

April 18, 2018

City of Lee's Summit Public Works Department 200 SE Green Street Lee's Summit, MO 64086

RE: Kessler Ridge at New Longview Storm Drainage Letter Olsson Project #017-3697

To Whom It May Concern,

The proposed Kessler Ridge at New Longview development, 6.76 acres, consists of a four-story apartment building, seven (7) four-unit townhouses, and associated drives, parking, and utilities to serve the site. This development lies within Lot 2 of the Minor Plat at New Longview and is bounded by SW Longview Blvd. on the west, SW Kessler Dr. on the south and east, and Lot 1 of the Minor Plat at New Longview on the north. Runoff from the site discharges to existing and new public storm sewer, and is conveyed entirely to the existing detention pond that was designed, approved, and constructed with the "Kessler Ridge at New Longview Macro and First Plat Micro Stormwater Drainage Study", September 2015, Lutjen Inc. (Macro Study).

A summary of the pertinent information from the Macro Study is provided, below:

1.) General Information:

Stormwater runoff from Kessler Ridge at New Longview is conveyed into two separate watersheds. A small portion flows south to an unnamed tributary of Little Blue River. Offsite detention has already been provided within this watershed. The majority of the site is conveyed to an unnamed tributary to Cedar Creek. This Preliminary Stormwater Drainage Study will evaluate the hydrologic impact generated by the construction of Kessler Ridge at New Longview.

2.) Methodology

This Macro and First Plat Micro Stormwater Drainage Study has been prepared to evaluate the hydrologic impact generated by development of Kessler Ridge at New Longview. The following sections summarize the Existing Conditions, Future Conditions and Proposed Conditions. The Future Conditions section establishes the requirements as future plats of Kessler Ridge at New Longview are developed.

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3.) Existing Conditions Analysis

This section of the Macro and First Plat Micro Stormwater Drainage Study has been prepared to evaluate the Existing Conditions related to stormwater runoff.

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Watershed A is divided into 5 subareas. Total modeled area within Watershed A is 130.14 acres under Existing Conditions. A small portion of the neighboring southern watershed (Watershed B) will be redirected to Watershed A, increasing the total size of the watershed to 132.07 acres under Future

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Previous development in this area constructed a sediment basin into which most of Kessler Ridge at New Longview will discharge. This basin is referred to in this study as Basin A5 as it falls within Subarea A5 of the watershed. Primary points of interest modeled within Watershed A in all analyses are:

Points A1 thru A4 are points of discharge where stormwater runoff from Watershed A discharges through culverts in the neighboring Bridlewood subdivision. All stormwater from Watershed A is tributary to Point A1 under Existing, Future and Proposed Conditions.

Basin A5 is the existing sediment basin on the east side of the Kessler Ridge at New Longview property. The sediment basin was constructed in 2005, part of anticipated development of the property. However, the plan for development of the property changed, and when construction halted, the basin was left in place. Design of the basin grading was provided to Lutjen by the City of Lee's Summit. No information on the basin outfall structure was provided. However, some information on the existing structure has been obtained by field verification. This basin will be modified to increase the available storage volume, and the existing outfall structure modified in order to meet current detention criteria.

Table 3-1 Existing Conditions Subarea Data

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Subarea:	Area (ac.):	Composite CN	Tc (hr.)
A1	5.75	80	0.267
A2	61.05	82	0.235
A3	12.69	81	0.187
A4	17.96	76	0.207
A5	32.70	77	0.129
Watershed A	130.14		
Watershed B	206.89	82	0.388

Table 3-2 Existing Conditions Runoff Data: Subarea Peak Discharge Rates

Subarea:	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
A1	11.57	21.29	36.80
A2	140.95	250.65	423.76
A3	30.14	54.38	92.61
A4	33.09	64.49	116.34
A5	128.71	252.23	455.00
В	379.45	683.01	1160.49

Table 3-3 Existing Conditions Runoff Data: Point of Interest Peak Discharge Rates

