3.39	3.93	3.07
176.00	16.00	0.00	0.00	3.39	3.93	3.07
177.00	16.00	0.00	0.00	3.39	3.93	3.07
178.00	16.00	0.00	0.00	3.39	3.93	3.07
179.00	16.00	0.00	0.00	3.39	3.93	3.06
180.00	16.00	0.00	0.00	3.39	3.92	3.06
181.00	16.00	0.00	0.00	3.39	3.92	3.06
182.00	16.00	0.00	0.00	3.39	3.92	3.06
183.00	16.00	0.00	0.00	3.39	3.92	3.06
184.00	16.00	0.00	0.00	3.39	3.92	3.06
185.00	16.00	0.00	0.00	3.39	3.92	3.05
186.00	16.00	0.00	0.00	3.39	3.92	3.05
187.00	16.00	0.00	0.00	3.39	3.92	3.05
188.00	16.00	0.00	0.00	3.39	3.92	3.05
189.00	16.00	0.00	0.00	3.39	3.92	3.05
190.00	16.00	0.00	0.00	3.39	3.92	3.05
191.00	16.00	0.00	0.00	3.39	3.92	3.04
192.00	16.00	0.00	0.00	3.39	3.92	3.04
193.00	16.00	0.00	0.00	3.39	3.92	3.04
194.00	16.00	0.00	0.00	3.39	3.92	3.04
195.00	16.00	0.00	0.00	3.39	3.92	3.04
196.00	16.00	0.00	0.00	3.39	3.92	3.03
197.00	16.00	0.00	0.00	3.39	3.92	3.03
198.00	16.00	0.00	0.00	3.39	3.92	3.03
199.00	16.00	0.00	0.00	3.39	3.92	3.03
200.00	16.00	0.00	0.00	3.39	3.92	3.03
201.00	16.00	0.00	0.00	3.39	3.92	3.03
202.00	16.00	0.00	0.00	3.39	3.92	3.02
203.00	16.00	0.00	0.00	3.39	3.92	3.02
204.00	16.00	0.00	0.00	3.39	3.92	3.02
205.00	16.00	0.00	0.00	3.39	3.92	3.02
206.00	16.00	0.00	0.00	3.39	3.92	3.02
207.00	16.00	0.00	0.00	3.39	3.92	3.02
208.00	16.00	0.00	0.00	3.39	3.92	3.01
209.00	16.00	0.00	0.00	3.39	3.92	3.01
210.00	16.00	0.00	0.00	3.39	3.92	3.01

