



# TIMBER RIDGE DRAINAGE BASIN

# SAPULPA CITYWIDE MASTER DRAINAGE PLAN

JUNE 2010

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## SECTION 15. TIMBER RIDGE DRAINAGE BASIN

### 15.1. EXISTING CONDITIONS HYDROLOGY

The Timber Ridge Drainage Basin generally extends from W. 71<sup>st</sup> Street south beyond W. Hilton Road and from S. 85<sup>th</sup> West Avenue east to Epps Road. It flows south to Polecat Creek and is depicted with its subbasins in **FIGURE 15-1**.

The hydrologic soil groups are presented in **FIGURE 15-2** with more information available in **SECTION 2.1 HYDROLOGIC ANALYSIS**. **FIGURE 15-3** includes the basin's existing land use which can be divided into 3 major categories of use: industrial and commercial, large lot residential, and pastureland and/or forestland. The industrial and commercial development can generally be found adjacent to the Turner Turnpike, the New Sapulpa Road and both sides of W. 81<sup>st</sup> Street. Residences on large acreages are scattered throughout the basin with one major subdivision located between W. 91<sup>st</sup> Street and the Creek Turnpike. The remainder of the land is used as pastureland and forestland.

The hydrologic coefficients used for input in the HEC-HMS model include the drainage area, the lag time and the soil complex curve number (CN). A summary of hydrologic coefficients is tabulated in **TABLE 15-1** with more detailed data in **APPENDIX 15-A**.

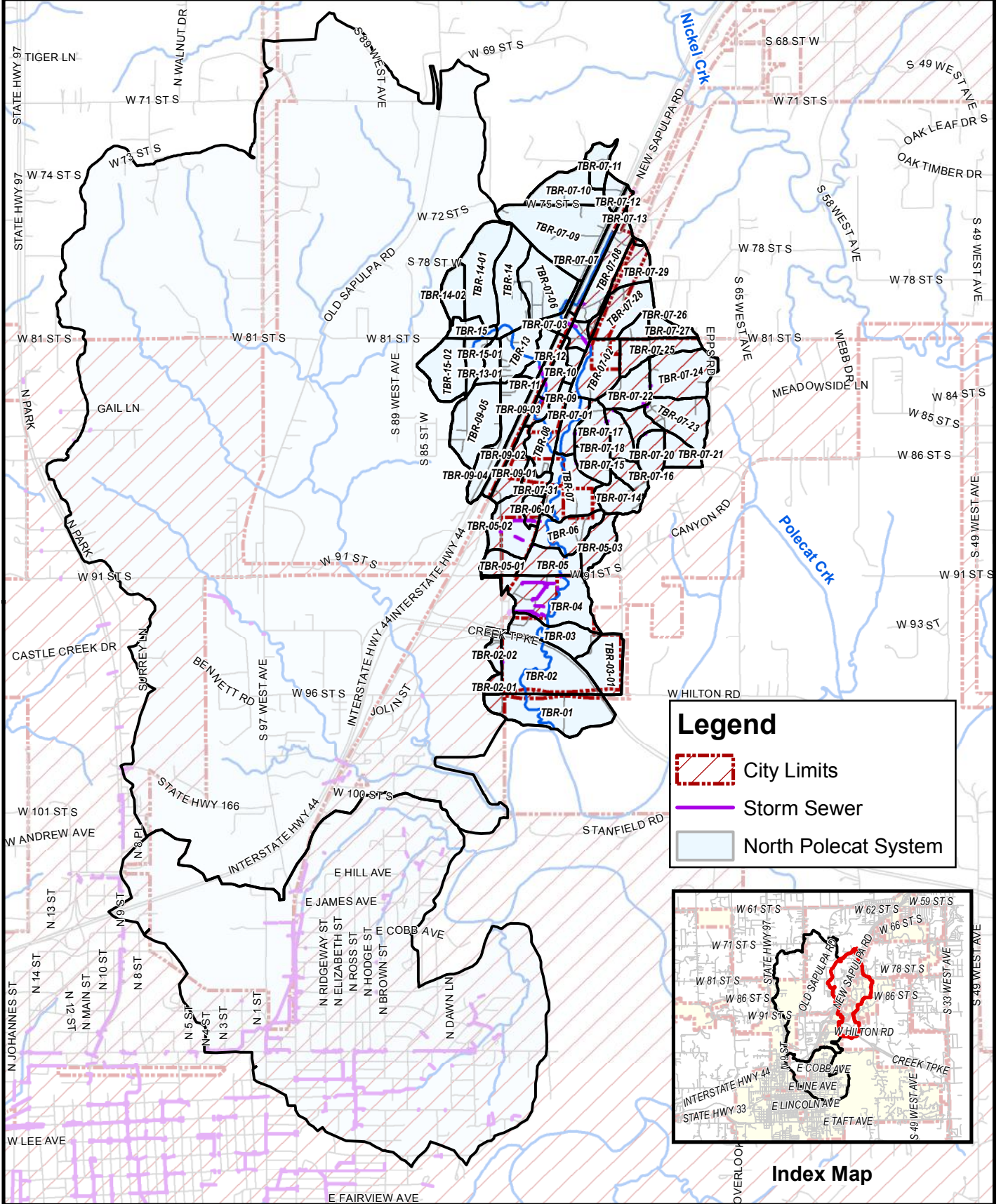
The HEC-HMS schematic used to develop the flow rates for the Timber Ridge Drainage Basin is located in **APPENDIX 15-B** with a complete list of flow rates for the existing conditions in **APPENDIX 15-C**. **TABLE 15-2** shows the resulting flow rates at major junctions in the Timber Ridge Drainage Basin.

### 15.2. EXISTING CONDITIONS HYDRAULICS

There were no major storm sewer systems in the Timber Ridge Drainage Basin. The streams were studied in detail and are identified in **FIGURE 15-4**. A HEC-RAS model was developed for the detailed open channel study. HEC-GeoRAS was used to import the cross section data into the HEC-RAS model. Bridges and culverts details were obtained from field survey data. Normal depth was used as the boundary condition. Manning's "n" were computed with the help of aerial images. Flow rates from the HEC-HMS model were used to perform the backwater analysis. Once the analysis was complete, the floodplains and water surface were created.

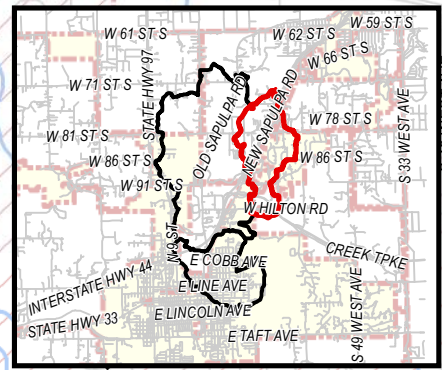
Floodplains were mapped for the Timber Ridge Drainage Basin using the 2-, 10, 100- and 500-year frequencies as shown in **APPENDIX 15-D**. The resulting water surface profiles for each frequency are presented in **APPENDIX 15-E**.

Finally, 14 bridges and culverts were studied to determine the likelihood of overtoppings during certain storm frequencies. Three structures have sufficient capacity to handle storm events with a 0.2% annual chance storm frequency. Three other structures could handle storm events ranging from a 10% to 20% annual chance frequency. The remaining seven structures would

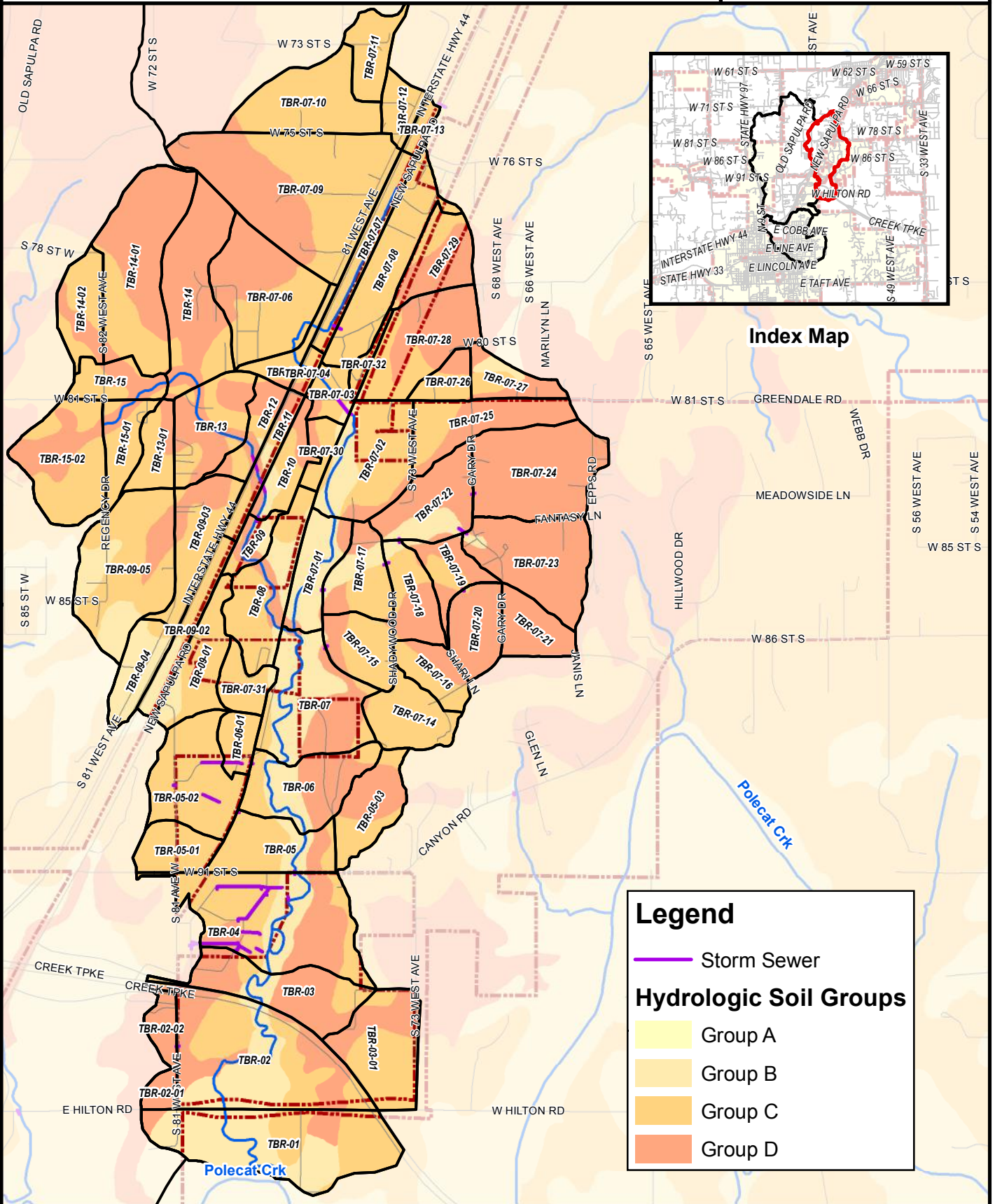


**Legend**

- City Limits
- Storm Sewer
- North Polecat System



Index Map



### Legend

- Storm Sewer

### Hydrologic Soil Groups

- Group A
- Group B
- Group C
- Group D



**TABLE 15-1. TIMBER RIDGE DRAINAGE BASIN –  
SUMMARY OF HYDROLOGIC COEFFICIENTS FOR EXISTING CONDITIONS**

Sub-Area	Drainage Area, Acres	Lag Time, Minutes	Composite CN
TBR-01	43.7	11.3	66.8
TBR-02	50.6	11.8	73.7
TBR-02-01	3.4	1.4	82.4
TBR-02-02	5.1	2.2	81.6
TBR-03	22.7	8.6	80.6
TBR-03-01	22.5	9.6	77.8
TBR-04	43.4	5.6	80.2
TBR-05	17.1	4.7	69.8
TBR-05-01	10.0	4.7	82.3
TBR-05-02	24.2	10.9	88.0
TBR-05-03	14.4	3.5	78.6
TBR-06	21.2	3.6	70.1
TBR-06-01	6.1	44.0	91.0
TBR-07	30.5	3.6	70.0
TBR-07-01	13.2	6.5	64.6
TBR-07-02	25.5	7.4	75.4
TBR-07-03	6.1	2.7	87.5
TBR-07-04	2.4	1.2	85.9
TBR-07-05	5.5	5.8	91.3
TBR-07-06	31.0	4.7	86.2
TBR-07-07	10.6	11.5	84.1
TBR-07-08	23.8	16.5	90.5
TBR-07-09	58.7	7.2	80.7
TBR-07-10	23.6	8.1	77.4
TBR-07-11	10.0	6.5	76.5
TBR-07-12	6.3	4.6	80.9
TBR-07-13	2.7	4.3	84.0
TBR-07-14	14.2	3.7	76.1
TBR-07-15	12.4	3.7	78.0
TBR-07-16	9.5	4.7	80.7
TBR-07-17	13.8	2.9	74.0
TBR-07-18	12.0	4.4	78.1
TBR-07-19	9.3	4.5	79.9
TBR-07-20	12.6	4.1	84.3
TBR-07-21	10.8	4.0	83.7

