3855 S. Northern Blvd. **(816) 743-9000**
Independence, MO 64052 **FAX (816) 743-9700**

Storm Drainage Study

WHISPERING WOODS
FIRST PLAT
LOTS 1- 33

Lee's Summit, Platte County, Missouri

April 19, 2018
2nd Revision July 20, 2018

PREPARED FOR:
Whispering Woods Land, LLC
803 P.C.A. Road
Warrensburg, Missouri 64093

Phoenix Engineering & Surveying, LLC, 3855 S. Northern Blvd., Independence, MO 64052
(816) 743-9000 Fax (816) 743-9700
Engineering Certificate of Authority: MO E-2000151302-D KS E-853
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Phoenix Engineering & Surveying, LLC, 3855 S. Northern Blvd., Independence, MO 64052
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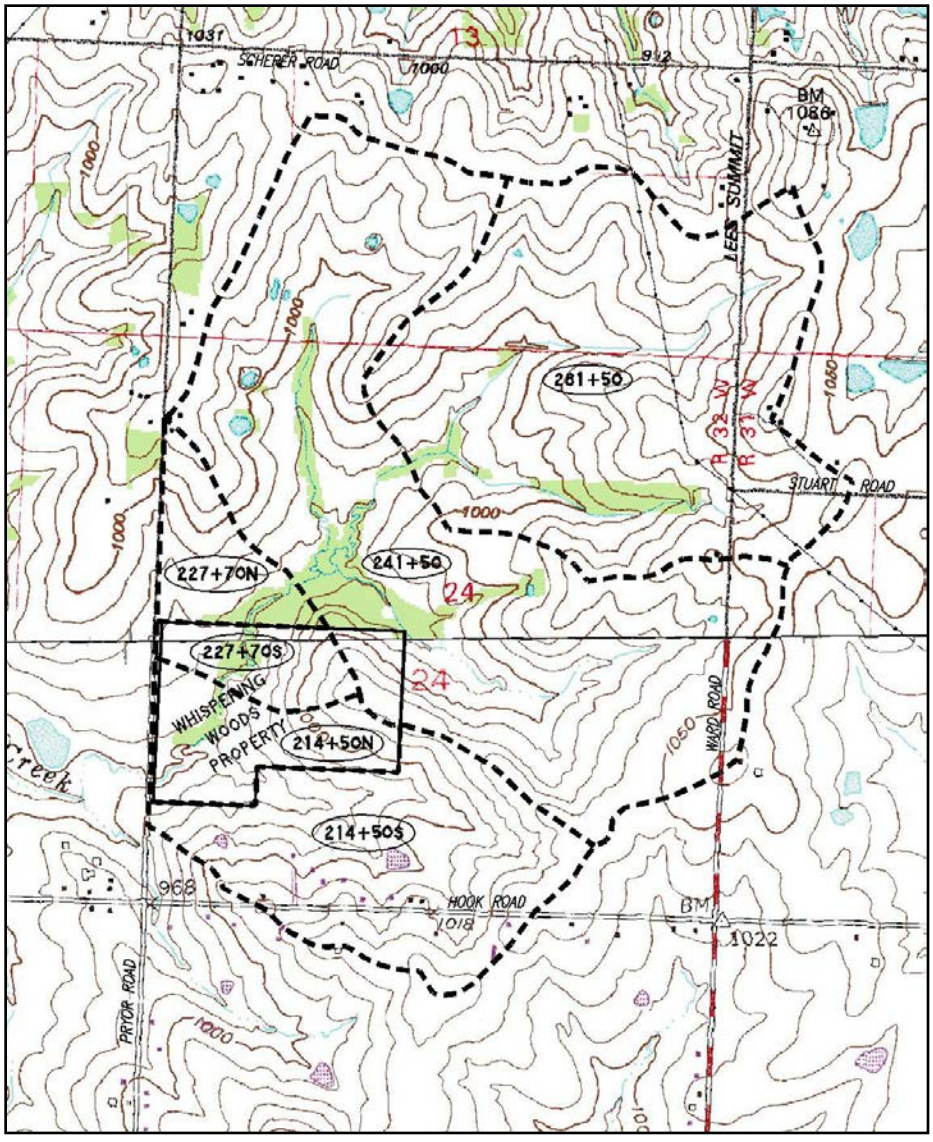
INTRODUCTION

Whispering Woods First Plat is the initial phase of the overall Whispering Woods development within the corporate limits of Lee's Summit, Missouri. Whispering Woods Land, LLC, the developers for this proposed subdivision currently owns 76.32 acres of property in the Southwest Quarter Section of Section 24, Township 47 North, Range 32 West in Lee's Summit, Jackson County, Missouri. Generally located along the east side of Pryor Road just north of the Hawthorn Hill Elementary School, Whispering Woods First Plat will consist of 33 residential lots, and several tracts reserved for open space, drainage ways, walking paths, and a pool with clubhouse. Whispering Woods First Plat is located entirely within the western basin as was discussed in the January 3, 2017 "Storm Drainage Study" which was submitted along with the Preliminary Development Plan for the overall proposed subdivision.



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METHODOLOGY

Drainage and hydraulic calculations were performed as outlined by Kansas City Chapter of APWA Section 5600. More specifically, the following chart lists the methods used for the drainage and hydraulic calculations for this development:

Calculation	Method
Water Quality Routing Calculations	"PondPack" software by Hastead Methods MARC BMP Manual (perforated riser)
SW River Run Culvert Analysis	HEC-RAS by U.S. Army Corps of Engineers HY-8 software by Federal Highway Admin.

Results and printouts of relevant calculations are included in the Appendices.

PRE-DEVELOPMENT CONDITIONS

Currently Whispering Woods First Plat is undeveloped land that has previously been cleared of timber in preparation for the construction of the necessary infrastructure for development. Mouse Creek flows generally from north to south-southwest crossing Pryor Road via a triple cell, 13'X8' reinforced concrete box culvert. Mouse Creek is an recognized flooding source according the Federal Emergency Management Agency (FEMA) and has been identified on the Flood Insurance Rate Map (FIRM) 29095C0531G both with an effective date of January 20, 2017. Portions of the FIRM panels have been shown in the following figure with an overlay of the plat boundary.

Several of the proposed lots have portions that are currently subject to the 1% annual chance exceedance (100-yr) floodplain. During construction and grading, these areas will be filled using compacted earthen fill to an elevation greater than the 1% annual chance flood elevations as indicated on the aforementioned FIRM panels. Following the placement of compacted fill, an application for a Letter of Map Revision based on Fill (LOMR-F) will be prepared and submitted to FEMA requesting that the subject property be acknowledged to have been removed from the 100-yr floodplain. Only area that are within the 'floodway fringe' will have fill material placed. By definition the floodway fringe is the area of the 100-yr floodplain that is outside of the regulatory floodway. Under FEMA regulations, the floodway fringe is an area that may be filled without impacting the conveyance of the stream.

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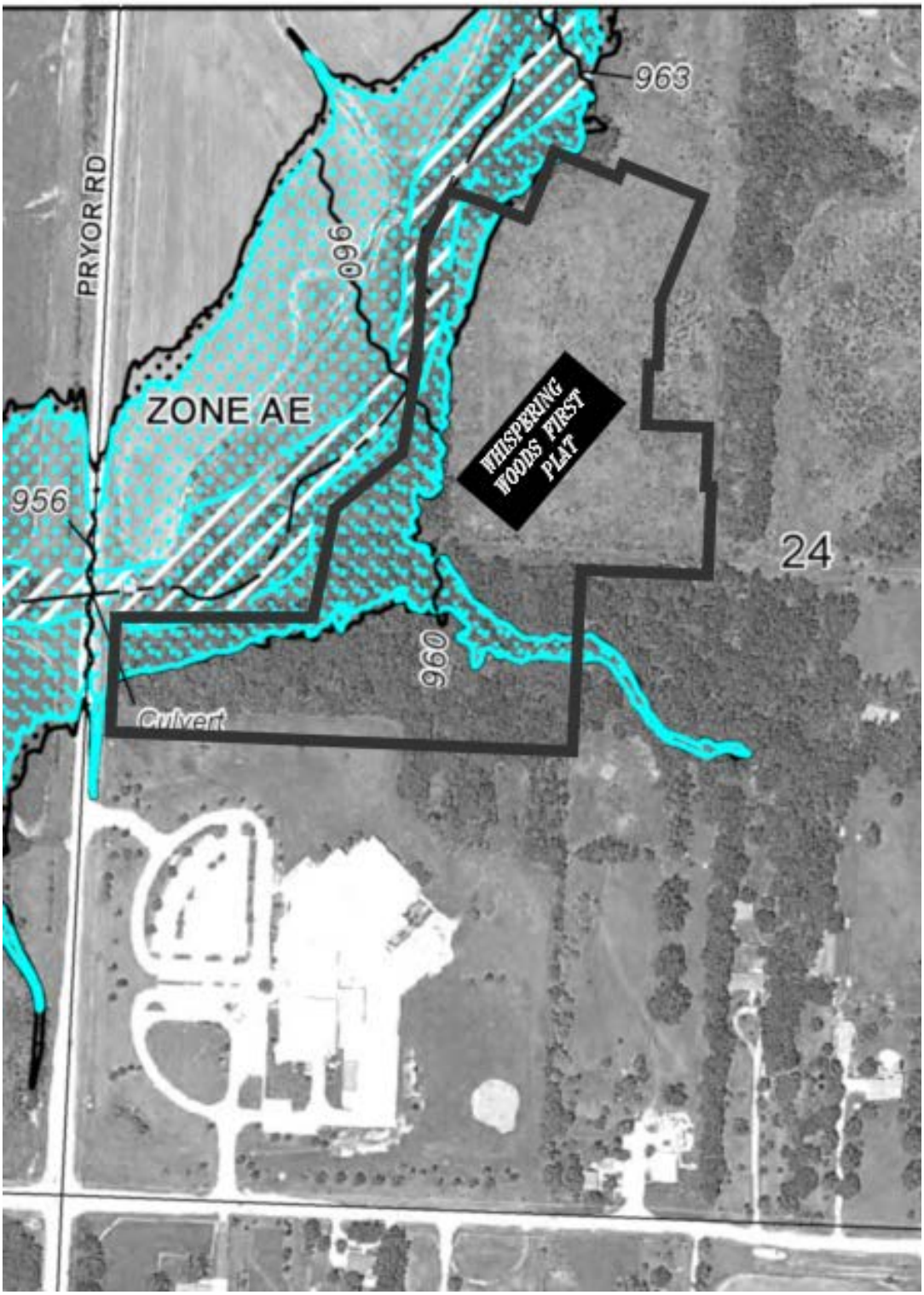

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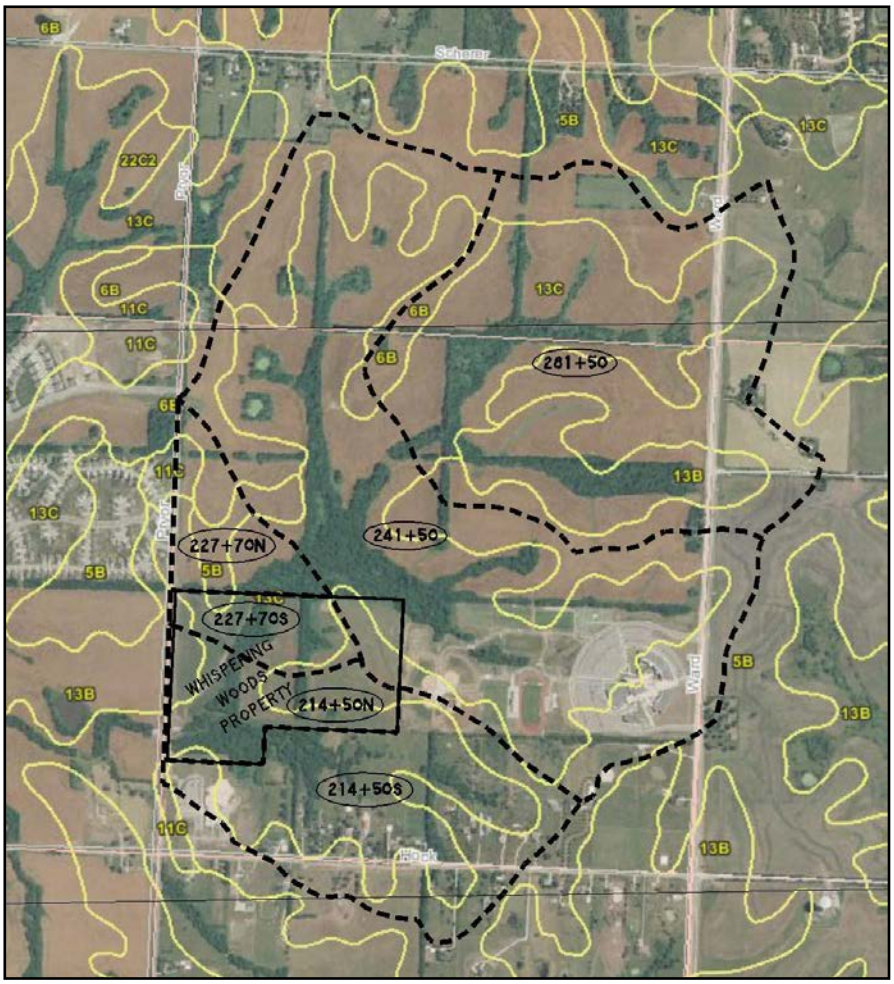
Several different soil types, as classified by the USDA are found throughout the watershed of the Whispering Woods property. The following table lists these soils by USDA soil classification and the TR-55 Hydrologic Soil Group (HSG) classification for each soil type. A portion of the USDA soil survey map for this area is included below.