Point of Interest:	Q₂ (cfs)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
Point A1	218.87	423.43	893.25
Point A2	207.36	403.52	859.23
Point A3	68.21	179.86	494.06
Point A4	39.24	134.90	420.02
Point B	379.45	683.01	1160.49

The existing Basin A5 accepts runoff from all of Subarea A5, most of which is currently undeveloped, except for a small portion of SW Longview Boulevard which drains to the existing basin. The basin currently provides detention which mitigates flooding within the Bridlewood subdivision. However, the 100-year storm event currently overtops the dam via an approximately 30' spillway at elevation 954.48. The existing primary outfall structure for the basin includes a low-flow event intake (24" diameter), a 7'x4' Field Inlet with 10" openings on three sides, and a 60" RCP outlet culvert. The existing structure appears to be in good repair, however a large amount of siltation in the basin appears to have filled the low-flow intake, causing a significant amount of water to be ponded consistently. Due to this clogging, in order to estimate the actual flow through the low-flow intake, it has been modeled with a low orifice coefficient, decreasing its intake capacity. It is expected that the existing outfall structure can be left in place, but modified to meet current detention criteria. The pond will be excavated and excess siltation removed.

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	Peak Q In (cfs)	 T _P In (hr.)	Peak Q Out (cfs)	T _P Out (hr.)	V _R (ac-ft)	Peak W.S.E.	Max. Storage Volume (ac-ft)
2-Year	128.71	11.97	6.86	13.67	7.501	962.91	3.695
10-Year	252.23	11.96	80.58	12.14	4.526	964.48	5.580
100-Year	455.00	11.95	311.14	12.07	26.437	966.47	8.479

4.) Proposed Conditions

4.1) Future Conditions (Macro) Analysis

SSOCIATES

The Future Conditions section of analysis assumes completion of all phases of Kessler Ridge at New Longview, including improvements to the existing sediment basin, Basin A5, to convert it to a wetland detention facility. The difference between the Existing Conditions model and the Future Conditions model is a direct result of the construction of Kessler Ridge at New Longview.

In order to mitigate the impacts of construction of Kessler Ridge at New Longview, and to improve the condition of the existing detention facility, Basin A5 will be excavated to increase the available detention volume. The volume of the basin will be increased, in order to maintain or decrease existing peak flow rates from the basin and decrease peak water surface elevations in the basin.

As in the Existing Conditions section, this Future Conditions stormwater runoff model was created and run for the 2, 10 and 100-year design storm events.

Subarea:	Area (ac.):	Composite CN	Tc (hr.)
A1	5.75	80	0.267
A2	63.34	82	0.235
A3	12.69	81	0.187
A4	9.16	81	0.153
A5	41.14	83	0.129
Watershed A	132.07		
Watershed B	207.26	82	0.388

Table 4.1-1 Future Conditions Subarea Data

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Table 4.1-2 Future Conditions Runoff Data: Subarea Peak Discharge Rates

Subarea:	Q ₂ (cfs)	Q ₁₀ (cfs)	Q100 (cfs)
A1	11.57	21.29	36.80
A2	146.26	260.09	439.72
A3	30.14	54.38	92.61
A4	22.86	41.22	70.25
A5	115.44	203.09	339.34
В	380.13	684.23	1162.57

Table 4.1-3 Future Conditions Runoff Data: Point of Interest Peak Discharge Rates

Point of Interest:	Q ₂ (cfs)	Q ₁₀ (cfs)	Q100 (cfs)
Point A1	211.81	410.54	727.64
Point A2	200.28	389.48	691.21
Point A3	54.22	145.48	256.29
Point A4	24.08	98.43	167.23
Point B	380.13	684.23	1162.57

Table 4.1-4 Basin A5 Future Conditions Detention Basin Data

	Peak Q In (cfs)	T _P In (hr.)	Peak Q Out (cfs)	T _P Out (hr.)	V _R (ac-ft)	Peak W.S.E.	Max. Storage Volume (ac-ft)
2-Year	115.44	11.95	9.46	12.71	6.661	960.12	3.750
10-Year	203.09	11.95	67.93	12.13	11.817	961.22	5.384
100-Year	339.34	11.95	109.75	12.14	20.166	963.21	8.872

