Future Conditions Flood Study

City of Cumming, GA

June 2014

ATKINS

Plan Design Enable

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1. Introduction

This report documents the future conditions flood study performed by Atkins for the City of Cumming, Georgia. The study includes hydrologic and hydraulic analyses and mapping of the future conditions 1% annual chance (100-year) flood for streams with a contributory drainage area greater than 100 acres within the City of Cumming. Future conditions were studied and mapped following the Regional Watershed Management Plan developed by the Metropolitan North Georgia Water Planning District (MNGWPD). The study includes Big Creek, Daves Creek, Littleridge Creek/Lanier, and Sawnee Creek watersheds within the city limits.

On March 4, 2013, the Federal Emergency Management Agency (FEMA) issued a revised Flood Insurance Study (FIS) for Forsyth County, GA. Atkins developed the new hydrologic and hydraulic models for Daves Creek, Littleridge Creek/Lanier, and Sawnee Creek watersheds. The FIS also incorporated a study named **"Big Creek Watershed Limited Detail Floodplain Mapping Study" by CH2M HILL**, dated December 2007 and developed for Forsyth County. As part of that study, CH2M HILL developed future conditions floodplains for the Big Creek Watershed. These future conditions models were developed based on the existing FIS models. Atkins based the future conditions models submitted with this report on the studies developed to create the FIS and the CH2M HILL future conditions models. Some models had to be extended and some new models had to be created to comply with the contributory area requirement. Extended and new streams were studied by limited detailed methods.

1.1. Study Area

The study includes the streams within the City of Cumming with drainage areas greater than 100 acres. The study area was divided into four watersheds:

- Big Creek Watershed
- Daves Creek Watershed
- Littleridge Creek/Lanier Watershed
- Sawnee Creek Watershed

The entire study area is contained within the Upper Chattahoochee Subbasin (HUC 03130001). Table 1, titled *Studied Streams* details the flooding sources within the studied watersheds which were the subject of future conditions hydrologic and hydraulic analyses.

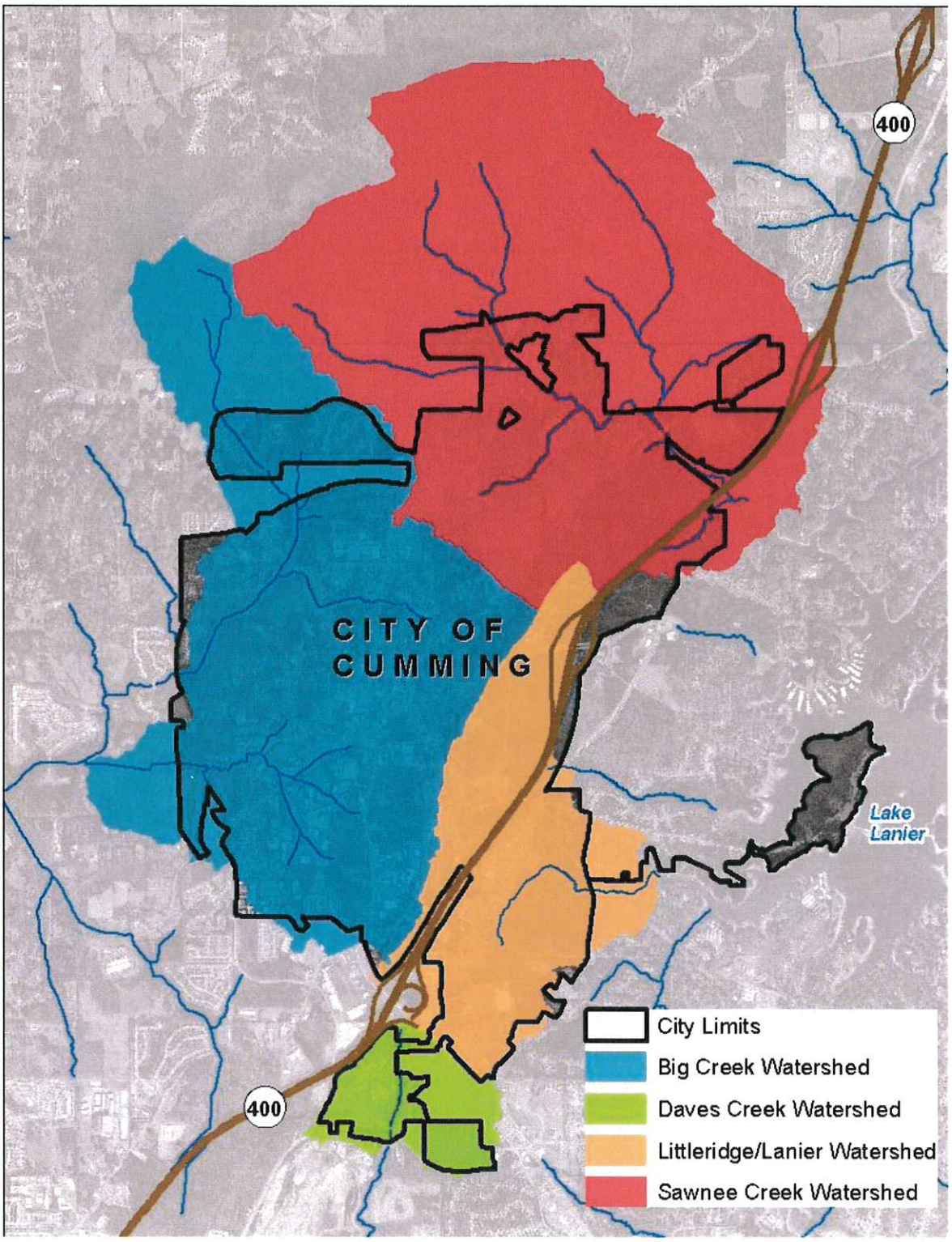

Figure 1. Study Area

Table 1. Studied Streams

STREAM NAME	STUDY TYPE	MILES
Big Creek Watershed		
Kelly Mill Branch	Detailed	2.14
Kelly Mill Branch Tributary A	Detailed	1.63
Kelly Mill Branch Tributary A	Limited Detail	0.15
Kelly Mill Branch Tributary A 1	Detailed	0.43
Kelly Mill Branch Tributary A 1	Limited Detail	0.05
Kelly Mill Branch Tributary A 1.1	Detailed	0.38
Kelly Mill Branch Tributary A 1.1	Limited Detail	0.23
Kelly Mill Branch Tributary A 2	Detailed	0.14
Kelly Mill Branch Tributary A 2	Limited Detail	0.20
Kelly Mill Branch Tributary D	Detailed	0.95
Kelly Mill Branch Tributary D	Limited Detail	0.15
Kelly Mill Branch Tributary E	Limited Detail	0.12
Kelly Mill Branch Tributary F	Limited Detail	0.17
Kelly Mill Branch Tributary G	Detailed	0.24
Kelly Mill Branch Tributary G	Limited Detail	0.25
Daves Creek Watershed		
Daves Creek	Detailed	0.72
Littleridge/ Lanier Watershed		
Littleridge Creek	Limited Detail	1.72
Littleridge Creek Tributary 2	Limited Detail	0.33
Littleridge Creek Tributary 3	Limited Detail	0.17
Baldridge Creek Tributary 2	Limited Detail	0.18
Sawnee Creek Watershed		
Sawnee Creek	Detailed	2.97
Sawnee Creek Tributary 1	Limited Detail	0.51
Sawnee Creek Tributary 2	Limited Detail	0.15
Sawnee Creek Tributary 4	Limited Detail	0.87
Sawnee Creek Tributary 5	Limited Detail	0.50
Sawnee Creek Tributary 5.1	Limited Detail	0.21
TOTAL		15.56

2. Analysis and Methodologies

2.1. Hydrologic Analysis

The future conditions hydrologic analysis is based on the existing conditions modeling, currently incorporated in the Forsyth County FIS, dated of March 4, 2013.

The existing conditions hydrologic analyses for Daves Creek, and Sawnee Creek watersheds were conducted using the Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) version 3.4. The methodologies applied for the consideration of infiltration losses and unit hydrograph transformation generally followed from the Natural Resources Conservation Services (NRCS) Technical Report 55 (TR-55) methodology. As per TR-55 guidance, rainfall-to-runoff transformation was defined based on the NRCS unit hydrograph, and runoff losses due to soil infiltration were accounted for based on standard curve numbers for the various types of land use.

Future conditions models for Daves Creek and Sawnee Creek watersheds were created by updating the curve numbers in the existing conditions models to reflect the anticipated future conditions land use. The future conditions curve numbers were determined based on the projected future land use information provided by the City of Cumming and Forsyth County. Rainfall, subbasin delineation, subbasin response, and reservoir information were not modified from the current existing conditions analysis.

The future condition flows for Littleridge Creek watershed were estimated using the regional regression equations.

The future condition flows for Big Creek watershed were referenced from "Big Creek Watershed Limited Detail Floodplain Mapping Study" prepared by CH2M Hill, dated December 2007.

2.1.1. Subbasins

The subbasins incorporated in the current existing conditions hydrologic analyses for Dave Creek and Sawnee Creek watersheds were left unchanged for the future conditions analyses. The subbasins for Big Creek watersheds remained unchanged from CH2M HILL hydrologic models.

Figure A-2 (Appendix A) illustrates the delineated subbasins and their locations with respect to the studied streams.

2.1.2. Future Land Use

The projected future conditions land use information was provided by the City of Cumming and Forsyth County. The future land use provided by these two entities is the most recent data available.

For Daves Creek watershed, the three most prominent existing land uses were Undeveloped (43%), Industrial/ Public Facility (25%), and 2-acre residential (12%). The future condition increased the curve numbers for the watershed and the three most prominent land uses were Public/ Institutional (25%), General Commercial (23%), and High Density Residential (22%).

For Sawnee Creek watershed, the three most prominent existing land uses were Undeveloped (44%), 1-ac residential (10%), and Right of Way (9%). The future condition increased the curve numbers for the watershed and the three most prominent land uses were Low Density Residential (35%), Medium Density Residential (20%), and General Commercial (12%)

Please refer to Figures A-3 and A-4, located in Appendix A, for the existing and future condition land use.

2.1.3. Future Conditions Curve Numbers

The future conditions rainfall runoff infiltration loss rates were defined using the NRCS curve number methodology. Curve numbers were estimated based on soil types and projected future land use conditions. Soils data was obtained from the most recent NRCS Soil Survey. Curve number values for the various land use categories were developed based on TR-55 guidelines. It should be noted that the land use categories detailed in TR-55 do not exactly match the land cover descriptions used in the future conditions land use data provided by the various county sources. Therefore, best engineering judgment was used to correlate

the future conditions land use descriptions to TR-55 recommended curve numbers. The base curve numbers used to calculate the loss rate parameters for the models are summarized in Table 2.

Table 2. Curve Number Selection

Land Use Category	Hydrologic Soil Group			
	A	B	C	D
Conservation	36	60	73	79
Corridor Transitional	39	61	74	80
General Commercial	89	92	94	95
Neighborhood Commercial	89	92	94	95
Industrial	81	88	91	93
Public / Institutional	81	88	91	93
Low Density Residential (less than 1.5 units per ac)	51	68	79	84
Medium Density Residential (1.5-2.5 units per ac)	54	70	80	85
High Density Residential (2.5-6 units per ac)	67	78	85	89
Private Park	39	61	74	80
Public Park	39	61	74	80
Road and ROW	83	89	92	93
Transportation / Communication / Utilities	69	80	86	89
Lake / Pond	30	30	30	30

Table B-1 (Appendix B) summarizes the calculated future conditions curve numbers along with the curve numbers used for the existing conditions study. Tables B-2 and B-4 summarize the future conditions HEC-HMS results and the existing and future discharges used to develop the hydraulic models.

2.2. Regional Regression Analysis

Regression equations were used to estimate peak flows on streams in the Littleridge Creek watershed. Littleridge Creek, Littleridge Creek Tributary 2, Littleridge Creek Tributary 3, and Baldridge Creek were analyzed using Regional Regression Equations.

Regional regression equations for urban unregulated streams used for the future condition are found in USGS Scientific Investigation Reports **SIR 2011-5042**. Regression equations are shown in Table 3.

Table 3: SIR 2011-5042 Regional flood-frequency equations for ungaged urban streams in Georgia

[mi^2, square mile; DRNAREA, drainage area, in mi^2; IMPNLCD01, percentage of impervious area from the 2001 National Land Cover Dataset, in percent; BSLDEM, mean basin slope from digital elevation model, in percent; DEVNLCD01, percentage of developed land from the 2001 National Land Cover Dataset, in percent]

Percent annual exceedance probability	Hydrologic region (shown in fig. 1)		
	1		2
	0.10 mi^2 < DRNAREA < 1 mi^2	1 mi^2 < DRNAREA < 400 mi^2	
50	$190(DRNAREA)^{0.751}10^{(0.0116IMPNLCD01)}$	$208(DRNAREA)^{0.578}10^{(0.00854IMPNLCD01)}$	unknown
20	$309(DRNAREA)^{0.760}10^{(0.00866IMPNLCD01)}$	$361(DRNAREA)^{0.573}10^{(0.00578IMPNLCD01)}$	unknown
10	$399(DRNAREA)^{0.767}10^{(0.00710IMPNLCD01)}$	$475(DRNAREA)^{0.571}10^{(0.00448IMPNLCD01)}$	unknown
4	$526(DRNAREA)^{0.773}10^{(0.00539IMPNLCD01)}$	$627(DRNAREA)^{0.569}10^{(0.00307IMPNLCD01)}$	unknown
2	$630(DRNAREA)^{0.778}10^{(0.00427IMPNLCD01)}$	$741(DRNAREA)^{0.569}10^{(0.00215IMPNLCD01)}$	unknown
1	$738(DRNAREA)^{0.781}10^{(0.00328IMPNLCD01)}$	$859(DRNAREA)^{0.569}10^{(0.00133IMPNLCD01)}$	unknown
0.5	$853(DRNAREA)^{0.785}10^{(0.00237IMPNLCD01)}$	$982(DRNAREA)^{0.569}10^{(0.00056IMPNLCD01)}$	unknown
0.2	$1,010(DRNAREA)^{0.790}10^{(0.00125IMPNLCD01)}$	$1,130(DRNAREA)^{0.573}$	unknown

Drainage areas for the regression analysis were based on the subbasin delineation completed for the Forsyth County FIS. Minor revisions were made to the subbasin delineation based on the Lidar topographic data and aerial imagery.

Impervious surface areas for each drainage basin were identified based the on the GLUT Impervious Surface Cover of Georgia data and the future condition land use provided by the county entities. The urban regional regression equations apply the 2001 National Land Cover Dataset (NLCD) to estimate the percentage of impervious area. However, since more updated data was available, this study was completed by factoring in the 2008 GLUT data. Once the 2008 GLUT imperviousness was determined, the future condition land use (with an impervious factor for each category) was incorporated to determine the future condition imperviousness for the drainage area. The impervious value for each land use category is listed in Table 4. Table B-4, located in Appendix B, lists the existing and future discharges used to develop the hydraulic models.

Table 4: Land Use Impervious Value

Land Use Category	Impervious Percentage
Conservation	0%
Corridor Transitional	0%
General Commercial	85%
Neighborhood Commercial	85%
Industrial	72%
Public / Institutional	72%
Low Density Residential (less than 1.5 units per ac)	20%
Medium Density Residential (1.5-2.5 units per ac)	25%
High Density Residential (2.5-6 units per ac)	47%
Private Park	0%
Public Park	0%
Road and ROW	100%
Transportation / Communication / Utilities	50%
Lake / Pond	100%

The existing condition flows used in to develop the effective hydraulic models used previous versions of the regional regression equations. The rural regional regression equation was referenced from *Magnitude and Frequency of Rural Floods in the Southeastern United States, 2006 (Scientific Investigations Report 2009-5043)*. The urban regional regression equation was referenced from *Flood-Frequency Relations for Urban Streams in Georgia–1994 Update (Water-Resources Investigations Report 95-4017).*

Because of the difference in the equations used between the existing condition models and the future condition analysis submitted with this report, the future condition flows are lower than the existing condition flows in the effective models. The future condition analysis has a higher imperviousness, but the differences in equations are resulting in lower flows than the existing condition models.

2.3. Hydraulic Analysis

The future conditions hydraulic analysis is based on the existing conditions modeling currently incorporated in the preliminary Forsyth County FIS, dated March 4, 2013.

The existing conditions hydraulic analyses for Big Creek, Daves Creek, Kelly Mill Branch, and Sawnee Creek watersheds were conducted using the Hydrologic Engineering Center's River Analysis System (HEC-RAS) version 4.1. Some adjustments were made to the existing conditions hydraulic analyses, including: extending some of the models to the City of Cumming jurisdictional boundary, revising structures in the hydraulic models that were surveyed in March 2014, and incorporation of the 100-year future conditions flows.

The surveyed information for the structures is located in Appendix D. Table D-1 lists the point's location, elevation and description. The surveyed worksheets and pictures area also included.

Existing cross section stationing, alignment, and geometries were generally unaltered in the future conditions. As previously discussed, some of the future condition models were extended and structures were updated with recent survey information. Furthermore, as discussed in Section 2.1, the subbasin delineations were not adjusted in the future conditions hydrologic analyses; therefore, the flow change locations incorporated in the future conditions hydraulic analyses have not been adjusted from those appearing in the existing conditions hydraulic analysis of each watershed.

2.3.1. Kelly Mill Branch Tributary A.1.1

System Understanding

Kelly Mill Branch Tributary A.1.1 has been routed through the city of Cumming stormwater system as indicated by the *Boundary and Topographic Survey for Forsyth County (Proposed Courthouse and Detention Facility)* plans developed by Terra Mark, dated November 26, 2012. The upstream portion of Kelly Mill Branch Tributary A.1.1 (upstream of Veterans Memorial Boulevard) remains in natural condition.

The City also provided as built plans in AutoCAD format, named *2012-127D T STORM UPDATE 1-31-14* showing the new sewer that crosses the War Memorial. This project included changes to the piped portion of Kelly Mill Branch Tributary A.1.1.

Figure 2 shows a summary of the as built plans and the topographic plans. Kelly Mill Branch Tributary A.1.1 initially flows into a 60" RCP pipe, then into a new 60" CMP pipe under the War Memorial and then splits into 2 48" CMP pipes. It is important to note, that one of those 48" pipe is described as a possible connection on the topographic plans. Around this area, flows from the NW sub-basin (See Firgure 3) enter the system into a 60" CMP pipe. Information provided by the City does not go beyond this point. However, Atkins assumed that the 60" CMP pipe connects to an 84" RCP pipe that crosses Castleberry Road and discharges into a natural channel again.