Several different soil types, as classified by the USDA are found throughout the watershed of the Whispering Woods property. The following table lists these soils by USDA soil classification and the TR-55 Hydrologic Soil Group (HSG) classification for each soil type. A portion of the USDA soil survey map for this area is included below.

USDA Classification	USDA Description	TR-55 HSG
5B	Macksburg Silt Loam, 2 to 5 percent slopes	B
6B	Sharpsburg Silt Loam, 2 to 5 percent slopes	C
11C	Greenton Silty Clay Loam, 5 to 9 percent slopes	B
13B	Sampsel Silty Clay Loam, 2 to 5 percent slopes	B
13C	Sampsel Silty Clay Loam, 5 to 9 percent slopes	D

On-site soils consist mostly of the Macksburg and Sampsel soils.



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PROPOSED CONDITIONS

The previous report from January 3, 2017 discussed the methodology and philosophy of increasing runoff when placing detention facilities in close proximity to large flooding sources. Supporting calculations were included in that report that showed justification for the subsequently approved detention waiver that was granted on February 6, 2017 for project PL2016-219. Since detention was previously waived for the project area, detailed calculations comparing peak discharges for the pre-development and post-development conditions have not been performed.

An 8'X6' reinforced concrete box culvert is also being included that provides a crossing of a minor tributary to Mouse Creek. The HY-8 culvert analysis is discussed later in this report.

WATER QUALITY

Although detention was waived for the development area of the Whispering Woods First Plat, water quality control was necessary to be installed. An extended wet detention facility has been designed along with a sediment forebay to collect coarse solids and is situated between Mouse Creek and Lots 13-17. Per design guidance, the pond has been designed to have a static water (normal pool) depth of four feet. An additional half foot of depth is included to accommodate the sedimentation for five years, determined per APWA 5600. This water quality pond will accept storm water runoff and provide a delayed release using a concrete structure along with a perforated orifice plate utilizing one column and seven rows of 1-3/16-inch perforations protected with a stainless steel screen. This outlet structure is a modified version of the standard detail obtained from the Urban Drainage and Flood Control District's (Denver, CO and surrounding areas) website.

The outlet structure is located as far away from the water quality pond inflow pipes as practical. Due to the shallow depth of Mouse Creek, combined with the location of the inflow pipes at the "downstream" end of the pond, it was not possible to locate the outlet near the north end. The forebay was designed to hold 20% of the total water quality volume and to be confined with a loose rock riprap wall, per design guidance.

The control structure allows for the overtopping for storm events between the 1-yr and 5-yr storms that will be contained in a 30-inch outfall pipe. and in in larger events and will discharge to Mouse Creek via a 30-inch pipe outfall for minor events. Due to the configuration of the pond, the western bank (natural grade) will serve as a 100-foot weir section (re-evaluation of topography reduced this length as was previously identified) to convey the 10-yr and 100-yr events. Since the pond is located within the FEMA identified 100-yr floodplain as well as the regulatory floodway an embankment is not being constructed for confinement of the larger localized runoff events. This design parameter is based on the FEMA requirement that no fill material be placed within the regulatory floodway without providing a no-rise certificate showing 0.00 feet of increase. Additionally, if an embankment were to be constructed, there would be the potential of scour along the creek side during major flooding events that could degrade the integrity of the embankment. Due to these two conditions, it was determined that allowing the natural grade to serve as a broad crested weir in its entirety along the western edge of the water quality pond would be the best option to prevent future maintenance concerns. Although the primary purpose of the outlet structure is to control the water quality runoff event, additional consideration was given to the minor storms including the 1-yr, 2-yr, and 5-yr events. These events will utilize the open area of the 5'X5' structure for discharging the excess runoff that exceeds the capacity of the orifice plate, in order to minimize the overtopping frequency.

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Below is a summary table of the PondPack hydrologic routing of the water quality pond using the 24-hr duration across various return periods. The supporting Pond Pack output is included in the appendices.

Rainfall Event	24-hr Rainfall (inches)	Inflow (cfs)	Outflow (cfs)	Calculated Peak Stage (ft)	Mouse Creek Stage (ft)
WQ rainfall	1.37	6.58	0.18	955.29	N/A
1-yr	3.1	40.07	28.41	956.26	N/A
2-yr	3.7	53.66	33.00	956.72	N/A
5-yr	4.73	77.89	40.05	957.57	N/A
10-yr	5.64	99.70	66.82	958.17	958.5
100-yr	9.23	186.36	181.48	958.56	961.5

Based on the PondPack modeling, the10-yr, 24-hr event will overtop at a depth of of approximately 1-1/2 inches and the 100-yr, 24-hr, event at approximately 4-inches. Due to the confining elevation being established at existing grade of 958.0, large events such as the 10-yr and 100-yr floods in Mouse Creek will inundate the water quality pond, therefore, the controlling elevation will be that of the Mouse Creek Floodplain.

A 100-yr variable duration analysis was also performed using the 24-min, 30-min, 45-min, 1-hr, 2-hr, 3-hr, 6-hr, 12-hr, and 24-hr events to determine the impact on storage due to variability of a localized storm event. The results are shown in the table below:

Storm Duration	Rainfall depth (inches)	Peak Stage (ft)	Peak Volume (ac-ft)
24-min	2.58	957.20	1.134
30-min	2.80	957.48	1.256
45-min	3.31	958.08	1.527
1-hr	3.66	958.23	1.601
2-hr	4.52	958.50	1.727
3-hr	5.04	958.61	1.785
6-hr	5.96	958.71	1.831
12-hr	6.93	958.64	1.797
24-hr	7.94	958.46	1.708

The 24-minute duration event corresponds to a rainfall duration of three times the time of concentration (8-min) of the storm sewer system discharging into the water quality pond. This indicates that during an intense localized rainfall event that has no influence from Mouse Creek, no overtopping of the west bank would occur. Additionally, under similar circumstances, the 100-yr event would need to have a duration of greater than 45-minutes in order to produce any flow overtopping the west bank.

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CULVERT ANALYSIS

The proposed 8'X6' reinforced concrete box culvert (RCBC) will pass rainfall runoff under SW River Run Drive from a contributing drainage area of 138 acres in size. The peak flowrates for the 10-yr, 25-yr, and 100-yr events were calculated using the Rational Method and time of concentration was determined using TR-55 methodology. The calculated time of calculation and flow rates are shown below.

Time of Concentration	
Sheet flow	
Manning, n	0.51
Flow Length, L (ft)	100.00
P2 (2-yr, 24-hr rainfall, in)	3.70
Land Slope, s (ft/ft)	5.65%
Tc (hr)	0.27
Tc (min)	16.01
Shallow concentrated flow	
Surface Description	Unpaved
Flow Length, L (ft)	1070.00
Watercourse slope, s (ft/ft)	1.54%
Average Velocity, V (ft/s)	2.00
Tc (hr)	0.15
Tc (min)	8.92

Channel Flow	
Cross Sectional Flow Area, A (sq. ft)	10.00
Wetted Perimeter, Pw (ft)	14.25
Hydraulic Radius, r (ft)	0.70
Channel Slope, s (ft/ft)	2.33%
Manning's Roughness Coeff., n	0.03
Velocity, V (ft/s)	5.99
Flow Length, L (ft)	3000.00
Tc (hr)	0.14
Tc (min)	8.35
Total Tc (hr)	**0.55**
Total Tc (min)	**33.27**

Runoff Calculation	
Intensity, 10-yr (inches/hour)	3.57
Intensity, 25-yr (inches/hour)	4.22
Intensity, 100-yr (inches/hour)	8.63
C	0.4
Area, acres	138
K, 10-yr	1.0
K, 25-yr	1.1
K, 100-yr	1.25
Q, 10-yr (cfs)	196.97
Q, 25-yr (cfs)	256.29
Q, 100-yr (cfs)	595.61

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In order to evaluate the culvert crossing of SW River Run, an HEC-RAS model was developed to establish the baseline water surface profile for both the 100-yr and 10-yr events along the minor tributary to Mouse Creek. The existing conditions model incorporates cross sections taken beginning just upstream of the confluence with Mouse Creek and extending upstream beyond the Whispering Woods property boundary. The point of primary concern is at the property boundary where no rise in the 100-yr water surface is allowed (i.e. no adverse impact on adjoining property).

The results of the existing condition model indicate that prior to construction of the proposed 8'X6' reinforced concrete box culvert (RCBC), the 100-yr water surface elevation at the upstream end of the proposed RCBC (HEC-RAS station 468.84; highlighted in green) is 963.01and at the property boundary (HEC-RAS station 690.66; highlighted in yellow) is 964.20 feet in elevation as shown from the HEC-RAS output below.

100-yr Existing Conditions HEC-RAS

Sta	100-yr Flow (cfs)	W.S. Elev. (ft)	Crit W.S. (ft)	E.G. Elev. (ft)	Velocity (ft/s)	Flow Area (sq ft)	Top Width ft)
68.04	595.61	954.54	954.54	955.57	8.42	83.99	49.07
224.63	595.61	957.91	956.51	958.28	5.64	186.00	116.04
315.75	595.61	958.67	958.67	961.46	13.39	44.50	78.64
468.84	595.61	963.01		963.99	7.94	75.03	206.71
531.38	595.61	964.13		964.16	1.81	760.63	243.66
690.66	595.61	964.20		964.24	1.71	403.54	105.40
1040.08	595.61	966.90	966.90	967.56	6.58	94.34	80.98
1559.81	595.61	977.34	976.42	977.52	3.45	192.64	117.25

A Proposed Condition model for both the 100-yr and 10-yr events was created using the data from the existing model to evaluate the effect of the introduction of the RCBC. This model was evaluated and resulted in an unreliable result, as the headwater elevation at the upstream end of the RCBC was calculating at an elevation significantly lower than the existing condition at the same location. Thus HY-8 was used in determining a realistic value for the 100-yr headwater elevation of 963.13 at section 468.84, (highlighted in green below) which indicates that the box culvert in fact increases the depth of water immediately upstream of the RCBC (HY-8 supporting documents included in Appendix C).

This value obtained from HY-8 (which was revised to incorporate the calculated tail water elevation obtained from the existing conditions HEC-RAS model. The previous "Proposed Condition" HEC-RAS model was then truncated to remove all sections downstream of the proposed stream crossing so that the known headwater elevation would be utilized as the beginning water surface elevation for the backwater analysis upstream of the box culvert to the primary point of comparison. The resulting water surface elevation at station 690.66 (highlighted in yellow below) under proposed conditions is 964.16 (shown below).

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100-yr Proposed Conditions HEC-RAS

Sta	Q (cfs)	W.S. Elev. (ft)	Crit W.S. (ft)	E.G. Elev. (ft)	Velocity (ft/s)	Flow Area (sq ft)	Top Width ft)
468.84	595.61	963.13	958.79	964.01	7.53	79.10	210.77
531.38	595.61	964.11		964.14	1.94	756.64	242.84
690.66	595.61	964.16		964.20	1.72	399.39	104.29
1040.08	595.61	966.90	966.90	967.56	6.58	94.34	80.98
1559.81	595.61	977.34	976.42	977.52	3.45	192.64	117.25

The table on the following page shows a direct comparison of the HEC-RAS modeling for both the 100-yr and the 10-yr event. The green highlighted rows indicate the section that is at the upstream end of the RCBC and the yellow highlighted rows are located at the Whispering Woods property boundary. Under both return periods analyzed, the proposed condition water surface is slightly higher at the RCBC (less than the 1.0-ft allowed) and slightly less at the property limits compared to the calculated existing condition.