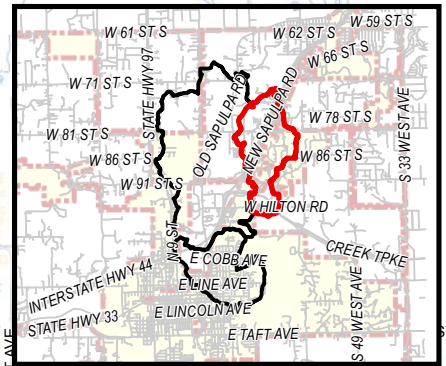
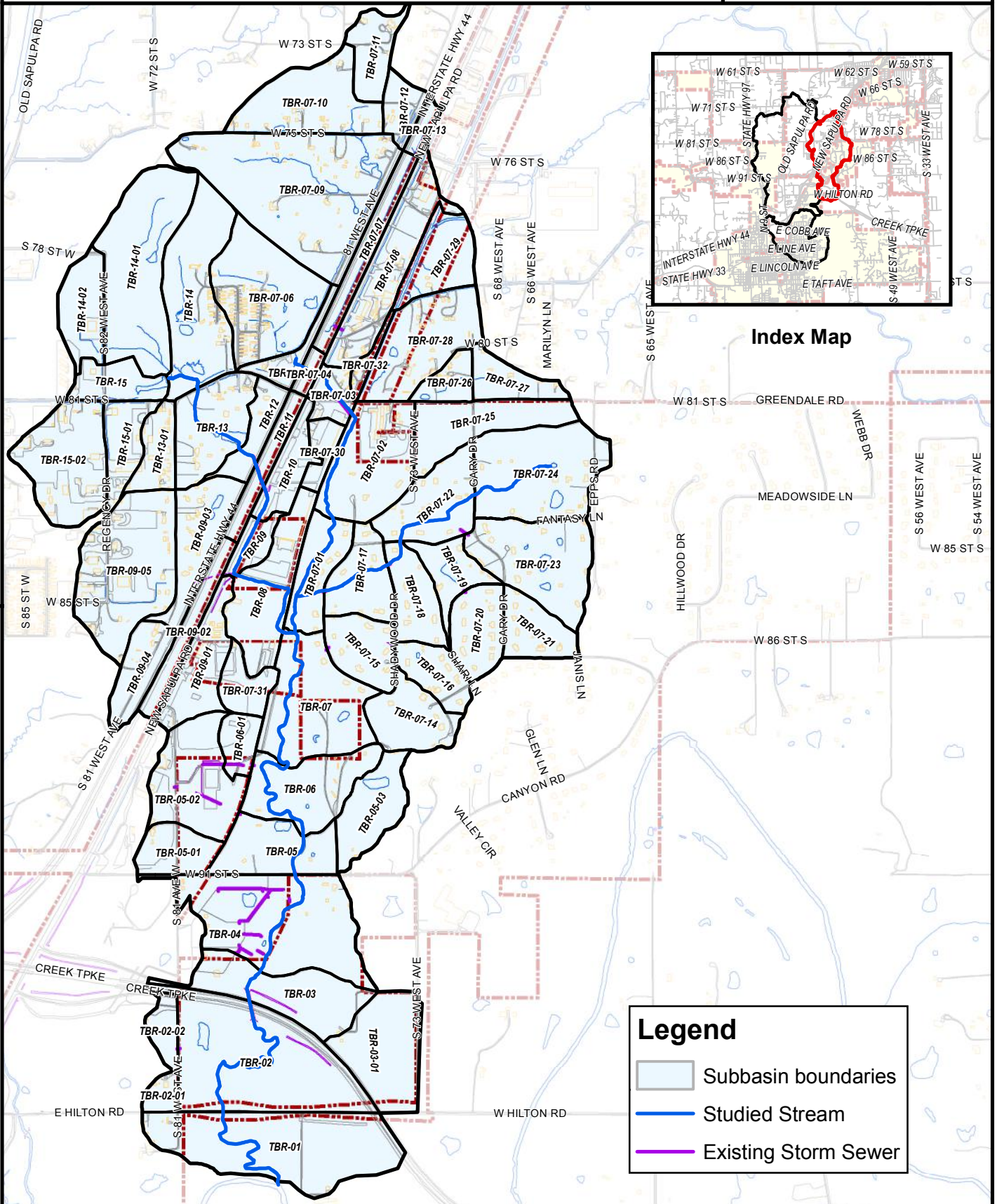


TBR-07-22	18.0	5.1	77.3
TBR-07-23	26.7	5.6	82.2
TBR-07-24	32.1	5.4	79.7
TBR-07-25	18.2	9.9	77.0
TBR-07-26	6.0	3.4	80.1
TBR-07-27	8.6	6.0	78.0
TBR-07-28	23.8	96.4	82.1
TBR-07-29	13.6	5.1	83.4
TBR-07-30	5.0	4.2	91.2
TBR-07-31	7.5	3.2	90.8
TBR-07-32	2.4	6.9	82.4
TBR-08	21.7	7.2	90.4
TBR-09	5.2	2.9	91.5
TBR-09-01	15.3	7.4	91.3
TBR-09-02	9.4	8.6	80.4
TBR-09-03	16.8	7.6	82.5
TBR-09-04	10.7	8.0	72.7
TBR-09-05	35.6	8.7	84.9
TBR-10	9.3	3.9	92.0
TBR-11	7.7	6.3	84.6
TBR-12	8.3	5.6	82.9
TBR-13	19.0	6.2	82.2
TBR-13-01	8.6	5.3	85.6
TBR-14	31.0	6.2	83.8
TBR-14-01	37.2	6.7	85.6
TBR-14-02	12.4	6.0	88.7
TBR-15	9.3	7.3	90.4
TBR-15-01	10.0	8.9	85.6
TBR-15-02	25.1	11.0	91.9

overtop during any storm event having a 50% annual chance frequency (or greater frequency). The locations of these structures are depicted in **FIGURE 15-5**.

**TABLE 15-2. TIMBER RIDGE DRAINAGE BASIN - EXISTING FLOW RATES AT MAJOR JUNCTIONS (CFS)**

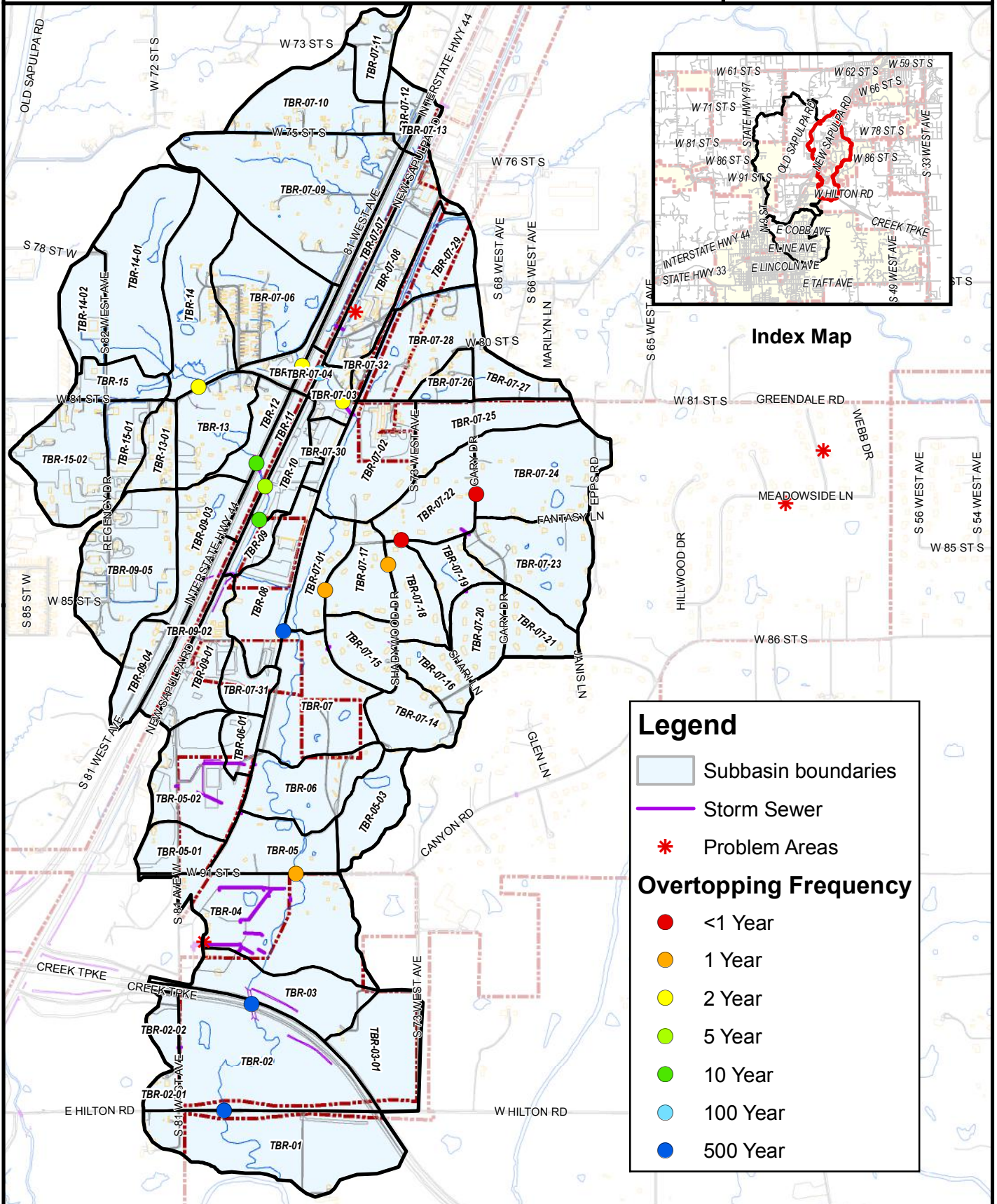
HMS Junction	Street Intersection	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
J-TBR-02	E. Hilton Road	690	1075	1819	2286	2788	3204	3663	4581
J-TBR-03	Creek Turnpike	711	1106	1871	2347	2871	3352	3855	4719
J-TBR-05	91st Street South	693	1076	1809	2258	2791	3532	4055	4854
J-TBR-07-03	Railroad Tracks	192	280	463	528	620	663	737	1064
J-TBR-07-04	New Sapulpa Road	190	282	456	524	617	665	737	1093
J-TBR-07-05	Turner Turnpike	188	279	460	576	720	832	943	1186
J-TBR-07-17	Westway Road	124	214	403	509	647	764	857	1041
J-TBR-07-18	Shadywood Drive	127	218	419	485	620	730	811	975
J-TBR-07-22	Royalwood Way	85	139	254	313	397	462	517	643
J-TBR-07-24	Gary Drive	39	65	110	137	173	200	227	283
J-TBR-08	Railroad Tracks	302	468	744	903	1078	1265	1503	1992
J-TBR-11	New Sapulpa Road	232	342	522	620	759	874	1021	1302
J-TBR-12	Turner Turnpike	227	334	507	602	736	846	988	1253
J-TBR-14	W. 81st Street South	207	304	458	555	677	768	857	1048



**Index Map**

**Legend**

- Subbasin boundaries
- Studied Stream
- Existing Storm Sewer



**Legend**

- Subbasin boundaries
- Storm Sewer
- \* Problem Areas

**Overtopping Frequency**

- <1 Year
- 1 Year
- 2 Year
- 5 Year
- 10 Year
- 100 Year
- 500 Year

### 15.3. PROBLEM AREAS

In addition to the structure overtoppings described earlier, only two other Problem Areas were identified in the Timber Ridge Drainage Basin. A summary of these Problem Areas, including the overtopped structures, is presented below. Their locations are shown in **FIGURE 15-5**.

A. Problem Area 1: 7919 New Sapulpa Road

A citizen has stated that the drainage ditches in this area need “dredging” to improve flow and mitigate flooding to local businesses. In addition, the existing culvert under the New Sapulpa Road (Highway 66), downstream of the Problem Area, is a 4 x 3-foot RCB which is assumed to cause flooding due to backwater from this culvert.

B. Problem Area 2: 8025 Liberty Bell Lane

An existing residence has experienced new development in its area resulting in the newly constructed homes being constructed with higher yards causing flooding in this individual’s yard. The homeowner has tied contacting the contractor but would like assistance from City staff with resolution of issue if possible.

C. Problem Area 3: Overtopped Structures

As mentioned previously, 11 structures would be overtopped during storm events ranging from a 10% annual chance storm to that with a 100% annual chance. Of these 11, at least 8 would be overtopped frequently (storm events with a 50% annual chance frequency or greater).

#### 15.4. EVALUATION OF ALTERNATIVES

Alternatives were considered for the identified Problem Areas with detailed cost estimates located in **APPENDIX 15-F**. Alternatives are summarized below with exhibits for each alternative presented in the following pages.

##### A. Problem Area 1: 7919 New Sapulpa Road

Alternative 1 - Improve drainage ditch and construct detention. In this alternative, water from Subbasin TBR-07-08, an existing commercial area, would be diverted south through an improved drainage ditch along the east side of New Sapulpa Road (or Highway 66) and then into a small detention basin with an outfall into the creek downstream of W. 81<sup>st</sup> Street. This diversion would include the replacement of two existing culverts (one at W. 78<sup>th</sup> Street and the other south of W. 78<sup>th</sup> Street) with two 5 x 3-foot RCBs and grading and lining of approximately 315 feet of ditch with concrete.

The detention would be a small one constructed at the northeast corner of the intersection of New Sapulpa Road and W. 81<sup>st</sup> Street. Stormwater would outflow through the existing 84-inch CMP (with a 10% annual chance capacity) into two new 36-inch RCPs approximately 215 feet east and under the railroad. From there, stormwater would flow through 50 feet of proposed 10 X 6-foot RCB under W. 81<sup>st</sup> Street and into the existing channel.

The detention would have an approximate surface area of 1.2 acres with an elevation of 716 feet and a storage capacity of 8.9 acre-feet. A berm, 143 feet long, would also be constructed along the detention's southern perimeter, to avoid overflow onto 81<sup>st</sup> Street through an existing low point.

The cost for this alternative would be approximately \$720,000 and is depicted in **FIGURE 15-6**.

##### B. Problem Area 2: 8025 Liberty Bell Lane

This Problem Area is a private problem; therefore, no action is recommended.