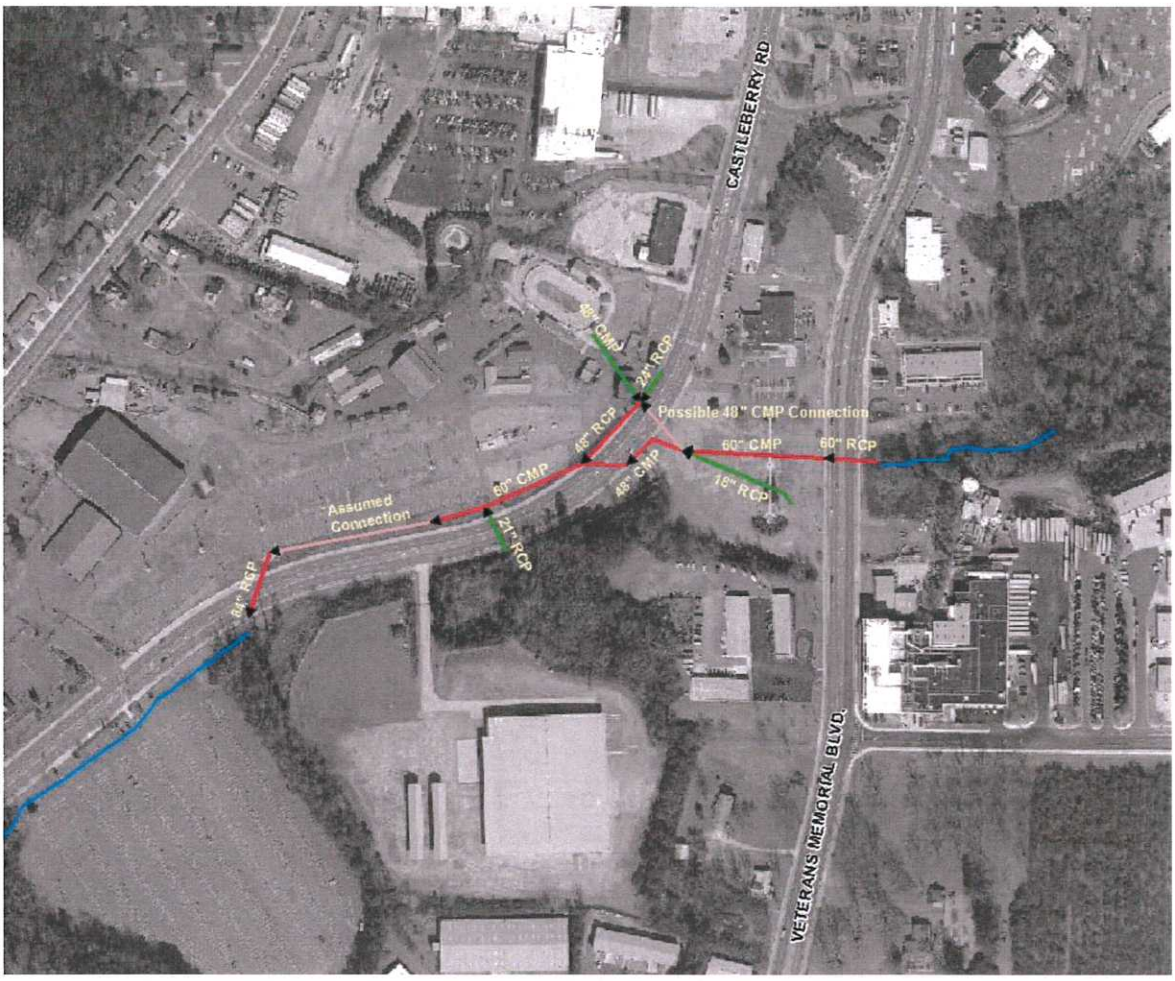

Figure 2. Stormwater System

Assumptions

- Only the initial 60" RCP pipe was analyzed for capacity and headwater elevations. Atkins assumed that the existing stormwater system will have enough capacity to convey existing and future flows from the NE subbasin, past the entrance point.
- The effective FEMA Flood Insurance Study (FIS) and the CH2M Hill future conditions study assume that all the flow from the contributing drainage area is overland flow and ignores the stormwater system capacity. For this revised future conditions model, Atkins follows the same methodology but removes the flow from the NE sub-basin (contained in pipe system) and adds it again downstream of the 84" pipe downstream of Castleberry Road.
- Atkins assumes that the flows from NW and S subbasins will remain on the surface. A comprehensive survey of the existing pipe system and detailed stromwater model would be required to determine the capacity of the stormwater system.

Methodology

Existing and future conditions flows from the NE subbasin were calculated using regression equations. Existing flow is 258 cfs (50% impervious), and future flow is 326 cfs (82% impervious).

HY-8 was used to calculate the headwater under inlet control of the 60" RCP culvert for both the existing and future flows. These elevations were used as starting water surface elevations for the HEC-RAS model developed for Kelly Mill Branch Tributary A.1.1 upstream of Veterans Memorial Drive.

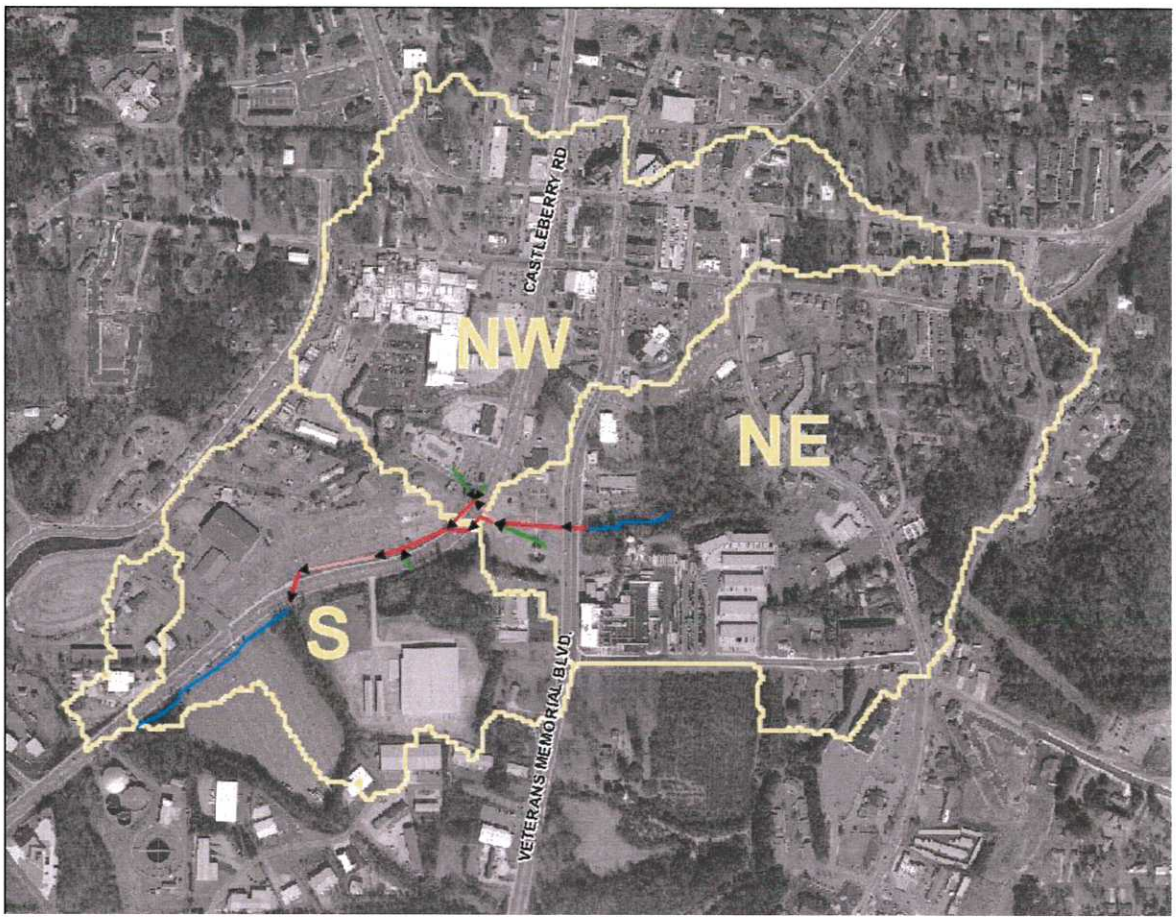

Figure 3. Kelly Mill Branch Tributary A.1.1 Subbasins

2.4. Survey

A total of nine structures were surveyed in accordance with FEMA standards for limited detailed studies. For each structure, Atkins took measurements, drew sketches, and took photos in the field. In addition a few GPS points were taken along the roadway embankment. Survey information is included in Appendix D.

3. Results and Summary

3.1. Future Conditions Flows

A summary of the future conditions flows, along with the existing 10-, 2-, 1-, and 0.2-Percent Annual Chance (10-, 50-, 100-, and 500-year, respectively) flows used in the preliminary FIS is shown on Table B-4, titled Summary of Discharges.

3.2. Future Conditions Floodplain

The future conditions 100-yr floodplain was delineated based on the future 100-year WSELs and the best available topographic data (same data used for the preliminary FIS). Appendix E (submitted under separate cover) includes work maps, which illustrate the future flooding effects, as well as the existing 100-yr floodplain as in the preliminary FIS.

Appendix A - Figures

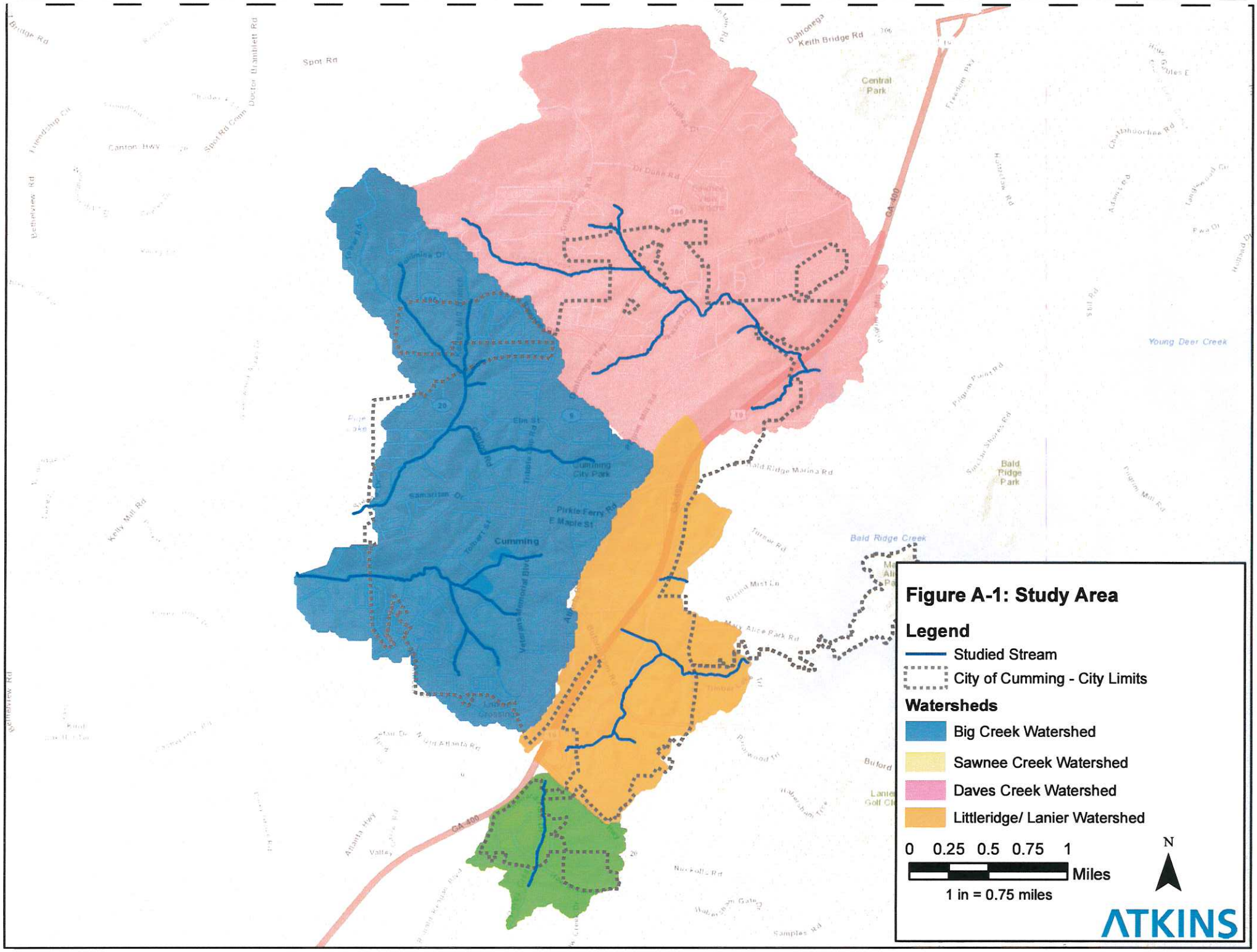
Figure A-1: Study Area
Legend
Studied Stream
City of Cumming - City Limits
Watersheds
Big Creek Watershed
Sawnee Creek Watershed
Daves Creek Watershed
Littleridge/ Lanier Watershed
0 0.25 0.5 0.75 1
Miles
1 in = 0.75 miles
N
ATKINS
Cumming
Central Park
Cumming City Park
Bald Ridge Park
Young Deer Creek
Bald Ridge Creek
Spot Rd
Keith Bridge Rd
Bald Ridge Marina Rd
Pirkle Ferry Rd
E Maple St
Elm St
GA 400

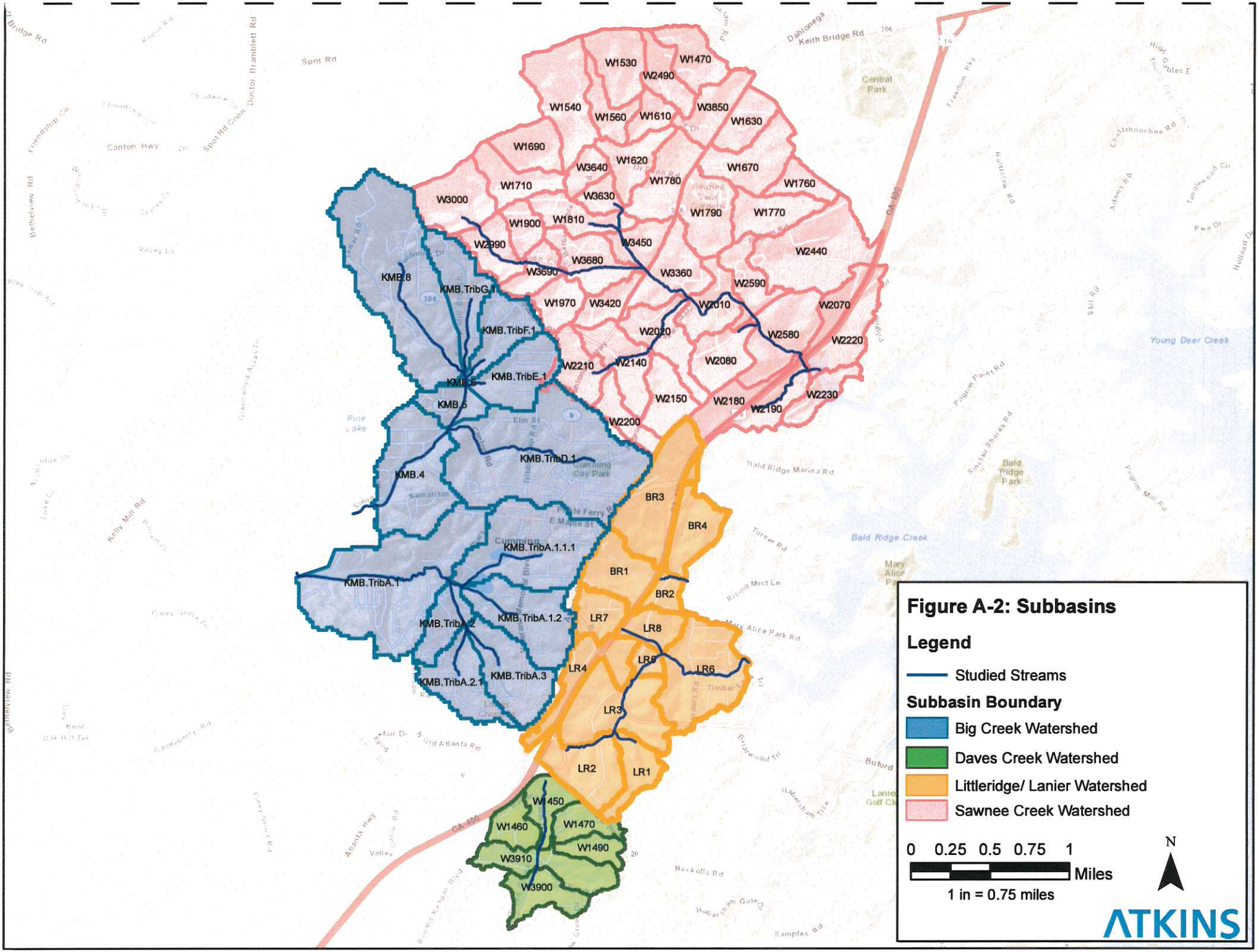
Figure A-2: Subbasins
Legend
Studied Streams
Subbasin Boundary
Big Creek Watershed
Daves Creek Watershed
Littleridge/ Lanier Watershed
Sawnee Creek Watershed
0 0.25 0.5 0.75 1
Miles
1 in = 0.75 miles
N
ATKINS
W1530
W1470
W2490
W1540
W1560
W1610
W3850
W1630
W1690
W1620
W3640
W1780
W1670
W1710
W1760
W3000
W3630
W1790
W1770
W1900
W1810
W2990
W3450
W2440
W3680
W3690
W3360
W2590
W1970
W3420
W2010
W2070
W2020
W2580
W2220
W2210
W2140
W2080
W2150
W2180
W2190
W2230
W2200
KMB.8
KMB.TribG.1
KMB.TribF.1
KMB.TribE.1
KMB.5
KMB.6
KMB.TribD.1
KMB.4
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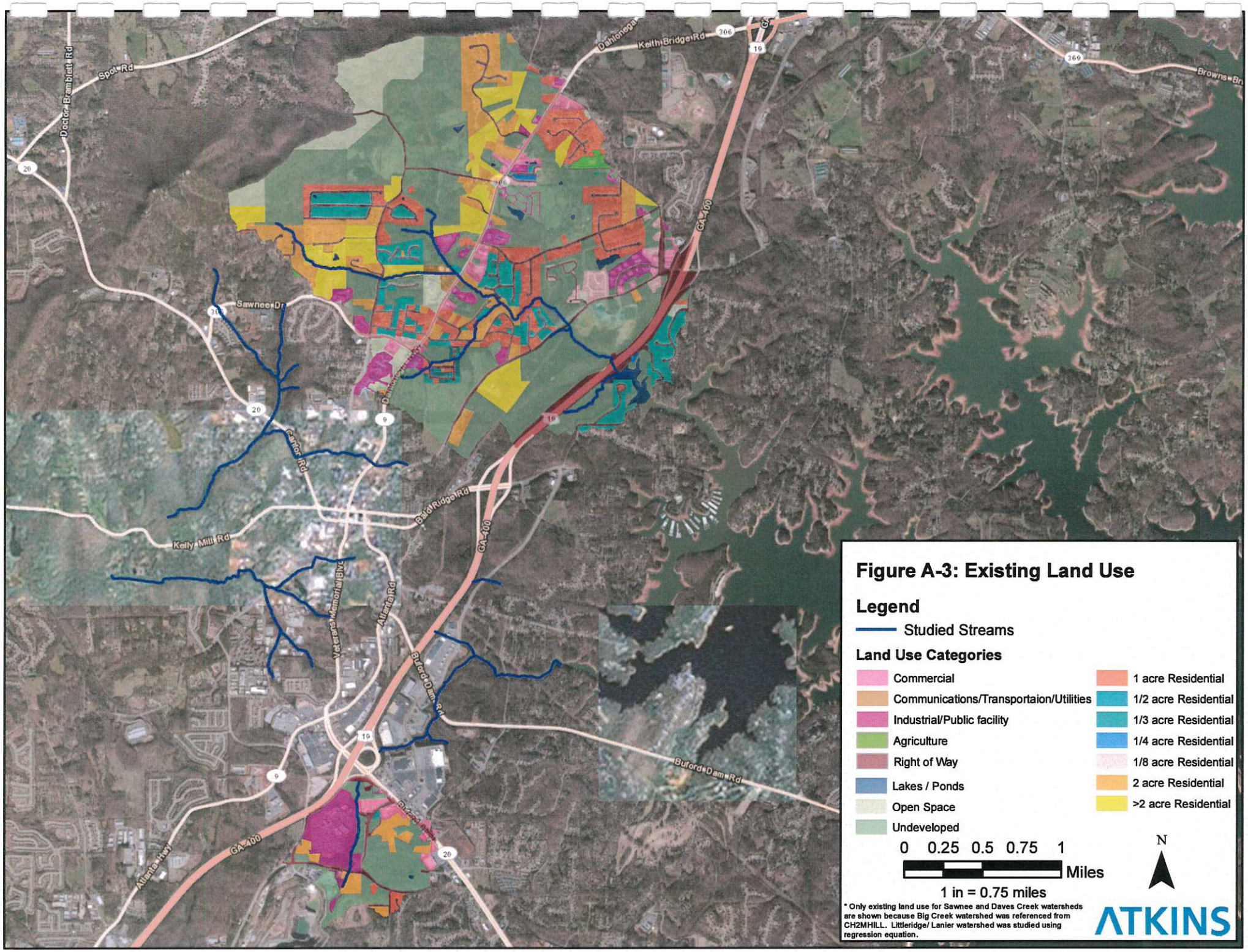
KMB.TribA.1
KMB.TribA.2
KMB.TribA.1.2
KMB.TribA.2.1
KMB.TribA.3
BR3
BR4
BR1
BR2
LR7
LR8
LR5
LR6
LR4
LR3
LR2
LR1
W1450
W1460
W1470
W1490
W3910
W3900
Dahlonega
Keith Bridge Rd
Spot Rd
Canton Hwy
Central Park
Young Deer Creek
Bald Ridge Marina Rd
Bald Ridge Creek
Pilgrim Point Rd
Sinclair Shores Rd
Bald Ridge Park
Pilgrim Mill Rd
Kelly Mill Rd
Bethelview Rd
Friendship Cir
Doctor Bramblett Rd
Spot Rd Conn
Freedom Pkwy
Chattahoochee Rd
Hightower Rd
Adams Rd
Holland Dr
Tanglewood Cir
Pine Lake
Elm St
Cumming City Park
Samaritan
Pirkle Ferry Rd
E Maple St
Cumming
Turner Rd
Rising Mist Ln
Mary Alice Park Rd
Timber Ln
Brierwood Trl
Buford
Lanier Golf Cl
Habersham Trce
Nuckolls Rd
Habersham Gate
Samples Rd
N Old Atlanta Rd
Atlanta Hwy
Valley
GA-400
Ronald Reagan Blvd
Gaddis Rd
Knot
Oak Hill Ter
Valley Ln
Valley Grove Rd
Greenwood Acres Dr
Luke Ln
Nottingham Dr
Pine Grove Dr
Sbil Rd
Pwa Dr