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Sta	Profile R.P.	Plan	Q (cfs)	W.S. Elev. (ft)	Crit W.S. (ft)	E.G. Elev. (ft)	Velocity (ft/s)	Flow Area (sq ft)	Top Width ft)
68.04	100-yr	exist	595.61	954.54	954.54	955.57	8.42	83.99	49.07
68.04	10-yr	exist	256.29	953.37	953.24	954.04	6.61	39.40	27.91
224.63	100-yr	exist	595.61	957.91	956.51	958.28	5.64	186.00	116.04
224.63	10-yr	exist	256.29	956.45		956.70	4.26	75.28	39.73
315.75	100-yr	exist	595.61	958.67	958.67	961.46	13.39	44.50	78.64
315.75	10-yr	exist	256.29	957.13		958.12	7.97	32.15	59.24
468.84	100-yr	exist	595.61	963.01		963.99	7.94	75.03	206.71
468.84	100-yr	proposed	595.61	963.13	958.79	964.01	7.53	79.10	210.77
468.84	10-yr	exist	256.29	959.49		959.96	5.47	46.87	60.68
468.84	10-yr	proposed	256.29	958.58	956.40	959.14	6.00	42.70	46.39
531.38	100-yr	exist	595.61	964.13		964.16	1.81	760.63	243.66
531.38	100-yr	proposed	595.61	964.11		964.14	1.94	756.64	242.84
531.38	10-yr	exist	256.29	960.11		960.17	2.36	180.74	71.17
531.38	10-yr	proposed	256.29	959.24		959.36	3.19	127.60	55.74
690.66	100-yr	exist	595.61	964.20		964.24	1.71	403.54	105.40
690.66	100-yr	proposed	595.61	964.16		964.20	1.72	399.39	104.29
690.66	10-yr	exist	256.29	960.42		960.48	2.05	125.46	51.15
690.66	10-yr	proposed	256.29	959.72		959.84	2.78	92.14	43.95
1040.08	100-yr	exist	595.61	966.90	966.90	967.56	6.58	94.34	80.98
1040.08	100-yr	proposed	595.61	966.90	966.90	967.56	6.58	94.34	80.98
1040.08	10-yr	exist	256.29	966.24	966.24	966.67	5.22	49.10	59.08
1040.08	10-yr	proposed	256.29	966.24	966.24	966.67	5.22	49.10	59.08
1559.81	100-yr	exist	595.61	977.34	976.42	977.52	3.45	192.64	117.25
1559.81	100-yr	proposed	595.61	977.34	976.42	977.52	3.45	192.64	117.25
1559.81	10-yr	exist	256.29	976.55	975.84	976.64	2.44	109.03	92.80
1559.81	10-yr	proposed	256.29	976.55	975.84	976.64	2.44	109.03	92.80

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CONCLUSIONS & RECOMMENDATIONS

It is our conclusion that the proposed storm water drainage system which includes a water quality feature in the form of an extended wet basin pond with sediment forebay (5-yr sedimentation capacity) will adequately serve the complete development of the Whispering Woods First Plat and additional expansion to the east. As previously noted, from an earlier report, changes in flow within Mouse Creek proper is not significantly affected by the overall proposed development. Detailed sizing of ponds and control structures will be provided in the construction documents.

The proposed 8'X6' Reinforced Concrete Box Culvert on SW River Run Dr has been analyzed in conformance with the National Flood Insurance Program's (NFIP) guidance. The methodology of analysis has been verified by Mr. Todd Tucker – Natural Hazards Program Specialist with FEMA Region VII to be appropriate along this non-FEMA regulated stream. The installation of the 8'X6' RCBC will not cause any rise greater than the allotted 1.0 feet anywhere along the stream reach and cause no-rise at the property boundary. The proposed RCBC complies with both FEMA's NFIP requirements as well as the City of Lee's Summit's Unified Development Oridinance – "Overlay District – Floodplain).

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APPENDIX A

Water Quality Outlet Calculation

&

Pond Pack Routing

WHISPERING WOODS 1ST PLAT Design Procedure: Extended Wet Detention Basin

Main Worksheet

I. Basin Water Quality Storage Volume

Step 1) Tributary area to Basin, A_T (ac)	A_T (ac) =	**17.54**
Step 2) Water Quality Volume WQ_v from Pond Pack	WQ_v (ac-ft) =	**0.405**
Step 3) Add 20% to account for silt and sediment deposition in the basin	V_{design} (ac-ft) =	**0.486**

IIa. Water Quality Outlet Type

Step 1) Set water quality outlet type — Outlet type = **2**

Type 1 = single orifice
Type 2 = perforated riser or plate
Type 3 = v-notch weir

Step 2) Proceed to Step IIb, IIc, or Iid basded on water quality outlet type selected

IIb. Water Quality Outlet, Single Orifice

Step 1) Depth of water quality volume at outlet, Z_{WQ} (ft)	Z_{WQ} (ft) =	**1**
Step 2) Average head of water quality volume over invert of orifice, HWQ (ft) $H_{WQ} = 0.5 * Z_{WQ}$	H_{WQ} (ft) =	**0.5**
Step 3) Average water quality outflow rate, Q_{WQ} (cfs) $Q_{WQ} = (WQ_v * 43{,}560)/(40 * 3{,}600)$	Q_{WQ} (cfs) =	**0.12**
Step 4) Set value of orifice discharge coefficient, C_0 $C_0 = 0.66$ when thickness of riser/weir plate is ≤ orifice diameter $C_0 = 0.80$ when thickness of riser/weir plate is > orifice diameter	C_0 =	**0.66**
Step 5) Water quality outlet orifice diameter (minimum of 4 inches), D_0 (in) $D_0 = 12 * 2 * (Q_{WQ}/(C_0 * \pi * (2 * g * H)^{0.5}))^{0.5}$ (if orifice diameter < 4 inches, use outlet type 2 or 3)	D_0 (in) =	**2.4**

Step 6) To size outlet orifice for EDDB with an irregular stage-volume relationship, use the Single Orifice Worksheet

IIc. Water Quality Outlet, Perforated Riser

Step 1) Depth at outlet above lowest perforation, Z_{WQ} (ft)	Z_{WQ} (ft) =	**1**
Step 2) Recommended maximum outlet area per row, A_0 (in^2) $A_0 = (WQ_v)/(0.013 * Z_{WQ}^2 + 0.22 * Z_{WQ} - 0.10)$	A_0 (in^2)=	**3.045**
Step 3) Circular perforation diameter per row assuming a single column, D_1 (in)	D_1 (in) =	**1.969**
Step 4) Number of columns, n_c If $D_1 > 2$ inches $n_c > 1$	n_c =	**2**
Step 5) Design circular perforation diameter (should be between 1 and 2 inches), D_{perf} (in)	D_{perf} (in) =	**1.375**
Step 6) Horizontal perforation column spacing when $n_c > 1$, center to center, S_c If $D_{perf} \geq 1.0$ inch, $S_c = 4$	S_c (in) =	**4**
Step 7) Number of rows (4" vertical spacing between perforations, center to center), n_r	n_r =	**3**

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Table of Contents (continued)

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Lee's Summit Rai

Return Event	Total Depth in	Rainfall Type	RNF ID
1	3.1000	Synthetic Curve	TypeII 24hr
2	3.7000	Synthetic Curve	TypeII 24hr
5	4.7300	Synthetic Curve	TypeII 24hr
10	5.6400	Synthetic Curve	TypeII 24hr
100	9.2300	Synthetic Curve	TypeII 24hr
3	1.3700	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
CDA	AREA	1	2.131		11.9300	40.07		
CDA	AREA	2	2.849		11.9200	53.66		
CDA	AREA	5	4.149		11.9200	77.89		
CDA	AREA	10	5.346		11.9200	99.70		
CDA	AREA	100	10.282		11.9200	186.36		
CDA	AREA	3	.405		12.0000	6.58		
*OUTFALL	JCT	1	1.884		12.0400	28.41		
*OUTFALL	JCT	2	2.587		12.0500	33.00		
*OUTFALL	JCT	5	3.866		12.0600	40.05		
*OUTFALL	JCT	10	5.047		12.0400	66.82		
*OUTFALL	JCT	100	9.940		11.9400	181.48		
*OUTFALL	JCT	3	.247		18.6400	.18		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
WQ POND	IN	POND 1	2.131	--	11.9300	40.07		
WQ POND	IN	POND 2	2.849		11.9200	53.66		
WQ POND	IN	POND 5	4.149		11.9200	77.89		
WQ POND	IN	POND 10	5.346		11.9200	99.70		
WQ POND	IN	POND 100	10.282		11.9200	186.36		
WQ POND	IN	POND 3	.405		12.0000	6.58		
WQ POND	OUT	POND 1	1.884		12.0400	28.41	956.26	.755
WQ POND	OUT	POND 2	2.587		12.0500	33.00	956.72	.934
WQ POND	OUT	POND 5	3.866		12.0600	40.05	957.57	1.295
WQ POND	OUT	POND 10	5.047		12.0400	66.82	958.17	1.569
WQ POND	OUT	POND 100	9.940		11.9400	181.48	958.56	1.759
WQ POND	OUT	POND 3	.247		18.6400	.18	955.29	.401

File.... C:\Documents and Settings\brian\Desktop\
Title... Project Date: 1/18/2018
Project Engineer: Brian Glenn
Project Title: Whispering Woods WQ pond Phase 1
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Lee's Summit Rai

Storm Tag Name = 1

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 1 yr
Total Rainfall Depth= 3.1000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 2

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 3.7000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 5

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 5 yr
Total Rainfall Depth= 4.7300 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 5.6400 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 9.2300 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

File.... C:\Documents and Settings\brian\Desktop\
Title... Project Date: 1/18/2018
Project Engineer: Brian Glenn
Project Title: Whispering Woods WQ pond Phase 1
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Lee's Summit Rai

Storm Tag Name = 3

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 3 yr
Total Rainfall Depth= 1.3700 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm
Duration = 24.0000 hrs Rain Depth = 3.1000 in
Rain Dir = C:\Documents and Settings\brian\Desktop\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\brian\Desktop\
HYG File - ID = work_pad.hyg - CDA 1
Tc (Min. Tc) = .0833 hrs
Drainage Area = 17.540 acres Runoff CN= 82

==========
Computational Time Increment = .01111 hrs
Computed Peak Time = 11.9286 hrs
Computed Peak Flow = 40.17 cfs

Time Increment for HYG File = .0100 hrs
Peak Time, Interpolated Output = 11.9302 hrs
Peak Flow, Interpolated Output = 40.07 cfs
==========

DRAINAGE AREA

ID:CDA
CN = 82
Area = 17.540 acres
S = 2.1951 in
0.2S = .4390 in

Cumulative Runoff

1.4581 in
2.131 ac-ft

HYG Volume... 2.131 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: CDA)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 238.58 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration = 24.0000 hrs Rain Depth = 3.7000 in
Rain Dir = C:\Documents and Settings\brian\Desktop\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\brian\Desktop\
HYG File - ID = work_pad.hyg - CDA 2
Tc (Min. Tc) = .0833 hrs
Drainage Area = 17.540 acres Runoff CN= 82

==========
Computational Time Increment = .01111 hrs
Computed Peak Time = 11.9286 hrs
Computed Peak Flow = 53.73 cfs

Time Increment for HYG File = .0100 hrs
Peak Time, Interpolated Output = 11.9202 hrs
Peak Flow, Interpolated Output = 53.66 cfs
==========

DRAINAGE AREA

ID:CDA
CN = 82
Area = 17.540 acres
S = 2.1951 in
0.2S = .4390 in

Cumulative Runoff

1.9490 in
2.849 ac-ft

HYG Volume... 2.849 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: CDA)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 238.58 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 3 year storm
Duration = 24.0000 hrs Rain Depth = 1.3700 in
Rain Dir = C:\Documents and Settings\brian\Desktop\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\brian\Desktop\
HYG File - ID = work_pad.hyg - CDA 3
Tc (Min. Tc) = .0833 hrs
Drainage Area = 17.540 acres Runoff CN= 82

==========
Computational Time Increment = .01111 hrs
Computed Peak Time = 12.0063 hrs
Computed Peak Flow = 6.61 cfs

Time Increment for HYG File = .0100 hrs
Peak Time, Interpolated Output = 12.0102 hrs
Peak Flow, Interpolated Output = 6.58 cfs
==========

DRAINAGE AREA

ID:CDA
CN = 82
Area = 17.540 acres
S = 2.1951 in
0.2S = .4390 in

Cumulative Runoff

.2773 in
.405 ac-ft

HYG Volume... .405 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: CDA)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 238.58 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 4.7300 in
Rain Dir = C:\Documents and Settings\brian\Desktop\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\brian\Desktop\
HYG File - ID = work_pad.hyg - CDA 5
Tc (Min. Tc) = .0833 hrs
Drainage Area = 17.540 acres Runoff CN= 82

==========
Computational Time Increment = .01111 hrs
Computed Peak Time = 11.9175 hrs
Computed Peak Flow = 77.92 cfs

Time Increment for HYG File = .0100 hrs
Peak Time, Interpolated Output = 11.9202 hrs
Peak Flow, Interpolated Output = 77.89 cfs
==========

DRAINAGE AREA

ID:CDA
CN = 82
Area = 17.540 acres
S = 2.1951 in
0.2S = .4390 in

Cumulative Runoff

2.8388 in
4.149 ac-ft

HYG Volume... 4.149 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: CDA)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 238.58 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration = 24.0000 hrs Rain Depth = 5.6400 in
Rain Dir = C:\Documents and Settings\brian\Desktop\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\brian\Desktop\
HYG File - ID = work_pad.hyg - CDA 10
Tc (Min. Tc) = .0833 hrs
Drainage Area = 17.540 acres Runoff CN= 82

==========
Computational Time Increment = .01111 hrs
Computed Peak Time = 11.9175 hrs
Computed Peak Flow = 99.79 cfs