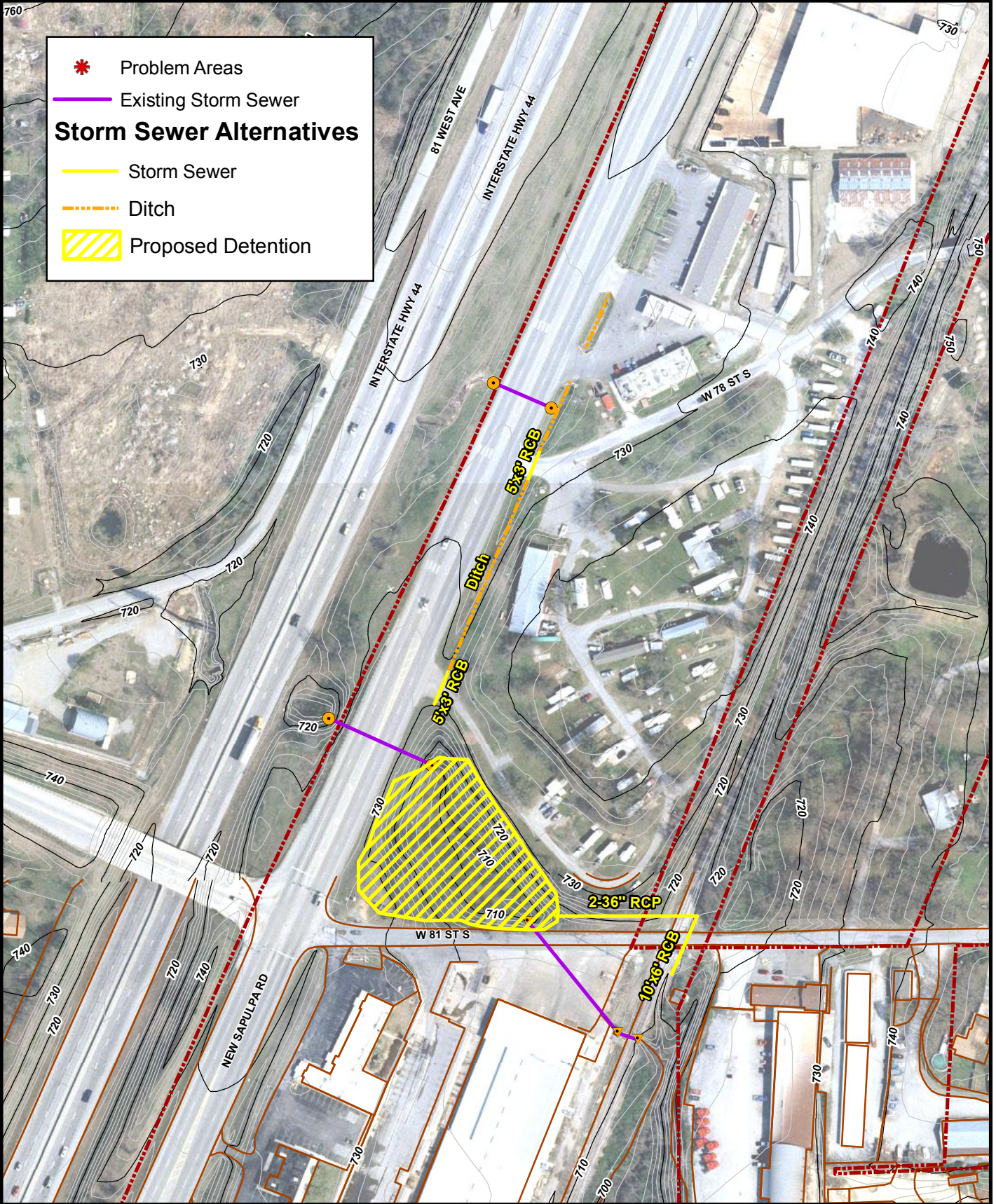
##### C. Problem Area 3: Overtopped Structures

Based on direction from the City, no replacement alternatives were studied for the overtopped structures in this basin.

- \* Problem Areas
- Existing Storm Sewer

### Storm Sewer Alternatives

- Storm Sewer
- - - Ditch
- Proposed Detention



15.5. RECOMMENDED PLAN

Using prioritization criteria from **SECTION 1 INTRODUCTION** and after discussions with City staff, the following alternatives were selected for the Timber Ridge Drainage Basin. In some cases, “No Action” was the selected course. For more details, please refer to the text and exhibits in **SECTION 15-4 EVALUATION OF ALTERNATIVES** and **APPENDIX 15-F**.

The Recommended Plan for the Timber Ridge Drainage Basin is:

<b>PROBLEM AREA</b>	<b>RECOMMENDED ALTERNATIVE</b>	<b>RATIONALE FOR SELECTION</b>	<b>ESTIMATED COST</b>
Problem Area 1	Alternative 1	This was the only viable alternative for this Problem Area.	\$720,000
Problem Area 2	Alternative 2	This Problem Area is a private problem; therefore, no action is recommended.	-0-
Problem Area 3	No Action	No replacement alternatives were studied for the overtopped structures in this basin.	-0-
		<b>TOTAL COST</b>	<b>\$720,000</b>



**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D			
									3800	A	B	C	D	A	B	C	D		94.3	
TBR-01		2789																		
	Overland	293	2.09	1.01	4.81			Forest (good cover)	31	25	55	70	77	0.0	28.6	2.3	0.0	66.8	43.7	0.06822
	Channel (ditch)	1505	2.84	2.52	9.95			Impervious	5	98	98	98	98	0.0	1.2	3.1	0.8			
	Paved			0.00	0.00			Pasture: Good Condition	57	39	61	74	80	0.0	22.6	28.8	5.2			
	Pipe			0.00	0.00			Residential 2 acre	7	46	65	77	82	0.0	5.1	0.0	2.3			
Stream	991	0.00	4.00	4.13	11.3	0.19														
TBR-02		3123																		
	Overland	293	1.91	0.97	5.04			Forest (good cover)	21	25	55	70	77	0.0	12.5	4.8	3.5	73.7	50.6	0.07913
	Channel (ditch)	406	1.41	1.76	3.84			Impervious	13	98	98	98	98	0.0	2.1	5.0	6.0			
	Paved	620	2.47	3.14	3.29			Pasture: Good Condition	66	39	61	74	80	0.0	18.0	25.4	22.8			
	Pipe			0.00	0.00															
Stream	1804	0.00	4.00	7.52	11.8	0.20														
TBR-02-01		446																		
	Overland	61	6.56	1.80	0.56			Forest (good cover)	0	25	55	70	77	0.0	0.0	0.0	0.4	82.4	3.4	0.00524
	Channel (ditch)	385	5.55	3.55	1.81			Impervious	6	98	98	98	98	0.0	1.3	0.0	4.8			
	Paved			0.00	0.00			Pasture: Good Condition	14	39	61	74	80	0.0	0.0	0.0	13.8			
	Pipe			0.00	0.00			Residential 2 acre	80	46	65	77	82	0.0	1.6	0.0	78.0			
Stream			0.00	0.00	1.4	0.02														
TBR-02-02		526																		
	Overland	195	6.00	1.72	1.89			Forest (good cover)	15	25	55	70	77	0.0	0.0	0.0	14.5	81.6	5.1	0.00793
	Channel (ditch)	331	3.99	3.00	1.84			Impervious	11	98	98	98	98	0.0	0.0	0.0	10.6			
	Paved			0.00	0.00			Pasture: Good Condition	73	39	61	74	80	0.0	0.0	0.0	72.7			
	Pipe			0.00	0.00			Residential 1 acre	2	51	68	79	84	0.0	0.0	0.0	2.2			
Stream			0.00	0.00	2.2	0.04														
TBR-03		1638																		
	Overland	294	1.81	0.94	5.19			Impervious	6	98	98	98	98	0.0	1.0	1.8	3.1	80.6	22.7	0.03551
	Channel (ditch)	1171	2.37	2.30	8.50			Pasture: Good Condition	73	39	61	74	80	0.0	10.4	15.2	47.8			
	Paved			0.00	0.00			Residential 1/8 acre	21	77	85	90	92	0.0	0.0	1.5	19.3			
	Pipe			0.00	0.00															
Stream	173	0.00	4.00	0.72	8.6	0.14														
TBR-03-01		1266																		
	Overland	290	1.61	0.89	5.45			Impervious	7	98	98	98	98	0.0	0.0	4.3	2.9	77.8	22.5	0.03515
	Channel (ditch)	976	1.09	1.55	10.52			Pasture: Good Condition	92	39	61	74	80	0.0	0.0	59.4	32.8			
	Paved			0.00	0.00			Residential 1/8 acre	1	77	85	90	92	0.0	0.0	0.2	0.3			
	Pipe			0.00	0.00															
Stream			0.00	0.00	9.6	0.16														

**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)	
										A	B	C	D	A	B	C	D				
									3800	A	B	C	D	A	B	C	D		94.3		
TBR-04		1470																			
	Overland	262	4.84	1.55	2.82			Impervious	2	98	98	98	98	0.0	0.2	1.7	0.1	80.2	43.4	0.06777	
	Channel (ditch)	541	2.54	2.38	3.79			Pasture: Good Condition	36	39	61	74	80	0.0	15.8	6.8	13.3				
	Paved			0.00	0.00			Residential 1/8 acre	38	77	85	90	92	0.0	0.4	31.4	5.9				
	Pipe			0.00	0.00			Forest (poor cover)	1	45	66	77	83	0.0	0.0	0.7	0.0				
	Stream	667	0.00	4.00	2.78	5.6	0.09	Residential 2 acre	24	46	65	77	82	0.0	4.0	7.5	12.2				
TBR-05		928																			
	Overland	289	4.06	1.42	3.41			Forest (good cover)	93	25	55	70	77	0.0	17.4	64.1	11.6	69.8	17.1	0.02673	
	Channel (ditch)	519	2.21	2.22	3.90			Impervious	5	98	98	98	98	0.0	2.0	3.1	0.3				
	Paved			0.00	0.00			Pasture: Good Condition	1	39	61	74	80	0.0	0.0	1.5	0.0				
	Pipe			0.00	0.00																
	Stream	121	0.00	4.00	0.50	4.7	0.08														
TBR-05-01		895																			
	Overland	288	1.67	0.91	5.29			Forest (good cover)	23	25	55	70	77	0.0	0.0	22.8	0.0	82.3	10.0	0.01560	
	Channel (ditch)	608	6.80	3.93	2.57			Impervious	2	98	98	98	98	0.0	0.0	2.3	0.0				
	Paved			0.00	0.00			Industrial	51	81	88	91	93	0.0	0.0	50.8	0.0				
	Pipe			0.00	0.00			Pasture: Good Condition	24	39	61	74	80	0.0	0.0	24.1	0.0				
	Stream			0.00	0.00	4.7	0.08														
TBR-05-02		1353																			
	Overland	380	0.42	0.45	13.98			Forest (good cover)	1	25	55	70	77	0.0	0.0	0.8	0.0	88.0	24.2	0.03781	
	Channel (ditch)	972	6.77	3.93	4.13			Industrial	83	81	88	91	93	0.0	0.0	82.8	0.0				
	Paved			0.00	0.00			Pasture: Good Condition	16	39	61	74	80	0.0	0.0	16.4	0.0				
	Pipe			0.00	0.00																
	Stream			0.00	0.00	10.9	0.18														
TBR-05-03		1287																			
	Overland	284	13.38	2.58	1.84			Forest (good cover)	11	25	55	70	77	0.0	0.0	6.3	4.6	78.6	14.4	0.02244	
	Channel (ditch)	793	7.60	4.16	3.17			Impervious	6	98	98	98	98	0.0	0.0	1.1	5.3				
	Paved			0.00	0.00			Pasture: Good Condition	65	39	61	74	80	0.0	0.0	21.3	43.3				
	Pipe			0.00	0.00			Residential 2 acre	18	46	65	77	82	0.0	0.0	18.1	0.0				
	Stream	210	0.00	4.00	0.87	3.5	0.06														
TBR-06		1322																			
	Overland	190	8.64	2.07	1.53			Forest (good cover)	80	25	55	70	77	0.0	30.5	16.0	33.0	70.1	21.2	0.03307	
	Channel (ditch)	1132	7.99	4.27	4.42			Impervious	3	98	98	98	98	0.0	0.1	0.1	2.6				
	Paved			0.00	0.00			Industrial	1	81	88	91	93	0.0	0.0	1.2	0.0				
	Pipe			0.00	0.00			Pasture: Good Condition	13	39	61	74	80	0.0	0.0	2.7	9.8				
	Stream			0.00	0.00	3.6	0.06	Residential 2 acre	4	46	65	77	82	0.0	0.0	4.0	0.0				

**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D			
									3800	A	B	C	D	A	B	C	D		94.3	
TBR-06-01	Overland	6207																		
	Channel (ditch)	114	4.44	1.48	1.29			Industrial	100	81	88	91	93	0.0	0.0	100.0	0.0	91.0	6.1	0.00950
	Paved	6093	0.91	1.41	72.03															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	44.0	0.73													
TBR-07	Overland	1285																		
	Channel (ditch)	119	9.18	2.13	0.93			Forest (good cover)	44	25	55	70	77	0.0	25.8	3.3	15.2	70.0	30.5	0.04770
	Paved	1165	6.46	3.83	5.07			Impervious	2	98	98	98	98	0.0	0.0	0.5	1.8			
	Pipe			0.00	0.00			Industrial	4	81	88	91	93	0.0	0.7	3.1	0.0			
	Stream			0.00	0.00	3.6	0.06	Pasture: Good Condition	15	39	61	74	80	0.0	12.4	2.2	0.0			
								Pasture: Poor Condition	9	68	79	86	89	0.0	0.8	0.0	8.1			
								Residential 1 acre	15	51	68	79	84	0.0	6.8	2.0	5.7			
								Residential 2 acre	0	46	65	77	82	0.0	0.0	0.1	0.0			
								Residential 5 acre	11	46	65	77	82	0.0	8.4	0.0	3.0			
TBR-07-01	Overland	1404																		
	Channel (ditch)	298	3.09	1.23	4.02			Forest (good cover)	47	25	55	70	77	0.0	42.7	0.0	3.8	64.6	13.2	0.02060
	Paved	626	2.13	2.17	4.80			Residential 1 acre	53	51	68	79	84	0.0	42.1	0.0	11.1			
	Pipe			0.00	0.00			Industrial	0	81	88	91	93	0.0	0.2	0.0	0.0			
	Stream	480	0.00	4.00	2.00	6.5	0.11													
TBR-07-02	Overland	1861																		
	Channel (ditch)	168	7.30	1.90	1.47			Forest (good cover)	44	25	55	70	77	0.0	23.6	20.4	0.5	75.4	25.5	0.03992
	Paved	1529	2.82	2.51	10.16			Impervious	1	98	98	98	98	0.0	0.1	1.1	0.1			
	Pipe			0.00	0.00			Industrial	31	81	88	91	93	0.0	1.2	29.5	0.0			
	Stream	164	0.00	4.00	0.68	7.4	0.12	Residential 1 acre	12	51	68	79	84	0.0	2.4	5.4	4.2			
								Residential 2 acre	11	46	65	77	82	0.0	0.0	6.7	4.8			
TBR-07-03	Overland	723																		
	Channel (ditch)	291	5.60	1.66	2.91			Impervious	11	98	98	98	98	0.0	0.7	7.0	3.4	87.5	6.1	0.00954
	Paved	99	28.40	8.17	0.20			Industrial	36	81	88	91	93	0.0	9.0	19.2	8.0			
	Pipe			0.00	0.00			Residential 1/4 acre	53	61	75	83	87	0.0	0.4	49.8	2.6			
	Stream	334	0.00	4.00	1.39	2.7	0.05													