Doctor Brambiett Rd
Spot Rd
Dahlonega
Keith Bridge Rd
Browns Br
Sawnee Dr
Farmer Rd
Bald Ridge Rd
Kelly Mill Rd
Veterans Memorial Hwy
Atlanta Rd
Buford Dam Rd
GA-400
Atlanta Hwy
Figure A-3: Existing Land Use
Legend
Studied Streams
Land Use Categories
Commercial
Communications/Transportaion/Utilities
Industrial/Public facility
Agriculture
Right of Way
Lakes / Ponds
Open Space
Undeveloped
1 acre Residential
1/2 acre Residential
1/3 acre Residential
1/4 acre Residential
1/8 acre Residential
2 acre Residential
>2 acre Residential
0 0.25 0.5 0.75 1
Miles
1 in = 0.75 miles
N
* Only existing land use for Sawnee and Daves Creek watersheds are shown because Big Creek watershed was referenced from CH2MHILL. Littleridge/ Lanier watershed was studied using regression equation.
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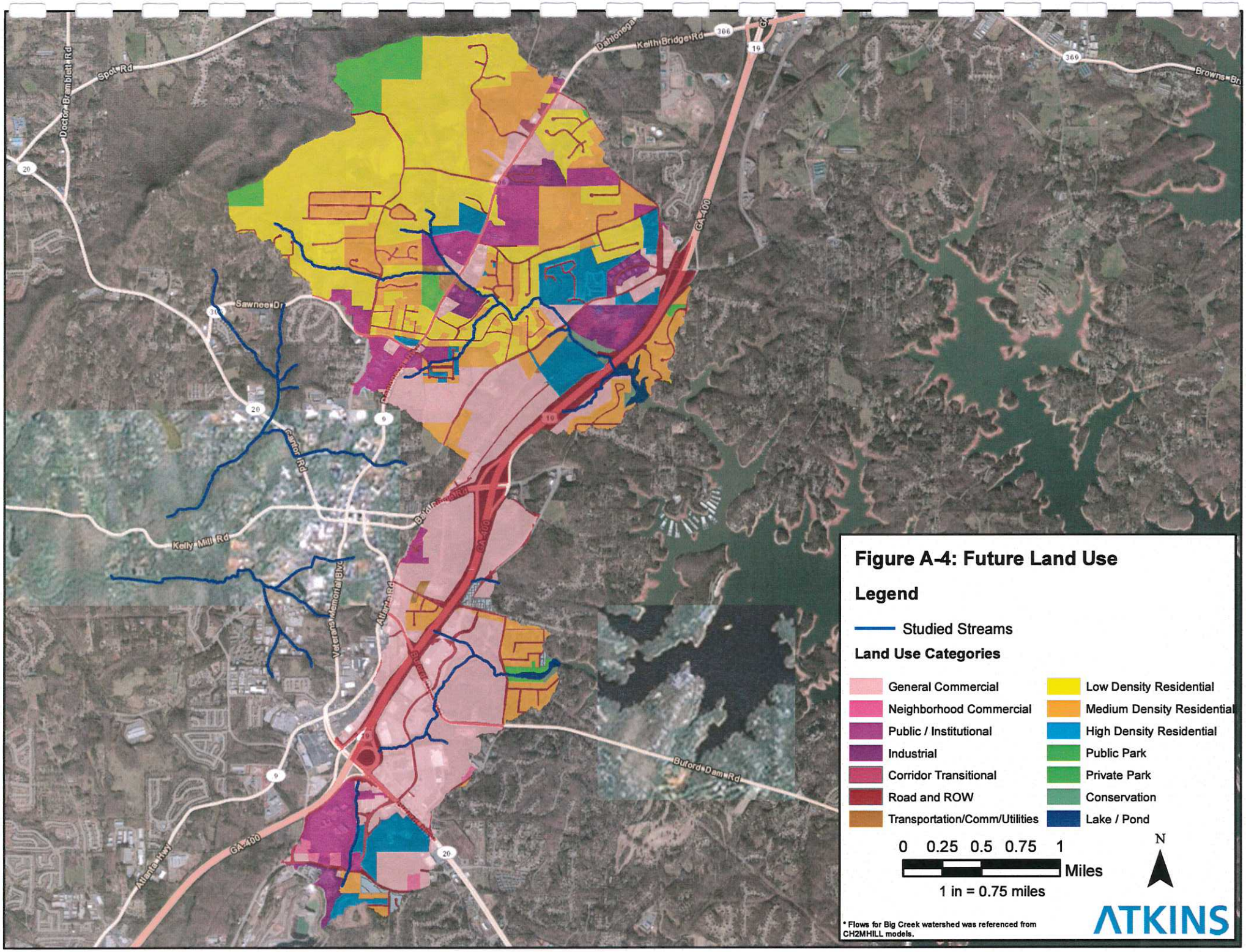


Figure A-4: Future Land Use
Legend
Studied Streams
Land Use Categories
General Commercial
Neighborhood Commercial
Public / Institutional
Industrial
Corridor Transitional
Road and ROW
Transportation/Comm/Utilities
Low Density Residential
Medium Density Residential
High Density Residential
Public Park
Private Park
Conservation
Lake / Pond
0 0.25 0.5 0.75 1
Miles
1 in = 0.75 miles
N
* Flows for Big Creek watershed was referenced from CH2MHILL models.
ATKINS
Doctor Brambiett Rd
Spot Rd
Dahlonega
Keith Bridge Rd
Browns Br
GA 400
Sawnee Dr
Kelly Mill Rd
Bethel Rd
Valley View Rd
Atlanta Hwy
Buford Dam Rd

Appendix B - Tables

Table B-1: Existing and Future Curve Numbers

ID	Future CN	Existing CN
Daves Creek Watershed		
W1450	88.4	78.4
W1460	88.4	88.0
W3910	89.3	71.7
W1470	84.1	75.0
W1490	83.6	67.4
W3900	78.6	69.8
Sawnee Creek Watershed		
W1540	65.0	61.8
W1690	68.0	61.0
W1710	69.9	66.3
W3640	69.7	63.8
W1530	66.3	61.0
W1560	67.4	61.0
W1610	68.9	61.9
W1620	69.3	62.5
W1780	73.5	64.9
W3630	70.2	66.8
W1810	71.3	66.8
W3450	86.7	69.4
W3000	67.1	62.1
W2990	69.0	64.9
W1900	69.6	65.6
W3690	72.1	66.6
W1970	76.4	70.5
W3680	71.5	67.6
W3420	70.1	69.7
W3360	81.9	76.1
W2210	88.8	72.6
W2200	83.7	62.0
W2140	83.3	70.2
W2150	88.6	62.9
W2020	74.9	67.0
W2010	72.0	69.3
W1470	69.3	63.8
W2490	70.0	64.6
W3850	74.8	66.9
W1630	78.2	73.1
W1670	79.0	68.3
W1760	76.4	67.9
W1790	81.3	65.5
W1770	70.8	64.3
W2440	80.2	74.6
W2590	78.8	66.9

W2080	79.5	64.3
W2580	81.4	62.2
W2070	87.3	72.9
W2180	90.2	70.4
W2190	84.8	68.7
W2220	74.0	72.8
W2230	62.7	61.4

Table B-2: HEC-HMS Output Table

ID	Future Condition Flow	Existing Condition Flow				
	100-yr (cfs)	10-yr (cfs)	25-yr (cfs)	50-yr (cfs)	100 (yr)	500-yr (cfs)
Daves Creek Watershed						
W1450	270	132	167	194	212	286
W1460	240	137	166	188	202	263
J777	510	269	333	382	414	549
R60	491	257	321	369	400	534
W3910	444	116	153	181	200	282
J22A	935	350	443	513	561	758
W1470	243	112	145	170	187	258
W1490	208	55	75	91	101	146
J772	445	163	214	253	280	393
R70	443	160	210	249	276	388
J22	1342	503	645	753	826	1134
R100	1218	445	582	685	754	1043
W3900	270	93	124	149	165	236
J760A	1466	538	705	832	917	1274
Sawnee Creek Watershed						
W1540	333	94	134	166	188	284
W1690	253	46	66	82	93	142
J788	547	140	200	248	281	426
R540	548	140	200	248	281	426
W1710	264	101	138	167	187	272
J785	797	197	279	344	391	588
R3650	782	194	276	342	387	585
W3640	136	45	63	77	86	127
J26	902	221	319	393	447	674
R620	800	205	297	370	423	648
W1530	285	59	84	105	119	182
J816	285	59	84	105	119	182
R420	268	58	83	104	118	180
W1560	191	26	38	47	54	82
W1610	137	31	44	54	61	93
J804	571	108	154	193	220	335
R590	470	98	143	180	206	315
W1620	209	46	65	80	91	137
J801	669	140	204	256	294	446
W1780	302	90	125	153	172	254
W3630	113	46	63	76	84	122
J770	1852	429	626	779	887	1359
R650	1818	426	621	775	883	1352
W1810	221	88	120	145	162	235
J764	2010	472	687	859	979	1508
R760	1900	456	664	832	954	1476

W3450	279	75	101	120	133	190
J638	2014	486	708	890	1019	1581
W3000	318	85	121	149	169	255
J15	318	85	121	149	169	255
R750	265	76	109	137	155	237
W2990	190	68	95	115	129	191
W1900	150	59	81	98	110	162
J748	559	165	235	290	329	498
R780	523	160	227	281	319	481
W3690	179	65	89	108	120	175
J745A	651	211	294	361	409	616
W1970	220	96	127	151	168	237
J745	823	285	388	471	530	788
R790	597	215	296	367	415	624
W3680	257	113	153	185	206	298
J638A	803	300	409	502	566	846
W3420	154	86	114	136	151	214
J791	2907	776	1110	1395	1595	2470
R860	2799	773	1107	1388	1586	2446
W3360	389	186	239	280	307	422
J734A	3046	860	1220	1526	1741	2674
W2210	368	125	163	193	213	299
W2200	250	41	58	72	81	122
J701	618	159	213	254	283	405
R1010	552	145	195	234	263	381
W2140	395	137	182	217	241	343
J712B	947					
W2150	397	64	91	112	126	189
J712	1294	335	454	547	613	886
R970	1178	293	411	501	563	831
W2020	333	107	146	176	196	285
J734B	1491					
J734	4325	1242	1743	2156	2450	3725
R900	4094	1209	1701	2101	2384	3615
W2010	241	107	143	171	190	271
J737A	4245	1273	1784	2200	2493	3768
W1470	257	85	119	145	164	243
J821	257	85	119	145	164	243
W2490	228	80	111	135	152	225
J6	485	164	228	278	313	462
R3870	422	156	216	264	297	424
W3850	262	90	123	148	165	240
J30	684	246	339	412	462	664
R2510	633	227	315	385	433	635
W1630	248	111	145	170	188	262
J798	849	318	437	528	590	852
R570	749	293	400	481	537	793

W1670	388	127	171	205	229	329
W1760	173	62	84	101	112	162
J775	1200	460	624	750	836	1222
R700	903	391	513	671	756	919
W1790	389	100	137	167	187	274
W1770	240	78	108	132	148	220
J767	1345	538	707	921	1043	1361
R810	1046	499	651	805	870	1071
W2440	645	289	375	441	485	672
J5	645	289	375	441	485	672
R820	629	288	372	437	479	661
J892	1398	671	843	1031	1123	1423
R890	1388	666	842	1028	1120	1421
J737	5617	1928	2601	3169	3564	5189
R2610	5591	1929	2602	3170	3567	5187
W2590	265	69	94	114	127	185
J8	5725	1986	2682	3261	3669	5347
R910	5719	1987	2681	3262	3670	5346
W2080	364	92	127	156	175	260
J725	5838	2031	2745	3332	3747	5475
R980	5697	2004	2712	3302	3711	5399
W2580	516	82	116	144	163	246
J728A	5907	2085	2825	3442	3869	5642
W2070	223	82	107	126	139	194
J728	5980	2111	2859	3481	3912	5710
W2180	301	75	100	119	132	188
J709	6078	2158	2925	3556	3996	5837
R1030	6076	2160	2924	3555	3995	5837
W2190	316	106	142	170	189	270
J706	6190	2196	2977	3616	4062	5933
R1040	6158	2191	2968	3608	4052	5920
W2220	269	157	205	242	267	372
J698	6321	2241	3035	3685	4138	6047
R1090	6262	2224	3024	3672	4121	6002
W2230	129	48	68	85	96	145
J695	6305	2246	3054	3708	4162	6069
sawnee	6305	2246	3054	3708	4162	6069

Table B-3: Regression Calculations

Urban Regression Calculations - Comparison between Existing and Future

		DA	Existing TIA	Existing	TIA	Future
Stream_Name	Trib Subbasins	Total Trib Area (sqmi)	Weighted Imp (%)	100-yr Flow (cfs)	Weighted Imp (%)	100 -yr Flow (cfs)
	LR1	0.0947	45.63	165	88.79	229
Little Ridge Creek	LR2	0.1728	70.17	318	94.10	381
Little Ridge Creek	LR1+LR2+LR3	0.5223	51.31	655	90.70	882
Little Ridge Creek	LR1+LR2+LR3+LR4+LR5	0.7010	52.41	831	91.22	1114
Little Ridge Creek Tributary 2	LR7	0.0863	33.05	140	68.48	183
Little Ridge Creek Tributary 2	LR7+LR8	0.1665	29.51	227	77.28	326
Little Ridge Creek	LR1+LR2+LR3+LR4+LR5+LR6+LI	1.1546	37.51	1046	80.40	1192
Baldridge Creek Tributary 2	BR1	0.1440	17.57	186	85.27	309
Baldridge Creek Tributary 2	BR1+BR2+BR3+BR4	0.5823	15.00	542	86.92	933