According to APWA Section 5608.4, the performance criteria is to provide enough detention as to limit peak flow rates at downstream points of interest to maximum release rates:

- 50% storm peak rate less than or equal to 0.5 cfs per site acre
- 10% storm peak rate less than or equal to 2.0 cfs per site acre
- 1% storm peak rate less than or equal to 3.0 cfs per site acre

Allowable release rates were calculated for Point A1 thru Point A4, allowing that offsite peak discharges would be permitted to bypass the detention. Offsite bypass peak flow rates were calculated as a percentage of the existing conditions, if no onsite detention were provided, relating to the percentage of offsite area flowing to each point, as follows.

Table 4.1-5 Point of Interest Onsite Area

Point of Interest:	Total Area (ac)	Onsite Area (ac)	Percent Onsite
Point A1	132.07	23.83	18.04%
Point A2	126.32	23.83	18.86%
Point A3	62.98	23.83	37.84%
Point A4	50.29	23.83	47.38%

Table 4.1-6 Point of Interest Allowable Peak Flow Rate Calculation

	Offsite Bypass			Onsite Allowable		
Point of Interest:	Q ₂ (cfs)	Q ₁₀ (cfs)	Q100 (cfs)	Q₂ (cfs)	Q10 (cfs)	Q100 (cfs)
Point A1	279.83	522.18	912.55	11.91	47.66	71.49
Point A2	270.40	504.84	822.46	11.91	47.66	71.49
Point A3	130.65	254.98	460.14	11.91	47.66	71.49
Point A4	32.16	110.56	272.73	11.91	47.66	71.49

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Table 4.1-7 Point of Interest Allowable Peak Flow Rates

Point of Interest:	Allowable Q ₂ (cfs)	Allowable Q ₁₀ (cfs)	Allowable Q ₁₀₀ (cfs)
Point A1	291.75	569.84	984.04
Point A2	282.32	552.50	953.95
Point A3	142.56	302.64	531.63
Point A4	44.07	158.22	344.22

All storm events, will see a slight decrease in flow rates as a result of the basin improvements. The following tables provide a comparison of runoff data between Existing and Future Conditions for Kessler Ridge at New Longview.

		Q₂ (cfs)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
	Future:	211.81	410.54	727.64
	Existing:	218.87	423.43	893.25
Point A1	Difference:	-7.06	-12.89	-165.61
	Allowable:	291.75	569.84	984.04
	Difference:	-79.94	-159.3	-256.4
	Future:	200.28	389.48	691.21
	Existing:	207.36	403.52	859.23
Point A2	Difference:	-7.08	-14.04	-168.02
	Allowable:	282.32	552.50	953.95
	Difference:	-82.04	-163.02	-262.74
	Future:	54.22	145.48	256.29
	Existing:	68.21	179.86	494.06
Point A3	Difference:	-13.99	-34.38	-237.77
	Allowable:	142.56	302.64	531.63
	Difference:	-88.34	-157.16	-275.34
	Future:	24.08	98.43	167.23
	Existing:	39.24	134.9	420.02
Point A4	Difference:	-15.16	-36.47	-252.79
	Allowable:	44.07	158.22	344.22
	Difference:	-19.99	-59.79	-176.99
	Future:	380.13	684.23	1162.57
Point B	Existing:	379.45	683.01	1160.49
	Difference:	+0.68	+1.22	+2.08

Table 4.1-8 Point of Interest Discharge Comparison

In addition to mitigation of peak flow rates, APWA Section 5608.4 also requires 40 hour extended detention of runoff from the local 90% mean annual event (1.37"/24-hour rainfall). The modifications to Basin A5 not only convert this facility into a wetland basin, which alone would provide the required mitigation, but also, during periods of wet weather, when the bottom is already full of water, the remaining volume will function as an extended detention basin, which releases the water quality event over a period of 40-72 hours."