**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)	
										A	B	C	D	A	B	C	D				
									3800	A	B	C	D	A	B	C	D		94.3		
TBR-07-04		235																			
	Overland	158	4.21	1.44	1.83			Impervious	47	98	98	98	98	0.0	0.0	34.9	12.4	85.9	2.4	0.00372	
	Channel (ditch)	77	21.72	7.12	0.18			Pasture: Good Condition	53	39	61	74	80	0.0	0.0	42.8	9.9				
	Paved			0.00	0.00																
	Pipe			0.00	0.00																
	Stream			0.00	0.00	1.2	0.02														
TBR-07-05		2261																			
	Overland	234	2.51	1.11	3.51			Impervious	37	98	98	98	98	0.0	0.0	33.5	4.0	91.3	5.5	0.00858	
	Channel (ditch)	681	1.84	2.02	5.62			Industrial	49	81	88	91	93	0.0	0.0	46.4	2.3				
	Paved			0.00	0.00			Pasture: Good Condition	14	39	61	74	80	0.0	0.0	13.8	0.0				
	Pipe			0.00	0.00																
	Stream	124	0.00	4.00	0.52	5.8	0.10														
TBR-07-06		1427																			
	Overland	101	38.10	4.36	0.39			Forest (poor cover)	29	45	66	77	83	0.0	0.0	4.5	24.3	86.2	31.0	0.04846	
	Channel (ditch)	652	16.50	6.19	1.76			Impervious	2	98	98	98	98	0.0	0.0	2.4	0.0				
	Paved			0.00	0.00			Pasture: Poor Condition	31	68	79	86	89	0.0	0.0	29.0	2.2				
	Pipe			0.00	0.00			Residential 1/8 acre	29	77	85	90	92	0.0	0.0	19.0	10.2				
	Stream	1346	0.00	4.00	5.61	4.7	0.08	Residential 2 acre	8	46	65	77	82	0.0	0.0	0.0	8.4				
TBR-07-07		2226																			
	Overland	193	6.79	1.83	1.75			Impervious	42	98	98	98	98	0.0	0.0	42.2	0.0	84.1	10.6	0.01656	
	Channel (ditch)	1360	1.11	1.56	14.56			Pasture: Good Condition	58	39	61	74	80	0.0	0.0	57.8	0.0				
	Paved			0.00	0.00																
	Pipe			0.00	0.00																
	Stream	673	0.00	4.00	2.81	11.5	0.19														
TBR-07-08		2057																			
	Overland	317	1.18	0.76	6.96			Impervious	11	98	98	98	98	0.0	0.0	11.4	0.0	90.5	23.8	0.03726	
	Channel (ditch)	1740	0.91	1.41	20.57			Industrial	72	81	88	91	93	0.0	0.0	71.7	0.4				
	Paved			0.00	0.00			Residential 1/4 acre	17	61	75	83	87	0.0	0.0	16.5	0.0				
	Pipe			0.00	0.00																
	Stream			0.00	0.00	16.5	0.28														
TBR-07-09		3043																			
	Overland	61	24.00	3.46	0.29			Forest (good cover)	6	25	55	70	77	0.0	0.0	4.2	2.2	80.7	58.7	0.09168	
	Channel (ditch)	364	20.36	6.89	0.88			Forest (poor cover)	39	45	66	77	83	0.0	0.0	7.9	31.3				
	Paved			0.00	0.00			Impervious	5	98	98	98	98	0.0	0.0	5.0	0.1				
	Pipe			0.00	0.00			Pasture: Good Condition	2	39	61	74	80	0.0	0.0	1.8	0.0				
	Stream	2618	0.00	4.00	10.91	7.2	0.12	Residential 1 acre	29	51	68	79	84	0.0	0.0	27.7	1.3				
								Residential 2 acre	18	46	65	77	82	0.0	0.0	9.6	8.4				
								Residential 5 acre	1	46	65	77	82	0.0	0.0	0.0	0.7				

**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D			
									3800	A	B	C	D	A	B	C	D		94.3	
TBR-07-10		1871																		
	Overland	255	8.99	2.11	2.01			Forest (good cover)	3	25	55	70	77	0.0	0.0	3.1	0.0	77.4	23.6	0.03681
	Channel (ditch)	1616	2.48	2.35	11.47			Forest (poor cover)	0	45	66	77	83	0.0	0.0	0.0	0.2			
	Paved			0.00	0.00			Impervious	2	98	98	98	98	0.0	0.0	1.7	0.2			
	Pipe			0.00	0.00			Pasture: Good Condition	29	39	61	74	80	0.0	0.0	29.3	0.0			
	Stream			0.00	0.00		8.1	0.13	Residential 1 acre	52	51	68	79	84	0.0	0.0	49.2			
								Residential 5 acre	14	46	65	77	82	0.0	0.0	14.0	0.0			
TBR-07-11		1034																		
	Overland	292	2.06	1.01	4.84			Impervious	1	98	98	98	98	0.0	0.0	0.9	0.0	76.5	10.0	0.01556
	Channel (ditch)	742	1.98	2.09	5.92			Pasture: Good Condition	25	39	61	74	80	0.0	0.0	24.7	0.0			
	Paved			0.00	0.00			Residential 5 acre	74	46	65	77	82	0.0	0.0	74.4	0.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00		6.5	0.11												
TBR-07-12		969																		
	Overland	267	2.75	1.16	3.83			Impervious	21	98	98	98	98	0.0	0.0	21.0	0.0	80.9	6.3	0.00991
	Channel (ditch)	264	2.28	2.25	1.95			Pasture: Good Condition	40	39	61	74	80	0.0	0.0	39.8	0.0			
	Paved			0.00	0.00			Residential 1 acre	34	51	68	79	84	0.0	0.0	33.9	0.0			
	Pipe			0.00	0.00			Residential 2 acre	3	46	65	77	82	0.0	0.0	3.0	0.0			
	Stream	439	0.00	4.00	1.83		4.6	0.08	Residential 5 acre	2	46	65	77	82	0.0	0.0	2.4			
TBR-07-13		617																		
	Overland	207	3.22	1.26	2.74			Impervious	42	98	98	98	98	0.0	0.0	41.7	0.0	84.0	2.7	0.00428
	Channel (ditch)	410	1.07	1.53	4.45			Pasture: Good Condition	58	39	61	74	80	0.0	0.0	58.3	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00		4.3	0.07												
TBR-07-14		1169																		
	Overland	267	4.24	1.45	3.08			Forest (good cover)	36	25	55	70	77	0.0	0.0	35.1	1.2	76.1	14.2	0.02220
	Channel (ditch)	902	10.58	4.93	3.05			Impervious	2	98	98	98	98	0.0	0.0	1.8	0.0			
	Paved			0.00	0.00			Residential 1 acre	58	51	68	79	84	0.0	0.0	58.1	0.2			
	Pipe			0.00	0.00			Residential 2 acre	4	46	65	77	82	0.0	0.0	3.7	0.0			
	Stream			0.00	0.00		3.7	0.06												
TBR-07-15		1075																		
	Overland	151	4.24	1.45	1.74			Forest (good cover)	24	25	55	70	77	0.0	0.0	21.7	2.0	78.0	12.4	0.01931
	Channel (ditch)	924	5.54	3.54	4.35			Residential 1 acre	76	51	68	79	84	0.0	0.9	53.7	21.7			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00		3.7	0.06												

**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D			
									3800	A	B	C	D	A	B	C	D		94.3	
TBR-07-16	Overland	1096						Impervious	3	98	98	98	98	0.0	0.0	2.1	0.4	80.7	9.5	0.01483
	Channel (ditch)	204	3.54	1.32	2.57			Residential 1 acre	72	51	68	79	84	0.0	0.0	47.6	24.4			
	Paved	892	3.47	2.79	5.33			Residential 2 acre	25	46	65	77	82	0.0	0.0	15.5	10.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	4.7	0.08													
TBR-07-17	Overland	1059						Forest (good cover)	38	25	55	70	77	0.0	1.7	33.0	3.5	74.0	13.8	0.02151
	Channel (ditch)	175	8.02	1.99	1.46			Residential 1 acre	62	51	68	79	84	0.0	26.2	9.8	25.8			
	Paved	499	9.97	4.79	1.74			Residential 2 acre	0	46	65	77	82	0.0	0.1	0.0	0.0			
	Pipe			0.00	0.00															
	Stream		0.00	4.00	1.61	2.9	0.05													
TBR-07-18	Overland	1376						Forest (good cover)	23	25	55	70	77	0.0	1.0	20.4	1.4	78.1	12.0	0.01873
	Channel (ditch)	211	5.31	1.62	2.17			Residential 1 acre	30	51	68	79	84	0.0	0.3	10.7	19.1			
	Paved	1165	6.13	3.73	5.20			Residential 2 acre	47	46	65	77	82	0.0	5.6	3.7	37.9			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	4.4	0.07													
TBR-07-19	Overland	1319						Forest (good cover)	42	25	55	70	77	0.0	2.5	17.7	21.4	79.9	9.3	0.01452
	Channel (ditch)	265	3.67	1.35	3.29			Impervious	9	98	98	98	98	0.0	0.0	8.0	1.4			
	Paved	433	8.95	4.53	1.60			Residential 1 acre	29	51	68	79	84	0.0	0.4	0.3	28.1			
	Pipe			0.00	0.00			Residential 2 acre	20	46	65	77	82	0.0	0.5	3.2	16.5			
	Stream		0.00	4.00	2.58	4.5	0.07													
TBR-07-20	Overland	1055						Impervious	3	98	98	98	98	0.0	0.0	0.0	2.7	84.3	12.6	0.01967
	Channel (ditch)	260	4.31	1.46	2.97			Residential 1 acre	97	51	68	79	84	0.0	0.0	0.8	96.5			
	Paved	795	5.15	3.41	3.88															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	4.1	0.07													
TBR-07-21	Overland	932						Impervious	4	98	98	98	98	0.0	0.0	0.0	4.4	83.7	10.8	0.01689
	Channel (ditch)	207	3.87	1.38	2.49			Pasture: Good Condition	23	39	61	74	80	0.0	0.0	0.0	22.8			
	Paved	725	3.68	2.87	4.21			Residential 1 acre	73	51	68	79	84	0.0	0.0	0.0	72.8			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	4.0	0.07													

**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)			
										A	B	C	D	A	B	C	D						
									3800	A	B	C	D	A	B	C	D		94.3				
TBR-07-22	Overland	1650																					
	Channel (ditch)	300	5.47	1.64	3.04			Forest (good cover)	13	25	55	70	77	0.0	0.0	0.0	12.7	77.3	18.0	0.02808			
	Paved	435	9.07	4.56	1.59			Impervious	2	98	98	98	98	0.0	0.0	0.0	2.1						
	Pipe			0.00	0.00			Residential 1 acre	3	51	68	79	84	0.0	0.1	0.0	3.0						
	Stream	915	0.00	4.00	3.81	5.1	0.08	Residential 2 acre	82	46	65	77	82	0.0	26.2	0.0	56.0						
TBR-07-23	Overland	1587																					
	Channel (ditch)	299	3.30	1.28	3.91			Forest (good cover)	9	25	55	70	77	0.0	0.0	0.0	8.6	82.2	26.7	0.04176			
	Paved	192	5.22	3.44	0.93			Impervious	7	98	98	98	98	0.0	0.3	0.0	6.4						
	Pipe			0.00	0.00			Pasture: Good Condition	37	39	61	74	80	0.0	0.0	0.0	37.0						
	Stream	1097	0.00	4.00	4.57	5.6	0.09	Residential 1 acre	31	51	68	79	84	0.0	2.1	0.0	29.4						
							Residential 2 acre	16	46	65	77	82	0.0	0.1	0.0	16.1							
TBR-07-24	Overland	1578																					
	Channel (ditch)	309	4.18	1.44	3.59			Forest (good cover)	56	25	55	70	77	0.0	0.0	0.0	55.6	79.7	32.1	0.05021			
	Paved	285	6.32	3.79	1.25			Impervious	3	98	98	98	98	0.0	0.0	0.0	3.4						
	Pipe			0.00	0.00			Pasture: Good Condition	10	39	61	74	80	0.0	0.0	0.0	9.9						
	Stream	983	0.00	4.00	4.10	5.4	0.09	Residential 1 acre	5	51	68	79	84	0.0	0.0	0.0	4.7						
							Residential 2 acre	26	46	65	77	82	0.0	0.0	0.0	26.5							
TBR-07-25	Overland	2156																					
	Channel (ditch)	296	1.66	0.90	5.46			Forest (good cover)	55	25	55	70	77	0.0	0.0	30.3	24.8	77.0	18.2	0.02848			
	Paved	1859	3.48	2.79	11.09			Impervious	4	98	98	98	98	0.0	0.0	1.8	2.5						
	Pipe			0.00	0.00			Pasture: Good Condition	36	39	61	74	80	0.0	0.0	0.0	36.0						
	Stream			0.00	0.00	9.9	0.17	Residential 2 acre	5	46	65	77	82	0.0	0.0	0.7	3.8						
TBR-07-26	Overland	737																					
	Channel (ditch)	263	2.84	1.18	3.71			Impervious	7	98	98	98	98	0.0	0.0	6.9	0.5	80.1	6.0	0.00943			
	Paved			0.00	0.00			Residential 2 acre	93	46	65	77	82	0.0	0.0	62.1	30.4						
	Pipe			0.00	0.00																		
	Stream	474	0.00	4.00	1.97	3.4	0.06																
TBR-07-27	Overland	1118																					
	Channel (ditch)	298	2.46	1.10	4.52			Impervious	3	98	98	98	98	0.0	0.0	0.0	2.9	78.0	8.6	0.01339			
	Paved	820	2.75	2.48	5.52			Residential 2 acre	97	46	65	77	82	0.0	18.5	26.9	51.8						
	Pipe			0.00	0.00																		
	Stream			0.00	0.00	6.0	0.10																