Table B-4: Summary of Discharges

Stream Name	Hydrology ID	HEC-RAS Station	100-year Flow (cfs)	
			Existing Condition	Future Condition
Big Creek Watershed				
Kelley Mill Branch	KMB.8	75178.53	1463	1670
Kelley Mill Branch	KMB.7	66919.18	1749	1990
Kelley Mill Branch	KMB.6	66756.38	2067	2414
Kelley Mill Branch	KMB.5	66468.04	1752	2363
Kelley Mill Branch	KMB.4	64064.45	1829	2538
Kelley Mill Branch	KMB.3	60067	3577	4858
Kelley Mill Branch Tributary A	KMB.TribA.3	9983.281	755	1019
Kelley Mill Branch Tributary A	KMB.TribA.3	8833.472	755	1019
Kelley Mill Branch Tributary A	KMB.TribA.2	7545.81	1039	1165
Kelley Mill Branch Tributary A	KMB.TribA.1	5918.98	1165	1286
Kelley Mill Branch Tributary A 1	KMB.TribA.1.2	2498.442	822	1059
Kelley Mill Branch Tributary A 1	KMB.TribA.1.2	2405.415	822	1059
Kelley Mill Branch Tributary A 1	KMB.TribA.1.1	374.85	822	1059
Kelley Mill Branch Tributary A 1.1	KMB.TribA.1.1.1	3046.058	258	326
Kelley Mill Branch Tributary A 1.1	KMB.TribA.1.1.1	1905.889	1463	1553
Kelley Mill Branch Tributary A 1.1	KMB.TribA.1.1.1	1745.84	1463	1553
Kelley Mill Branch Tributary A 1.1	KMB.TribA.1.1.1	972.469	1721	1879
Kelley Mill Branch Tributary A 1.1	KMB.TribA.1.1.1	819.5845	1325	1485
Kelley Mill Branch Tributary A 1.1	KMB.TribA.1.1.1	236.8276	1721	1879
Kelley Mill Branch Tributary A 2	KMB.TribA.2.1	1734.717	836	953
Kelley Mill Branch Tributary D	KMB.TribD.1	5796.929	1797	2176
Kelley Mill Branch Tributary D	KMB.TribD.1	4945.384	1797	2176
Kelley Mill Branch Tributary D	KMB.TribD.1	4592.996	1501	1881
Kelley Mill Branch Tributary D	KMB.TribD.1	4225.025	1797	2176
Kelley Mill Branch Tributary E	KMB.TribE.1	576.25	490	589
Kelley Mill Branch Tributary F	KMB.TribF.1	912.244	321	427
Kelley Mill Branch Tributary G	KMB.TribG.1	2434.816	325	364
Daves Creek Watershed				
Daves Creek	J777	27225.43	414	510
Daves Creek	J22	24793.65	826	1342
Daves Creek	J760A	23884.1	917	1466
Little Ridge/ Lanier Watershed				
Little Ridge Creek		8974.903	443	381
Little Ridge Creek		7050.313	443	882
Little Ridge Creek		5983.863	894	882
Little Ridge Creek		4500	1457	1114

Little Ridge Creek		3625.628	1457	1192
Little Ridge Creek Tributary 2		1627.682		183
Little Ridge Creek Tributary 2		727.1181		326
Little Ridge Creek Tributary 3		899.7458		229
Baldridge Creek Tributary 2		5126.008	649	309
Baldridge Creek Tributary 2		4396.912	907	933
Sawnee Creek Watershed				
Sawnee Creek	J745	10012.87	530	823
Sawnee Creek	J638A	9740.381	566	803
Sawnee Creek	J791	8710.921	1595	2907
Sawnee Creek	J734A	7581.917	1741	3046
Sawnee Creek	J734	6415.596	2450	4325
Sawnee Creek	J737A	4980.334	2493	4245
Sawnee Creek	J8	3924.086	3669	5725
Sawnee Creek	J725	2922.768	3747	5838
Sawnee Creek	J728A	1753.159	3869	5907
Sawnee Creek	J709	963.331	3996	6078
Sawnee Creek	J706	676.7739	4062	6190
Sawnee Creek	J698	74.87993	4138	6321
Sawnee Creek Tributary 1	W2080	2688.711	200	316
Sawnee Creek Tributary 2	W2080	744.9994	229	364
Sawnee Creek Tributary 4	J701	4633.074	569	618
Sawnee Creek Tributary 4	J712b	3264.746	569	947
Sawnee Creek Tributary 4	J712	2399.406	786	1294
Sawnee Creek Tributary 4	J734B	1196.532	786	1491
Sawnee Creek Tributary 5	J770	2627.903	564	1852
Sawnee Creek Tributary 5	J770	2233.671	875	1852
Sawnee Creek Tributary 5	J764	1599.811	1042	2010
Sawnee Creek Tributary 5.1	W1810	1108.472	216	221

Notes:

Regression Analysis from Effective Approximate Models

Regression Analysis (equation referenced from *Scientific Investigations Report 2011-5042*)

*Flows for Big Creek and Kelley Mill Branch watershed streams were referenced from *Big Creek Watershed Limited Detail Floodplain Mapping Study* prepared by CH2MHILL dated December 2007.

Big Creek Watershed								
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	E.G. Elev	E.G. Slope	Vel Chnl	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	
Kelly Mill Branch	75178.53	1670	1251.25	1255.99	1257.52	0.015251	13.86	1.17
Kelly Mill Branch	75104.22	1670	1248.46	1254.35	1256.50	0.012133	14.44	1.08
Kelly Mill Branch	74863.69	1670	1243.76	1249.03	1250.83	0.011957	13.88	1.08
Kelly Mill Branch	74720.96	1670	1238.75	1242.54	1243.82	0.017600	13.53	1.24
Kelly Mill Branch	74642.77	1670	1235.51	1240.35	1241.61	0.011539	12.81	1.04
Kelly Mill Branch	74556.59	1670	1231.01	1236.47	1237.81	0.008930	12.26	0.93
Kelly Mill Branch	74497.44	1670	1227.73	1233.29	1234.67	0.009025	12.40	0.94
Kelly Mill Branch	73399.64	1670	1223.82	1228.92	1229.88	0.007756	10.77	0.86
Kelly Mill Branch	73240.88	1670	1218.12	1223.96	1225.22	0.007974	11.95	0.89
Kelly Mill Branch	73071.14	1670	1214.62	1221.24	1221.48	0.001915	6.42	0.45
Kelly Mill Branch	72917.74	1670	1211.95	1221.11	1221.26	0.000878	5.46	0.32
Kelly Mill Branch	72736.52	1670	1207.57	1221.15	1221.16	0.000072	2.04	0.10
Kelly Mill Branch	72674.52	Culvert						
Kelly Mill Branch	72613.59	1670	1203.69	1209.64	1212.50	0.012616	15.53	1.13
Kelly Mill Branch	72402.43	1670	1198.15	1203.01	1204.09	0.009961	11.90	0.97
Kelly Mill Branch	72298.85	1670	1195.19	1200.24	1201.61	0.011168	12.88	1.03
Kelly Mill Branch	70655.94	1670	1191.67	1196.96	1198.22	0.009560	12.31	0.96
Kelly Mill Branch	70497.47	1670	1187.33	1192.07	1193.31	0.011472	12.64	1.03
Kelly Mill Branch	70335.30	1670	1183.38	1188.56	1189.89	0.009918	12.50	0.98
Kelly Mill Branch	70168.39	1670	1180.08	1185.63	1187.03	0.009436	12.90	0.97
Kelly Mill Branch	70011.17	1670	1178.28	1185.79	1186.13	0.001964	7.08	0.46
Kelly Mill Branch	69858.41	1670	1175.37	1185.92	1185.96	0.000244	3.16	0.17
Kelly Mill Branch	69695.96	1670	1172.01	1185.91	1185.93	0.000075	2.12	0.10
Kelly Mill Branch	69535.51	1670	1169.07	1185.89	1185.92	0.000079	2.44	0.11
Kelly Mill Branch	69380.49	1670	1165.93	1185.88	1185.91	0.000054	2.25	0.09
Kelly Mill Branch	69299.37	1670	1163.75	1185.89	1185.90	0.000021	1.51	0.06
Kelly Mill Branch	69209.37	Culvert						
Kelly Mill Branch	69119.62	1670	1160.29	1165.79	1168.32	0.012063	14.28	1.09
Kelly Mill Branch	69019.99	1670	1151.75	1157.90	1160.07	0.010284	14.09	1.02
Kelly Mill Branch	67907.36	1670	1149.92	1153.48	1154.76	0.020046	13.96	1.31
Kelly Mill Branch	67746.51	1670	1146.39	1149.74	1150.65	0.017804	12.51	1.22
Kelly Mill Branch	67582.98	1670	1143.08	1147.19	1147.62	0.008356	9.89	0.86
Kelly Mill Branch	67433.61	1670	1141.57	1146.44	1146.78	0.004224	7.87	0.63
Kelly Mill Branch	67264.87	1670	1139.69	1144.26	1145.52	0.012198	12.81	1.06
Kelly Mill Branch	67104.22	1670	1138.35	1143.72	1143.81	0.001895	2.82	0.22
Kelly Mill Branch	66919.18	1990	1137.12	1142.69	1143.28	0.005621	9.94	0.75
Kelly Mill Branch	66839.38	1990	1136.23	1142.61	1142.90	0.002601	7.40	0.52
Kelly Mill Branch	66756.38	2414	1135.63	1140.24	1140.65	0.006931	9.69	0.80
Kelly Mill Branch	66637.18	2414	1135.05	1138.95	1139.55	0.012575	11.67	1.05
Kelly Mill Branch	66468.04	2363	1133.08	1138.87	1138.95	0.001568	4.99	0.39
Kelly Mill Branch	66307.82	2363	1130.34	1138.72	1138.79	0.000809	4.92	0.30
Kelly Mill Branch	66144.47	2363	1127.89	1138.64	1138.70	0.000413	4.20	0.23
Kelly Mill Branch	65988.04	2363	1127.23	1138.59	1138.63	0.000304	3.71	0.20
Kelly Mill Branch	65828.65	2363	1129.74	1138.53	1138.58	0.000434	3.72	0.22
Kelly Mill Branch	64845.54	2363	1123.01	1138.53	1138.54	0.000038	1.26	0.06
Kelly Mill Branch	64745.92	2363	1121.89	1138.52	1138.53	0.000048	1.70	0.08
Kelly Mill Branch	64679.05	Culvert						
Kelly Mill Branch	64603.13	2363	1121.70	1128.56	1131.20	0.010201	13.25	0.95
Kelly Mill Branch	64499.91	2363	1120.72	1127.66	1128.48	0.008489	11.03	0.82
Kelly Mill Branch	64449.32	2363	1120.36	1126.65	1127.50	0.009704	11.94	0.89
Kelly Mill Branch	64282.73	2363	1119.20	1125.40	1126.16	0.007908	11.98	0.86

Kelly Mill Branch	64064.45	2538	1117.67	1125.21	1125.35	0.001526	5.59	0.38
Kelly Mill Branch	63826.13	2538	1116.00	1124.19	1124.75	0.003743	8.59	0.58
Kelly Mill Branch	63668.28	2538	1114.89	1123.89	1124.24	0.001949	6.67	0.43
Kelly Mill Branch	63502.21	2538	1113.73	1123.25	1123.85	0.002609	8.06	0.50
Kelly Mill Branch	63342.01	2538	1112.61	1121.16	1123.04	0.007136	12.23	0.81
Kelly Mill Branch	63184.58	2538	1111.51	1121.71	1122.13	0.001641	6.73	0.40
Kelly Mill Branch	63060.71	2538	1110.64	1121.78	1121.95	0.000658	4.55	0.26
Kelly Mill Branch	62962.97	2538	1109.79	1121.71	1121.89	0.000585	4.32	0.25
Kelly Mill Branch	62898.97	Culvert						
Kelly Mill Branch	62804.76	2538	1106.90	1115.07	1117.03	0.030515	11.94	0.85
Kelly Mill Branch	62760.52	2538	1106.20	1115.11	1116.32	0.004329	9.72	0.65
Kelly Mill Branch	62620.16	2538	1105.02	1113.72	1115.52	0.006829	11.22	0.76
Kelly Mill Branch	62464.79	2538	1103.72	1112.18	1113.79	0.006269	10.79	0.74
Kelly Mill Branch	62300.33	2538	1102.35	1110.87	1112.26	0.005458	10.14	0.69
Kelly Mill Branch	62142.76	2538	1101.03	1109.30	1111.03	0.007067	11.00	0.76
Kelly Mill Branch	61937.56	2538	1099.31	1107.80	1108.79	0.009109	8.90	0.61
Kelly Mill Branch	61822.34	2538	1098.61	1106.91	1107.87	0.004244	8.85	0.61
Kelly Mill Branch	61665.70	2538	1097.65	1106.76	1107.16	0.002149	6.25	0.42
Kelly Mill Branch	61502.39	2538	1096.66	1106.31	1106.83	0.002186	6.60	0.44
Kelly Mill Branch	61341.66	2538	1095.68	1106.23	1106.51	0.001119	5.30	0.31
Kelly Mill Branch	61184.91	2538	1094.73	1106.11	1106.34	0.000762	4.71	0.26
Kelly Mill Branch	61017.80	2538	1093.71	1106.09	1106.23	0.000423	3.74	0.20
Kelly Mill Branch	60862.64	2538	1093.11	1106.09	1106.18	0.000217	3.15	0.16
Kelly Mill Branch	60697.53	2538	1092.47	1106.07	1106.14	0.000201	2.86	0.14
Kelly Mill Branch	60544.26	2538	1091.88	1106.03	1106.11	0.000255	2.87	0.15
Kelly Mill Branch	60382.66	2538	1091.25	1106.02	1106.07	0.000206	2.61	0.13
Kelly Mill Branch	60131.90	2538	1090.28	1105.89	1106.00	0.000206	2.56	0.12
Kelly Mill Branch	60067.00	4858	1091.66	1104.17	1105.80	0.003797	11.62	0.62
Kelly Mill Branch	59943.32	4858	1090.30	1104.07	1105.30	0.002535	10.21	0.52
Kelly Mill Branch	59783.66	4858	1088.56	1103.96	1104.89	0.001631	8.91	0.42
Kelly Mill Branch	59638.98	4858	1086.97	1103.78	1104.66	0.001225	7.88	0.37
Kelly Mill Branch Tributary A	9383.28	1019	1174.70	1181.56	1182.74	0.007396	9.46	0.78
Kelly Mill Branch Tributary A	9280.92	1019	1174.21	1179.36	1180.61	0.007671	9.78	0.82
Kelly Mill Branch Tributary A	9219.29	1019	1171.64	1179.28	1180.14	0.004385	8.07	0.62
Kelly Mill Branch Tributary A	9156.92	1019	1171.90	1178.11	1179.70	0.008323	11.51	0.88
Kelly Mill Branch Tributary A	9049.87	1019	1170.07	1175.56	1177.10	0.011458	11.61	0.99
Kelly Mill Branch Tributary A	8930.46	1019	1166.25	1171.70	1173.11	0.010580	10.74	0.94
Kelly Mill Branch Tributary A	8833.47	1019	1162.44	1166.87	1167.38	0.003620	6.77	0.57
Kelly Mill Branch Tributary A	8679.74	1019	1157.63	1167.11	1167.16	0.000209	2.61	0.15
Kelly Mill Branch Tributary A	8515.85	1019	1154.21	1167.12	1167.14	0.000035	1.36	0.07
Kelly Mill Branch Tributary A	8358.01	1019	1151.34	1167.12	1167.14	0.000024	1.29	0.06
Kelly Mill Branch Tributary A	8218.47	1019	1150.04	1167.12	1167.13	0.000021	1.27	0.05
Kelly Mill Branch Tributary A	8134.62	Culvert						
Kelly Mill Branch Tributary A	8051.72	1019	1147.84	1151.47	1152.96	0.012037	10.63	1.01
Kelly Mill Branch Tributary A	7955.47	1019	1146.73	1150.02	1150.55	0.008756	7.61	0.82
Kelly Mill Branch Tributary A	7779.79	1019	1143.78	1146.97	1148.27	0.019067	12.38	1.24
Kelly Mill Branch Tributary A	7545.81	1165	1138.04	1142.68	1144.34	0.009898	11.08	0.94
Kelly Mill Branch Tributary A	7386.09	1165	1135.63	1141.26	1141.94	0.003629	7.94	0.60
Kelly Mill Branch Tributary A	7219.17	1165	1134.52	1139.30	1140.91	0.009957	11.43	0.96
Kelly Mill Branch Tributary A	7089.22	1165	1133.24	1138.26	1138.77	0.003897	6.99	0.59
Kelly Mill Branch Tributary A	6898.99	1165	1130.50	1138.19	1138.42	0.000710	4.27	0.28
Kelly Mill Branch Tributary A	6748.87	1165	1127.38	1138.15	1138.33	0.000405	4.06	0.22
Kelly Mill Branch Tributary A	6578.85	1165	1125.15	1138.12	1138.26	0.000248	3.59	0.18
Kelly Mill Branch Tributary A	6452.49	1165	1119.60	1138.15	1138.21	0.000055	2.15	0.09