Time Increment for HYG File = .0100 hrs
Peak Time, Interpolated Output = 11.9202 hrs
Peak Flow, Interpolated Output = 99.70 cfs
==========

DRAINAGE AREA

ID:CDA
CN = 82
Area = 17.540 acres
S = 2.1951 in
0.2S = .4390 in

Cumulative Runoff

3.6574 in
5.346 ac-ft

HYG Volume... 5.346 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: CDA)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 238.58 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 9.2300 in
Rain Dir = C:\Documents and Settings\brian\Desktop\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\brian\Desktop\
HYG File - ID = work_pad.hyg - CDA 100
Tc (Min. Tc) = .0833 hrs
Drainage Area = 17.540 acres Runoff CN= 82

==========
Computational Time Increment = .01111 hrs
Computed Peak Time = 11.9175 hrs
Computed Peak Flow = 186.72 cfs

Time Increment for HYG File = .0100 hrs
Peak Time, Interpolated Output = 11.9202 hrs
Peak Flow, Interpolated Output = 186.36 cfs
==========

DRAINAGE AREA

ID:CDA
CN = 82
Area = 17.540 acres
S = 2.1951 in
0.2S = .4390 in

Cumulative Runoff

7.0345 in
10.282 ac-ft

HYG Volume... 10.282 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: CDA)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 238.58 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

File.... C:\Documents and Settings\brian\Desktop\04078 WATER QUALITY POND REVISED 7-19-18.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
954.00	-----	.2849	.0000	.000	.000
954.50	-----	.3064	.8866	.148	.148
956.00	-----	.3721	1.0161	.508	.656
958.00	-----	.4647	1.2527	.835	1.491
959.00	-----	.5129	1.4658	.489	1.980

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 954.00 ft
Increment = .10 ft
Max. Elev.= 959.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Weir-Rectangular	wr	--->	TW	958.000	959.000
Inlet Box	RB	--->	CV	955.500	959.000
Orifice-Circular	O3	--->	CV	955.208	959.000
Orifice-Circular	O2	--->	CV	954.833	959.000
Orifice-Circular	O1	--->	CV	954.500	959.000
Culvert-Circular	cv	--->	TW	953.250	959.000

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = wr
Structure Type = Weir-Rectangular

# of Openings = 1
Crest Elev. = 958.00 ft
Weir Length = 100.00 ft
Weir Coeff. = 3.200000

Weir TW effects (Use adjustment equation)

Structure ID = RB
Structure Type = Inlet Box

# of Openings = 1
Invert Elev. = 955.50 ft
Orifice Area = 25.0000 sq.ft
Orifice Coeff. = .670
Weir Length = 15.00 ft
Weir Coeff. = 3.200
K, Submerged = .000
K, Reverse = 1.000
Kb,Barrel = .000000 (per ft of full flow)
Barrel Length = .00 ft
Mannings n = .0000

Structure ID = O3
Structure Type = Orifice-Circular

# of Openings = 2
Invert Elev. = 955.21 ft
Diameter = .1146 ft
Orifice Coeff. = .670

OUTLET STRUCTURE INPUT DATA

Structure ID = O2
Structure Type = Orifice-Circular

# of Openings = 2
Invert Elev. = 954.83 ft
Diameter = .1146 ft
Orifice Coeff. = .670

Structure ID = O1
Structure Type = Orifice-Circular

# of Openings = 2
Invert Elev. = 954.50 ft
Diameter = .1146 ft
Orifice Coeff. = .670

OUTLET STRUCTURE INPUT DATA

Structure ID = cv
Structure Type = Culvert-Circular

No. Barrels	=	1
Barrel Diameter	=	2.5000 ft
Upstream Invert	=	953.25 ft
Dnstream Invert	=	953.00 ft
Horiz. Length	=	49.59 ft
Barrel Length	=	49.59 ft
Barrel Slope	=	.00504 ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0100
Ke	=	.0000 (forward entrance loss)
Kb	=	.005454 (per ft of full flow)
Kr	=	.5000 (reverse entrance loss)
HW Convergence	=	.001 +/- ft

INLET CONTROL DATA...

Equation form	=	1
Inlet Control K	=	.0098
Inlet Control M	=	2.0000
Inlet Control c	=	.03980
Inlet Control Y	=	.6700
T1 ratio (HW/D)	=	1.158
T2 ratio (HW/D)	=	1.304
Slope Factor	=	-.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 956.14 ft ---> Flow = 27.16 cfs
At T2 Elev = 956.51 ft ---> Flow = 31.05 cfs

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...

Maximum Iterations	=	30
Min. TW tolerance	=	.01 ft
Max. TW tolerance	=	.01 ft
Min. HW tolerance	=	.01 ft
Max. HW tolerance	=	.01 ft
Min. Q tolerance	=	.10 cfs
Max. Q tolerance	=	.10 cfs

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Documents and Settings\brian\Desktop\
Inflow HYG file = work_pad.hyg - WQ POND IN 1
Outflow HYG file = work_pad.hyg - WQ POND OUT 1

Pond Node Data = WQ POND
Pond Volume Data = WQ POND
Pond Outlet Data = Outlet 10

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	954.50 ft
Starting Volume	=	.148 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0100 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	40.07 cfs	at	11.9300 hrs
Peak Outflow	=	28.41 cfs	at	12.0400 hrs
Peak Elevation	=	956.26 ft		
Peak Storage	=	.755 ac-ft		

MASS BALANCE (ac-ft)

+ Initial Vol	=	.148
+ HYG Vol IN	=	2.131
- Infiltration	=	.000
- HYG Vol OUT	=	1.884
- Retained Vol	=	.395
Unrouted Vol	=	-.000 ac-ft (.001% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Documents and Settings\brian\Desktop\
Inflow HYG file = work_pad.hyg - WQ POND IN 2
Outflow HYG file = work_pad.hyg - WQ POND OUT 2

Pond Node Data = WQ POND
Pond Volume Data = WQ POND
Pond Outlet Data = Outlet 10

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	954.50 ft
Starting Volume	=	.148 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0100 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	53.66 cfs	at	11.9200 hrs
Peak Outflow	=	33.00 cfs	at	12.0500 hrs
Peak Elevation	=	956.72 ft		
Peak Storage	=	.934 ac-ft		

MASS BALANCE (ac-ft)

+ Initial Vol	=	.148
+ HYG Vol IN	=	2.849
- Infiltration	=	.000
- HYG Vol OUT	=	2.587
- Retained Vol	=	.409
Unrouted Vol	=	-.000 ac-ft (.000% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Documents and Settings\brian\Desktop\
Inflow HYG file = work_pad.hyg - WQ POND IN 3
Outflow HYG file = work_pad.hyg - WQ POND OUT 3

Pond Node Data = WQ POND
Pond Volume Data = WQ POND
Pond Outlet Data = Outlet 10

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	954.50 ft
Starting Volume	=	.148 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0100 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	6.58 cfs	at	12.0000 hrs
Peak Outflow	=	.18 cfs	at	18.6400 hrs
Peak Elevation	=	955.29 ft		
Peak Storage	=	.401 ac-ft		

MASS BALANCE (ac-ft)

+ Initial Vol	=	.148
+ HYG Vol IN	=	.405
- Infiltration	=	.000
- HYG Vol OUT	=	.247
- Retained Vol	=	.306
Unrouted Vol	=	.000 ac-ft (.001% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Documents and Settings\brian\Desktop\
Inflow HYG file = work_pad.hyg - WQ POND IN 5
Outflow HYG file = work_pad.hyg - WQ POND OUT 5

Pond Node Data = WQ POND
Pond Volume Data = WQ POND
Pond Outlet Data = Outlet 10

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	954.50 ft
Starting Volume	=	.148 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0100 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	77.89 cfs	at	11.9200 hrs
Peak Outflow	=	40.05 cfs	at	12.0600 hrs
Peak Elevation	=	957.57 ft		
Peak Storage	=	1.295 ac-ft		

MASS BALANCE (ac-ft)

+ Initial Vol	=	.148
+ HYG Vol IN	=	4.149
- Infiltration	=	.000
- HYG Vol OUT	=	3.866
- Retained Vol	=	.431
Unrouted Vol	=	-.000 ac-ft (.001% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Documents and Settings\brian\Desktop\
Inflow HYG file = work_pad.hyg - WQ POND IN 10
Outflow HYG file = work_pad.hyg - WQ POND OUT 10

Pond Node Data = WQ POND
Pond Volume Data = WQ POND
Pond Outlet Data = Outlet 10

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	954.50 ft
Starting Volume	=	.148 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0100 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	99.70 cfs	at	11.9200 hrs
Peak Outflow	=	66.82 cfs	at	12.0400 hrs
Peak Elevation	=	958.17 ft		
Peak Storage	=	1.569 ac-ft		

MASS BALANCE (ac-ft)

+ Initial Vol	=	.148
+ HYG Vol IN	=	5.346
- Infiltration	=	.000
- HYG Vol OUT	=	5.047
- Retained Vol	=	.447
Unrouted Vol	=	-.000 ac-ft (.001% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Documents and Settings\brian\Desktop\
Inflow HYG file = work_pad.hyg - WQ POND IN 100
Outflow HYG file = work_pad.hyg - WQ POND OUT 100

Pond Node Data = WQ POND
Pond Volume Data = WQ POND
Pond Outlet Data = Outlet 10

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	954.50 ft
Starting Volume	=	.148 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0100 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	186.36 cfs	at	11.9200 hrs
Peak Outflow	=	181.48 cfs	at	11.9400 hrs
Peak Elevation	=	958.56 ft		
Peak Storage	=	1.759 ac-ft		

MASS BALANCE (ac-ft)

+ Initial Vol	=	.148
+ HYG Vol IN	=	10.282
- Infiltration	=	.000
- HYG Vol OUT	=	9.940
- Retained Vol	=	.490
Unrouted Vol	=	-.000 ac-ft (.001% of Inflow Volume)

Index of Starting Page Numbers for ID Names

APPENDIX B

100-yr Variable Duration PondPack Result Summary

MASTER DESIGN STORM SUMMARY

Network Storm Collection: 100yr variable D

Return Event	Total Depth in	Rainfall Type	RNF ID
30min	2.8000	Synthetic Curve	TypeII 24hr
45min	3.3100	Synthetic Curve	TypeII 24hr
1hr	3.6600	Synthetic Curve	TypeII 24hr
2hr	4.5200	Synthetic Curve	TypeII 24hr
3hr	5.0400	Synthetic Curve	TypeII 24hr
6hr	5.9600	Synthetic Curve	TypeII 24hr
12hr	6.9300	Synthetic Curve	TypeII 24hr
24hr	7.9400	Synthetic Curve	TypeII 24hr
24min	2.5800	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
CDA	AREA	100	1.792		.3100	182.32		
CDA	AREA	100	2.379		.4300	224.28		
CDA	AREA	100	2.795		.5500	249.48		
CDA	AREA	100	3.877		1.0400	292.99		
CDA	AREA	100	4.553		1.5300	304.51		
CDA	AREA	100	5.777		3.0200	293.88		
CDA	AREA	100	7.090		5.9900	227.36		
CDA	AREA	100	8.482		11.9200	155.26		
CDA	AREA	100	1.541		.2600	159.87		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*OUTFALL		JCT	100	1.676		.4300	39.38		
*OUTFALL		JCT	100	2.263		.5400	51.59		
*OUTFALL		JCT	100	2.678		.6300	81.79		
*OUTFALL		JCT	100	3.756		1.0800	158.05		
*OUTFALL		JCT	100	4.428		1.5700	200.98		
*OUTFALL		JCT	100	5.636		3.0500	237.64		
*OUTFALL		JCT	100	6.905		6.0200	210.86		
*OUTFALL		JCT	100	8.153		11.9500	145.66		
*OUTFALL		JCT	100	1.426		.3800	37.16		
WQ POND	IN	POND	100	1.792		.3100	182.32		
WQ POND	IN	POND	100	2.379		.4300	224.28		
WQ POND	IN	POND	100	2.795		.5500	249.48		
WQ POND	IN	POND	100	3.877		1.0400	292.99		
WQ POND	IN	POND	100	4.553		1.5300	304.51		
WQ POND	IN	POND	100	5.777		3.0200	293.88		
WQ POND	IN	POND	100	7.090		5.9900	227.36		
WQ POND	IN	POND	100	8.482		11.9200	155.26		
WQ POND	IN	POND	100	1.541		.2600	159.87		
WQ POND	OUT	POND	100	1.676		.4300	39.38	957.48	1.256
WQ POND	OUT	POND	100	2.263		.5400	51.59	958.08	1.527
WQ POND	OUT	POND	100	2.678		.6300	81.79	958.23	1.601
WQ POND	OUT	POND	100	3.756		1.0800	158.05	958.50	1.727
WQ POND	OUT	POND	100	4.428		1.5700	200.98	958.61	1.785
WQ POND	OUT	POND	100	5.636		3.0500	237.64	958.71	1.831
WQ POND	OUT	POND	100	6.905		6.0200	210.86	958.64	1.797
WQ POND	OUT	POND	100	8.153		11.9500	145.66	958.46	1.708
WQ POND	OUT	POND	100	1.426		.3800	37.16	957.20	1.134