The Kessler Ridge Apartments development is part of Area A5 which is tributary to Basin A5, the detention basin proposed within the Macro Study, and ultimately Point A1. Area A5 within the Macro Study had an assumed tributary area of 41.14 acres, curve number of 83, and time of concentration of 0.129 hours. As shown on the attached exhibit, which includes the proposed development of the Kessler Ridge Apartments and future land uses, the proposed tributary area and time of concentration remain unchanged; however, the curve number is increased from 83 to 85.7.

After review of the Macro Study, it was found that detention basin A5 proposed within the Macro Study was designed with a freeboard below the emergency spillway during the 100-year event of 1.27 feet. With the increased curve number, the available freeboard is reduced to 1.00 feet and the resulting increase in peak flowrates at Point A1 are still within the allowable rates prescribed within the Macro Study. Refer to the updated tables, below, and attached model summary included with this letter.

Subarea:	Area (ac.):	Composite CN	Tc (hr.)					
A1	5.75	80	0.267					
A2	63.34	82	0.235					
A3	12.69	81	0.187					
A4	9.16	81	0.153					
A5	41.14	85.7	0.129					
Watershed A	132.07							
Watershed B	207.26	82	0.388					

Table 4.1-1 Future Conditions Subarea Data (UPDATED)

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Table 4.1-2 Future Conditions Runoff Data: Subarea Peak Discharge Rates (UPDATED)

Subarea:	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
A1	11.57	21.29	36.80
A2	146.26	260.09	439.72
A3	30.14	54.38	92.61
A4	22.86	41.22	70.25
A5	128.13	216.90	352.89
В	380.13	684.23	1162.57

Table 4.1-3 Future Conditions Runoff Data: Point of Interest Peak Discharge Rates (UPDATED)

Point of Interest:	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
Point A1	211.93	427.71	733.00
Point A2	200.39	406.65	696.56
Point A3	54.33	156.33	261.30
Point A4	24.19	106.48	172.17
Point B	380.13	684.23	1162.57

Table 4.1-4 Basin A5 Future Conditions Detention Basin Data (UPDATED)

	Peak Q In (cfs)	T _P In (hr.)	Peak Q Out (cfs)	T _P Out (hr.)	V _R (ac-ft)	Peak W.S.E.	Max. Storage Volume (ac-ft)
2-Year	128.13	11.95	17.36	12.71	7.219	960.24	3.916
10-Year	216.90	11.95	75.54	12.13	12.550	961.50	5.836
100-Year	352.89	11.95	114.27	12.14	21.056	963.48	9.387



		Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
	Future:	211.93	427.71	733.00
	Existing:	218.87	423.43	893.25
Point A1	Difference:	-6.94	+4.28	-160.25
	Allowable:	291.75	569.84	984.04
	Difference:	-79.82	-142.13	-251.04
	Future:	200.39	406.65	696.56
	Existing:	207.36	403.52	859.23
Point A2	Difference:	-6.97	+3.13	-162.67
	Allowable:	282.32	552.50	953.95
	Difference:	-81.93	-145.85	-257.39
	Future:	54.33	156.33	261.30
	Existing:	68.21	179.86	494.06
Point A3	Difference:	-13.88	-23.53	-232.76
	Allowable:	142.56	302.64	531.63
	Difference:	-88.23	-146.31	-270.33
	Future:	24.19	106.48	172.17
	Existing:	39.24	134.9	420.02
Point A4	Difference:	-15.05	-28.42	-247.85
	Allowable:	44.07	158.22	344.22
	Difference:	-19.88	-51.74	-172.05
	Future:	380.13	684.23	1162.57
Point B	Existing:	379.45	683.01	1160.49
	Difference:	+0.68	+1.22	+2.08

This letter is submitted in-lieu-of a micro stormwater drainage study and is requested to be accepted and approved for the development of the Kessler Ridge Apartments.

Sincerely,

Olsson Associates Nicholas D. Heiser, P.E.