Kelly Mill Branch Tributary A	6329.05	Culvert						
Kelly Mill Branch Tributary A	6202.56	1165	1107.40	1111.24	1112.60	0.011423	10.65	0.99
Kelly Mill Branch Tributary A	6109.30	1165	1103.17	1107.91	1109.47	0.009428	10.82	0.92
Kelly Mill Branch Tributary A	5918.98	1286	1099.09	1106.73	1107.29	0.001820	6.56	0.44
Kelly Mill Branch Tributary A	5752.26	1286	1098.25	1104.60	1106.58	0.008597	12.60	0.92
Kelly Mill Branch Tributary A	5671.93	1286	1097.23	1103.97	1105.49	0.005630	10.55	0.75
Kelly Mill Branch Tributary A	5595.68	1286	1095.61	1102.37	1104.83	0.009725	14.67	1.01
Kelly Mill Branch Tributary A	5533.29	1286	1094.34	1100.50	1102.85	0.009378	13.29	0.96
Kelly Mill Branch Tributary A	5481.30	1286	1091.86	1099.37	1100.67	0.004036	10.13	0.66
Kelly Mill Branch Tributary A	5436.23	1286	1091.61	1099.59	1100.37	0.002334	8.02	0.51
Kelly Mill Branch Tributary A	5393.31	1286	1090.83	1099.53	1100.26	0.002054	7.97	0.48
Kelly Mill Branch Tributary A	5360.13	1286	1089.45	1099.56	1100.13	0.001408	7.20	0.41
Kelly Mill Branch Tributary A	5294.27	Culvert						
Kelly Mill Branch Tributary A	5186.63	1286	1087.25	1093.49	1094.07	0.003388	8.35	0.59
Kelly Mill Branch Tributary A	5108.48	1286	1086.42	1091.96	1093.42	0.008325	11.65	0.90
Kelly Mill Branch Tributary A	4953.99	1286	1085.60	1091.89	1092.38	0.003109	7.78	0.56
Kelly Mill Branch Tributary A	4791.73	1286	1084.12	1089.81	1091.48	0.008663	12.06	0.92
Kelly Mill Branch Tributary A	4634.24	1286	1083.09	1089.64	1089.86	0.001603	5.82	0.41
Kelly Mill Branch Tributary A	4476.15	1286	1082.93	1088.35	1089.32	0.006519	10.22	0.79
Kelly Mill Branch Tributary A	4319.20	1286	1082.11	1088.19	1088.51	0.002441	6.79	0.50
Kelly Mill Branch Tributary A	4155.79	1286	1081.58	1087.15	1087.91	0.005503	9.46	0.73
Kelly Mill Branch Tributary A	3992.51	1286	1080.76	1085.25	1086.60	0.012531	12.41	1.06
Kelly Mill Branch Tributary A	3833.45	1286	1079.42	1084.97	1085.15	0.001764	5.56	0.42
Kelly Mill Branch Tributary A	3673.61	1286	1078.47	1084.59	1084.89	0.001494	5.30	0.39
Kelly Mill Branch Tributary A	3511.94	1286	1077.25	1084.18	1084.59	0.002165	7.00	0.48
Kelly Mill Branch Tributary A	3355.67	1286	1076.09	1084.14	1084.30	0.000887	4.95	0.31
Kelly Mill Branch Tributary A	3189.12	1286	1075.29	1083.92	1084.15	0.000907	5.34	0.32
Kelly Mill Branch Tributary A	3030.97	1286	1074.72	1083.79	1084.01	0.000866	5.29	0.31
Kelly Mill Branch Tributary A	2867.38	1286	1074.38	1083.21	1083.77	0.001804	7.33	0.45
Kelly Mill Branch Tributary A	2709.52	1286	1073.65	1079.87	1082.92	0.013271	14.88	1.12
Kelly Mill Branch Tributary A	2549.49	1286	1072.93	1079.13	1081.09	0.008818	12.62	0.93
Kelly Mill Branch Tributary A	2389.92	1286	1072.21	1078.28	1079.38	0.005539	10.30	0.75
Kelly Mill Branch Tributary A	2236.21	1286	1071.42	1076.31	1078.04	0.013931	14.28	1.15
Kelly Mill Branch Tributary A	2072.45	1286	1070.26	1075.69	1076.36	0.004911	8.96	0.69
Kelly Mill Branch Tributary A	1906.82	1286	1068.00	1075.85	1075.99	0.000573	3.99	0.25
Kelly Mill Branch Tributary A	1746.45	1286	1067.73	1074.99	1075.75	0.003297	8.63	0.59
Kelly Mill Branch Tributary A	1588.22	1286	1066.90	1072.33	1074.68	0.012417	14.06	1.09
Kelly Mill Branch Tributary A	1432.05	1286	1065.49	1072.23	1072.95	0.003734	8.77	0.62
Kelly Mill Branch Tributary A	1268.66	1286	1063.66	1072.42	1072.55	0.000717	4.53	0.28
Kelly Mill Branch Tributary A	1160.16	1286	1063.54	1071.94	1072.36	0.001278	5.94	0.37
Kelly Mill Branch Tributary A	1096.44	Culvert						
Kelly Mill Branch Tributary A	1033.29	1286	1062.96	1070.38	1071.18	0.002806	7.83	0.54
Kelly Mill Branch Tributary A	870.70	1286	1062.07	1069.01	1070.37	0.005873	10.95	0.77
Kelly Mill Branch Tributary A	628.93	1286	1060.98	1067.65	1068.38	0.004016	8.88	0.63
Kelly Mill Branch Tributary A	478.17	1286	1060.87	1067.61	1067.86	0.001712	6.10	0.42
Kelly Mill Branch Tributary A	375.76	1286	1060.04	1067.54	1067.69	0.001039	4.95	0.33
Kelly Mill Branch Tributary A	179.96	1286	1058.01	1067.19	1067.48	0.001000	5.70	0.34
Kelly Mill Branch Tributary A1	2498.21	1059	1152.32	1155.93	1157.22	0.010276	9.49	0.92
Kelly Mill Branch Tributary A1	2405.42	1059	1147.47	1153.82	1154.05	0.000995	4.53	0.32
Kelly Mill Branch Tributary A1	2243.07	1059	1143.93	1153.86	1153.94	0.000236	3.00	0.17
Kelly Mill Branch Tributary A1	2085.78	1059	1143.41	1153.86	1153.90	0.000102	2.04	0.11
Kelly Mill Branch Tributary A1	1930.85	1059	1138.72	1153.87	1153.89	0.000035	1.52	0.07
Kelly Mill Branch Tributary A1	1766.80	1059	1138.11	1153.87	1153.88	0.000025	1.34	0.06
Kelly Mill Branch Tributary A1	1652.95	1059	1138.14	1153.85	1153.87	0.000041	1.64	0.07

Kelly Mill Branch Tributary A1	1616.81	Culvert						
Kelly Mill Branch Tributary A1	1567.27	1059	1134.33	1139.93	1142.62	0.010134	13.18	1.00
Kelly Mill Branch Tributary A1	1365.52	1059	1130.87	1137.64	1137.80	0.000687	3.92	0.27
Kelly Mill Branch Tributary A1	1209.17	1059	1130.32	1136.49	1137.50	0.004465	8.49	0.65
Kelly Mill Branch Tributary A1	1047.29	1059	1129.77	1134.53	1136.35	0.010625	11.13	0.97
Kelly Mill Branch Tributary A1	885.65	1059	1125.28	1130.43	1132.31	0.011010	11.14	0.97
Kelly Mill Branch Tributary A1	805.98	1059	1122.22	1128.46	1129.68	0.005115	9.08	0.69
Kelly Mill Branch Tributary A1	724.11	1059	1118.18	1128.94	1129.30	0.000719	5.06	0.29
Kelly Mill Branch Tributary A1	651.30	1059	1116.00	1129.09	1129.20	0.000173	3.06	0.15
Kelly Mill Branch Tributary A1	562.57	1059	1110.33	1129.16	1129.16	0.000008	0.87	0.04
Kelly Mill Branch Tributary A1	374.85	1059	1114.12	1129.13	1129.16	0.000053	1.81	0.08
Kelly Mill Branch Tributary A1	333.98	Culvert						
Kelly Mill Branch Tributary A1	183.54	1059	1107.81	1111.89	1113.13	0.008898	9.62	0.88
Kelly Mill Branch Tributary A1	110.73	1059	1104.08	1108.12	1109.51	0.010002	10.30	0.93
Kelly Mill Branch Tributary A1.1 (Section2)	3046.06	326	1161.54	1167.00	1167.13	0.000737	3.02	0.25
Kelly Mill Branch Tributary A1.1 (Section2)	2952.93	326	1160.51	1166.96	1167.06	0.000587	2.64	0.22
Kelly Mill Branch Tributary A1.1 (Section2)	2856.61	326	1160.60	1166.96	1167.01	0.000215	1.97	0.14
Kelly Mill Branch Tributary A1.1 (Section2)	2759.19	326	1156.95	1166.98	1166.99	0.000042	1.12	0.07
Kelly Mill Branch Tributary A1.1 (Section2)	2646.26	326	1155.68	1166.98	1166.99	0.000021	0.86	0.05
Kelly Mill Branch Tributary A1.1 (Section1)	1905.89	1553	1147.03	1152.27	1152.39	0.000821	3.56	0.28
Kelly Mill Branch Tributary A1.1 (Section1)	1745.84	1553	1145.65	1152.26	1152.30	0.000246	2.33	0.16
Kelly Mill Branch Tributary A1.1 (Section1)	1449.39	1553	1142.22	1152.24	1152.25	0.000082	1.62	0.10
Kelly Mill Branch Tributary A1.1 (Section1)	1398.55	Culvert						
Kelly Mill Branch Tributary A1.1 (Section1)	1348.57	1553	1139.98	1145.62	1148.31	0.010326	13.47	1.01
Kelly Mill Branch Tributary A1.1 (Section1)	1205.87	1553	1136.63	1140.71	1141.42	0.005347	7.66	0.69
Kelly Mill Branch Tributary A1.1 (Section1)	1045.80	1553	1134.81	1138.78	1140.13	0.011900	11.40	1.02
Kelly Mill Branch Tributary A1.1 (Section1)	972.47	1879	1126.85	1138.35	1138.63	0.000543	4.89	0.26
Kelly Mill Branch Tributary A1.1 (Section1)	883.51	1879	1123.00	1138.50	1138.55	0.000049	1.82	0.08
Kelly Mill Branch Tributary A1.1 (Section1)	819.58	1486	1136.00	1138.42	1138.53	0.001334	2.79	0.32
Kelly Mill Branch Tributary A1.1 (Section1)	699.70	1486	1135.76	1138.24	1138.37	0.001377	2.89	0.32
Kelly Mill Branch Tributary A1.1 (Section1)	642.66	1486	1135.65	1138.03	1138.25	0.002701	3.93	0.45
Kelly Mill Branch Tributary A1.1 (Section1)	568.28	1486	1135.50	1137.82	1138.05	0.002754	3.90	0.45
Kelly Mill Branch Tributary A1.1 (Section1)	477.83	1486	1135.31	1137.31	1137.69	0.005435	4.98	0.62
Kelly Mill Branch Tributary A1.1 (Section1)	377.95	1486	1135.11	1136.87	1137.16	0.004752	4.27	0.57
Kelly Mill Branch Tributary A1.1 (Section1)	320.83	1486	1135.00	1136.11	1136.66	0.017295	5.98	1.00
Kelly Mill Branch Tributary A1.1 (Section1)	236.83	1879	1114.28	1119.53	1121.57	0.010668	12.20	1.00
Kelly Mill Branch Tributary A1.1 (Section1)	145.92	1879	1111.24	1115.46	1116.27	0.010013	9.16	0.90
Kelly Mill Branch Tributary A2	1734.72	953	1166.75	1171.27	1172.70	0.010955	10.55	0.96
Kelly Mill Branch Tributary A2	1637.13	953	1163.27	1168.15	1169.57	0.009726	9.95	0.90
Kelly Mill Branch Tributary A2	1566.04	953	1161.99	1166.52	1167.50	0.006824	8.38	0.76
Kelly Mill Branch Tributary A2	1504.64	953	1160.05	1165.53	1166.94	0.010648	9.90	0.92
Kelly Mill Branch Tributary A2	1428.26	953	1158.31	1164.38	1165.33	0.005331	8.08	0.68
Kelly Mill Branch Tributary A2	1372.42	953	1157.75	1164.65	1165.00	0.001587	5.33	0.39
Kelly Mill Branch Tributary A2	1316.04	953	1157.82	1164.73	1164.87	0.000999	4.17	0.31
Kelly Mill Branch Tributary A2	1250.38	953	1154.77	1164.73	1164.80	0.000315	2.76	0.17
Kelly Mill Branch Tributary A2	1240.00	Culvert						
Kelly Mill Branch Tributary A2	1218.27	953	1154.31	1164.69	1164.79	0.000369	3.01	0.19
Kelly Mill Branch Tributary A2	1163.47	953	1155.91	1164.68	1164.76	0.000277	2.73	0.17
Kelly Mill Branch Tributary A2	1070.08	953	1155.75	1164.65	1164.73	0.000310	3.06	0.19
Kelly Mill Branch Tributary A2	951.33	953	1151.80	1164.69	1164.71	0.000040	1.46	0.07
Kelly Mill Branch Tributary A2	787.35	953	1149.10	1164.69	1164.70	0.000016	1.04	0.05
Kelly Mill Branch Tributary A2	651.74	953	1148.08	1164.68	1164.70	0.000020	1.18	0.05

Kelly Mill Branch Tributary A2	590.20	Culvert						
Kelly Mill Branch Tributary A2	531.22	953	1146.75	1152.09	1154.69	0.010161	12.94	0.99
Kelly Mill Branch Tributary A2	433.24	953	1146.00	1149.05	1150.19	0.011660	9.24	0.96
Kelly Mill Branch Tributary A2	308.05	953	1144.04	1147.12	1147.63	0.006246	6.99	0.71
Kelly Mill Branch Tributary A2	157.34	953	1141.82	1145.27	1146.39	0.010010	9.10	0.90
Kelly Mill Branch Tributary D	5796.93	2176	1202.54	1209.48	1210.80	0.009772	12.44	0.94
Kelly Mill Branch Tributary D	5707.84	2176	1200.64	1206.92	1208.32	0.007555	10.06	0.83
Kelly Mill Branch Tributary D	5558.65	2176	1197.36	1203.93	1205.68	0.008651	11.16	0.89
Kelly Mill Branch Tributary D	5510.16	2176	1196.26	1203.59	1205.32	0.006310	11.96	0.81
Kelly Mill Branch Tributary D	5416.96	2176	1195.45	1202.66	1204.31	0.008098	13.20	0.90
Kelly Mill Branch Tributary D	5337.65	2176	1194.93	1201.39	1203.12	0.010195	12.89	0.98
Kelly Mill Branch Tributary D	5137.85	2176	1190.56	1196.73	1198.52	0.009718	12.35	0.96
Kelly Mill Branch Tributary D	5046.02	2176	1189.52	1195.74	1197.44	0.009788	12.27	0.96
Kelly Mill Branch Tributary D	4945.38	2176	1186.95	1193.09	1194.11	0.005969	10.94	0.78
Kelly Mill Branch Tributary D	4745.05	2176	1182.71	1190.00	1192.51	0.009042	14.53	0.98
Kelly Mill Branch Tributary D	4593.00	1881	1179.77	1186.61	1187.64	0.004698	10.11	0.70
Kelly Mill Branch Tributary D	4532.95	1881	1183.36	1186.04	1187.19	0.012326	9.10	0.98
Kelly Mill Branch Tributary D	4435.91	1881	1182.30	1184.95	1185.21	0.002620	4.16	0.45
Kelly Mill Branch Tributary D	4334.61	1881	1181.20	1183.90	1184.72	0.008210	7.45	0.80
Kelly Mill Branch Tributary D	4225.03	2176	1176.91	1182.23	1183.67	0.010236	12.38	0.98
Kelly Mill Branch Tributary D	4062.07	2176	1173.99	1179.33	1181.23	0.010364	12.92	1.00
Kelly Mill Branch Tributary D	3980.44	2176	1171.85	1177.48	1179.63	0.013275	15.38	1.15
Kelly Mill Branch Tributary D	3900.44	2176	1171.10	1176.22	1178.03	0.009157	11.69	0.93
Kelly Mill Branch Tributary D	3836.23	2176	1170.47	1175.16	1176.84	0.016470	15.12	1.24
Kelly Mill Branch Tributary D	3770.30	2176	1169.62	1174.49	1174.81	0.002262	5.70	0.46
Kelly Mill Branch Tributary D	3703.85	2176	1169.22	1174.15	1174.57	0.006195	9.09	0.75
Kelly Mill Branch Tributary D	3623.36	2176	1166.60	1174.31	1174.40	0.000309	2.81	0.18
Kelly Mill Branch Tributary D	3558.93	2176	1165.20	1174.33	1174.37	0.000288	3.13	0.18
Kelly Mill Branch Tributary D	3503.19	2176	1163.57	1174.29	1174.35	0.000148	2.50	0.14
Kelly Mill Branch Tributary D	3400.88	Culvert						
Kelly Mill Branch Tributary D	3292.48	2176	1159.83	1164.98	1166.97	0.009883	12.00	0.97
Kelly Mill Branch Tributary D	3181.02	2176	1158.25	1163.00	1164.75	0.012122	13.00	1.06
Kelly Mill Branch Tributary D	3021.29	2176	1152.78	1160.08	1160.53	0.001641	6.42	0.42
Kelly Mill Branch Tributary D	2865.37	2176	1151.19	1158.28	1159.95	0.006755	12.51	0.85
Kelly Mill Branch Tributary D	2699.49	2176	1149.16	1155.73	1158.25	0.009535	13.30	0.97
Kelly Mill Branch Tributary D	2543.49	2176	1146.91	1152.63	1153.98	0.005952	10.29	0.77
Kelly Mill Branch Tributary D	2375.27	2176	1143.82	1153.10	1153.36	0.000828	5.32	0.31
Kelly Mill Branch Tributary D	2222.37	2176	1141.09	1153.14	1153.24	0.000289	3.70	0.19
Kelly Mill Branch Tributary D	2060.69	2176	1137.90	1153.08	1153.20	0.000228	3.85	0.18
Kelly Mill Branch Tributary D	1930.52	2176	1135.60	1153.11	1153.14	0.000079	2.47	0.11
Kelly Mill Branch Tributary D	1835.00	Culvert						
Kelly Mill Branch Tributary D	1744.29	2176	1133.85	1141.09	1143.42	0.009171	14.46	0.98
Kelly Mill Branch Tributary D	1266.35	2176	1127.41	1136.01	1137.01	0.002872	9.13	0.57
Kelly Mill Branch Tributary D	1104.54	2176	1126.70	1135.80	1136.57	0.001897	7.74	0.46
Kelly Mill Branch Tributary D	948.12	2176	1125.84	1135.80	1136.25	0.001092	6.25	0.36
Kelly Mill Branch Tributary D	785.37	2176	1125.87	1135.28	1136.00	0.001912	7.88	0.47
Kelly Mill Branch Tributary D	621.69	2176	1124.92	1132.49	1135.22	0.008801	14.13	0.96
Kelly Mill Branch Tributary D	459.31	2176	1123.76	1129.64	1131.91	0.009461	12.87	0.96
Kelly Mill Branch Tributary D	300.17	2176	1122.52	1127.18	1128.79	0.012998	12.84	1.09
Kelly Mill Branch Tributary D	141.09	2176	1119.88	1123.63	1124.82	0.014011	11.80	1.10
Kelly Mill Branch Tributary E	576.25	589	1144.41	1146.81	1147.70	0.015290	9.28	1.07
Kelly Mill Branch Tributary E	407.49	589	1141.36	1143.62	1144.46	0.012630	7.83	0.95
Kelly Mill Branch Tributary E	256.75	589	1137.42	1138.95	1139.58	0.015299	6.58	0.98

Kelly Mill Branch Tributary E	95.17	589	1134.58	1135.74	1136.15	0.015010	5.34	0.92
Kelly Mill Branch Tributary F	912.24	427	1148.37	1151.24	1151.82	0.006569	6.31	0.71
Kelly Mill Branch Tributary F	751.75	427	1146.37	1149.29	1150.33	0.013256	8.30	0.98
Kelly Mill Branch Tributary F	587.86	427	1143.21	1145.44	1146.28	0.013747	7.64	0.98
Kelly Mill Branch Tributary F	435.19	427	1139.44	1141.88	1142.49	0.008200	6.64	0.78
Kelly Mill Branch Tributary F	269.32	427	1137.54	1139.93	1140.79	0.012813	7.94	0.96
Kelly Mill Branch Tributary F	98.09	427	1136.02	1137.75	1138.05	0.007000	5.09	0.68
Kelly Mill Branch Tributary G	2434.82	364	1189.79	1193.71	1194.81	0.015291	8.42	1.01
Kelly Mill Branch Tributary G	2384.86	364	1188.62	1192.62	1193.25	0.006074	6.42	0.68
Kelly Mill Branch Tributary G	2307.16	364	1188.34	1191.68	1192.62	0.010196	8.12	0.87
Kelly Mill Branch Tributary G	2243.59	364	1186.55	1190.23	1191.04	0.012329	7.62	0.91
Kelly Mill Branch Tributary G	2188.66	364	1184.97	1189.00	1189.76	0.011309	7.36	0.88
Kelly Mill Branch Tributary G	2123.28	364	1184.46	1187.91	1188.63	0.008549	7.43	0.80
Kelly Mill Branch Tributary G	2087.43	364	1184.26	1187.55	1188.28	0.010471	7.71	0.86
Kelly Mill Branch Tributary G	2045.98	364	1182.52	1186.75	1187.59	0.011201	7.99	0.88
Kelly Mill Branch Tributary G	1989.05	364	1182.36	1185.77	1186.57	0.010301	7.87	0.87
Kelly Mill Branch Tributary G	1927.81	364	1181.26	1184.41	1185.20	0.012448	8.11	0.94
Kelly Mill Branch Tributary G	1867.12	364	1179.25	1182.31	1183.07	0.013968	7.70	0.97
Kelly Mill Branch Tributary G	1805.56	364	1177.39	1180.55	1181.31	0.010123	7.79	0.86
Kelly Mill Branch Tributary G	1752.93	364	1174.97	1178.24	1179.14	0.011256	7.72	0.89
Kelly Mill Branch Tributary G	1678.33	364	1173.29	1176.56	1177.46	0.011357	7.71	0.90
Kelly Mill Branch Tributary G	1603.92	364	1171.88	1176.05	1176.46	0.004867	5.33	0.59
Kelly Mill Branch Tributary G	1555.44	364	1171.33	1175.17	1176.07	0.011469	7.69	0.89
Kelly Mill Branch Tributary G	1498.89	364	1170.17	1174.48	1175.09	0.006539	6.49	0.69
Kelly Mill Branch Tributary G	1408.44	364	1171.55	1173.54	1174.26	0.013445	7.28	0.96
Kelly Mill Branch Tributary G	1341.97	364	1166.85	1170.44	1170.72	0.002352	4.53	0.44
Kelly Mill Branch Tributary G	1253.23	364	1161.37	1163.46	1164.33	0.014079	8.00	1.00
Kelly Mill Branch Tributary G	1092.00	364	1158.18	1160.39	1161.19	0.014636	7.19	0.98
Kelly Mill Branch Tributary G	923.02	364	1153.86	1155.80	1156.56	0.013871	7.45	0.97
Kelly Mill Branch Tributary G	765.49	364	1147.79	1149.87	1150.66	0.013620	7.85	0.98
Kelly Mill Branch Tributary G	609.02	364	1145.96	1147.77	1148.44	0.014634	6.87	0.97
Kelly Mill Branch Tributary G	442.39	364	1142.56	1144.31	1144.95	0.014967	7.23	0.99
Kelly Mill Branch Tributary G	285.56	364	1139.44	1141.54	1142.08	0.009108	6.08	0.79
Kelly Mill Branch Tributary G	136.01	364	1138.63	1140.77	1141.02	0.005004	4.43	0.58