File.... C:\Documents and Settings\brian\Desktop\
Title... Project Date: 1/18/2018
Project Engineer: Brian Glenn
Project Title: Whispering Woods WQ pond Phase 1
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = 100yr variable D

Storm Tag Name = 30min

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 2.8000 in
Duration Multiplier = 0.021
Resulting Duration = .5040 hrs
Resulting Start Time= .0000 hrs Step= .0021 hrs End= .5040 hrs

Storm Tag Name = 45min

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 3.3100 in
Duration Multiplier = 0.03125
Resulting Duration = .7500 hrs
Resulting Start Time= .0000 hrs Step= .0031 hrs End= .7500 hrs

Storm Tag Name = 1hr

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 3.6600 in
Duration Multiplier = 0.0416
Resulting Duration = .9984 hrs
Resulting Start Time= .0000 hrs Step= .0042 hrs End= .9984 hrs

Storm Tag Name = 2hr

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.5200 in
Duration Multiplier = 0.083
Resulting Duration = 1.9920 hrs
Resulting Start Time= .0000 hrs Step= .0083 hrs End= 1.9920 hrs

Storm Tag Name = 3hr

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 5.0400 in
Duration Multiplier = 0.125
Resulting Duration = 3.0000 hrs
Resulting Start Time= .0000 hrs Step= .0125 hrs End= 3.0000 hrs

File.... C:\Documents and Settings\brian\Desktop\
Title... Project Date: 1/18/2018
Project Engineer: Brian Glenn
Project Title: Whispering Woods WQ pond Phase 1
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = 100yr variable D

Storm Tag Name = 6hr

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 5.9600 in
Duration Multiplier = 0.25
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .0250 hrs End= 6.0000 hrs

Storm Tag Name = 12hr

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 6.9300 in
Duration Multiplier = 0.5
Resulting Duration = 12.0000 hrs
Resulting Start Time= .0000 hrs Step= .0500 hrs End= 12.0000 hrs

Storm Tag Name = 24hr

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 7.9400 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 24min

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 2.5800 in
Duration Multiplier = 0.0167
Resulting Duration = .4008 hrs
Resulting Start Time= .0000 hrs Step= .0017 hrs End= .4008 hrs

APPENDIX C
HEC-RAS & HY-8 Culvert Analysis

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 595.61 cfs

Maximum Flow: 600 cfs

Table 1 - Summary of Culvert Flows at Crossing: Crossing 1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
953.22	0.00	0.00	0.00	1
955.06	60.00	60.00	0.00	1
956.14	120.00	120.00	0.00	1
957.07	180.00	180.00	0.00	1
958.31	240.00	240.00	0.00	1
959.13	300.00	300.00	0.00	1
959.44	360.00	360.00	0.00	1
960.25	420.00	420.00	0.00	1
961.14	480.00	480.00	0.00	1
962.12	540.00	540.00	0.00	1
963.13	595.61	595.61	0.00	1
964.22	649.99	649.99	0.00	Overtopping

Rating Curve Plot for Crossing: Crossing 1

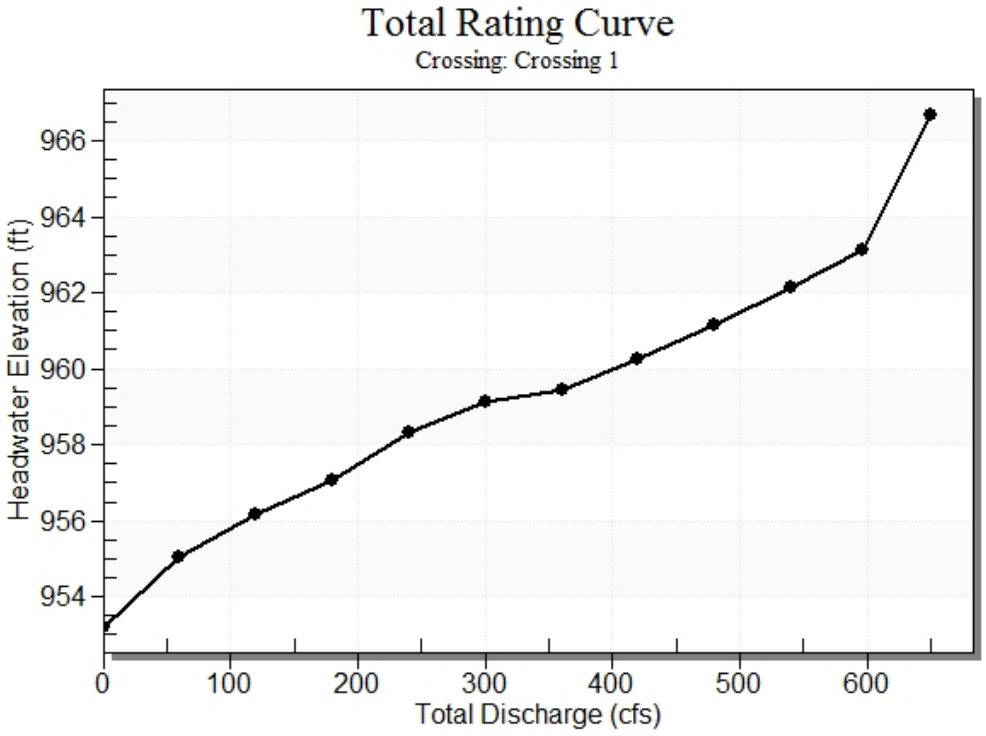


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	953.22	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
60.00	60.00	955.06	1.840	0.723	1-S2n	0.956	1.204	0.996	1.037	7.528	0.000
120.00	120.00	956.14	2.921	1.710	1-S2n	1.514	1.912	1.603	2.074	9.355	0.000
180.00	180.00	957.07	3.853	2.941	1-JS1t	1.999	2.505	3.111	3.111	7.232	0.000
240.00	240.00	958.31	4.675	5.094	1-S1t	2.446	3.035	4.148	4.148	7.232	0.000
300.00	300.00	959.13	5.447	5.915	1-S1t	2.870	3.522	4.628	4.628	8.102	0.000
360.00	360.00	959.44	6.219	5.781	5-JS1t	3.277	3.977	4.901	4.901	9.182	0.000
420.00	420.00	960.25	7.032	6.559	5-JS1t	3.673	4.407	5.173	5.173	10.149	0.000
480.00	480.00	961.14	7.917	7.415	5-JS1t	4.060	4.817	5.445	5.445	11.019	0.000
540.00	540.00	962.12	8.899	8.349	5-S2n	4.439	5.211	4.731	5.718	14.267	0.000
595.61	595.61	963.13	9.909	9.284	5-S2n	4.785	5.563	5.085	5.970	14.641	0.000

****

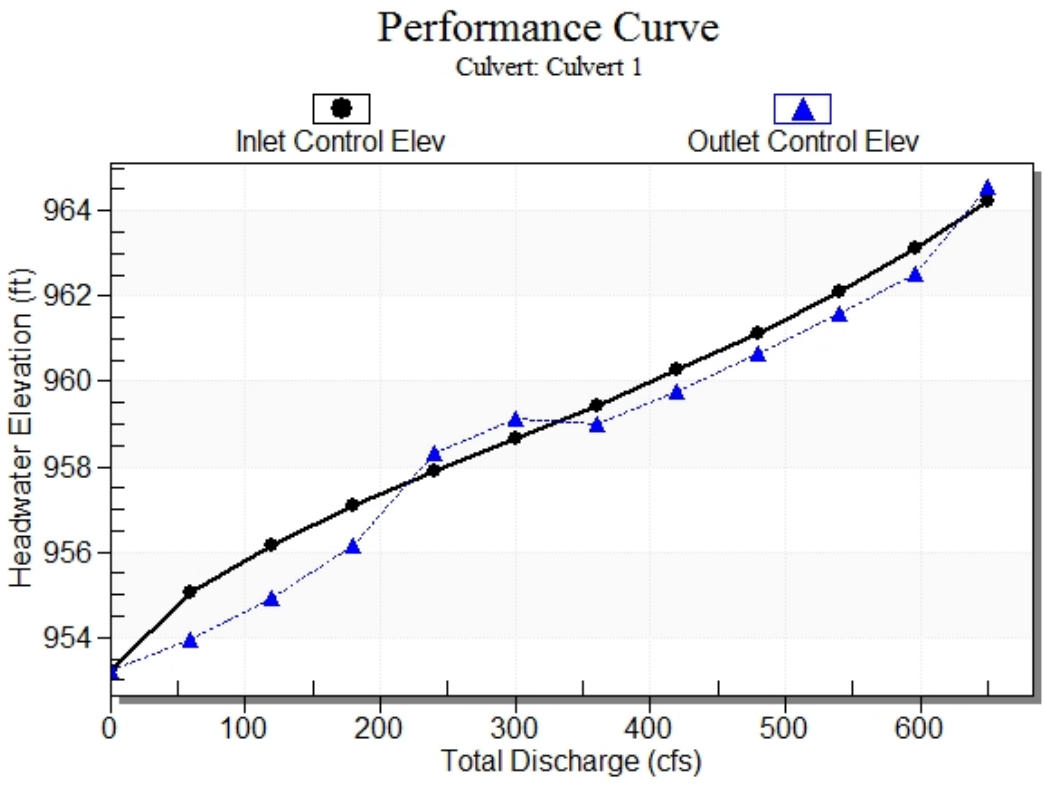
Straight Culvert

Inlet Elevation (invert): 953.22 ft, Outlet Elevation (invert): 952.70 ft

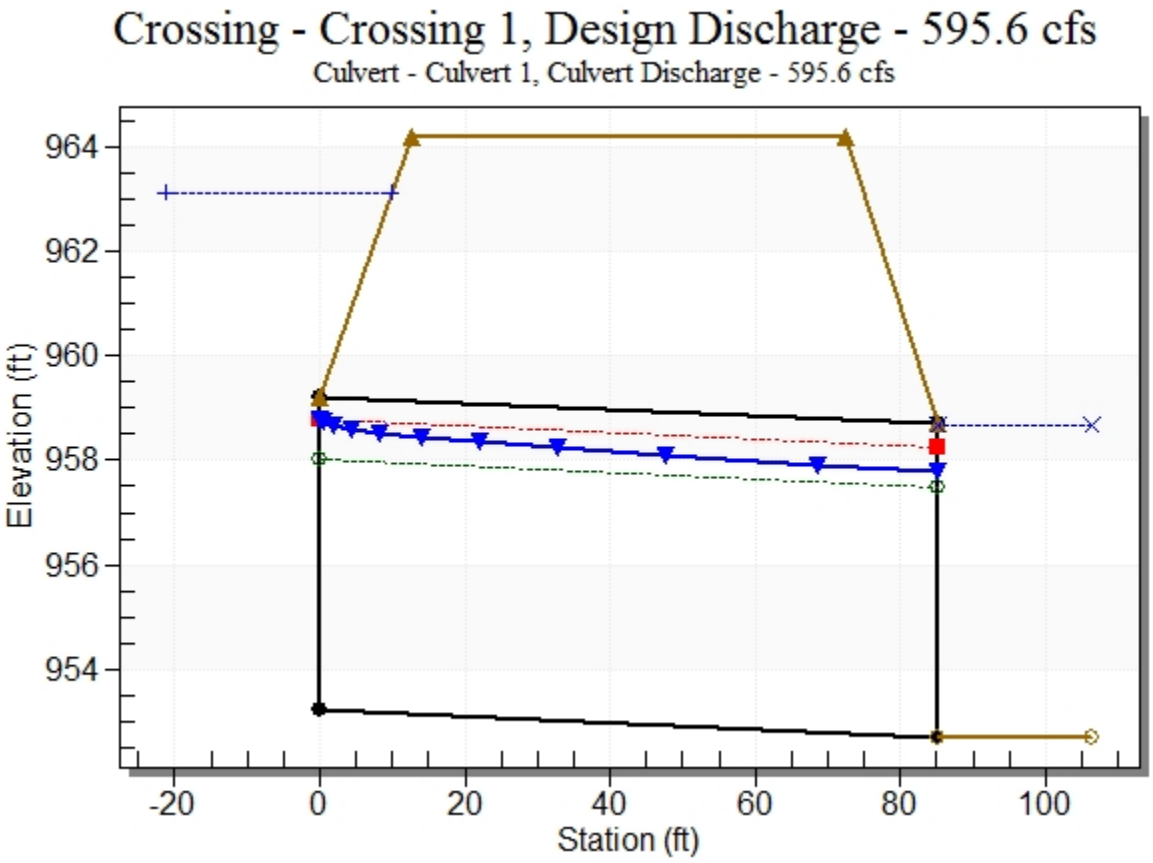
Culvert Length: 85.16 ft, Culvert Slope: 0.0061

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 953.22 ft
Outlet Station: 85.16 ft
Outlet Elevation: 952.70 ft
Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box
Barrel Span: 8.00 ft
Barrel Rise: 6.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75º flare) Wingwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Crossing 1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
0.00	952.70	0.00	0.00
256.29	957.13	4.43	0.00
595.61	958.67	5.97	0.00
700.00	960.00	7.30	0.00