**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)	
										A	B	C	D	A	B	C	D				
									3800	A	B	C	D	A	B	C	D		94.3		
TBR-07-28	Overland	4981																			
	Channel (ditch)	3001	0.24	0.34	146.40			Forest (good cover)	14	25	55	70	77	0.0	1.1	12.9	0.0	82.1	23.8	0.03720	
	Paved	1321	1.66	1.91	11.52			Impervious	2	98	98	98	98	0.0	0.1	0.7	1.4				
	Pipe			0.00	0.00			Pasture: Poor Condition	28	68	79	86	89	0.0	0.0	3.4	24.5				
	Stream	659	0.00	4.00	2.75	96.4	1.61	Residential 1/2 acre	18	54	70	80	85	0.0	0.0	0.0	18.2				
								Residential 1/4 acre	0	61	75	83	87	0.0	0.1	0.3	0.0				
							Residential 2 acre	38	46	65	77	82	0.0	0.0	15.7	21.9					
TBR-07-29	Overland	1258																			
	Channel (ditch)	269	2.48	1.10	4.06			Forest (poor cover)	64	45	66	77	83	0.0	0.0	10.6	53.0	83.4	13.6	0.02126	
	Paved	177	3.84	2.94	1.01			Impervious	2	98	98	98	98	0.0	0.0	0.1	1.7				
	Pipe			0.00	0.00			Industrial	16	81	88	91	93	0.0	0.0	12.7	3.1				
	Stream	811	0.00	4.00	3.38	5.1	0.08	Pasture: Good Condition	11	39	61	74	80	0.0	0.0	5.2	6.3				
								Residential 1 acre	7	51	68	79	84	0.0	0.0	0.0	7.2				
TBR-07-30	Overland	819																			
	Channel (ditch)	217	1.84	0.95	3.80			Industrial	100	81	88	91	93	0.0	7.1	70.7	22.2	91.2	5.0	0.00776	
	Paved	602	4.23	3.09	3.25																
	Pipe			0.00	0.00																
	Stream			0.00	0.00	4.2	0.07														
TBR-07-31	Overland	878																			
	Channel (ditch)	300	4.05	1.41	3.53			Industrial	100	81	88	91	93	0.0	6.9	93.1	0.0	90.8	7.5	0.01173	
	Paved	578	12.91	5.46	1.77																
	Pipe			0.00	0.00																
	Stream			0.00	0.00	3.2	0.05														
TBR-07-32	Overland	1061																			
	Channel (ditch)	31	21.78	3.29	0.15			Forest (good cover)	0	25	55	70	77	0.0	0.0	0.3	0.0	82.4	2.4	0.00378	
	Paved	1031	1.05	1.51	11.35			Impervious	1	98	98	98	98	0.0	0.3	0.5	0.0				
	Pipe			0.00	0.00			Residential 1/4 acre	99	61	75	83	87	0.0	8.1	90.8	0.0				
	Stream			0.00	0.00	6.9	0.12														
TBR-08	Overland	1764																			
	Channel (ditch)	183	3.43	1.30	2.34			Forest (good cover)	1	25	55	70	77	0.0	0.4	0.0	0.1	90.4	21.7	0.03392	
	Paved	1041	2.43	2.33	7.46			Industrial	99	81	88	91	93	0.0	23.6	63.9	11.9				
	Pipe			0.00	0.00			Pasture: Good Condition	0	39	61	74	80	0.0	0.0	0.0	0.0				
	Stream	540	0.00	4.00	2.25	7.2	0.12														



**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

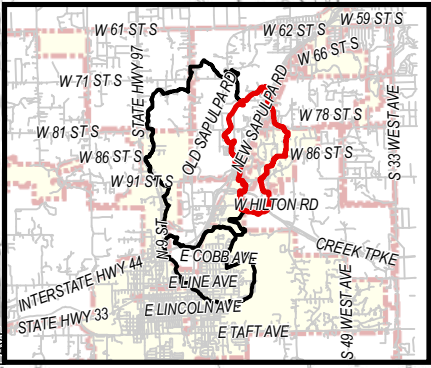
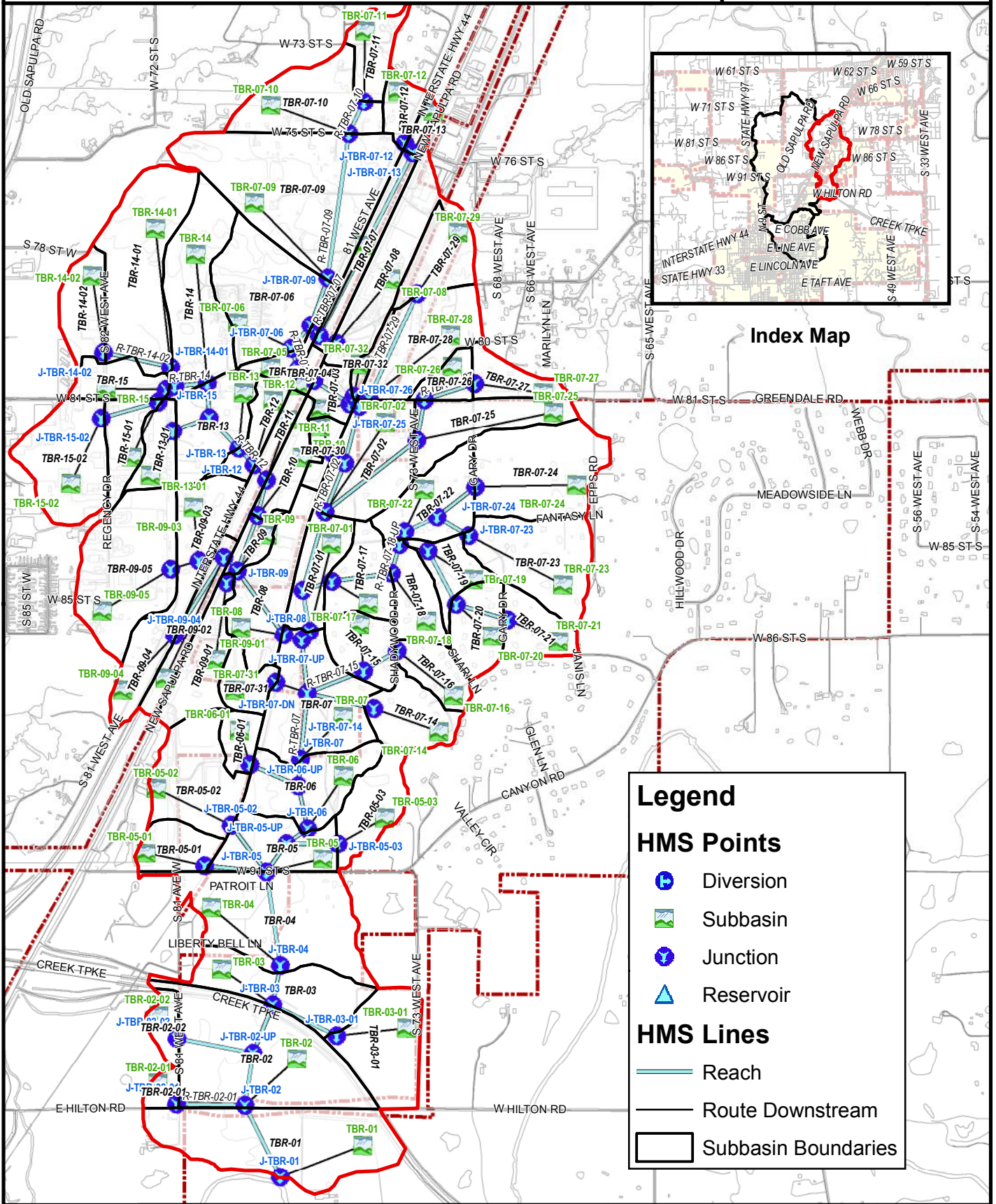
Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)	
										A	B	C	D	A	B	C	D				
									3800	A	B	C	D	A	B	C	D		94.3		
TBR-09	Overland	899																			
	Channel (ditch)	269	8.29	2.03	2.21			Impervious	12	98	98	98	98	0.0	0.0	6.6	5.8	91.5	5.2	0.00808	
	Paved			0.00	0.00			Industrial	88	81	88	91	93	0.0	34.4	17.6	35.5				
	Pipe			0.00	0.00																
	Stream	630	0.00	4.00	2.63	2.9	0.05														
TBR-09-01	Overland	1915																			
	Channel (ditch)	293	3.27	1.27	3.85			Impervious	10	98	98	98	98	0.0	4.0	5.8	0.0	91.3	15.3	0.02385	
	Paved	757	2.78	2.49	5.07			Industrial	90	81	88	91	93	0.0	11.3	78.8	0.0				
	Pipe	864	4.52	4.25	3.38																
	Stream			0.00	0.00	7.4	0.12														
TBR-09-02	Overland	1809																			
	Channel (ditch)	282	2.94	1.20	3.90			Impervious	41	98	98	98	98	0.0	16.1	24.6	0.0	80.4	9.4	0.01474	
	Paved	1527	2.66	2.44	10.45			Pasture: Good Condition	59	39	61	74	80	0.0	26.1	33.3	0.0				
	Pipe			0.00	0.00																
	Stream			0.00	0.00	8.6	0.14														
TBR-09-03	Overland	1357																			
	Channel (ditch)	282	2.55	1.12	4.20			Forest (poor cover)	1	45	66	77	83	0.0	0.0	0.4	0.9	82.5	16.8	0.02627	
	Paved	1075	2.01	2.11	8.49			Impervious	18	98	98	98	98	0.0	0.0	15.1	2.6				
	Pipe			0.00	0.00			Pasture: Good Condition	20	39	61	74	80	0.0	0.0	19.4	0.4				
	Stream			0.00	0.00	7.6	0.13	Residential 1 acre	54	51	68	79	84	0.0	0.2	36.2	17.2				
								Residential 2 acre	8	46	65	77	82	0.0	0.0	0.3	7.3				
TBR-09-04	Overland	1376																			
	Channel (ditch)	265	3.12	1.24	3.57			Impervious	18	98	98	98	98	0.0	16.0	1.8	0.0	72.7	10.7	0.01675	
	Paved	1111	1.63	1.90	9.76			Pasture: Good Condition	23	39	61	74	80	0.0	20.6	2.6	0.0				
	Pipe			0.00	0.00			Residential 1 acre	59	51	68	79	84	0.0	53.3	5.6	0.0				
	Stream			0.00	0.00	8.0	0.13														
TBR-09-05	Overland	1826																			
	Channel (ditch)	149	3.13	1.24	2.00			Impervious	3	98	98	98	98	0.0	0.7	2.3	0.4	84.9	35.6	0.05564	
	Paved	1677	2.24	2.23	12.52			Industrial	56	81	88	91	93	0.0	11.8	40.3	4.2				
	Pipe			0.00	0.00			Pasture: Good Condition	0	39	61	74	80	0.0	0.0	0.2	0.0				
	Stream			0.00	0.00	8.7	0.15	Residential 1 acre	40	51	68	79	84	0.0	14.2	19.0	6.6				
								Residential 1/4 acre	0	61	75	83	87	0.0	0.0	0.4	0.0				

**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D			
									3800	A	B	C	D	A	B	C	D		94.3	
TBR-10		1248																		
	Overland	126	11.62	2.40	0.88			Impervious	14	98	98	98	98	0.0	2.6	4.4	7.1	92.0	9.3	0.01447
	Channel (ditch)	815	4.24	3.09	4.39			Industrial	86	81	88	91	93	0.0	17.1	42.5	26.3			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
Stream	308	0.00	4.00	1.28		3.9	0.07													
TBR-11		1058																		
	Overland	182	1.24	0.78	3.89			Impervious	44	98	98	98	98	0.0	6.0	21.2	17.0	84.6	7.7	0.01197
	Channel (ditch)	875	2.21	2.21	6.59			Pasture: Good Condition	56	39	61	74	80	0.0	8.9	27.2	19.8			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
Stream			0.00	0.00		6.3	0.10													
TBR-12		882																		
	Overland	282	0.94	0.68	6.92			Forest (poor cover)	29	45	66	77	83	0.0	0.0	17.7	11.7	82.9	8.3	0.01290
	Channel (ditch)	600	7.24	4.06	2.46			Impervious	17	98	98	98	98	0.0	1.4	6.1	9.4			
	Paved			0.00	0.00			Pasture: Good Condition	26	39	61	74	80	0.0	0.8	12.0	13.0			
	Pipe			0.00	0.00			Residential 1 acre	20	51	68	79	84	0.0	0.0	1.0	18.8			
	Stream			0.00	0.00		5.6	0.09	Residential 2 acre	8	46	65	77	82	0.0	0.0	0.0			
TBR-13		979																		
	Overland	254	2.73	1.16	3.66			Forest (poor cover)	10	45	66	77	83	0.0	0.0	6.2	3.7	82.2	19.0	0.02971
	Channel (ditch)	725	1.45	1.79	6.76			Impervious	9	98	98	98	98	0.0	0.0	2.9	6.5			
	Paved			0.00	0.00			Pasture: Good Condition	0	39	61	74	80	0.0	0.0	0.0	0.2			
	Pipe			0.00	0.00			Residential 1 acre	19	51	68	79	84	0.0	0.0	7.6	11.7			
	Stream			0.00	0.00		6.2	0.10	Residential 2 acre	27	46	65	77	82	0.0	0.0	12.3			
								Residential 5 acre	34	46	65	77	82	0.0	0.0	8.6	25.3			
TBR-13-01		1069																		
	Overland	296	3.93	1.39	3.54			Impervious	4	98	98	98	98	0.0	0.0	1.2	2.8	85.6	8.6	0.01348
	Channel (ditch)	774	2.69	2.45	5.27			Industrial	30	81	88	91	93	0.0	0.0	30.2	0.0			
	Paved			0.00	0.00			Pasture: Good Condition	15	39	61	74	80	0.0	0.0	14.5	0.0			
	Pipe			0.00	0.00			Residential 1/4 acre	51	61	75	83	87	0.0	0.0	29.2	22.0			
Stream			0.00	0.00		5.3	0.09													

**Appendix 15-A. North Polecat System - Timber Ridge - Hydrologic Coefficients for Existing Conditions**

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D			
									3800	A	B	C	D	A	B	C	D		94.3	
TBR-14	Overland	2485						Forest (poor cover)	76	45	66	77	83	0.0	0.0	14.4	62.0	83.8	31.0	0.04850
	Channel (ditch)	871	14.71	5.84	2.49			Graded Development Areas	1	77	86	91	94	0.0	0.0	0.0	0.8			
	Paved			0.00	0.00			Impervious	5	98	98	98	98	0.0	0.0	0.8	4.3			
	Pipe			0.00	0.00			Pasture: Poor Condition	3	68	79	86	89	0.0	0.0	0.5	2.4			
	Stream	1346	0.00	4.00	5.61	6.2	0.10	Residential 1/8 acre	8	77	85	90	92	0.0	0.0	0.0	7.6			
								Residential 2 acre	7	46	65	77	82	0.0	0.0	0.0	7.3			
TBR-14-01	Overland	2820						Forest (poor cover)	54	45	66	77	83	0.0	0.0	2.2	51.7	85.6	37.2	0.05819
	Channel (ditch)	378	24.11	7.51	0.84			Graded Development Areas	10	77	86	91	94	0.0	0.0	3.6	6.7			
	Paved			0.00	0.00			Impervious	2	98	98	98	98	0.0	0.0	1.3	1.1			
	Pipe			0.00	0.00			Pasture: Poor Condition	33	68	79	86	89	0.0	0.0	23.7	9.6			
	Stream	2349	0.00	4.00	9.79	6.7	0.11													
TBR-14-02	Overland	1471						Forest (poor cover)	1	45	66	77	83	0.0	0.0	0.7	0.0	88.7	12.4	0.01943
	Channel (ditch)	570	2.90	2.55	3.73			Impervious	5	98	98	98	98	0.0	0.0	4.2	1.1			
	Paved			0.00	0.00			Industrial	29	81	88	91	93	0.0	0.0	14.8	14.6			
	Pipe			0.00	0.00			Pasture: Poor Condition	65	68	79	86	89	0.0	0.0	51.0	13.8			
	Stream	600	0.00	4.00	2.50	6.0	0.10													
TBR-15	Overland	956						Impervious	14	98	98	98	98	0.0	0.0	6.2	7.7	90.4	9.3	0.01455
	Channel (ditch)	681	1.14	1.58	7.20			Industrial	33	81	88	91	93	0.0	0.0	32.5	0.3			
	Paved			0.00	0.00			Pasture: Poor Condition	53	68	79	86	89	0.0	0.0	17.7	35.7			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	7.3	0.12													
TBR-15-01	Overland	1530						Impervious	10	98	98	98	98	0.0	0.0	7.3	2.3	85.6	10.0	0.01569
	Channel (ditch)	1318	1.46	1.79	12.27			Industrial	49	81	88	91	93	0.0	0.0	48.5	0.4			
	Paved			0.00	0.00			Pasture: Good Condition	41	39	61	74	80	0.0	0.0	25.6	15.2			
	Pipe			0.00	0.00			Residential 1/4 acre	1	61	75	83	87	0.0	0.0	0.6	0.1			
	Stream			0.00	0.00	8.9	0.15													
TBR-15-02	Overland	1663						Impervious	2	98	98	98	98	0.0	0.0	1.9	0.2	91.9	25.1	0.03915
	Channel (ditch)	1058	0.92	1.42	12.45			Industrial	98	81	88	91	93	0.0	0.0	62.3	35.5			
	Paved	354	1.67	2.57	2.29															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	11.0	0.18													