Daves Creek Watershed								
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	E.G. Elev	E.G. Slope	Vel Chnl	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	
Daves Creek	27225.43	510	1199.64	1202.82	1203.61	0.028036	7.11	0.95
Daves Creek	27125.50	510	1198.10	1200.24	1200.89	0.025488	6.72	0.91
Daves Creek	26998.97	510	1194.00	1196.28	1196.93	0.027487	7.19	0.95
Daves Creek	26885.89	510	1186.23	1192.86	1193.06	0.003062	3.65	0.35
Daves Creek	26861.33	510	1185.91	1192.86	1192.99	0.001241	3.01	0.23
Daves Creek	26826.66	510	1186.36	1192.89	1192.94	0.000532	1.97	0.16
Daves Creek	26763.88	510	1186.26	1192.90	1192.92	0.000153	1.20	0.09
Daves Creek	26690.22	510	1184.69	1192.90	1192.91	0.000058	0.90	0.06
Daves Creek	26583.16	510	1182.40	1192.90	1192.90	0.000021	0.62	0.03
Daves Creek	26478.10	510	1180.46	1192.90	1192.90	0.000025	0.75	0.04
Daves Creek	26340.98	510	1179.32	1192.89	1192.90	0.000017	0.68	0.03
Daves Creek	26250.00	510	1178.26	1192.89	1192.90	0.000010	0.56	0.03
Daves Creek	26208.04	510	1175.47	1192.89	1192.90	0.000020	0.65	0.03
Daves Creek	26153.00	Culvert						
Daves Creek	26086.49	510	1172.88	1177.59	1179.39	0.036308	10.77	1.00
Daves Creek	26009.58	510	1169.07	1174.92	1175.31	0.013626	5.25	0.50
Daves Creek	25968.20	510	1168.50	1174.37	1174.77	0.012196	5.48	0.49
Daves Creek	25893.18	510	1168.15	1174.30	1174.39	0.001855	2.55	0.20
Daves Creek	25832.48	510	1167.58	1173.57	1174.08	0.019874	6.18	0.59
Daves Creek	25774.01	510	1166.71	1171.57	1172.57	0.032682	8.26	0.78
Daves Creek	25655.40	510	1165.07	1170.53	1170.76	0.007321	4.20	0.39
Daves Creek	25576.36	510	1163.92	1169.03	1169.76	0.022503	7.42	0.66
Daves Creek	25477.82	510	1162.78	1167.79	1168.03	0.008844	4.39	0.42
Daves Creek	25363.34	510	1161.63	1167.13	1167.25	0.005030	3.48	0.32
Daves Creek	25297.09	510	1161.06	1166.77	1166.95	0.006544	4.01	0.36
Daves Creek	25250.00	510	1160.49	1165.12	1166.20	0.055073	8.49	0.96
Daves Creek	25017.60	510	1157.63	1163.90	1163.96	0.002037	2.57	0.21
Daves Creek	24793.65	1342	1155.37	1163.38	1163.46	0.002392	3.20	0.23
Daves Creek	24678.59	1342	1153.83	1163.25	1163.29	0.000997	2.25	0.15
Daves Creek	24573.04	1342	1152.49	1162.64	1163.01	0.004644	5.01	0.33
Daves Creek	24520.00	Culvert						
Daves Creek	24458.69	1342	1152.02	1162.15	1162.48	0.002089	5.17	0.32
Daves Creek	24344.30	1342	1151.68	1162.19	1162.23	0.000503	2.61	0.15
Daves Creek	24290.64	1342	1151.44	1162.17	1162.20	0.000319	2.26	0.13
Daves Creek	24195.92	1342	1150.91	1161.76	1162.06	0.001856	4.82	0.27
Daves Creek	24054.00	Culvert						
Daves Creek	24021.27	1342	1149.00	1155.23	1157.57	0.029164	12.29	0.91
Daves Creek	23884.10	1466	1146.44	1154.68	1154.93	0.006296	4.86	0.37
Daves Creek	23750.00	1466	1146.08	1153.91	1154.13	0.005365	4.33	0.35
Daves Creek	23655.09	1466	1145.98	1153.16	1153.47	0.009172	5.48	0.44
Daves Creek	23500.00	1466	1145.19	1150.77	1151.39	0.020903	7.24	0.66

Littleridge/ Lanier Watershed								
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	E.G. Elev	E.G. Slope	Vel Chnl	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	
Baldridge Creek Tributary 2	5126.01	309	1109.72	1113.44	1113.57	0.006349	2.92	0.34
Baldridge Creek Tributary 2	5004.47	309	1108.18	1110.96	1111.72	0.063490	6.97	0.99
Baldridge Creek Tributary 2	4821.81	309	1101.45	1107.73	1107.77	0.001017	1.70	0.15
Baldridge Creek Tributary 2	4736.63	Culvert						
Baldridge Creek Tributary 2	4643.13	309	1099.94	1105.86	1105.89	0.000944	1.49	0.14
Baldridge Creek Tributary 2	4396.91	933	1099.89	1105.00	1105.12	0.006082	3.81	0.35
Baldridge Creek Tributary 2	4201.01	933	1097.17	1103.25	1103.59	0.011008	5.63	0.48
Littleridge Creek	8974.90	381	1181.27	1186.38	1186.59	0.007006	3.63	0.37
Littleridge Creek	8827.64	381	1180.15	1184.61	1185.08	0.015707	5.59	0.54
Littleridge Creek	8719.70	381	1177.82	1182.30	1182.86	0.028205	6.13	0.70
Littleridge Creek	8588.12	381	1173.45	1176.90	1177.83	0.054095	7.75	0.95
Littleridge Creek	8388.18	381	1162.34	1165.76	1165.96	0.013678	4.46	0.50
Littleridge Creek	8212.71	381	1158.67	1161.55	1162.16	0.040394	6.97	0.84
Littleridge Creek	8091.75	381	1153.36	1156.20	1156.92	0.046251	7.20	0.89
Littleridge Creek	8024.06	381	1148.83	1155.98	1156.07	0.001534	2.39	0.18
Littleridge Creek	7800.00	Culvert						
Littleridge Creek	7603.69	381	1139.55	1143.59	1143.77	0.008106	3.44	0.39
Littleridge Creek	7460.35	381	1137.46	1142.39	1142.60	0.008172	3.68	0.39
Littleridge Creek	7292.84	381	1136.74	1141.35	1141.48	0.005447	3.27	0.33
Littleridge Creek	7050.31	882	1133.71	1139.31	1139.60	0.008930	5.40	0.45
Littleridge Creek	6873.22	882	1130.91	1137.06	1137.65	0.013519	6.47	0.54
Littleridge Creek	6742.94	882	1129.93	1134.94	1135.51	0.020246	7.03	0.65
Littleridge Creek	6462.15	882	1124.02	1127.52	1128.29	0.034628	7.91	0.82
Littleridge Creek	6269.22	882	1120.11	1127.80	1127.82	0.000425	1.46	0.10
Littleridge Creek	6110.10	882	1119.41	1127.73	1127.75	0.000383	1.56	0.10
Littleridge Creek	5983.86	882	1112.13	1127.64	1127.69	0.000367	1.97	0.09
Littleridge Creek	5890.29	Culvert						
Littleridge Creek	5818.67	882	1110.73	1118.55	1118.85	0.004218	4.34	0.31
Littleridge Creek	5500.00	882	1111.38	1116.59	1116.93	0.009372	5.33	0.46
Littleridge Creek	5284.10	882	1110.33	1114.60	1114.84	0.010032	4.99	0.46
Littleridge Creek	5000.00	882	1108.91	1114.45	1114.48	0.000417	1.82	0.14
Littleridge Creek	4500.00	1114	1108.91	1114.45	1114.45	0.000015	0.72	0.05
Littleridge Creek	4148.77	1114	1108.91	1114.43	1114.45	0.000024	0.91	0.07
Littleridge Creek	3885.68	1114	1108.91	1114.43	1114.44	0.000017	0.77	0.06
Littleridge Creek	3625.63	1192	1108.91	1114.41	1114.43	0.000043	1.22	0.09
Littleridge Creek	3552.07	1192	1112.78	1113.53	1114.34	0.067968	3.18	0.85
Littleridge Creek	3474.38	1192	1086.17	1090.77	1092.36	0.045823	10.17	0.97
Littleridge Creek	3315.45	1192	1081.11	1087.45	1087.74	0.005521	4.82	0.37
Littleridge Creek	3136.31	1192	1080.24	1086.93	1087.03	0.002672	3.54	0.26
Littleridge Creek	2876.98	1192	1076.60	1086.85	1086.86	0.000260	1.39	0.08
Littleridge Creek	2663.68	1192	1075.06	1086.81	1086.82	0.000180	1.29	0.07
Littleridge Creek	2492.25	1192	1074.03	1086.78	1086.79	0.000179	1.42	0.07
Littleridge Creek	2374.80	1192	1073.91	1086.76	1086.78	0.000144	1.28	0.07
Littleridge Creek	2253.58	1192	1070.50	1086.71	1086.75	0.000261	1.77	0.09
Littleridge Creek	2211.05	Culvert						
Littleridge Creek	2166.41	1192	1068.50	1075.85	1076.20	0.005860	4.81	0.37
Littleridge Creek	2050.27	1192	1067.94	1074.56	1075.16	0.012899	6.70	0.54
Littleridge Creek	1877.42	1192	1066.43	1071.93	1072.59	0.017000	6.99	0.61
Littleridge Creek	1672.42	1192	1063.48	1071.39	1071.48	0.002108	2.85	0.22
Littleridge Creek	1433.52	1192	1061.36	1071.23	1071.27	0.000445	1.77	0.11

Littleridge Creek	1230.32	1192	1060.68	1071.17	1071.19	0.000271	1.51	0.09
Littleridge Creek	1000.00	1192	1059.07	1071.11	1071.13	0.000271	1.65	0.09
Littleridge Creek	763.33	1192	1057.14	1071.04	1071.07	0.000297	1.93	0.09
Littleridge Creek	500.00	1192	1056.85	1070.97	1071.02	0.000131	1.90	0.09
Littleridge Creek	240.75	1192	1056.85	1071.00	1071.00	0.000001	0.39	0.02
Littleridge Creek	0.00	1192	1056.85	1071.00	1071.00	0.000002	0.53	0.02
Littleridge Creek Tributary 2	1672.68	183	1124.31	1132.03	1132.03	0.000009	0.24	0.02
Littleridge Creek Tributary 2	1516.66	183	1118.00	1132.03	1132.03	0.000004	0.20	0.01
Littleridge Creek Tributary 2	1327.00	Culvert						
Littleridge Creek Tributary 2	785.32	183	1108.91	1110.38	1110.40	0.000284	1.29	0.19
Littleridge Creek Tributary 2	727.12	326	1108.91	1110.26	1110.35	0.001464	2.77	0.42
Littleridge Creek Tributary 2	518.33	326	1108.91	1110.12	1110.15	0.000559	1.59	0.26
Littleridge Creek Tributary 2	316.10	326	1108.91	1109.87	1109.96	0.001833	2.47	0.45
Littleridge Creek Tributary 2	159.64	326	1108.91	1109.70	1109.74	0.001000	1.60	0.32
Littleridge Creek Tributary 3	899.75	229	1157.07	1160.14	1160.65	0.026488	5.85	0.68
Littleridge Creek Tributary 3	822.63	229	1154.50	1159.12	1159.38	0.010212	4.22	0.43
Littleridge Creek Tributary 3	737.49	229	1152.88	1158.27	1158.57	0.008859	4.58	0.41
Littleridge Creek Tributary 3	665.36	229	1152.71	1156.88	1157.51	0.026314	6.42	0.67
Littleridge Creek Tributary 3	563.88	229	1148.93	1153.46	1154.28	0.038982	7.30	0.76
Littleridge Creek Tributary 3	462.40	229	1144.70	1148.21	1149.22	0.065297	8.06	1.00
Littleridge Creek Tributary 3	356.75	229	1140.49	1143.70	1144.03	0.027104	5.53	0.67
Littleridge Creek Tributary 3	250.78	229	1138.44	1141.73	1142.00	0.014176	4.24	0.50
Littleridge Creek Tributary 3	115.70	229	1137.21	1139.18	1139.36	0.028203	4.13	0.65

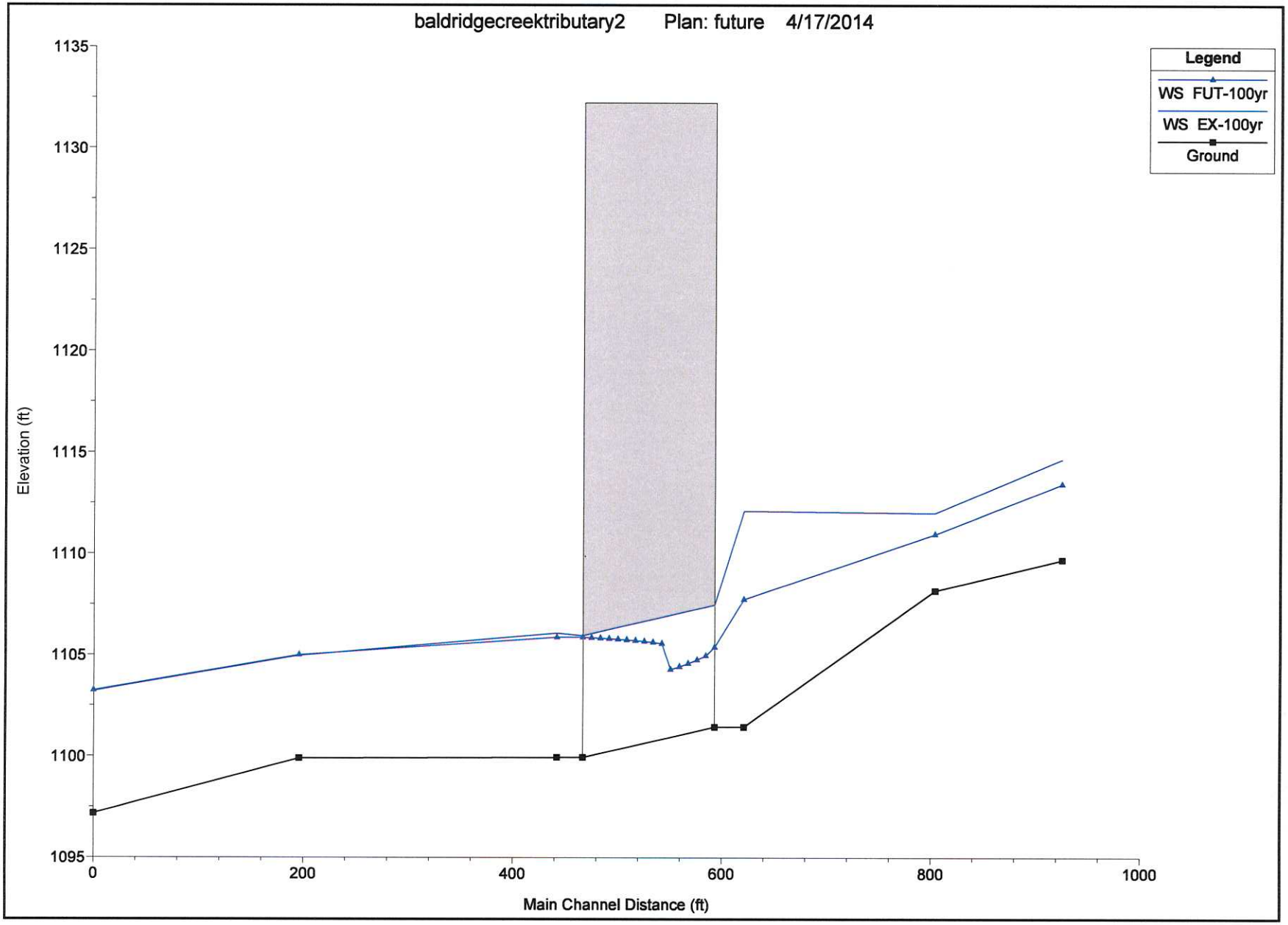
Sawnee Creek Watershed								
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	E.G. Elev	E.G. Slope	Vel Chnl	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	
Sawnee Creek	10012.87	823	1146.45	1153.01	1153.17	0.007068	4.20	0.37
Sawnee Creek	9903.17	823	1145.83	1152.37	1152.50	0.005335	3.87	0.33
Sawnee Creek	9740.38	823	1144.07	1150.69	1151.11	0.015167	5.83	0.54
Sawnee Creek	9610.95	823	1142.94	1150.41	1150.48	0.001878	2.70	0.20
Sawnee Creek	9546.65	823	1142.52	1150.01	1150.26	0.006418	4.51	0.36
Sawnee Creek	9504.69	823	1141.79	1149.83	1150.03	0.004127	3.61	0.28
Sawnee Creek	9397.59	823	1140.64	1149.56	1149.70	0.002278	2.82	0.21
Sawnee Creek	9305.74	823	1139.41	1149.30	1149.46	0.002859	3.43	0.23
Sawnee Creek	9294.00	Culvert						
Sawnee Creek	9279.20	823	1138.84	1147.34	1147.86	0.012609	6.21	0.48
Sawnee Creek	9177.88	823	1137.53	1146.96	1147.20	0.002762	4.36	0.33
Sawnee Creek	9087.76	823	1136.23	1147.03	1147.06	0.000413	1.76	0.12
Sawnee Creek	9021.39	823	1136.11	1147.01	1147.04	0.000165	1.77	0.11
Sawnee Creek	8934.92	823	1135.61	1146.95	1147.02	0.000286	2.25	0.14
Sawnee Creek	8860.00	Culvert						
Sawnee Creek	8710.92	2907	1135.26	1146.22	1146.96	0.003342	7.66	0.47
Sawnee Creek	8621.00	2907	1135.02	1146.45	1146.55	0.000470	3.16	0.19
Sawnee Creek	8472.21	2907	1133.52	1146.33	1146.46	0.000830	3.59	0.21
Sawnee Creek	8359.89	2907	1130.88	1145.33	1146.10	0.002684	7.09	0.35
Sawnee Creek	8333.00	Culvert						
Sawnee Creek	8303.96	2907	1130.42	1142.57	1143.78	0.006347	8.84	0.50
Sawnee Creek	8188.36	2907	1130.53	1141.93	1143.01	0.005817	8.40	0.52
Sawnee Creek	8115.26	2907	1130.43	1139.95	1142.21	0.017895	12.50	0.86
Sawnee Creek	8022.85	2907	1130.43	1140.07	1140.86	0.006073	8.15	0.54
Sawnee Creek	7944.99	2907	1130.43	1140.08	1140.40	0.002869	5.82	0.38
Sawnee Creek	7872.84	2907	1130.13	1139.91	1140.18	0.002859	5.17	0.34
Sawnee Creek	7833.44	2907	1129.93	1139.68	1140.06	0.003040	6.02	0.39
Sawnee Creek	7781.33	2907	1129.83	1139.32	1139.81	0.007533	6.88	0.44
Sawnee Creek	7710.25	2907	1129.83	1138.67	1139.22	0.009207	7.04	0.48
Sawnee Creek	7610.56	2907	1127.03	1138.29	1138.62	0.003503	4.83	0.31
Sawnee Creek	7581.92	3046	1126.03	1137.89	1138.46	0.006157	6.60	0.40
Sawnee Creek	7516.90	3046	1124.63	1137.74	1138.08	0.003799	5.46	0.31
Sawnee Creek	7403.78	3046	1124.13	1136.91	1137.51	0.006787	6.71	0.41
Sawnee Creek	7319.38	3046	1123.73	1136.30	1136.91	0.007282	6.91	0.42
Sawnee Creek	7230.51	3046	1123.63	1136.08	1136.40	0.003446	5.09	0.30
Sawnee Creek	7165.21	3046	1123.13	1135.90	1136.17	0.003152	4.69	0.28
Sawnee Creek	7045.32	3046	1122.63	1135.01	1135.61	0.006955	6.70	0.41
Sawnee Creek	6937.10	3046	1122.53	1132.28	1134.11	0.030599	11.24	0.80
Sawnee Creek	6879.47	3046	1120.04	1128.63	1131.35	0.022161	13.25	0.98
Sawnee Creek	6814.17	3046	1117.74	1126.47	1129.34	0.016076	14.12	0.89
Sawnee Creek	6731.62	3046	1116.74	1125.72	1127.78	0.015615	12.73	0.78
Sawnee Creek	6663.20	3046	1115.04	1126.10	1126.79	0.005201	7.35	0.42
Sawnee Creek	6631.59	3046	1114.64	1126.09	1126.61	0.003402	6.75	0.38
Sawnee Creek	6415.60	4325	1113.51	1122.67	1124.62	0.024670	12.44	0.80
Sawnee Creek	6266.93	4325	1108.76	1120.51	1121.90	0.012546	9.78	0.58
Sawnee Creek	6120.73	4325	1106.71	1119.07	1120.16	0.010189	8.57	0.51
Sawnee Creek	6019.47	4325	1106.34	1116.51	1118.49	0.026710	11.43	0.79
Sawnee Creek	5872.71	4325	1102.49	1115.14	1115.81	0.008708	7.53	0.44
Sawnee Creek	5862.00	Bridge						
Sawnee Creek	5852.81	4325	1101.87	1112.36	1113.79	0.023346	10.79	0.72
Sawnee Creek	5800.88	4325	1101.26	1112.48	1112.84	0.005513	6.43	0.38