Tailwater Channel Data - Crossing 1

Tailwater Channel Option: Enter Rating Curve
Channel Invert Elevation: 952.70 ft

Roadway Data for Crossing: Crossing 1

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 150.00 ft
Crest Elevation: 964.22 ft
Roadway Surface: Paved
Roadway Top Width: 60.00 ft

HEC-RAS HEC-RAS 5.0.3 September 2016
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X    X  XXXXXX   XXXX       XXXX      XX     XXXX
X    X  X       X   X      X  X     X  X   X
X    X  X       X          X  X    X   X   X
XXXXXX  XXXX    X      XXX  XXX    XXXXX   XXXX
X    X  X       X          X  X    X   X       X
X    X  X       X   X      X  X    X   X       X
X    X  XXXXXX   XXXX      X   X   X   X   XXXX
```

PROJECT DATA
Project Title: Mouse Creek Tributary 2018-05-30
Project File : MouseCreekTributa.prj
Run Date and Time: 5/31/2018 2:55:18 PM

Project in English units

PLAN DATA

Plan Title: BLG Exist
Plan File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.p06

Geometry Title: blg-exist
Geometry File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.g05

Flow Title : Flow 01
Flow File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.f01

Plan Summary Information:
Number of: Cross Sections = 8 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information

Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Flow 01
Flow File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.f01

Flow Data (cfs)

River	Reach	RS	100 yr	25 yr	2 yr	100 yr +10%	10-yr
Mouse Creek Trib	RiverCL (1)	1559.81	595.61	256.29	196.97	655.171	256.29

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Mouse Creek Trib	RiverCL (1)	100 yr		Normal S = 0.05
Mouse Creek Trib	RiverCL (1)	25 yr		Normal S = 0.05
Mouse Creek Trib	RiverCL (1)	2 yr		Normal S = 0.05
Mouse Creek Trib	RiverCL (1)	100 yr +10%		Normal S = 0.05
Mouse Creek Trib	RiverCL (1)	10-yr		Normal S = 0.05

GEOMETRY DATA

Geometry Title: blg-exist
Geometry File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.g05

CROSS SECTION

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 1559.81

INPUT
Description:
Station Elevation Data num= 125

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	995.72	8.549988	995.14	10.60999	995	13.70001	994.77	24.70001	994
34.5	993.33	8.78998	993	48.28998	992.32	52.85999	992	56.71997	991.74
67.60999	991	79.13	990.25	82.96997	990	92.35999	989.5	101.59	989
109.97	988.57	120.31	988	138.2	987.12	140.53	987	145.2	986.78
161.81	986	168.25	985.67	183.44	985	189.7	984.71	206.66	984
213.05	983.72	224.96	983.25	225.67	983.22	231.36	983	240.78	982.61
256.02	982	270.05	981.46	280.67	981	292.64	980.39	299.67	980.08
301.35	980	307.16	979.7	319.24	979	327.57	978.43	333.05	978
335.61	977.8	346	977	355	976.33	360.35	976	363.5	975.81
372.68	975.28	379.63	975	392.2	974.69	401.77	974.61	402.05	974.62
413.18	975	419.33	975.18	421.63	975.35	426.15	975.54	431.07	975.81
434.59	976	434.89	976.01	440.07	976.27	452.87	977	461.06	977.47
470.21	978	471.35	978.04	491.29	978.19	493.12	978.21	498.61	978.3
506.93	978.26	527.46	978.37	528.13	978.38	529.43	978.4	539.68	978.5
554.76	978.5	573.52	978.78	582.4	979	593.02	979.27	625.77	980
626.55	980.03	639.63	980.52	651.62	981	667.76	981.7	674.49	982
684.04	982.46	695.33	983	700.32	983.25	714.8	984	725.59	984.57
733.8	985	745.98	985.68	751.9	986	759.22	986.58	764.6	987
766.11	987.17	773.71	988	777.36	988.4	779.84	988.67	781.99	989
782.48	989.07	782.6	989.08	782.76	989.1	782.85	989.1	783.1	989.11
783.39	989.12	783.54	989.12	784.58	989.18	788.46	989.47	788.65	989.5
789	989.54	790.38	989.62	796.59	990	812.26	990.97	812.71	991
823.43	991.58	831.3	992	838.19	991.95	839.98	991.94	841.52	991.93
842.36	991.93	844.07	991.92	844.32	991.92	844.68	991.73	849.7	992.07
851.87	992.22	856.92	992.55	859.93	992.76	874.46	994.18	889.49	995.65

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	360.35	.07	434.59	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
360.35	434.59	519.73	519.73	519.73	.1	.3

CROSS SECTION

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 1040.08

INPUT
Description:
Station Elevation Data num= 139

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	996	15.91003	995	31.83002	994	48.31	993	64.82001	992
71.53003	991.68	1.65002	991	92.46002	990.36	98.07001	990	103.97	989.59
112.58	989	116.72	988.71	126.88	988	136.81	987.28	140.69	987
148.58	986.42	154.2	986	156.9	985.8	167.64	985	175.68	984.39
180.77	984	190.26	983.28	193.97	983	195.72	982.87	207.32	982
212.04	981.65	220.63	981	234.1	980	237.55	979.77	248.87	979
255.99	978.52	263.63	978	274.59	977.22	277.74	977	286.96	976.34
291.92	976	293.6	975.88	306.33	975	311.75	974.6	319.87	974
325.09	973.61	333.44	973	336.87	972.75	346.14	972	347.74	971.88
359.21	971	372.03	970.02	372.28	970	372.41	969.99	384.43	969
395.85	968.06	396.58	968	398.46	967.85	398.57	967.84	407.34	967.18
409.7	967	419.15	966.36	422.33	966	434.05	965	441.71	965
451.62	965.03	457.6	965.27	474.7	965.92	478.26	966.16	480.97	966.39
494.44	967	497.82	967.16	513.66	968	532.78	969	546.44	969.71
552.26	970	556.36	970.2	574.98	971	595.96	971.9	598.22	972
621.31	972.98	621.72	973	625.98	973.18	626.83	973.22	629.4	973.32
644.61	973.96	645.67	974	646.7	974.05	667.46	975	686.85	975.89
689.58	976	698.64	976.38	712.53	977	730.14	977.74	735.84	978
750.5	978.6	759.31	979	784.41	980	809.67	981	812.29	981.1
815.77	981.2	841.55	982	854.74	982.45	861.71	982.67	872.21	983
874.98	983.02	879.15	983	879.57	982.82	880.71	982.34	893.57	983
908.5	983.95	909.22	984	909.6	984.02	924.9	984.83	928.08	984.99
928.19	985	928.63	985.02	950.4	986	955	986.21	973.29	987
974.2	987.04	974.33	987.05	974.6	987.06	974.73	987.07	975.98	987.13
977.85	987.22	979.34	987.3	980.58	987.35	981.64	987.4	996.03	988
996.3	988.02	996.83	988.05	1000.43	988.21	1006.58	988.51	1008.68	988.61
1012.46	988.8	1013.76	988.86	1015.7	988.95	1016.94	989	1021.47	989.12
1023.57	989.22	1030.94	989.46	1035.94	989.75	1040.5	990		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	419.15	.07	480.97	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
419.15	480.97	349.42	349.42	349.42	.1	.3

CROSS SECTION

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 690.66

INPUT
Description:
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
73.35	969	83.91	968.24	87.48	968	91.56	967.62	99.2	967
106.07	966.67	110.86	966.49	123.26	966	123.27	966	140.96	965
141.37	964.98	142.74	964.94	143.92	964.82	149.03	964.67	153.12	964.55
159.12	964.37	179.17	959.98	186.05	958.65	189.57	958.19	191.84	955.94
192.33	955.8	194.41	955.04	194.8	955.02	196.59	955.37	197.05	955.39
200.09	956.79	200.5	956.96	211.37	957.32	232.13	961.11	233.06	961.25
238.11	962.07	255.52	963.99	264.68	964.63	270.19	964.76	288.19	965.22
288.7	965.25	295.11	965.61	295.85	965.35	296.85	965	298.89	964.28
299.69	964	301.21	963.46	304.64	964	309.6	964.78	311	965
311.36	965.06	319.38	966	322.86	966.41	334.44	966.72	344.7	967
360.15	967.58								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
73.35	.1	179.17	.07	232.13	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
179.17	232.13	159.28	159.28	159.28	.1	.3

CROSS SECTION

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 531.38

INPUT
Description:
Station Elevation Data num= 184

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	967.15	.1	967.15	1.39	967.12	1.52	967.12	2.6	967.1
3.44	967.09	4.02	967.09	4.91	967.08	6.62	967.04	9.22	967
9.37	967	9.41	967.03	9.53	967	9.66	967	9.75	967
10.88	967.01	11.81	966.99	11.88	967	13.36	966.98	13.41	966.99
15.32	966.96	16.49	966.95	16.76	966.95	19.73	966.89	20.37	966.88
20.42	966.88	21.23	966.87	25.08	966.82	28.87	966.73	34.22	966.64
65.24	965.77	65.5	965.77	66.25	965.74	66.92	965.71	67.02	965.63
80.7	965.69	83.17	965.7	84.33	965.7	88.87	965.66	92.38	965.56

```
  92.63  965.56   94.25  965.57   94.57  965.56  101.51  965.29  101.91  965.32
 102.15  965.32  102.37  965.31  102.61  965.12  108.88  964.93  109.48  964.85
 117.86  964.61  119.59  964.55  125.46  964.32  127.74  964.23  134.56  963.84
 134.87  963.93     138  963.82  144.07  963.55  149.55  963.39  151.78  963.33
 153.66  963.29  154.13  963.26  154.32  963.25  158.04  962.99  176.69  961.72
 192.58  960.67  197.84   959.8  201.65  959.51  212.48  957.55  217.74  956.14
 218.38  954.71  219.66  954.28  221.16  953.83  222.43  953.47  223.15  953.54
 225.49  953.55  227.37  955.06  229.16  955.93  243.27  957.68   246.6  957.92
 253.95  958.46  260.65  959.53  281.99  961.43  291.26   961.5   300.5  961.66
 308.09  961.99  319.03  962.39  325.72  962.61   331.4  962.76  333.63  962.84
 337.64  963.02  338.85  963.02  355.71  963.55  370.37     964  379.05  964.43
  382.2  964.51  389.13   964.7  399.19     965  399.48     965  400.28  965.03
 401.47  965.06  402.46   965.1  405.69  965.21  407.57  965.27  408.44   965.3
 418.35  965.68  420.16  965.74   428.7     966  430.28  966.07   431.6  966.16
 431.88  966.14  432.48  966.23  433.29  966.29  436.37  966.39  442.53  966.92
 447.58  967.33  447.71     967  457.33  968.04  459.75  967.47  462.06  968.41
 468.73   968.9  474.72     968  475.11  969.46  480.95  969.92  482.77  970.06
 482.89  970.07  486.61  968.45  487.83  970.44  492.96  970.92  498.42  968.87
 499.74  968.92  500.09  968.93  503.05     969  503.08     969  503.24     969
 503.28     969  503.39     969  503.73     969  504.08  969.01  504.13  969.01
 505.45  971.53  505.57  971.54  505.64  969.04  505.86  971.55  506.63  971.58
 507.48  969.08  507.51  971.62  508.07  969.08  508.28  971.65   508.3  971.65
 508.69  971.66  508.89  971.66  508.97  971.66   509.6  971.67  509.89  971.67
 509.91  971.68  511.09  971.71  511.26  971.72  512.39  969.19  512.69  971.77
 513.33   971.8  513.84  969.23  516.61  969.26  520.87  969.35  522.91   969.4
 527.59  969.52  530.63  972.66  532.03  972.72  532.15  969.62   532.7  972.75
 534.26  972.82  534.57  972.83  536.36   972.9  538.12  972.97  538.13  969.77
 546.24     970  546.37     970  547.05     970  547.61     970  548.26     970
  548.8     970  550.16  970.01  552.36  973.68  552.46  973.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  217.74     .07  229.16      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.74  229.16             62.54   62.54   62.54             .1       .3