		LAND COVER LEGEN	ID			
iser		TREATMENT	AREA (AC.)	CN		
nhe		WOODS/NATIVE VEG.	4.14	70		
JSER:		OPEN SPACE	1.26	74		
lwg L		RESIDENTIAL	14.79	82		
ions.c	***************************************	COMMERCIAL/APARTMENTS	6.80	94		
ondit		MULTI-FAMILY	6.76	88		
ed_C		RIGHT-OF-WAY	7.35	94		
ropos	******************	IMPERVIOUS (BUILDINGS)	0.04	98		
77_P		TOTAL	41.14	85.7		
F: \2017\3501-4000\017-3697\40-Design\Exhibits\(N N 0' 100' 200' 4	 00'			
DWG:		JUALE IN FEET				
DRA	AWN BY: NDH					
DAT	ATE: 03/26/2018					



Project Summary	
Title	KESSLER RIDGE APARTMENTS
Engineer	MGD
Company	Olsson Associates
Date	4/18/2018
Notes	

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BASIN A5 MODIFIED	Outlet Input Data, 2 years	5

Subsection: Master Network Summary

Catchments Summary

Label	el Scenario Return Hydrograph Event Volume (years) (ac-ft)		Time to Peak (hours)	Peak Flow (ft³/s)	
SUB A5	2-Year	2	7.412	11.950	128.13
SUB A5	10-Year	10	12.744	11.950	216.90
SUB A5	100-Year	100	21.253	11.950	352.89
SUB A4	2-Year	2	1.366	11.980	22.86
SUB A4	10-Year	10	2.482	11.980	41.22
SUB A4	100-Year	100	4.312	11.960	70.25
SUB A2	2-Year	2	9.847	12.040	146.26
SUB A2	10-Year	10	17.676	12.020	260.09
SUB A2	100-Year	100	30.429	12.020	439.72
SUB A3	2-Year	2	1.891	12.010	30.14
SUB A3	10-Year	10	3.436	12.000	54.38
SUB A3	100-Year	100	5.968	11.990	92.61
SUB A1	2-Year	2	0.821	12.050	11.57
SUB A1	10-Year	10	1.510	12.040	21.29
SUB A1	100-Year	100	2.646	12.040	36.80
SUB B	2-Year	2	32.221	12.100	380.13
SUB B	10-Year	10	57.840	12.100	684.23
SUB B	100-Year	100	99.571	12.100	1,162.57

Node Summary

Label Scenario		Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
PT A4	2-Year	2	8.586	11.980	24.19
PT A4	10-Year	10	15.032	12.040	106.48
PT A4	100-Year	100	25.368	12.020	172.17
PT A3	2-Year	2	10.477	12.010	54.33
PT A3	10-Year	10	18.468	12.040	156.33
PT A3	100-Year	100	31.336	12.020	261.30
PT A2	2-Year	2	20.323	12.040	200.39
PT A2	10-Year	10	36.143	12.050	406.65
PT A2	100-Year	100	61.764	12.040	696.56
PT A1	2-Year	2	21.143	12.060	211.93
PT A1	10-Year	10	37.652	12.070	427.71
PT A1	100-Year	100	64.409	12.060	733.00
PT B	2-Year	2	32.221	12.100	380.13
PT B	10-Year	10	57.840	12.100	684.23
PT B	100-Year	100	99.571	12.100	1,162.57

Pond Summary

FUTURE CONDITIONS.ppc 4/18/2018 Bentley Systems, Inc. Haestad Methods Solution Center 27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666

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Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
BASIN A5 (IN)	2-Year	2	7.412	11.950	128.13	(N/A)	(N/A)
BASIN A5 (OUT)	2-Year	2	7.219	12.360	17.36	960.24	3.916
BASIN A5 (IN)	10-Year	10	12.744	11.950	216.90	(N/A)	(N/A)
BASIN A5 (OUT)	10-Year	10	12.550	12.130	75.54	961.50	5.836
BASIN A5 (IN)	100-Year	100	21.253	11.950	352.89	(N/A)	(N/A)
BASIN A5 (OUT)	100-Year	100	21.056	12.130	114.27	963.48	9.387

FUTURE CONDITIONS.ppc 4/18/2018

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Subsection: Elevation-Area Volume Curve Label: BASIN A5 Return Event: 2 years Storm Event: 2-YEAR