Index Map

**Legend**

**HMS Points**

- Diversion
- Subbasin
- Junction
- Reservoir

**HMS Lines**

- Reach
- Route Downstream
- Subbasin Boundaries

**Appendix 15-C. North Polecat System - Timber Ridge  
Existing Flow Rates (CFS)**

HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi <sup>2</sup>
J-TBR-01	680	1061	1804	2270	2769	3187	3637	4581	1.69271
J-TBR-02	690	1075	1819	2286	2788	3204	3663	4581	1.62449
J-TBR-02-01	6	10	16	19	23	27	30	36	0.00524
J-TBR-02-02	8	14	22	27	34	38	43	53	0.00793
J-TBR-02-UP	701	1091	1827	2298	2799	3204	3677	4584	1.54012
J-TBR-03	711	1106	1871	2347	2871	3352	3855	4719	1.53219
J-TBR-03-01	20	33	59	75	96	113	129	165	0.03515
J-TBR-04	698	1087	1843	2311	2850	3537	3806	4759	1.46153
J-TBR-05	693	1076	1809	2258	2791	3532	4055	4854	1.39376
J-TBR-05-01	15	24	39	48	59	68	76	94	0.01560
J-TBR-05-02	38	55	83	100	122	139	155	189	0.03781
J-TBR-05-03	18	31	52	66	83	96	109	136	0.02244
J-TBR-05-UP	676	1045	1739	2179	2712	3135	3556	4558	1.31362
J-TBR-06	672	1039	1725	2158	2683	3099	3516	4509	1.29118
J-TBR-06-01	5	7	11	13	16	19	21	26	0.00950
J-TBR-06-UP	679	1041	1716	2141	2660	3068	3477	4487	1.25811
J-TBR-07	675	1036	1710	2134	2651	3058	3465	4472	1.24861
J-TBR-07-01	363	546	907	1141	1426	1634	1843	2228	0.67555
J-TBR-07-01-UP	363	544	898	1134	1411	1616	1802	2171	0.65495
J-TBR-07-02	242	348	582	689	800	887	971	1311	0.44358
J-TBR-07-02-DN	206	297	493	556	651	692	773	1111	0.35236
J-TBR-07-02-UP	209	299	491	554	649	692	772	1135	0.34460
J-TBR-07-03	192	280	463	528	620	663	737	1064	0.28614
J-TBR-07-04	190	282	456	524	617	665	737	1093	0.27282
J-TBR-07-05	188	279	460	576	720	832	943	1186	0.26910
J-TBR-07-06	179	268	443	555	695	804	912	1148	0.26052
J-TBR-07-06-UP	148	224	371	466	584	675	766	964	0.21206
J-TBR-07-07	61	89	136	167	205	234	262	323	0.06801
J-TBR-07-08	36	49	73	88	106	120	134	164	0.03726
J-TBR-07-09	88	137	237	301	382	445	508	647	0.14405
J-TBR-07-10	31	52	93	119	153	179	205	261	0.05237
J-TBR-07-11	9	16	29	37	47	55	63	80	0.01556
J-TBR-07-12	9	14	24	29	37	42	48	59	0.00991
J-TBR-07-13	13	22	35	43	54	61	69	85	0.01419
J-TBR-07-14	15	26	47	60	77	90	102	129	0.02220
J-TBR-07-15	26	43	72	91	115	133	151	189	0.03414
J-TBR-07-16	13	21	35	43	54	63	71	87	0.01483
J-TBR-07-17	124	214	403	509	647	764	857	1041	0.21137

**Appendix 15-C. North Polecat System - Timber Ridge  
Existing Flow Rates (CFS)**

HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi <sup>2</sup>
J-TBR-07-18	127	218	419	485	620	730	811	975	0.18986
J-TBR-07-18-UP	132	212	379	464	586	677	758	939	0.17113
J-TBR-07-19	49	81	127	157	194	221	248	305	0.05108
J-TBR-07-20	38	62	96	118	145	165	185	226	0.03656
J-TBR-07-21	18	29	45	55	68	78	87	106	0.01689
J-TBR-07-22	85	139	254	313	397	462	517	643	0.12005
J-TBR-07-22-UP	70	117	201	253	318	370	417	518	0.09197
J-TBR-07-23	38	61	98	121	151	173	195	240	0.04176
J-TBR-07-24	39	65	110	137	173	200	227	283	0.05021
J-TBR-07-25	30	50	88	113	143	168	192	245	0.05130
J-TBR-07-26	16	26	45	57	72	84	95	120	0.02282
J-TBR-07-27	9	15	27	34	43	50	57	72	0.01339
J-TBR-07-28	21	35	55	69	85	98	111	138	0.05846
J-TBR-07-29	21	34	53	65	81	92	103	127	0.02126
J-TBR-07-30	12	18	25	29	35	39	43	51	0.00776
J-TBR-07-31	18	28	39	46	55	62	68	81	0.01173
J-TBR-07-32	3	5	8	10	13	15	17	21	0.00378
J-TBR-07-DN	673	1031	1686	2095	2597	2988	3381	4362	1.20091
J-TBR-07-UP	665	1013	1629	2015	2491	2853	3219	4172	1.13284
J-TBR-08	302	468	744	903	1078	1265	1503	1992	0.45729
J-TBR-09	290	448	678	810	995	1200	1428	1884	0.42337
J-TBR-09-01	32	46	65	77	93	104	115	138	0.02385
J-TBR-09-02	91	141	229	285	355	409	462	577	0.11340
J-TBR-09-03	74	113	178	219	271	310	348	430	0.08191
J-TBR-09-04	7	12	25	32	42	51	59	77	0.01675
J-TBR-09-05	52	78	122	150	185	211	237	292	0.05564
J-TBR-10	237	349	502	604	736	877	1028	1318	0.27804
J-TBR-11	232	342	522	620	759	874	1021	1302	0.26357
J-TBR-12	227	334	507	602	736	846	988	1253	0.25160
J-TBR-13	228	337	530	648	796	905	1007	1286	0.23870
J-TBR-13-01	15	23	35	43	53	60	67	81	0.01348
J-TBR-13-UP	221	324	489	593	725	822	918	1122	0.20899
J-TBR-14	207	304	458	555	677	768	857	1048	0.19551
J-TBR-14-01	84	128	194	235	287	325	362	442	0.07762
J-TBR-14-02	24	37	54	64	78	87	97	117	0.01943
J-TBR-14-UP	163	236	351	423	515	582	649	790	0.14701
J-TBR-15	80	112	162	195	235	265	294	357	0.06939
J-TBR-15-01	62	87	127	152	184	207	230	280	0.05484
J-TBR-15-02	48	66	94	111	134	150	166	201	0.03915

**Appendix 15-C. North Polecat System - Timber Ridge  
Existing Flow Rates (CFS)**

HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi <sup>2</sup>
R-TBR-01	677	1057	1796	2256	2754	3168	3613	4553	1.62449
R-TBR-02	683	1064	1801	2259	2760	3169	3621	4540	1.54012
R-TBR-02-01	6	10	16	19	23	27	30	36	0.00524
R-TBR-02-02	8	14	22	27	34	38	43	53	0.00793
R-TBR-02-UP	700	1090	1826	2295	2797	3201	3673	4581	1.53219
R-TBR-03	698	1084	1825	2285	2798	3247	3743	4617	1.46153
R-TBR-03-01	20	33	59	75	96	113	129	165	0.03515
R-TBR-04	688	1070	1803	2255	2783	3413	3708	4644	1.39376
R-TBR-05	672	1041	1732	2156	2667	3326	3813	4585	1.31362
R-TBR-05-01	15	24	39	48	59	68	76	94	0.01560
R-TBR-05-02	38	55	83	100	122	139	155	189	0.03781
R-TBR-05-03	18	31	52	66	83	96	109	136	0.02244
R-TBR-06	669	1033	1709	2134	2651	3057	3467	4446	1.25811
R-TBR-06-01	5	7	11	13	16	19	21	26	0.00950
R-TBR-07	670	1026	1683	2093	2594	2985	3379	4359	1.20091
R-TBR-07-01	361	541	893	1120	1396	1595	1795	2162	0.65495
R-TBR-07-01-UP	241	348	581	687	798	884	965	1298	0.44358
R-TBR-07-02	205	297	492	555	650	691	773	1100	0.35236
R-TBR-07-02-UP	203	293	487	551	647	689	770	1097	0.34460
R-TBR-07-03	187	273	452	520	614	657	731	1038	0.27282
R-TBR-07-04	188	279	453	522	615	664	735	1086	0.26910
R-TBR-07-05	179	268	443	555	695	804	912	1148	0.26052
R-TBR-07-06	148	224	371	466	584	675	766	964	0.21206
R-TBR-07-06-UP	88	137	237	301	382	445	508	647	0.14405
R-TBR-07-07	13	22	35	43	54	61	69	85	0.01419
R-TBR-07-09	31	52	93	119	153	179	205	261	0.05237
R-TBR-07-10	9	16	29	37	47	55	63	80	0.01556
R-TBR-07-14	15	26	47	60	77	90	102	129	0.02220
R-TBR-07-15	26	43	72	91	115	133	151	189	0.03414
R-TBR-07-16	13	21	35	43	54	63	71	87	0.01483
R-TBR-07-17	123	208	399	508	643	758	855	1039	0.21137
R-TBR-07-18	120	205	380	479	609	717	803	972	0.18986
R-TBR-07-18-UP	120	204	387	445	574	670	747	902	0.17113
R-TBR-07-20	38	62	96	118	145	165	185	226	0.03656
R-TBR-07-21	18	29	45	55	68	78	87	106	0.01689
R-TBR-07-22	69	115	202	251	316	365	411	510	0.09197
R-TBR-07-23	38	61	98	121	151	173	195	240	0.04176
R-TBR-07-24	35	60	105	134	169	198	223	278	0.05021

**Appendix 15-C. North Polecat System - Timber Ridge  
Existing Flow Rates (CFS)**

HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi <sup>2</sup>
R-TBR-07-25	30	50	88	113	143	168	192	245	0.05130
R-TBR-07-26	16	26	45	57	72	84	95	120	0.02282
R-TBR-07-27	9	15	27	34	43	50	57	72	0.01339
R-TBR-07-29	21	34	53	65	81	92	103	127	0.02126
R-TBR-07-UP	659	1005	1623	2004	2479	2841	3216	4153	1.13284
R-TBR-08	287	443	676	808	994	1190	1413	1865	0.42337
R-TBR-09	230	345	500	602	734	873	1024	1312	0.27804
R-TBR-09-04	7	12	25	32	42	51	59	77	0.01675
R-TBR-10	231	340	490	589	717	852	997	1272	0.26357
R-TBR-12	222	326	492	584	714	818	954	1203	0.23870
R-TBR-13	214	314	484	588	719	815	909	1147	0.20899
R-TBR-13-01	15	23	35	43	53	60	67	81	0.01348
R-TBR-13-UP	207	304	458	555	677	768	857	1048	0.19551
R-TBR-14	163	236	351	423	515	582	649	790	0.14701
R-TBR-14-02	24	37	54	64	78	87	97	117	0.01943
R-TBR-15-02	48	66	94	111	134	150	166	201	0.03915
TBR-01	13	27	65	91	126	155	184	251	0.06822
TBR-02	30	53	104	137	179	214	249	325	0.07913
TBR-02-01	6	10	16	19	23	27	30	36	0.00524
TBR-02-02	8	14	22	27	34	38	43	53	0.00793
TBR-03	26	41	68	86	108	125	142	178	0.03551
TBR-03-01	20	33	59	75	96	113	129	165	0.03515
TBR-04	54	89	149	186	234	270	306	381	0.06777
TBR-05	10	19	40	54	73	87	102	134	0.02673
TBR-05-01	15	24	39	48	59	68	76	94	0.01560
TBR-05-02	38	55	83	100	122	139	155	189	0.03781
TBR-05-03	18	31	52	66	83	96	109	136	0.02244
TBR-06	13	26	54	72	96	116	135	176	0.03307
TBR-06-01	5	7	11	13	16	19	21	26	0.00950
TBR-07	19	38	78	104	139	166	194	253	0.04770
TBR-07-01	4	8	21	30	42	52	63	86	0.02060
TBR-07-02	21	36	67	87	112	132	152	195	0.03992
TBR-07-03	13	21	31	36	44	50	55	66	0.00954
TBR-07-04	5	8	12	15	18	20	22	27	0.00372
TBR-07-05	12	18	25	30	36	40	44	53	0.00858
TBR-07-06	56	89	134	162	198	224	249	302	0.04846
TBR-07-07	13	20	32	39	49	56	63	79	0.01656
TBR-07-08	36	49	73	88	106	120	134	164	0.03726
TBR-07-09	71	114	189	236	297	343	388	485	0.09168