CROSS SECTION


RIVER: Mouse Creek Trib
REACH: RiverCL (1)        RS: 468.84

INPUT
Description:
```

Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
117.22	966.14	120.43	966.02	155.87	963.79	156.8	963.77	157.52	963.71
161.77	963.17	162.6	963.15	163.56	963.01	166.87	962.52	166.97	962.51
167.47	962.49	176.1	962.22	178.1	962.15	178.32	962.14	186.25	961.62
206.78	960.48	211.87	960.24	216.77	959.99	226.32	958.99	233.31	958.4
235.4	958.23	239.38	957.42	250.44	955.76	251.55	955.49	254.68	954
255.36	953.67	255.58	953.6	257.38	953.37	257.55	953.32	257.6	953.33
260.7	953.48	260.74	953.48	262.93	955.59	262.98	955.62	263.14	955.64
263.8	955.79	272.11	957.42	279.54	959	285.09	960.02	285.79	960.05
299.03	960.48	323.17	961.31	330.34	961.51	338.38	961.85	345.43	962.16
365.59	962.92	369.97	963	372.16	963.08	380.77	963.4	386.68	963.63
396.35	964	396.89	964.02	397.21	964.03	398.52	964.08	405.57	964.33
412.1	964.57	412.4	964.58	423.67	964.99	423.96	965	425.32	965.07
432.14	965.39	434.81	965.52	444.77	966.31	444.82	966.32	444.87	966.32

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
117.22	.1	239.38	.07	272.11	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
239.38	272.11	153.09	153.09	153.09	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
117.22	253.59	963.86	T
261.59	444.87	963.86	T

CROSS SECTION

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 315.75

INPUT
Description:
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
94.41998	965.769	6.04999	965.38	100.67	963.11	104.22	962.29	104.53	962.21
115.94	959.3	132.3	958.77	140.47	958.79	146.65	958.23	149.83	957.91
161.58	956.7	162.93	956.57	167.2	956.18	169.14	956.32	172.82	956.52
176.07	956.37	180.85	956.24	181.9	956.13	189.4	955.58	190.5	955.46
191.48	955.38	191.74	955.19	195.5	954	196.02	953.84	196.56	953.66
198.98	952.9	199.85	952.73	202.18	952.89	202.72	952.91	202.93	952.98
205.21	954.92	205.44	955.13	205.49	955.14	205.59	955.26	205.65	955.27
212.91	954.96	213.55	955.28	215.66	956.55	215.66	956.72	218.48	957.91

```
  220.05   958.6  220.92  958.79  228.25  959.59  239.08  960.78  241.51  961.06
  241.88     961  246.98  959.77   251.5  960.29  258.57  960.74  266.14  962.21
  270.94  962.94  282.88  964.36   285.8  964.71  287.59  964.93  287.79  964.92

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
94.41998      .1  161.58     .07  215.66      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       161.58  215.66           91.12   91.12   91.12             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
94.41998     196  961.28       T
     204  287.79  961.28       T

CROSS SECTION


RIVER: Mouse Creek Trib
REACH: RiverCL (1)        RS: 224.63

INPUT
Description:
Station Elevation Data    num=      50
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  960.17      .1  960.16    6.04  959.98   12.02  959.73    28.5     960
   29.82  960.35   32.21     961   35.84  961.98   51.63  958.35   52.16  961.34
   60.54  961.02    60.6     961    61.6  960.56   63.27     960    65.8  959.23
   66.55     959   68.53   958.4   74.23  958.03   77.45  957.98   81.29  958.07
   88.75  957.84  112.67  957.28  117.07  957.11  129.66  956.68  137.12  956.49
  142.62  956.39  146.18  955.04  148.91  954.78  149.76  954.93  150.91  954.59
  153.63  952.41  154.23   952.3  156.04  951.41  161.36  952.67  161.73  952.83
   162.6   953.3  165.85  954.83  181.18  956.68  184.93  957.03  191.68  957.33
  214.79  958.58  216.61   958.6  217.04  958.61  217.14   958.8  238.63  961.19
  268.27  960.01  269.62  963.32  287.13   961.1     304  964.26   304.1  964.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  150.91     .07  165.85      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       150.91  165.85          156.59  156.59  156.59             .1       .3

CROSS SECTION
```

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 68.04

INPUT
Description:
Station Elevation Data num= 153

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	9724.52	9968	971.71	4.34998	971.03	14.62	971.02	14.63	971.02
14.67999	971.08	14.82996	971.27	14.88	971.33	15.25	971.83	15.26996	971.84
15.27997	971.84	16.51001	972.24	32.01996	971.94	6.70996	971.56	46.85999	971.55
47.70996	971.54	48.90997	971.52	53.13995	971.44	55.07001	971.4	58.66998	971.34
58.76996	971.34	58.78998	971.33	59.52997	971.09	59.54999	971.08	60.75	971.1
60.81	971.1	70.12	971.25	73.42999	971.3	84.08997	971.04	89.70001	970.91
90.73999	970.88	90.95001	970.88	91.58997	971.09	91.70001	971.12	96.23999	971.19
102.74	971.28	102.96	971.29	103.75	971.3	124.35	971.58	133.88	971.7
139.55	969.78	141.65	969.06	141.67	969.05	143.5	968.43	143.52	968.42
146.22	967.51	146.23	967.5	146.24	967.5	147.31	967.14	149.75	966.3
149.76	966.3	152.49	965.79	152.5	965.78	154.01	965.5	154.08	965.49
158.02	964.75	161.66	964.07	163.03	963.81	164.52	963.53	164.96	963.44
165.6	963.33	165.63	963.32	165.69	963.31	165.86	963.28	166.12	963.23
166.17	963.22	166.3	963.2	166.53	963.15	166.61	963.14	166.76	963.11
166.78	963.11	166.84	963.1	166.96	963.07	167.01	963.06	167.08	963.05
167.11	963.05	167.13	963.04	167.19	963.03	167.2	963.03	167.23	963.02
167.25	963.02	167.33	963	167.35	963	167.42	962.99	167.43	962.98
167.48	962.98	167.49	962.97	167.5	962.97	167.54	962.96	167.57	962.96
167.62	962.95	167.64	962.95	167.64	962.94	167.68	962.94	167.71	962.93
167.72	962.93	167.75	962.92	168.04	962.9	168.63	962.84	171.45	962.64
200.41	960.78	235.15	959.3	243.17	959.11	253.65	958.87	263.91	958.5
277.73	958	290.11	957.58	304.58	957.07	341.15	957.01	343.2	956.99
381.15	956.13	381.34	956.12	382.25	956	397.8	954.35	409.22	953.52
416.78	953.1	417.8	952.92	423.94	952	427.93	950.32	428.94	950.12
429.03	950.14	430.17	950.46	438.44	952.34	439.44	952.98	440.81	954.15
445.32	954.57	469.38	956.48	469.48	956.48	500.54	956.36	506.36	956.17
514.93	956	527.99	956.25	571.85	956.48	580.28	956.77	601.18	956.63
614.9	956.57	648.95	957.14	649.78	957.16	650.15	957.16	650.55	957.25
650.87	957.29	651.59	957.37	654.86	957.76	673.59	960	681.46	961.18
685.01	961.7	689.07	961.75	708.23	961.95	713.71	962.01	720.01	962.07
724.16	962.12	727.11	962.15	754.17	963.07				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	416.78	.07	439.44	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

416.78	439.44	0	0	0	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Mouse Creek Trib

Reach	River Sta.	n1	n2	n3
RiverCL (1)	1559.81	.1	.07	.1
RiverCL (1)	1040.08	.1	.07	.1
RiverCL (1)	690.66	.1	.07	.1
RiverCL (1)	531.38	.1	.07	.1
RiverCL (1)	468.84	.1	.07	.1
RiverCL (1)	315.75	.1	.07	.1
RiverCL (1)	224.63	.1	.07	.1
RiverCL (1)	68.04	.1	.07	.1

SUMMARY OF REACH LENGTHS

River: Mouse Creek Trib

Reach	River Sta.	Left	Channel	Right
RiverCL (1)	1559.81	519.73	519.73	519.73
RiverCL (1)	1040.08	349.42	349.42	349.42
RiverCL (1)	690.66	159.28	159.28	159.28
RiverCL (1)	531.38	62.54	62.54	62.54
RiverCL (1)	468.84	153.09	153.09	153.09
RiverCL (1)	315.75	91.12	91.12	91.12
RiverCL (1)	224.63	156.59	156.59	156.59
RiverCL (1)	68.04	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Mouse Creek Trib

Reach	River Sta.	Contr.	Expan.

RiverCL (1)	1559.81	.1	.3
RiverCL (1)	1040.08	.1	.3
RiverCL (1)	690.66	.1	.3
RiverCL (1)	531.38	.1	.3
RiverCL (1)	468.84	.1	.3
RiverCL (1)	315.75	.1	.3
RiverCL (1)	224.63	.1	.3
RiverCL (1)	68.04	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
RiverCL (1)	68.04	100 yr	595.61	950.12	954.54	954.54	955.57	0.040360	8.42	83.99	49.07	0.87
RiverCL (1)	68.04	10-yr	256.29	950.12	953.37	953.24	954.04	0.050023	6.61	39.41	27.92	0.89
RiverCL (1)	224.63	100 yr	595.61	951.41	957.91	956.51	958.28	0.009228	5.64	186.00	116.04	0.44
RiverCL (1)	224.63	10-yr	256.29	951.41	956.45		956.70	0.008273	4.26	75.27	39.72	0.39
RiverCL (1)	315.75	100 yr	595.61	952.73	958.67	958.67	961.46	0.043845	13.39	44.50	78.64	1.00
RiverCL (1)	315.75	10-yr	256.29	952.73	957.13		958.12	0.023981	7.97	32.15	59.24	0.70
RiverCL (1)	468.84	100 yr	595.61	953.32	963.01		963.99	0.007740	7.94	75.03	206.71	0.46
RiverCL (1)	468.84	10-yr	256.29	953.32	959.49		959.96	0.006875	5.47	46.87	60.68	0.40
RiverCL (1)	531.38	100 yr	595.61	953.47	964.13		964.16	0.000421	1.81	760.63	243.66	0.10
RiverCL (1)	531.38	10-yr	256.29	953.47	960.11		960.17	0.001437	2.36	180.74	71.17	0.17
RiverCL (1)	690.66	100 yr	595.61	955.02	964.20		964.24	0.000609	1.71	403.54	105.40	0.12
RiverCL (1)	690.66	10-yr	256.29	955.02	960.42		960.48	0.002822	2.05	125.46	51.14	0.23
RiverCL (1)	1040.08	100 yr	595.61	965.00	966.90	966.90	967.56	0.058998	6.58	94.34	80.98	0.97
RiverCL (1)	1040.08	10-yr	256.29	965.00	966.24	966.24	966.67	0.077510	5.22	49.10	59.08	1.01
RiverCL (1)	1559.81	100 yr	595.61	974.61	977.34	976.42	977.52	0.009295	3.45	192.64	117.25	0.41
RiverCL (1)	1559.81	10-yr	256.29	974.61	976.55	975.84	976.64	0.008467	2.44	109.03	92.80	0.36

HEC-RAS HEC-RAS 5.0.3 September 2016
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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X    X  XXXXXX   XXXX       XXXX      XX     XXXX
X    X  X       X   X      X  X     X  X   X
X    X  X       X          X  X    X   X   X
XXXXXXX XXXX    X      XXX XXXX    XXXXX   XXXX
X    X  X       X          X  X    X   X       X
X    X  X       X   X      X  X    X   X       X
X    X  XXXXXX   XXXX      X   X   X   X   XXXXX
```

PROJECT DATA
Project Title: Mouse Creek Tributary 2018-05-30
Project File : MouseCreekTributa.prj
Run Date and Time: 5/31/2018 2:54:16 PM

Project in English units

PLAN DATA

Plan Title: Proposed
Plan File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.p08

Geometry Title: blg-pro
Geometry File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.g04

Flow Title : Proposed
Flow File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.f03

Plan Summary Information:
Number of: Cross Sections = 5 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information

Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Proposed
Flow File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.f03

Flow Data (cfs)

River	Reach	RS	100 yr	25 yr	2 yr	100 yr +10%	10-yr
Mouse Creek Trib	RiverCL (1)	1559.81	595.61	256.29	196.97	655.171	256.29

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Mouse Creek Trib	RiverCL (1)	100 yr		Known WS = 963.13
Mouse Creek Trib	RiverCL (1)	25 yr		Normal S = 0.05
Mouse Creek Trib	RiverCL (1)	2 yr		Normal S = 0.05
Mouse Creek Trib	RiverCL (1)	100 yr +10%		Normal S = 0.05
Mouse Creek Trib	RiverCL (1)	10-yr		Known WS = 958.58

GEOMETRY DATA

Geometry Title: blg-pro
Geometry File : h:\projects\2004\04078A - Whispering Woods\doc\calc\Storm\dwg\HECRAS\MouseCreekTributa.g04