Elevation (ft)	Planimeter (ft²)	Area (acres)	A1+A2+sqr(A1*A 2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
957.00	0.0	0.894	0.000	0.000	0.000
958.00	0.0	1.190	3.115	1.038	1.038
960.00	0.0	1.360	3.822	2.548	3.587
962.00	0.0	1.735	4.631	3.087	6.674
964.00	0.0	2.002	5.601	3.734	10.408
966.00	0.0	2.262	6.392	4.261	14.669

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Subsection: Outlet Input Data Label: BASIN A5 MODIFIED

Return Event: 2 years Storm Event: 2-YEAR

Requested Pond Water Surface Elevations		
Minimum (Headwater)	957.00 ft	
Increment (Headwater)	0.50 ft	
Maximum (Headwater)	966.00 ft	

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	6" ORIFICE PLATE	Forward	60" OUT	957.00	966.00
Orifice-Area	7' FI OPEN	Forward	60" OUT	960.00	966.00
Orifice-Area	4' FI OPEN	Forward	60" OUT	960.00	966.00
Culvert-Circular	60" OUT	Forward	TW	953.89	966.00
Irregular Weir	SPILLWAY	Forward	TW	964.48	966.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

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Subsection: Outlet Input Data Label: BASIN A5 MODIFIED

Return Event: 2 years Storm Event: 2-YEAR

Structure ID: 6" ORIFICE PLATE Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	957.00 ft
Orifice Diameter	6.0 in
Orifice Coefficient	0.600

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Subsection: Outlet Input Data Label: BASIN A5 MODIFIED

Return Event: 2 years Storm Event: 2-YEAR

Structure ID: 60" OUT Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	60.0 in
Length	78.05 ft
Length (Computed Barrel)	78.05 ft
Slope (Computed)	0.002 ft/ft
Outlet Control Data	
Manning's n	0.013
Ке	0.200
Kb	0.004
Kr	1.000
Convergence Tolerance	0.00 ft
Inlet Control Data	
Equation Form	Form 1
К	0.0018
М	2.0000
С	0.0292
Υ	0.7400
T1 ratio (HW/D)	0.000
T2 ratio (HW/D)	1.206
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation. Use submerged inlet control 0 equation above T2

elevation In transition zone between unsubmerged and submerged

inlet control, interpolate between flows at T1 & T2...

T1 Elevation	953.89 ft	T1 Flow	153.67 ft ³ /s
T2 Elevation	959.92 ft	T2 Flow	175.62 ft³/s

Subsection: Outlet Input Data Label: BASIN A5 MODIFIED

Return Event: 2 years Storm Event: 2-YEAR

Structure ID: 4' FI OPEN Structure Type: Orifice-Area	
Number of Openings	2
Elevation	960.00 ft
Orifice Area	3.3 ft ²
Top Elevation	960.83 ft
Datum Elevation	960.00 ft
Orifice Coefficient	0.600
Structure ID: 7' FI OPEN Structure Type: Orifice-Area	
Number of Openings	1
Elevation	960.00 ft
Orifice Area	5.8 ft ²
Top Elevation	960.83 ft
Datum Elevation	960.00 ft
Orifice Coefficient	0.600
Structure ID: SPILLWAY Structure Type: Irregula	f ar Weir Elevation
(ft)	(ft)
0.00	966.00
2.74	965.36
18.72	964.48
28.21	965.01
57.17	900.00
Lowest Elevation	964.48 ft
Weir Coefficient	3.00 (ft^0.5)/s
Structure ID: TW Structure Type: TW Setup, D	0S Channel
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance	0.01 ft

(Minimum) Tailwater Tolerance (Maximum) Headwater Tolerance (Minimum)

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0.50 ft

0.01 ft

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Subsection: Outlet Input Data Label: BASIN A5 MODIFIED

Return Event: 2 years Storm Event: 2-YEAR

Convergence Tolerances	
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft ³ /s
Flow Tolerance (Maximum)	10.000 ft ³ /s

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