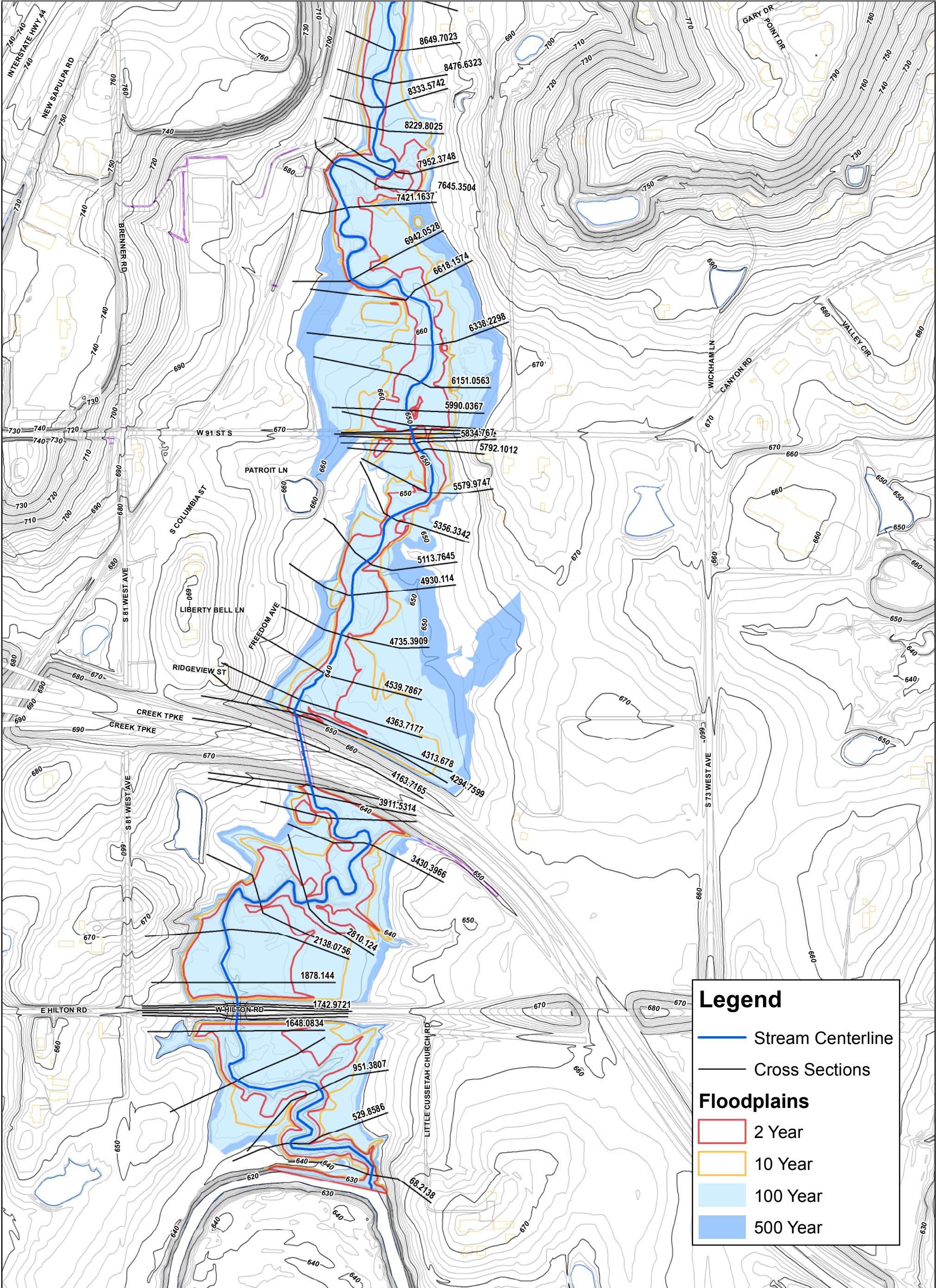


**Appendix 15-C. North Polecat System - Timber Ridge  
Existing Flow Rates (CFS)**

HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi <sup>2</sup>
TBR-07-10	22	37	65	83	106	124	142	181	0.03681
TBR-07-11	9	16	29	37	47	55	63	80	0.01556
TBR-07-12	9	14	24	29	37	42	48	59	0.00991
TBR-07-13	5	7	11	14	17	19	22	27	0.00428
TBR-07-14	15	26	47	60	77	90	102	129	0.02220
TBR-07-15	14	25	44	55	70	81	92	115	0.01931
TBR-07-16	13	21	35	43	54	63	71	87	0.01483
TBR-07-17	13	24	43	56	73	86	99	126	0.02151
TBR-07-18	14	24	41	52	65	76	86	108	0.01873
TBR-07-19	12	20	34	42	53	61	69	85	0.01452
TBR-07-20	21	34	53	65	80	91	102	124	0.01967
TBR-07-21	18	29	45	55	68	78	87	106	0.01689
TBR-07-22	19	33	57	72	93	108	123	156	0.02808
TBR-07-23	38	61	98	121	151	173	195	240	0.04176
TBR-07-24	39	65	110	137	173	200	227	283	0.05021
TBR-07-25	15	25	46	59	76	89	102	131	0.02848
TBR-07-26	8	14	23	29	36	42	47	58	0.00943
TBR-07-27	9	15	27	34	43	50	57	72	0.01339
TBR-07-28	7	10	19	24	31	37	43	55	0.03720
TBR-07-29	21	34	53	65	81	92	103	127	0.02126
TBR-07-30	12	18	25	29	35	39	43	51	0.00776
TBR-07-31	18	28	39	46	55	62	68	81	0.01173
TBR-07-32	3	5	8	10	13	15	17	21	0.00378
TBR-08	44	64	92	109	131	147	163	196	0.03392
TBR-09	13	20	28	33	39	44	48	57	0.00808
TBR-09-01	32	46	65	77	93	104	115	138	0.02385
TBR-09-02	11	17	28	36	45	52	59	74	0.01474
TBR-09-03	22	35	56	70	87	100	113	140	0.02627
TBR-09-04	7	12	25	32	42	51	59	77	0.01675
TBR-09-05	52	78	122	150	185	211	237	292	0.05564
TBR-10	22	35	48	56	67	75	82	97	0.01447
TBR-11	12	19	29	36	44	50	56	69	0.01197
TBR-12	12	19	31	38	47	54	61	75	0.01290
TBR-13	26	42	67	84	104	119	135	167	0.02971
TBR-13-01	15	23	35	43	53	60	67	81	0.01348
TBR-14	47	74	116	142	175	201	225	277	0.04850
TBR-14-01	61	93	143	174	213	242	271	331	0.05819
TBR-14-02	24	37	54	64	78	87	97	117	0.01943
TBR-15	19	27	39	47	56	63	70	84	0.01455

**Appendix 15-C. North Polecat System - Timber Ridge  
Existing Flow Rates (CFS)**

HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi <sup>2</sup>
TBR-15-01	15	23	35	43	52	60	67	82	0.01569
TBR-15-02	48	66	94	111	134	150	166	201	0.03915