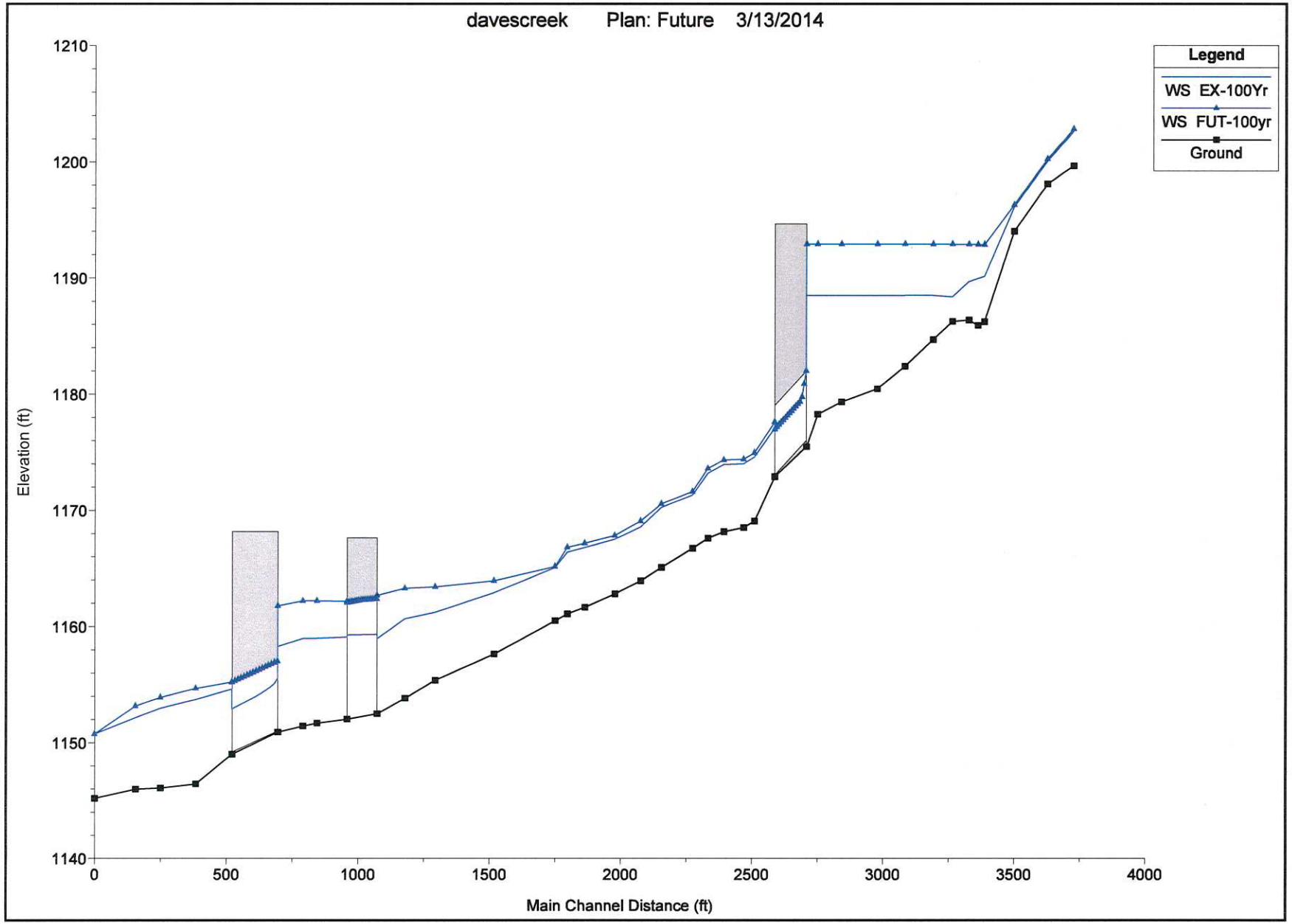
Sawnee Creek	5662.21	4325	1100.62	1112.06	1112.41	0.004758	6.20	0.36
Sawnee Creek	5569.16	4325	1099.87	1111.78	1112.08	0.003253	5.09	0.30
Sawnee Creek	5434.23	4325	1098.61	1110.98	1111.50	0.005962	7.12	0.40
Sawnee Creek	5191.80	4325	1096.98	1109.30	1109.95	0.006877	7.49	0.43
Sawnee Creek	4980.33	4325	1094.83	1107.88	1108.55	0.006442	7.44	0.42
Sawnee Creek	4814.51	4325	1094.36	1107.34	1107.75	0.003154	5.61	0.30
Sawnee Creek	4633.19	4325	1092.89	1106.52	1107.00	0.005493	6.53	0.38
Sawnee Creek	4491.27	4325	1092.22	1105.99	1106.32	0.003780	5.47	0.32
Sawnee Creek	4327.93	4325	1090.45	1104.91	1105.62	0.004557	7.02	0.36
Sawnee Creek	4186.92	4325	1088.48	1104.01	1104.86	0.006146	7.46	0.38
Sawnee Creek	4052.35	4325	1088.50	1103.72	1104.15	0.003235	5.78	0.30
Sawnee Creek	3924.09	5725	1088.53	1103.10	1103.64	0.004717	6.90	0.37
Sawnee Creek	3821.51	5725	1088.73	1102.93	1103.24	0.002408	5.26	0.27
Sawnee Creek	3678.68	5725	1087.97	1101.31	1102.59	0.007467	9.30	0.53
Sawnee Creek	3547.82	5725	1085.10	1097.65	1100.92	0.018772	14.56	0.93
Sawnee Creek	3501.29	5725	1081.80	1097.88	1098.47	0.001848	6.15	0.32
Sawnee Creek	3356.17	5725	1078.25	1097.75	1098.23	0.000895	5.57	0.23
Sawnee Creek	3291.00	Culvert						
Sawnee Creek	3236.24	5725	1077.46	1089.55	1090.79	0.004129	8.94	0.48
Sawnee Creek	3111.73	5725	1075.90	1089.16	1089.98	0.005576	7.82	0.41
Sawnee Creek	3036.89	5725	1074.98	1088.17	1089.42	0.008977	9.38	0.51
Sawnee Creek	2922.77	5838	1073.46	1087.15	1088.38	0.009267	9.77	0.50
Sawnee Creek	2756.63	5838	1072.14	1085.68	1086.92	0.008405	9.60	0.50
Sawnee Creek	2607.47	5838	1070.33	1084.77	1085.72	0.006761	8.73	0.45
Sawnee Creek	2454.92	5838	1070.02	1083.15	1084.42	0.010824	10.24	0.54
Sawnee Creek	2206.10	5838	1067.17	1081.25	1082.23	0.006793	8.59	0.44
Sawnee Creek	1941.13	5838	1066.81	1079.41	1080.28	0.007751	8.55	0.47
Sawnee Creek	1753.16	5907	1065.23	1078.57	1079.03	0.004872	6.62	0.37
Sawnee Creek	1634.84	5907	1065.39	1078.24	1078.52	0.003128	5.55	0.30
Sawnee Creek	1529.64	5907	1064.78	1077.96	1078.21	0.002583	5.20	0.27
Sawnee Creek	1257.99	5907	1064.53	1077.49	1077.73	0.001318	5.05	0.27
Sawnee Creek	1141.65	5907	1064.49	1077.37	1077.58	0.001110	4.82	0.26
Sawnee Creek	963.33	6078	1061.81	1075.80	1077.12	0.004724	9.64	0.51
Sawnee Creek	893.38	6078	1061.81	1074.66	1076.56	0.006697	11.73	0.62
Sawnee Creek	853.00	Bridge						
Sawnee Creek	750.58	6078	1061.29	1071.19	1074.17	0.016984	13.96	0.92
Sawnee Creek	676.77	6190	1060.89	1071.07	1072.32	0.007718	9.10	0.62
Sawnee Creek	500.22	6190	1059.17	1071.22	1071.54	0.001507	5.16	0.29
Sawnee Creek	236.87	6190	1057.31	1071.19	1071.31	0.000453	3.01	0.16
Sawnee Creek	74.88	6321	1056.85	1071.00	1071.21	0.000711	3.98	0.21
Sawnee Creek Tributary 1	2688.71	316	1147.84	1151.42	1152.01	0.026735	6.35	0.70
Sawnee Creek Tributary 1	2600.00	316	1145.88	1148.21	1148.88	0.049358	7.48	0.93
Sawnee Creek Tributary 1	2511.60	316	1139.85	1144.67	1145.50	0.030259	7.81	0.74
Sawnee Creek Tributary 1	2400.00	316	1137.78	1140.40	1141.09	0.053840	8.16	0.98
Sawnee Creek Tributary 1	2280.25	316	1129.75	1134.87	1135.53	0.035255	6.57	0.75
Sawnee Creek Tributary 1	2200.00	316	1128.55	1131.99	1132.73	0.034390	7.65	0.81
Sawnee Creek Tributary 1	2094.51	316	1123.72	1127.89	1128.77	0.041066	8.17	0.85
Sawnee Creek Tributary 1	2000.00	316	1122.40	1125.74	1126.04	0.019185	5.69	0.60
Sawnee Creek Tributary 1	1800.00	316	1117.16	1119.97	1120.70	0.043642	8.27	0.91
Sawnee Creek Tributary 1	1613.38	316	1108.99	1112.63	1113.19	0.031621	6.57	0.73
Sawnee Creek Tributary 1	1400.00	316	1100.36	1103.29	1104.16	0.047662	7.71	0.92
Sawnee Creek Tributary 1	1293.21	316	1095.58	1098.84	1099.60	0.038446	7.29	0.83
Sawnee Creek Tributary 1	1234.64	316	1093.61	1096.62	1097.33	0.039612	7.18	0.83
Sawnee Creek Tributary 1	1174.63	316	1089.94	1091.75	1092.34	0.070297	7.33	1.06