CROSS SECTION

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 1559.81

INPUT
Description:
Station Elevation Data num= 125

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	995.72	8.549988	995.14	10.60999	995	13.70001	994.77	24.70001	994
34.5	993.33	8.78998	993	48.28998	992.32	52.85999	992	56.71997	991.74
67.60999	991	79.13	990.25	82.96997	990	92.35999	989.5	101.59	989
109.97	988.57	120.31	988	138.2	987.12	140.53	987	145.2	986.78
161.81	986	168.25	985.67	183.44	985	189.7	984.71	206.66	984
213.05	983.72	224.96	983.25	225.67	983.22	231.36	983	240.78	982.61
256.02	982	270.05	981.46	280.67	981	292.64	980.39	299.67	980.08
301.35	980	307.16	979.7	319.24	979	327.57	978.43	333.05	978
335.61	977.8	346	977	355	976.33	360.35	976	363.5	975.81
372.68	975.28	379.63	975	392.2	974.69	401.77	974.61	402.05	974.62
413.18	975	419.33	975.18	421.63	975.35	426.15	975.54	431.07	975.81
434.59	976	434.89	976.01	440.07	976.27	452.87	977	461.06	977.47
470.21	978	471.35	978.04	491.29	978.19	493.12	978.21	498.61	978.3
506.93	978.26	527.46	978.37	528.13	978.38	529.43	978.4	539.68	978.5
554.76	978.5	573.52	978.78	582.4	979	593.02	979.27	625.77	980
626.55	980.03	639.63	980.52	651.62	981	667.76	981.7	674.49	982
684.04	982.46	695.33	983	700.32	983.25	714.8	984	725.59	984.57
733.8	985	745.98	985.68	751.9	986	759.22	986.58	764.6	987
766.11	987.17	773.71	988	777.36	988.4	779.84	988.67	781.99	989
782.48	989.07	782.6	989.08	782.76	989.1	782.85	989.1	783.1	989.11
783.39	989.12	783.54	989.12	784.58	989.18	788.46	989.47	788.65	989.5
789	989.54	790.38	989.62	796.59	990	812.26	990.97	812.71	991
823.43	991.58	831.3	992	838.19	991.95	839.98	991.94	841.52	991.93
842.36	991.93	844.07	991.92	844.32	991.92	844.68	991.73	849.7	992.07
851.87	992.22	856.92	992.55	859.93	992.76	874.46	994.18	889.49	995.65

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	360.35	.07	434.59	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
360.35	434.59	519.73	519.73	519.73	.1	.3

CROSS SECTION

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 1040.08

INPUT
Description:
Station Elevation Data num= 139

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	996	15.91003	995	31.83002	994	48.31	993	64.82001	992
71.53003	991.68	1.65002	991	92.46002	990.36	98.07001	990	103.97	989.59
112.58	989	116.72	988.71	126.88	988	136.81	987.28	140.69	987
148.58	986.42	154.2	986	156.9	985.8	167.64	985	175.68	984.39
180.77	984	190.26	983.28	193.97	983	195.72	982.87	207.32	982
212.04	981.65	220.63	981	234.1	980	237.55	979.77	248.87	979
255.99	978.52	263.63	978	274.59	977.22	277.74	977	286.96	976.34
291.92	976	293.6	975.88	306.33	975	311.75	974.6	319.87	974
325.09	973.61	333.44	973	336.87	972.75	346.14	972	347.74	971.88
359.21	971	372.03	970.02	372.28	970	372.41	969.99	384.43	969
395.85	968.06	396.58	968	398.46	967.85	398.57	967.84	407.34	967.18
409.7	967	419.15	966.36	422.33	966	434.05	965	441.71	965
451.62	965.03	457.6	965.27	474.7	965.92	478.26	966.16	480.97	966.39
494.44	967	497.82	967.16	513.66	968	532.78	969	546.44	969.71
552.26	970	556.36	970.2	574.98	971	595.96	971.9	598.22	972
621.31	972.98	621.72	973	625.98	973.18	626.83	973.22	629.4	973.32
644.61	973.96	645.67	974	646.7	974.05	667.46	975	686.85	975.89
689.58	976	698.64	976.38	712.53	977	730.14	977.74	735.84	978
750.5	978.6	759.31	979	784.41	980	809.67	981	812.29	981.1
815.77	981.2	841.55	982	854.74	982.45	861.71	982.67	872.21	983
874.98	983.02	879.15	983	879.57	982.82	880.71	982.34	893.57	983
908.5	983.95	909.22	984	909.6	984.02	924.9	984.83	928.08	984.99
928.19	985	928.63	985.02	950.4	986	955	986.21	973.29	987
974.2	987.04	974.33	987.05	974.6	987.06	974.73	987.07	975.98	987.13
977.85	987.22	979.34	987.3	980.58	987.35	981.64	987.4	996.03	988
996.3	988.02	996.83	988.05	1000.43	988.21	1006.58	988.51	1008.68	988.61
1012.46	988.8	1013.76	988.86	1015.7	988.95	1016.94	989	1021.47	989.12
1023.57	989.22	1030.94	989.46	1035.94	989.75	1040.5	990		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	419.15	.07	480.97	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
419.15	480.97	349.42	349.42	349.42	.1	.3

CROSS SECTION

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 690.66

INPUT
Description:
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
73.35	969	83.91	968.24	87.48	968	91.56	967.62	99.2	967
106.07	966.67	110.86	966.49	123.26	966	123.27	966	140.96	965
141.37	964.98	142.74	964.94	143.92	964.82	149.03	964.67	153.12	964.55
159.12	964.37	179.17	959.98	186.05	958.65	189.57	958.19	191.84	955.94
192.33	955.8	194.41	955.04	194.8	955.02	196.59	955.37	197.05	955.39
200.09	956.79	200.5	956.96	211.37	957.32	232.13	961.11	233.06	961.25
238.11	962.07	255.52	963.99	264.68	964.63	270.19	964.76	288.19	965.22
288.7	965.25	295.11	965.61	295.85	965.35	296.85	965	298.89	964.28
299.69	964	301.21	963.46	304.64	964	309.6	964.78	311	965
311.36	965.06	319.38	966	322.86	966.41	334.44	966.72	344.7	967
360.15	967.58								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
73.35	.1	179.17	.07	232.13	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
179.17	232.13	159.28	159.28	159.28	.1	.3

CROSS SECTION

RIVER: Mouse Creek Trib
REACH: RiverCL (1) RS: 531.38

INPUT
Description:
Station Elevation Data num= 184

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	967.15	.1	967.15	1.39	967.12	1.52	967.12	2.6	967.1
3.44	967.09	4.02	967.09	4.91	967.08	6.62	967.04	9.22	967
9.37	967	9.41	967.03	9.53	967	9.66	967	9.75	967
10.88	967.01	11.81	966.99	11.88	967	13.36	966.98	13.41	966.99
15.32	966.96	16.49	966.95	16.76	966.95	19.73	966.89	20.37	966.88
20.42	966.88	21.23	966.87	25.08	966.82	28.87	966.73	34.22	966.64
65.24	965.77	65.5	965.77	66.25	965.74	66.92	965.71	67.02	965.63
80.7	965.69	83.17	965.7	84.33	965.7	88.87	965.66	92.38	965.56

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  92.63  965.56   94.25  965.57   94.57  965.56  101.51  965.29  101.91  965.32
 102.15  965.32  102.37  965.31  102.61  965.12  108.88  964.93  109.48  964.85
 117.86  964.61  119.59  964.55  125.46  964.32  127.74  964.23  134.56  963.84
 134.87  963.93     138  963.82  144.07  963.55  149.55  963.39  151.78  963.33
 153.66  963.29  154.13  963.26  154.32  963.25  158.04  962.99  176.69  961.72
 192.58  960.67  197.84   959.8  201.65  959.51  212.48  957.55  217.74  956.14
 218.38  954.71  219.66  954.28   220.7  953.49  222.43  953.47     224  953.49
 226.04  953.49  227.37  955.06  229.16  955.93  243.27  957.68   246.6  957.92
 253.95  958.46  260.65  959.53  281.99  961.43  291.26   961.5   300.5  961.66
 308.09  961.99  319.03  962.39  325.72  962.61   331.4  962.76  333.63  962.84
 337.64  963.02  338.85  963.02  355.71  963.55  370.37     964  379.05  964.43
  382.2  964.51  389.13   964.7  399.19     965  399.48     965  400.28  965.03
 401.47  965.06  402.46   965.1  405.69  965.21  407.57  965.27  408.44   965.3
 418.35  965.68  420.16  965.74   428.7     966  430.28  966.07   431.6  966.16
 431.88  966.14  432.48  966.23  433.29  966.29  436.37  966.39  442.53  966.92
 447.58  967.33  447.71     967  457.33  968.04  459.75  967.47  462.06  968.41
 468.73   968.9  474.72     968  475.11  969.46  480.95  969.92  482.77  970.06
 482.89  970.07  486.61  968.45  487.83  970.44  492.96  970.92  498.42  968.87
 499.74  968.92  500.09  968.93  503.05     969  503.08     969  503.24     969
 503.28     969  503.39     969  503.73     969  504.08  969.01  504.13  969.01
 505.45  971.53  505.57  971.54  505.64  969.04  505.86  971.55  506.63  971.58
 507.48  969.08  507.51  971.62  508.07  969.08  508.28  971.65   508.3  971.65
 508.69  971.66  508.89  971.66  508.97  971.66   509.6  971.67  509.89  971.67
 509.91  971.68  511.09  971.71  511.26  971.72  512.39  969.19  512.69  971.77
 513.33   971.8  513.84  969.23  516.61  969.26  520.87  969.35  522.91   969.4
 527.59  969.52  530.63  972.66  532.03  972.72  532.15  969.62   532.7  972.75
 534.26  972.82  534.57  972.83  536.36   972.9  538.12  972.97  538.13  969.77
 546.24     970  546.37     970  547.05     970  547.61     970  548.26     970
  548.8     970  550.16  970.01  552.36  973.68  552.46  973.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  217.74     .05  229.16     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.74  229.16            62.54   62.54   62.54             .1       .3

CROSS SECTION


RIVER: Mouse Creek Trib
REACH: RiverCL (1)        RS: 468.84

INPUT
Description:
```

Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
117.22	966.14	120.43	966.02	155.87	963.79	156.8	963.77	157.52	963.71
161.77	963.17	162.6	963.15	163.56	963.01	166.87	962.52	166.97	962.51
167.47	962.49	176.1	962.22	178.1	962.15	178.32	962.14	186.25	961.62
206.78	960.48	211.87	960.24	216.77	959.99	226.32	958.99	233.31	958.4
235.4	958.23	239.38	957.42	250.44	955.76	251.55	955.49	253.59	954.55
253.59	954.53	253.73	953.22	261.5	953.23	261.59	954.32	262.93	955.59
262.98	955.62	263.14	955.64	263.8	955.79	272.11	957.42	279.54	959
285.09	960.02	285.79	960.05	299.03	960.48	323.17	961.31	330.34	961.51
338.38	961.85	345.43	962.16	365.59	962.92	369.97	963	372.16	963.08
380.77	963.4	386.68	963.63	396.35	964	396.89	964.02	397.21	964.03
398.52	964.08	405.57	964.33	412.1	964.57	412.4	964.58	423.67	964.99
423.96	965	425.32	965.07	432.14	965.39	434.81	965.52	444.77	966.31
444.82	966.32	444.87	966.32						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
117.22	.08	239.38	.05	272.11	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
239.38	272.11	0	0	0 .3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
117.22	253.59	963.86	T
261.59	444.87	963.86	T

SUMMARY OF MANNING'S N VALUES

River:Mouse Creek Trib

Reach	River Sta.	n1	n2	n3
RiverCL (1)	1559.81	.1	.07	.1
RiverCL (1)	1040.08	.1	.07	.1
RiverCL (1)	690.66	.1	.07	.1
RiverCL (1)	531.38	.08	.05	.08
RiverCL (1)	468.84	.08	.05	.08

SUMMARY OF REACH LENGTHS

River: Mouse Creek Trib

Reach	River Sta.	Left	Channel	Right
RiverCL (1)	1559.81	519.73	519.73	519.73
RiverCL (1)	1040.08	349.42	349.42	349.42
RiverCL (1)	690.66	159.28	159.28	159.28
RiverCL (1)	531.38	62.54	62.54	62.54
RiverCL (1)	468.84	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Mouse Creek Trib

Reach	River Sta.	Contr.	Expan.
RiverCL (1)	1559.81	.1	.3
RiverCL (1)	1040.08	.1	.3
RiverCL (1)	690.66	.1	.3
RiverCL (1)	531.38	.1	.3
RiverCL (1)	468.84	.3	.5

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
RiverCL (1)	468.84	100 yr	595.61	953.22	963.13	958.79	964.01	0.004183	7.53	79.10	210.77	0.42
RiverCL (1)	468.84	10-yr	256.29	953.22	958.58	956.40	959.14	0.006047	6.00	42.70	46.39	0.46
RiverCL (1)	531.38	100 yr	595.61	953.47	964.11		964.14	0.000252	1.94	756.64	242.84	0.11
RiverCL (1)	531.38	10-yr	256.29	953.47	959.24		959.36	0.001663	3.19	127.60	55.74	0.25
RiverCL (1)	690.66	100 yr	595.61	955.02	964.16		964.20	0.000624	1.72	399.39	104.29	0.12
RiverCL (1)	690.66	10-yr	256.29	955.02	959.72		959.84	0.006754	2.78	92.14	43.95	0.34
RiverCL (1)	1040.08	100 yr	595.61	965.00	966.90	966.90	967.56	0.058998	6.58	94.34	80.98	0.97
RiverCL (1)	1040.08	10-yr	256.29	965.00	966.24	966.24	966.67	0.077510	5.22	49.10	59.08	1.01
RiverCL (1)	1559.81	100 yr	595.61	974.61	977.34	976.42	977.52	0.009295	3.45	192.64	117.25	0.41
RiverCL (1)	1559.81	10-yr	256.29	974.61	976.55	975.84	976.64	0.008467	2.44	109.03	92.80	0.36