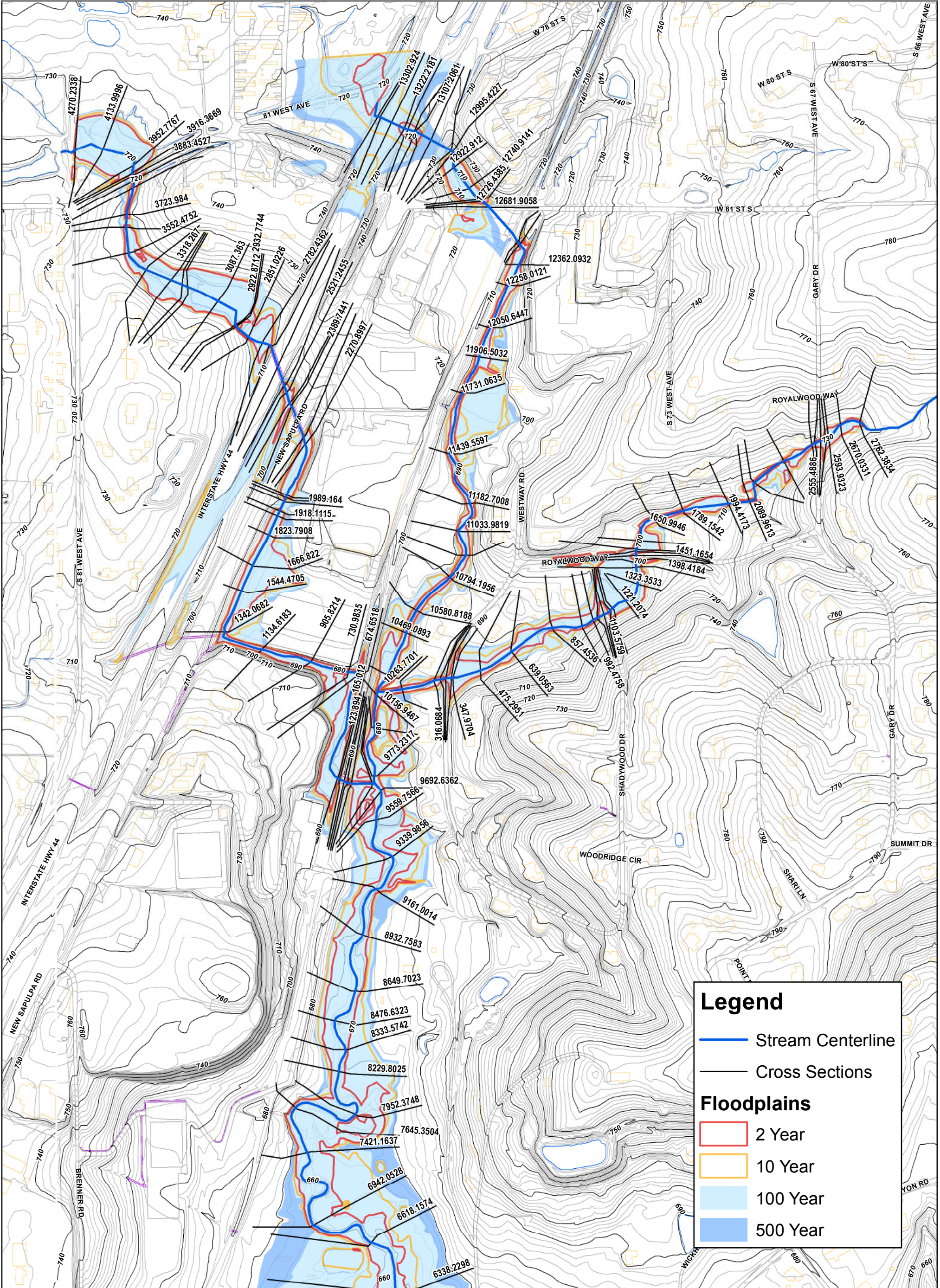


**Legend**

- Stream Centerline
- Cross Sections

**Floodplains**

- 2 Year
- 10 Year
- 100 Year
- 500 Year

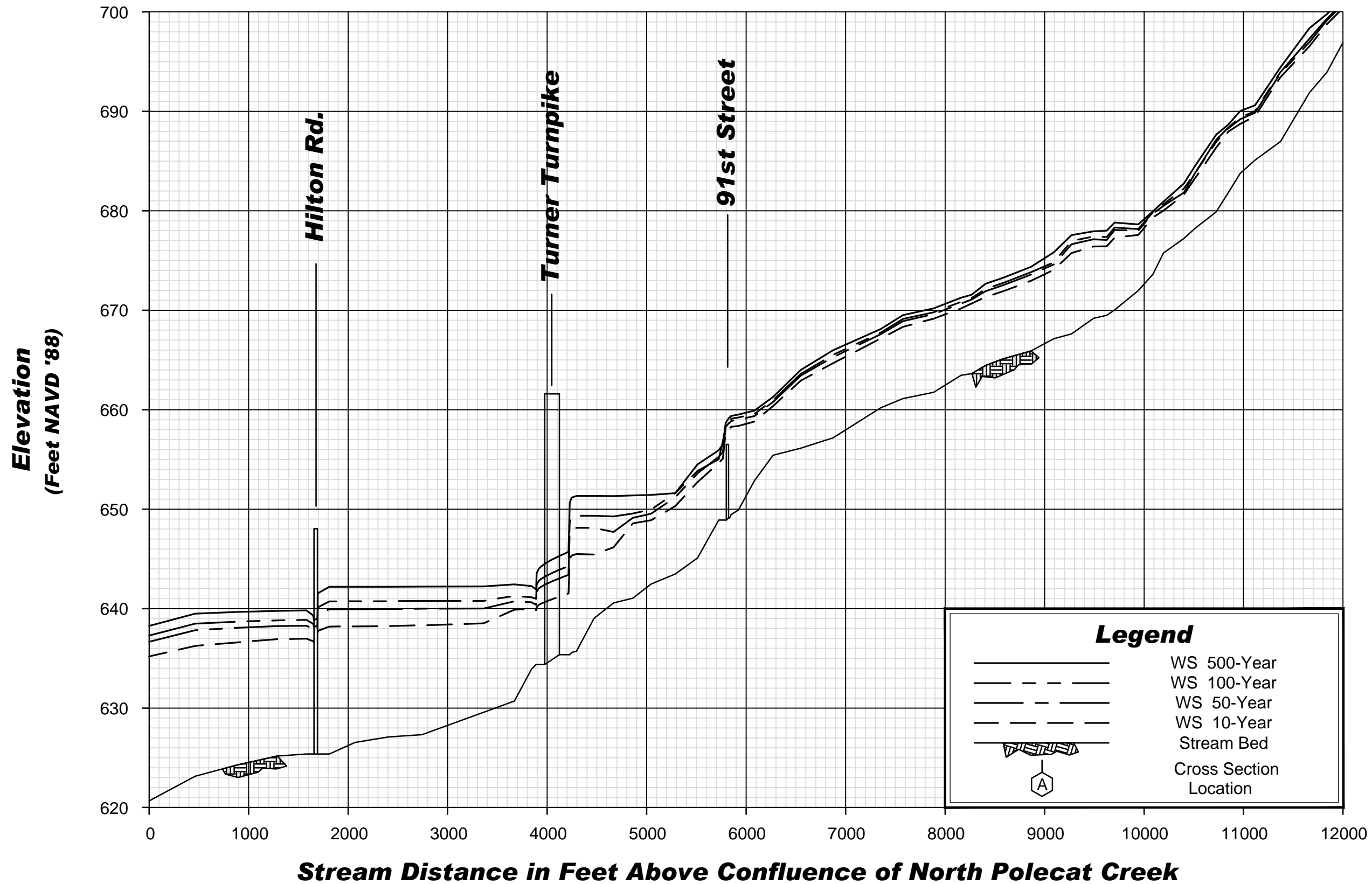


**Legend**

- Stream Centerline
- Cross Sections

**Floodplains**

- 2 Year
- 10 Year
- 100 Year
- 500 Year



**Appendix 15-E-1  
Existing Flood Profiles**

**Timber Ridge Creek**

**City of Sapulpa, OK**

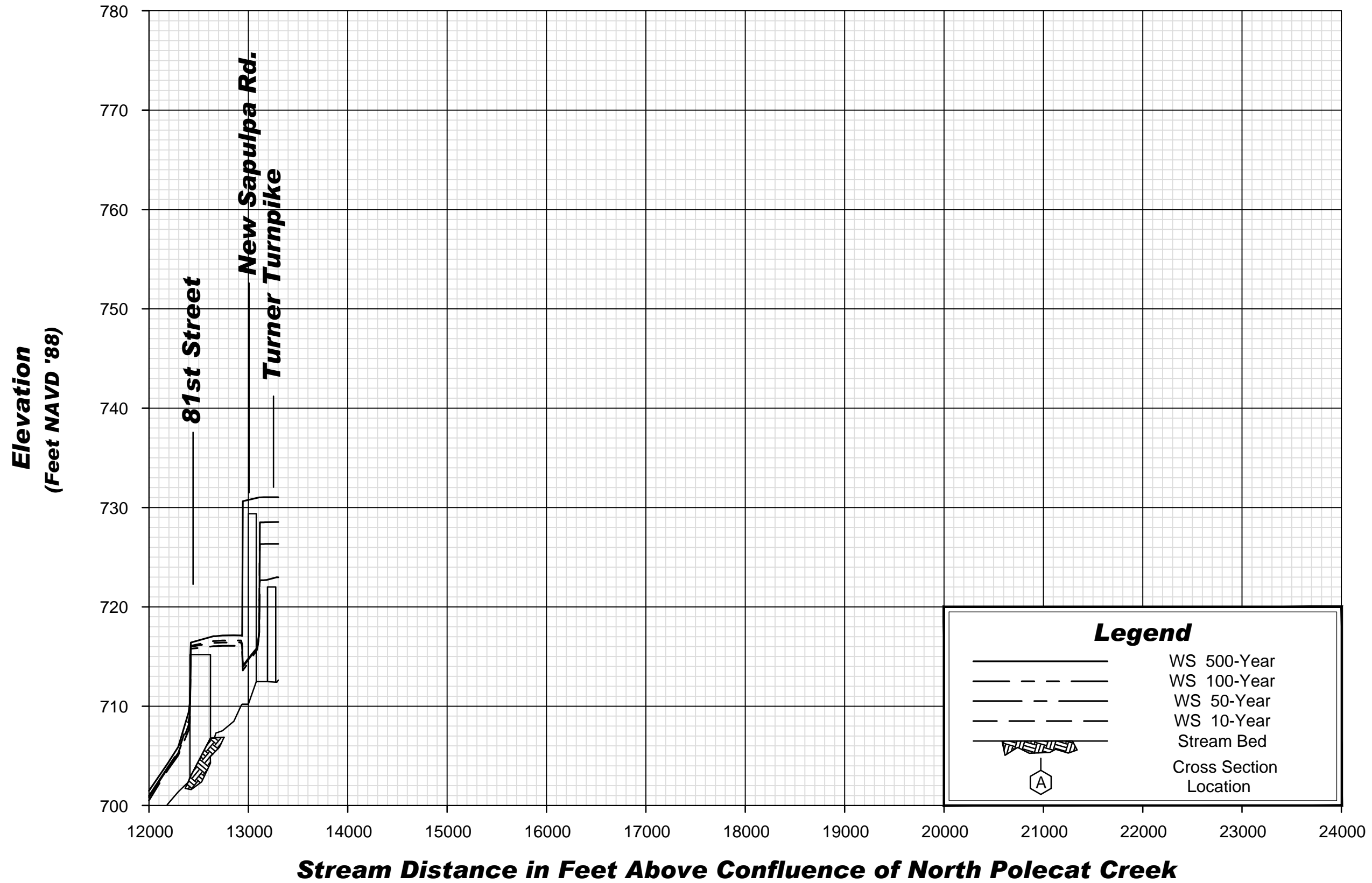
PREPARED BY

**Meshek & Associates, PLC.**

1437 S. Boulder Ave. - Suite 1080

Tulsa, OK 74119

(918) 392-5620



**Appendix 15-E-2**  
**Existing Flood Profiles**

**Timber Ridge Creek**

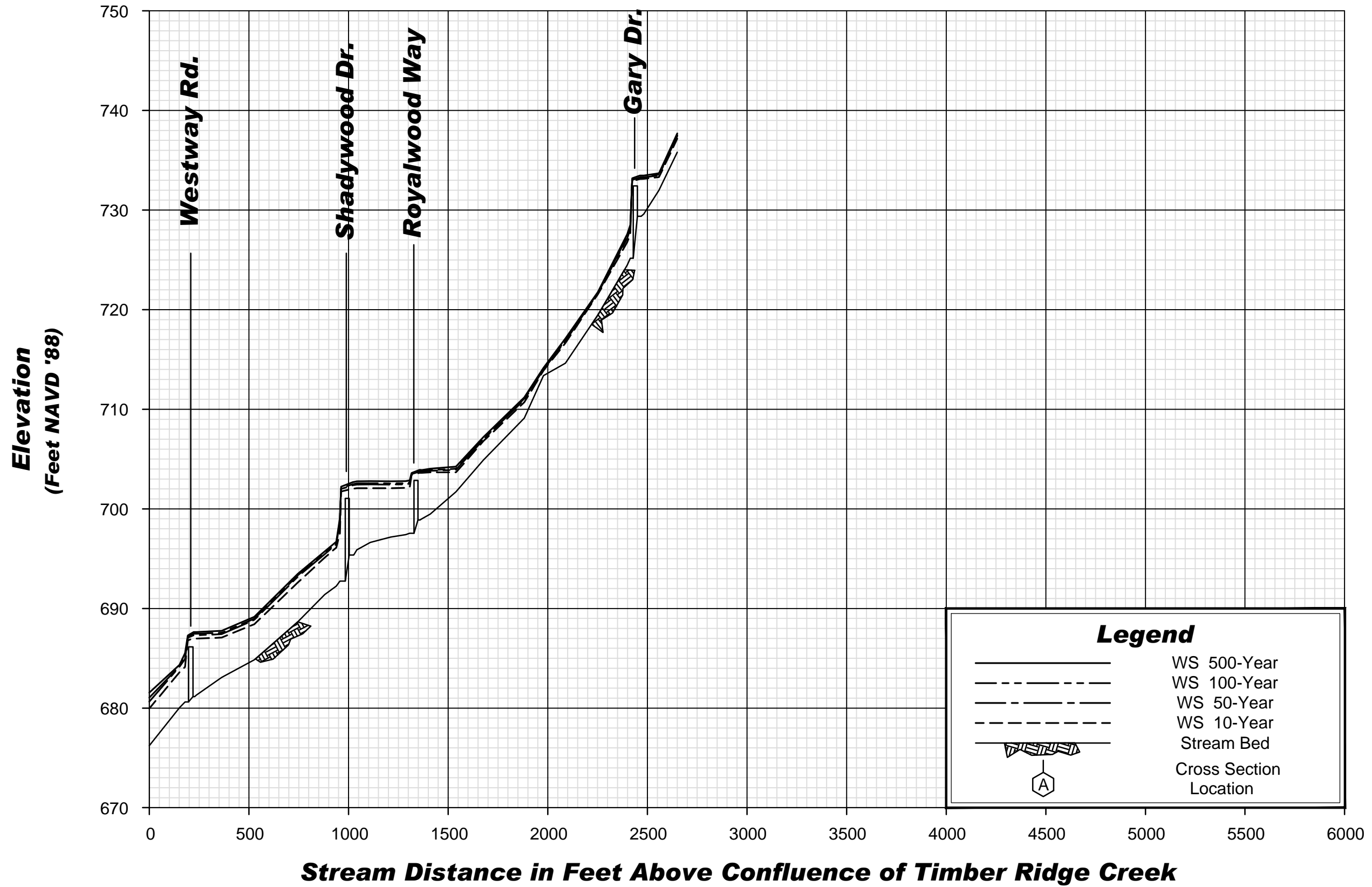
**City of Sapulpa, OK**

PREPARED BY

**Meshek & Associates, PLC.**

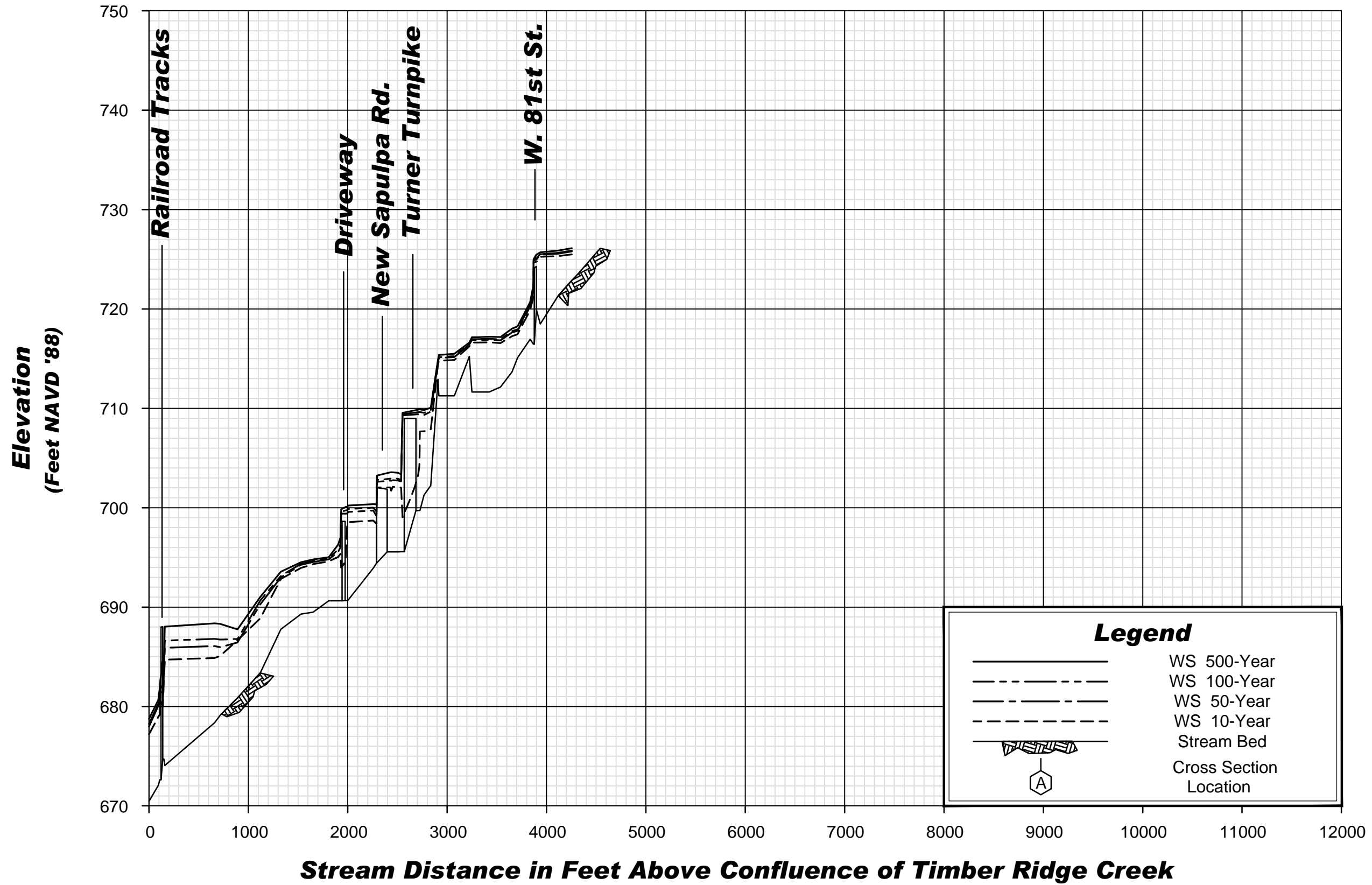
1437 S. Boulder Ave. - Suite 1080  
Tulsa, OK 74119

(918) 392-5620



**Appendix 15-E-3  
Existing Flood Profiles  
Timber Ridge Creek  
East Tributary**

**City of Sapulpa, OK**  
PREPARED BY  
**Meshek & Associates, PLC.**  
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**Appendix 15-E-4**  
**Existing Flood Profiles**  
**Timber Ridge Creek**  
**West Tributary**

**City of Sapulpa, OK**

PREPARED BY  
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Tulsa, OK 74119 (918) 392-5620



**City of Sapulpa**

**Appendix 15-F. Timber Ridge Drainage System - Problem Area 1 Alternate 1**

ITEM	ITEM NO.	DESCRIPTION	UNIT	TOTAL	UNIT PRICE	TOTAL COST
1	202.06(A)	UNCLASSIFIED EXCAVATION	CY	18800	\$ 12.00	\$ 225,600.00
2	223.06	TEMPORARY SILT FENCE	LF	2856	\$ 2.00	\$ 5,712.00
3	230.06(A)	SOLID SLAB BERMUDA SODDING	SY	1904	\$ 2.50	\$ 4,760.00
4	411.06(A)	PAVEMENT REPLACEMENT	SY	127	\$ 50.00	\$ 6,333.33
5	509.06(E)	CLASS C CONCRETE	CY	39	\$ 300.00	\$ 13,974.00
6	613.06(B)	36" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	430	\$ 140.00	\$ 60,200.00
7	613.06(X)	5'x3' C850 REINFORCED CONCRETE BOX	LF	213	\$ 440.00	\$ 93,720.00
8	613.06(X)	10'x6' C850 REINFORCED CONCRETE BOX	LF	50	\$ 1,260.00	\$ 63,000.00
9	613.06(S)	TRENCH EXCAVATION	CY	590	\$ 8.00	\$ 4,716.62
10	613.06(T)	STANDARD BEDDING MATERIAL	CY	323	\$ 20.00	\$ 6,458.60
11	619.06(B)	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	1	\$ 15,000.00	\$ 15,000.00
12	619.06(B)	PAVEMENT REMOVAL	SY	127	\$ 7.00	\$ 886.67
<b>Subtotal</b>						<b>\$ 500,361.22</b>
<b>15% Contingency</b>						<b>\$ 75,054.18</b>
<b>Subtotal</b>						<b>\$ 575,415.41</b>
<b>25% Utility Relocation Contingency</b>						<b>\$ 143,853.85</b>
<b>Total</b>						<b>\$ 719,269.26</b>