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
211.00	16.00	0.00	0.00	3.39	3.92	3.01
212.00	16.00	0.00	0.00	3.39	3.92	3.01
213.00	16.00	0.00	0.00	3.39	3.92	3.01
214.00	16.00	0.00	0.00	3.39	3.92	3.00
215.00	16.00	0.00	0.00	3.39	3.92	3.00
216.00	16.00	0.00	0.00	3.39	3.92	3.00
217.00	16.00	0.00	0.00	3.39	3.92	3.00
218.00	16.00	0.00	0.00	3.39	3.92	3.00
219.00	16.00	0.00	0.00	3.39	3.92	2.99
220.00	16.00	0.00	0.00	3.39	3.92	2.99
221.00	16.00	0.00	0.00	3.39	3.92	2.99
222.00	16.00	0.00	0.00	3.39	3.92	2.99
223.00	16.00	0.00	0.00	3.39	3.92	2.99
224.00	16.00	0.00	0.00	3.39	3.92	2.99
225.00	16.00	0.00	0.00	3.39	3.92	2.98
226.00	16.00	0.00	0.00	3.39	3.92	2.98
227.00	16.00	0.00	0.00	3.39	3.92	2.98
228.00	16.00	0.00	0.00	3.39	3.92	2.98
229.00	16.00	0.00	0.00	3.39	3.92	2.98
230.00	16.00	0.00	0.00	3.39	3.92	2.98
231.00	16.00	0.00	0.00	3.39	3.92	2.97
232.00	16.00	0.00	0.00	3.39	3.92	2.97
233.00	16.00	0.00	0.00	3.39	3.92	2.97
234.00	16.00	0.00	0.00	3.39	3.92	2.97
235.00	16.00	0.00	0.00	3.39	3.92	2.97
236.00	16.00	0.00	0.00	3.39	3.92	2.97
237.00	16.00	0.00	0.00	3.39	3.92	2.96
238.00	16.00	0.00	0.00	3.39	3.92	2.96
239.00	16.00	0.00	0.00	3.39	3.92	2.96
240.00	16.00	0.00	0.00	3.39	3.92	2.96
241.00	16.00	0.00	0.00	3.39	3.92	2.96
242.00	16.00	0.00	0.00	3.39	3.92	2.95
243.00	16.00	0.00	0.00	3.39	3.92	2.95
244.00	16.00	0.00	0.00	3.39	3.92	2.95
245.00	16.00	0.00	0.00	3.39	3.92	2.95
246.00	16.00	0.00	0.00	3.39	3.92	2.95
247.00	16.00	0.00	0.00	3.39	3.92	2.95
248.00	16.00	0.00	0.00	3.39	3.92	2.94
249.00	16.00	0.00	0.00	3.39	3.92	2.94
250.00	16.00	0.00	0.00	3.39	3.91	2.94
251.00	16.00	0.00	0.00	3.39	3.91	2.94
252.00	16.00	0.00	0.00	3.39	3.91	2.94
253.00	16.00	0.00	0.00	3.39	3.91	2.94
254.00	16.00	0.00	0.00	3.39	3.91	2.93
255.00	16.00	0.00	0.00	3.39	3.91	2.93
256.00	16.00	0.00	0.00	3.39	3.91	2.93
257.00	16.00	0.00	0.00	3.39	3.91	2.93
258.00	16.00	0.00	0.00	3.39	3.91	2.93
259.00	16.00	0.00	0.00	3.39	3.91	2.93
260.00	16.00	0.00	0.00	3.39	3.91	2.92
261.00	16.00	0.00	0.00	3.39	3.91	2.92
262.00	16.00	0.00	0.00	3.39	3.91	2.92
263.00	16.00	0.00	0.00	3.39	3.91	2.92
264.00	16.00	0.00	0.00	3.39	3.91	2.92
265.00	16.00	0.00	0.00	3.39	3.91	2.91
266.00	16.00	0.00	0.00	3.39	3.91	2.91
267.00	16.00	0.00	0.00	3.39	3.91	2.91
268.00	16.00	0.00	0.00	3.39	3.91	2.91
269.00	16.00	0.00	0.00	3.39	3.91	2.91
270.00	16.00	0.00	0.00	3.39	3.91	2.91
271.00	16.00	0.00	0.00	3.39	3.91	2.90
272.00	16.00	0.00	0.00	3.39	3.91	2.90
273.00	16.00	0.00	0.00	3.39	3.91	2.90
274.00	16.00	0.00	0.00	3.39	3.91	2.90
275.00	16.00	0.00	0.00	3.39	3.91	2.90
276.00	16.00	0.00	0.00	3.39	3.91	2.90
277.00	16.00	0.00	0.00	3.39	3.91	2.89

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
278.00	16.00	0.00	0.00	3.39	3.91	2.89
279.00	16.00	0.00	0.00	3.39	3.91	2.89
280.00	16.00	0.00	0.00	3.39	3.91	2.89
281.00	16.00	0.00	0.00	3.39	3.91	2.89
282.00	16.00	0.00	0.00	3.39	3.91	2.89
283.00	16.00	0.00	0.00	3.39	3.91	2.88
284.00	16.00	0.00	0.00	3.39	3.91	2.88
285.00	16.00	0.00	0.00	3.39	3.91	2.88
286.00	16.00	0.00	0.00	3.39	3.91	2.88
287.00	16.00	0.00	0.00	3.39	3.91	2.88
288.00	16.00	0.00	0.00	3.39	3.91	2.88
289.00	16.00	0.00	0.00	3.39	3.91	2.87
290.00	16.00	0.00	0.00	3.39	3.91	2.87
291.00	16.00	0.00	0.00	3.39	3.91	2.87
292.00	16.00	0.00	0.00	3.39	3.91	2.87
293.00	16.00	0.00	0.00	3.39	3.91	2.87
294.00	16.00	0.00	0.00	3.39	3.91	2.86
295.00	16.00	0.00	0.00	3.39	3.91	2.86
296.00	16.00	0.00	0.00	3.39	3.91	2.86
297.00	16.00	0.00	0.00	3.39	3.91	2.86
298.00	16.00	0.00	0.00	3.39	3.91	2.86
299.00	16.00	0.00	0.00	3.39	3.91	2.86
300.00	16.00	0.00	0.00	3.39	3.91	2.85
301.00	16.00	0.00	0.00	3.39	3.91	2.85
302.00	16.00	0.00	0.00	3.39	3.91	2.85
303.00	16.00	0.00	0.00	3.39	3.91	2.85
304.00	16.00	0.00	0.00	3.39	3.91	2.85
305.00	16.00	0.00	0.00	3.39	3.91	2.85
306.00	16.00	0.00	0.00	3.39	3.91	2.84
307.00	16.00	0.00	0.00	3.39	3.91	2.84
308.00	16.00	0.00	0.00	3.39	3.91	2.84
309.00	16.00	0.00	0.00	3.39	3.91	2.84
310.00	16.00	0.00	0.00	3.39	3.91	2.84
311.00	16.00	0.00	0.00	3.39	3.91	2.84
312.00	16.00	0.00	0.00	3.39	3.91	2.83
313.00	16.00	0.00	0.00	3.39	3.91	2.83
314.00	16.00	0.00	0.00	3.39	3.91	2.83
315.00	16.00	0.00	0.00	3.39	3.91	2.83
316.00	16.00	0.00	0.00	3.39	3.91	2.83
317.00	16.00	0.00	0.00	3.39	3.91	2.82
318.00	16.00	0.00	0.00	3.39	3.91	2.82
319.00	16.00	0.00	0.00	3.39	3.91	2.82
320.00	16.00	0.00	0.00	3.39	3.91	2.82
321.00	16.00	0.00	0.00	3.39	3.91	2.82
322.00	16.00	0.00	0.00	3.39	3.91	2.82
323.00	16.00	0.00	0.00	3.39	3.91	2.81
324.00	16.00	0.00	0.00	3.39	3.91	2.81
325.00	16.00	0.00	0.00	3.39	3.91	2.81
326.00	16.00	0.00	0.00	3.39	3.91	2.81
327.00	16.00	0.00	0.00	3.39	3.91	2.81
328.00	16.00	0.00	0.00	3.39	3.91	2.81
329.00	16.00	0.00	0.00	3.39	3.91	2.80
330.00	16.00	0.00	0.00	3.39	3.91	2.80
331.00	16.00	0.00	0.00	3.39	3.91	2.80
332.00	16.00	0.00	0.00	3.39	3.91	2.80
333.00	16.00	0.00	0.00	3.39	3.91	2.80
334.00	16.00	0.00	0.00	3.39	3.91	2.80
335.00	16.00	0.00	0.00	3.39	3.91	2.79
336.00	16.00	0.00	0.00	3.39	3.91	2.79
337.00	16.00	0.00	0.00	3.39	3.91	2.79
338.00	16.00	0.00	0.00	3.39	3.91	2.79
339.00	16.00	0.00	0.00	3.39	3.91	2.79
340.00	16.00	0.00	0.00	3.39	3.91	2.78
341.00	16.00	0.00	0.00	3.39	3.91	2.78
342.00	16.00	0.00	0.00	3.39	3.91	2.78
343.00	16.00	0.00	0.00	3.39	3.91	2.78
344.00	16.00	0.00	0.00	3.39	3.91	2.78

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
345.00	16.00	0.00	0.00	3.39	3.91	2.78
346.00	16.00	0.00	0.00	3.39	3.91	2.77
347.00	16.00	0.00	0.00	3.39	3.91	2.77
348.00	16.00	0.00	0.00	3.39	3.91	2.77
349.00	16.00	0.00	0.00	3.39	3.91	2.77
350.00	16.00	0.00	0.00	3.39	3.91	2.77
351.00	16.00	0.00	0.00	3.39	3.91	2.77
352.00	16.00	0.00	0.00	3.39	3.91	2.76
353.00	16.00	0.00	0.00	3.39	3.91	2.76
354.00	16.00	0.00	0.00	3.39	3.91	2.76
355.00	16.00	0.00	0.00	3.39	3.91	2.76
356.00	16.00	0.00	0.00	3.39	3.91	2.76
357.00	16.00	0.00	0.00	3.39	3.91	2.76
358.00	16.00	0.00	0.00	3.39	3.91	2.75
359.00	16.00	0.00	0.00	3.39	3.91	2.75
360.00	16.00	0.00	0.00	3.39	3.91	2.75

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	14.42	60.20	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Aqua	4.68	60.20	2.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Aqua	3.75	0.00	3.39	0.00	0.35	0.00

Flood Routing Results for Basin

25 Year 3 Day Storm Routing

Peak Stage	4.57	NAVD	
Peak Discharge (CFS)	10.61	CFS	Minimum orifice and weir
Allowable discharge	18.60	CFS	Minimum is acceptable
Calculated Minimum Perimeter Berm Elevation	4.60	NAVD	

100 Year 3 Day Storm Routing

Peak Stage	4.68	NAVD	
Peak Discharge (CFS)	14.42	CFS	
Minimum Finished Floor Elevation	7.00	NAVD	FEMA

Rose Marina - Aqua Basin

Total Treatment Summary

Pre-Development Loading			
Total TN Loading=	22.7	kg TN/yr	
Total TP Loading=	3.3	kg TP/yr	
Post Development Loading (After Dry Retention)			
Total TN Loading=	3.1	kg TN/yr	
Total TP Loading=	0.5	kg TP/yr	
Net Nutrient Reduction From Pre-Developed Condition			% Change
Annual TN Reduction=	19.6	kg TN/yr	86%
Annual TP Reduction=	2.8	kg TP/yr	85%
Summary:			
The addition of dry retention treatment results in a significant decrease of Nitrogen and Phosphorus, as a result of the proposed marina redevelopment.			

PRE-DEVELOPMENT CONDITIONS

1. Land Use

2.33 acres	Existing Parking
0.78 acres	Undeveloped
3.11 acres	TOTAL

* Off-site basin area = 0.00 acres No loading change anticipated for off-site basin area

2. Ground Cover Soil Types

(HSG) A Urban land-Aquents complex, organic substratum

3. Impervious Areas:

41% Impervious

41% Directly Connected Impervious Area

4. Estimation of Pre-Development Loadings:

A. Pre-Development Runoff Loading

95 CN for Parking
80 CN for Other

$$CN(\text{weighted}) = \frac{(CN1 \cdot \text{Area1}) + (CN2 \cdot \text{Area2})}{(\text{Area1} + \text{Area2})} = 91$$

From Appendix C, Zone 4, the annual runoff coefficient for:

$$DCIA = 95\%, CN = 95 = 0.803$$

Annual Runoff Volume (Area x Rainfall x Runoff C):

Area	3.11 acres
Rainfall	52.5 in/yr from Appendix A-3, Harper 2007
Runoff Coefficient	0.803
Total Runoff Volume=	10.9 ac-ft/yr

B. Total Nitrogen:

mg/l from historical water quality data for
Total N Concentration= 2.40 nearby monitoring sites
Annual TN Loading = 32.3 kg TN/yr

TN = 32.3 kg TN/yr

C. Total Phosphorus:

mg/l from historical water quality data for
Total P Concentration= 0.35 nearby monitoring sites
Annual TP Loading = 4.6 kg TP/yr

TP = 4.6 kg TP/yr

POST-DEVELOPMENT CONDITIONS

1. Land Use for

1.69	acres	Parking/sidewalks
1.69		SUBTOTAL
1.42	acres	Dry detention and landscaped areas
3.11		TOTAL (Excludes Preserve Wetland)

2. Ground Cover Soil Types

(HSG) A Urban land-Aquents complex, organic substratum

3. Impervious Areas:

Total Impervious:	1.69 Acres	=	54.3%
Directly Connected Impervious Area:	1.69 Acres	=	54.3%

4. Non-DCIA Curve Number:

Curve Number for Pervious Areas, Landscape, (HSG) A =	61.0	Table 4-22 Harper 2007
Pervious Area =	1.42	Acres
Curve Number for Impervious Areas =	91.0	General Assumption
Impervious Area which is not DCIA =	0.0	Acres

Non-DCIA Curve Number = 61.0

5. Annual Runoff Volume:

From Appendix C, Zone 4, the annual runoff coefficient for:

$$\text{DCIA} = 54.3\%, \text{CN} = 61.0 = 0.299$$

Annual Runoff Volume (Area x Rainfall x Runoff C):

Area	1.69 acres
Rainfall	52.5 in/yr from Appendix A-3, Harper 2007
Runoff Coefficient	0.299
Total Runoff Volume=	2.21 ac-ft/yr

6. Post-Development Loading:

A. Total Nitrogen:

Total N Concentration = 2.400 mg/l from Table 4-17
High intensity commercial

Annual TN Loading = 6.5 kg TN/yr

B. Total Phosphorus:

Total P Concentration = 0.345 mg/l from Table 4-17
High intensity commercial

Annual TP Loading = 0.9 kg TP/yr

DRY RETENTION REMOVAL CHARACTERISTICS

Dry Retention Volume

DCIA Percentage = 0.0%

All stormwater is run through detention system

Non - DCIA CN = 100.0%

Appendix D (Zone 4) Finds that 55.7% efficiency is achieved at 0.75 inches.

Dry retention removal

7.0 kg TN/yr with 55.7% removal yields a loading rate of 3.1 TN/yr

1.1 kg TP/yr with 55.7% removal yields a loading rate of 0.5 TN/yr

EAST BASIN PIPE CALCULATIONS

[illegible]