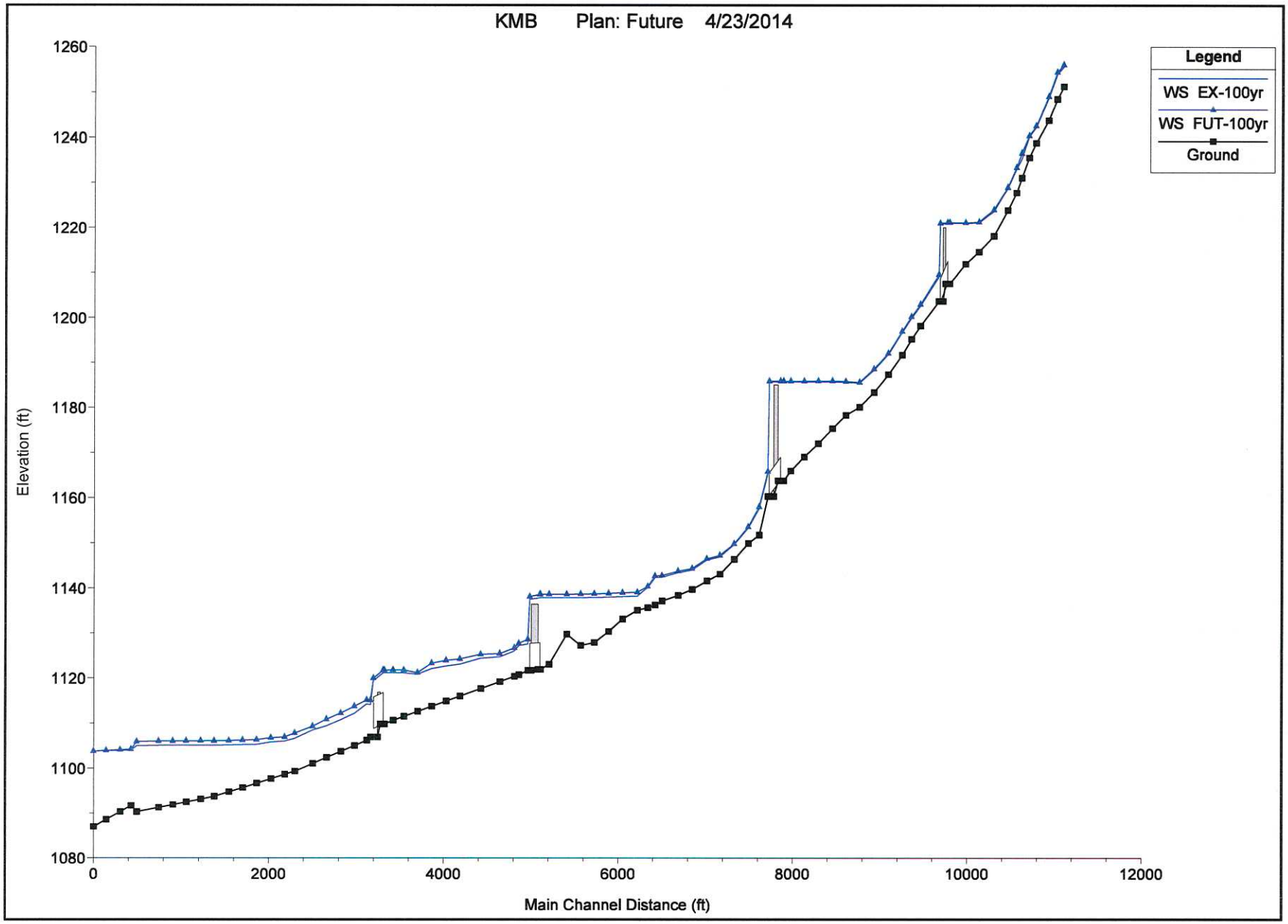
Sawnee Creek Tributary 1	1093.61	316	1085.22	1088.41	1088.73	0.014258	4.82	0.52
Sawnee Creek Tributary 1	1000.43	316	1082.02	1085.75	1086.62	0.039494	7.89	0.85
Sawnee Creek Tributary 1	844.36	316	1078.46	1082.32	1082.44	0.007313	3.80	0.37
Sawnee Creek Tributary 1	716.21	316	1075.73	1079.56	1080.53	0.046785	7.98	0.89
Sawnee Creek Tributary 1	646.08	316	1074.38	1078.47	1078.75	0.012119	5.10	0.49
Sawnee Creek Tributary 1	567.50	316	1071.84	1075.65	1076.88	0.056543	8.91	0.97
Sawnee Creek Tributary 1	400.00	316	1067.21	1070.24	1070.65	0.024057	6.17	0.67
Sawnee Creek Tributary 1	200.00	316	1065.56	1068.59	1068.67	0.004856	2.87	0.31
Sawnee Creek Tributary 1	127.96	316	1064.19	1068.00	1068.21	0.008019	4.00	0.40
Sawnee Creek Tributary 1	67.13	316	1062.84	1067.29	1067.58	0.013141	5.38	0.51
Sawnee Creek Tributary 2	745.00	364	1101.72	1107.27	1107.86	0.015936	6.41	0.56
Sawnee Creek Tributary 2	600.00	364	1099.58	1103.10	1104.13	0.047250	8.95	0.94
Sawnee Creek Tributary 2	400.00	364	1090.57	1093.53	1094.31	0.050351	7.48	0.93
Sawnee Creek Tributary 2	200.43	364	1083.96	1087.64	1087.94	0.015905	5.31	0.55
Sawnee Creek Tributary 2	154.19	364	1084.14	1085.95	1086.46	0.082644	7.81	1.14
Sawnee Creek Tributary 2	77.54	364	1080.72	1083.37	1083.68	0.018674	4.79	0.58
Sawnee Creek Tributary 2	57.59	364	1079.85	1082.49	1082.95	0.031365	6.20	0.75
Sawnee Creek Tributary 4	4633.07	618	1193.47	1196.40	1196.61	0.010611	4.05	0.45
Sawnee Creek Tributary 4	4482.76	618	1190.58	1194.39	1194.99	0.024187	6.77	0.69
Sawnee Creek Tributary 4	4376.27	618	1188.01	1192.38	1192.84	0.016971	6.62	0.60
Sawnee Creek Tributary 4	4172.51	618	1184.72	1190.41	1190.68	0.006987	4.41	0.39
Sawnee Creek Tributary 4	3971.31	618	1182.00	1187.07	1188.05	0.030899	8.60	0.78
Sawnee Creek Tributary 4	3801.57	618	1178.31	1183.12	1183.56	0.019907	6.69	0.63
Sawnee Creek Tributary 4	3713.27	618	1173.81	1182.47	1182.62	0.005140	3.77	0.29
Sawnee Creek Tributary 4	3677.28	Culvert						
Sawnee Creek Tributary 4	3445.72	618	1169.04	1175.10	1175.83	0.022250	7.58	0.64
Sawnee Creek Tributary 4	3264.75	947	1165.60	1171.57	1171.77	0.006864	4.64	0.39
Sawnee Creek Tributary 4	3000.00	947	1163.07	1166.78	1167.61	0.065349	10.70	1.10
Sawnee Creek Tributary 4	2768.15	947	1156.32	1165.42	1165.50	0.002495	2.98	0.22
Sawnee Creek Tributary 4	2734.02	Culvert						
Sawnee Creek Tributary 4	2692.77	947	1155.78	1163.02	1163.38	0.012046	5.74	0.48
Sawnee Creek Tributary 4	2536.09	947	1155.34	1160.74	1161.15	0.016393	6.74	0.58
Sawnee Creek Tributary 4	2399.41	1294	1153.86	1159.56	1159.72	0.007262	4.93	0.40
Sawnee Creek Tributary 4	2189.31	1294	1151.55	1157.12	1157.61	0.016217	7.20	0.60
Sawnee Creek Tributary 4	2000.00	1294	1149.93	1156.16	1156.29	0.003507	3.84	0.29
Sawnee Creek Tributary 4	1793.60	1294	1146.91	1155.87	1155.90	0.000928	2.09	0.15
Sawnee Creek Tributary 4	1756.44	Culvert						
Sawnee Creek Tributary 4	1719.55	1294	1146.70	1153.22	1153.58	0.020322	6.54	0.61
Sawnee Creek Tributary 4	1627.48	1294	1146.49	1151.66	1152.01	0.015797	6.66	0.58
Sawnee Creek Tributary 4	1500.00	1294	1143.40	1150.67	1150.86	0.005391	4.77	0.35
Sawnee Creek Tributary 4	1328.19	1294	1141.20	1147.31	1148.85	0.034325	10.42	0.87
Sawnee Creek Tributary 4	1196.53	1491	1135.98	1141.61	1142.19	0.018487	7.75	0.64
Sawnee Creek Tributary 4	1000.00	1491	1131.14	1137.40	1138.25	0.020992	9.05	0.70
Sawnee Creek Tributary 4	760.90	1491	1127.42	1132.94	1133.49	0.018344	7.86	0.64
Sawnee Creek Tributary 4	500.00	1491	1124.08	1128.40	1128.78	0.018139	7.06	0.63
Sawnee Creek Tributary 4	295.84	1491	1120.74	1125.74	1126.00	0.010287	5.60	0.48
Sawnee Creek Tributary 4	92.39	1491	1116.78	1122.71	1123.31	0.017393	8.03	0.63
Sawnee Creek Tributary 5	2627.90	1852	1159.13	1165.02	1165.10	0.004078	3.71	0.30
Sawnee Creek Tributary 5	2409.72	1852	1157.25	1162.93	1163.44	0.016101	7.42	0.61
Sawnee Creek Tributary 5	2233.67	1852	1153.33	1160.71	1161.14	0.010628	6.85	0.50
Sawnee Creek Tributary 5	2027.19	1852	1150.92	1158.26	1158.79	0.012106	7.82	0.55
Sawnee Creek Tributary 5	1860.23	1852	1149.03	1157.33	1157.46	0.004529	4.37	0.32

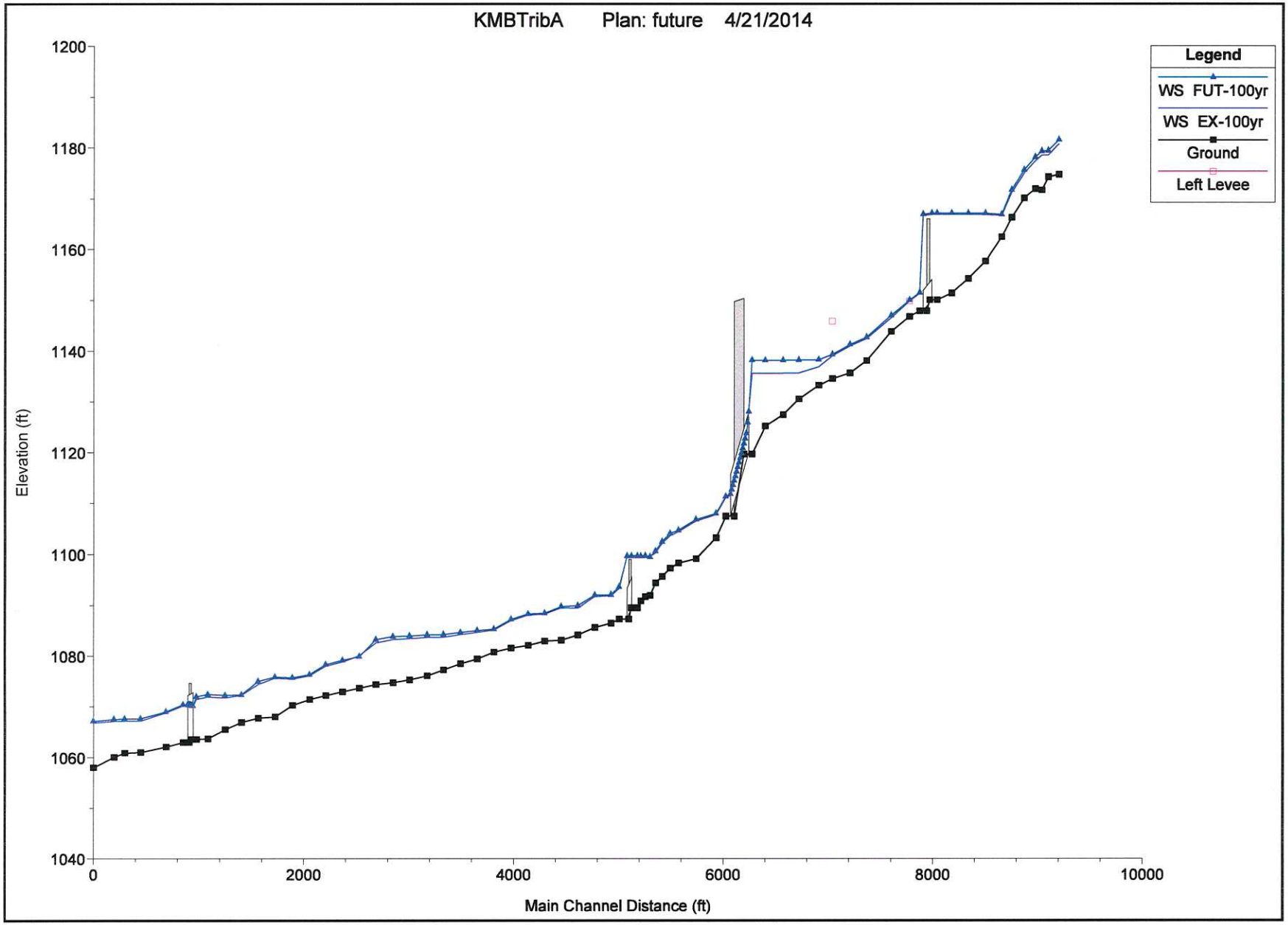
Sawnee Creek Tributary 5	1599.81	2010	1147.85	1156.31	1156.46	0.003378	4.33	0.29
Sawnee Creek Tributary 5	1400.00	2010	1145.20	1154.39	1155.15	0.016188	9.04	0.60
Sawnee Creek Tributary 5	1200.00	2010	1143.41	1152.00	1152.56	0.010169	6.97	0.50
Sawnee Creek Tributary 5	1000.00	2010	1142.01	1150.67	1151.05	0.005485	5.43	0.37
Sawnee Creek Tributary 5	800.00	2010	1140.15	1149.01	1149.57	0.010244	6.92	0.50
Sawnee Creek Tributary 5	620.97	2010	1138.94	1147.59	1148.01	0.007256	6.31	0.43
Sawnee Creek Tributary 5	416.36	2010	1136.01	1146.92	1147.07	0.002772	3.96	0.26
Sawnee Creek Tributary 5	300.71	2010	1135.38	1146.81	1146.88	0.000921	2.66	0.16
Sawnee Creek Tributary 5	177.72	2010	1136.27	1146.69	1146.75	0.001174	2.74	0.17
Sawnee Creek Tributary 5	82.35	2010	1135.69	1146.59	1146.65	0.001001	2.59	0.16
Sawnee Creek Tributary 5.1	1108.47	221	1174.78	1177.90	1178.67	0.045496	7.23	0.87
Sawnee Creek Tributary 5.1	961.47	221	1170.84	1174.97	1175.10	0.004445	2.92	0.29
Sawnee Creek Tributary 5.1	772.26	221	1169.42	1172.37	1173.09	0.045478	6.97	0.87
Sawnee Creek Tributary 5.1	643.85	221	1164.15	1168.94	1169.17	0.009910	3.92	0.42
Sawnee Creek Tributary 5.1	500.00	221	1163.44	1165.63	1166.11	0.071352	6.62	1.02
Sawnee Creek Tributary 5.1	357.37	221	1156.34	1159.36	1159.76	0.028250	5.11	0.68
Sawnee Creek Tributary 5.1	268.27	221	1154.20	1157.47	1157.72	0.018436	4.97	0.57
Sawnee Creek Tributary 5.1	202.10	221	1152.77	1155.67	1156.09	0.034523	5.86	0.75
Sawnee Creek Tributary 5.1	128.21	221	1150.94	1153.61	1153.99	0.024349	5.40	0.65

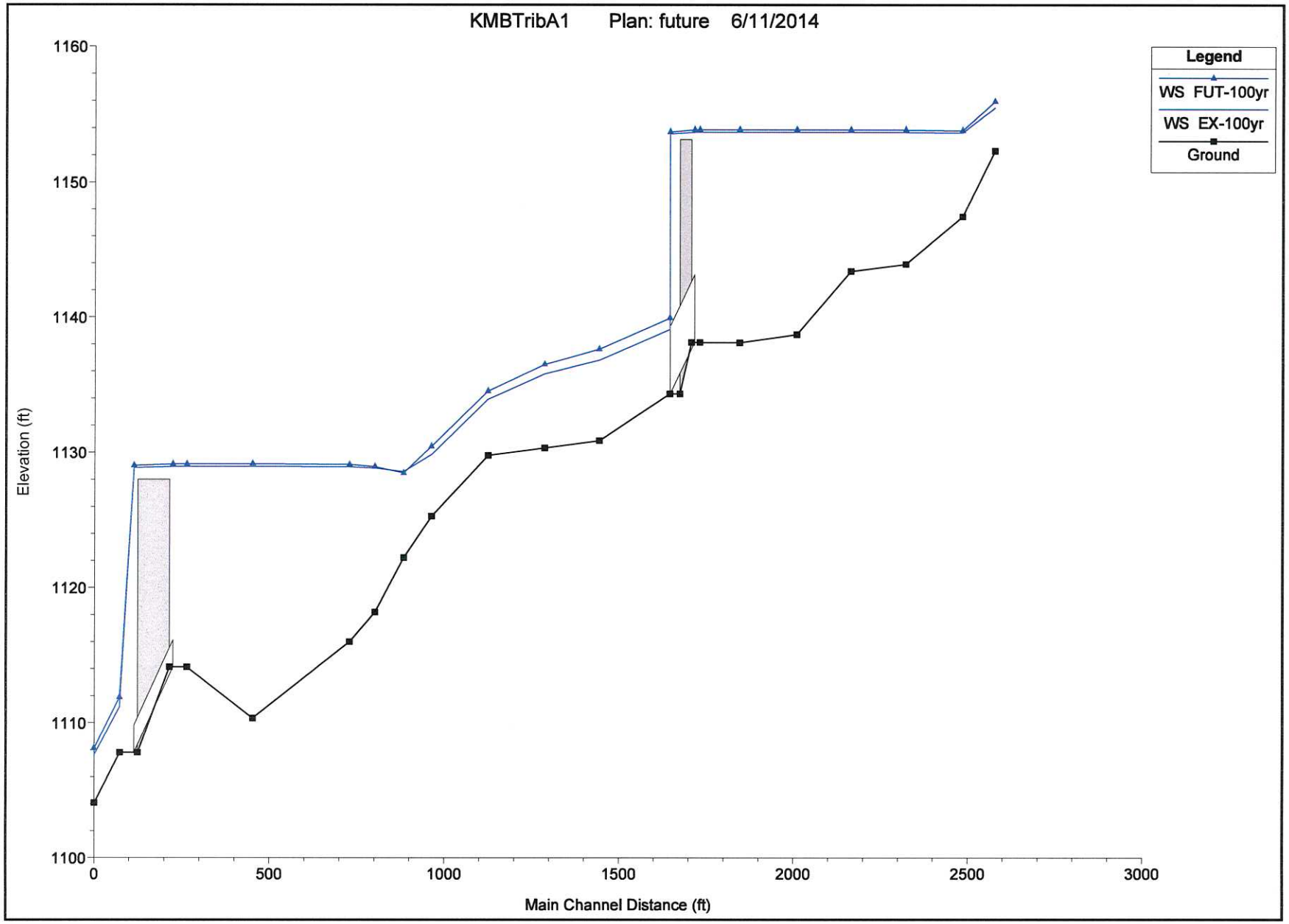
Appendix C – HEC-RAS Profiles

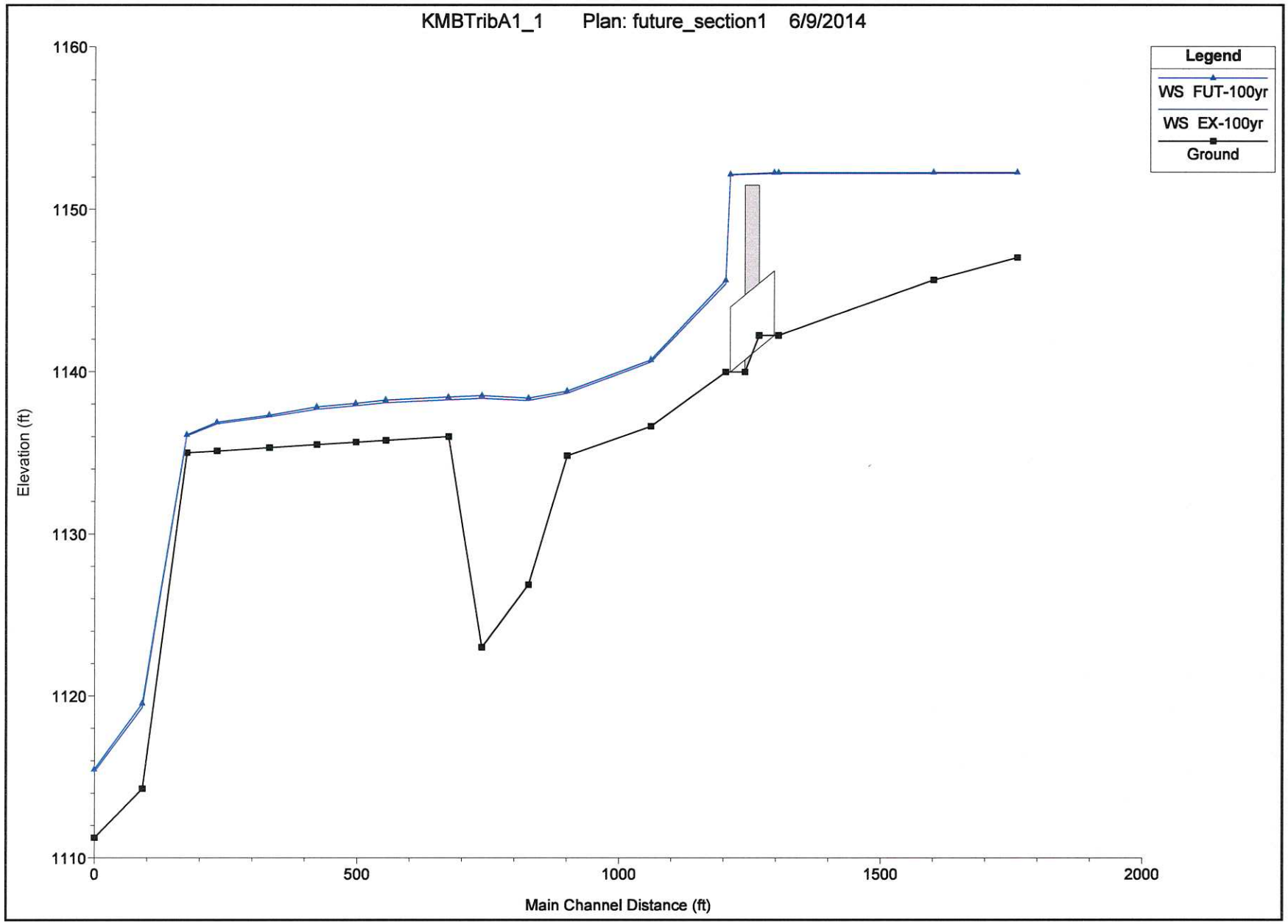

baldridgecreektributary2 Plan: future 4/17/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1135
1130
1125
1120
1115
1110
1105
1100
1095
0
200
400
600
800
1000
Main Channel Distance (ft)

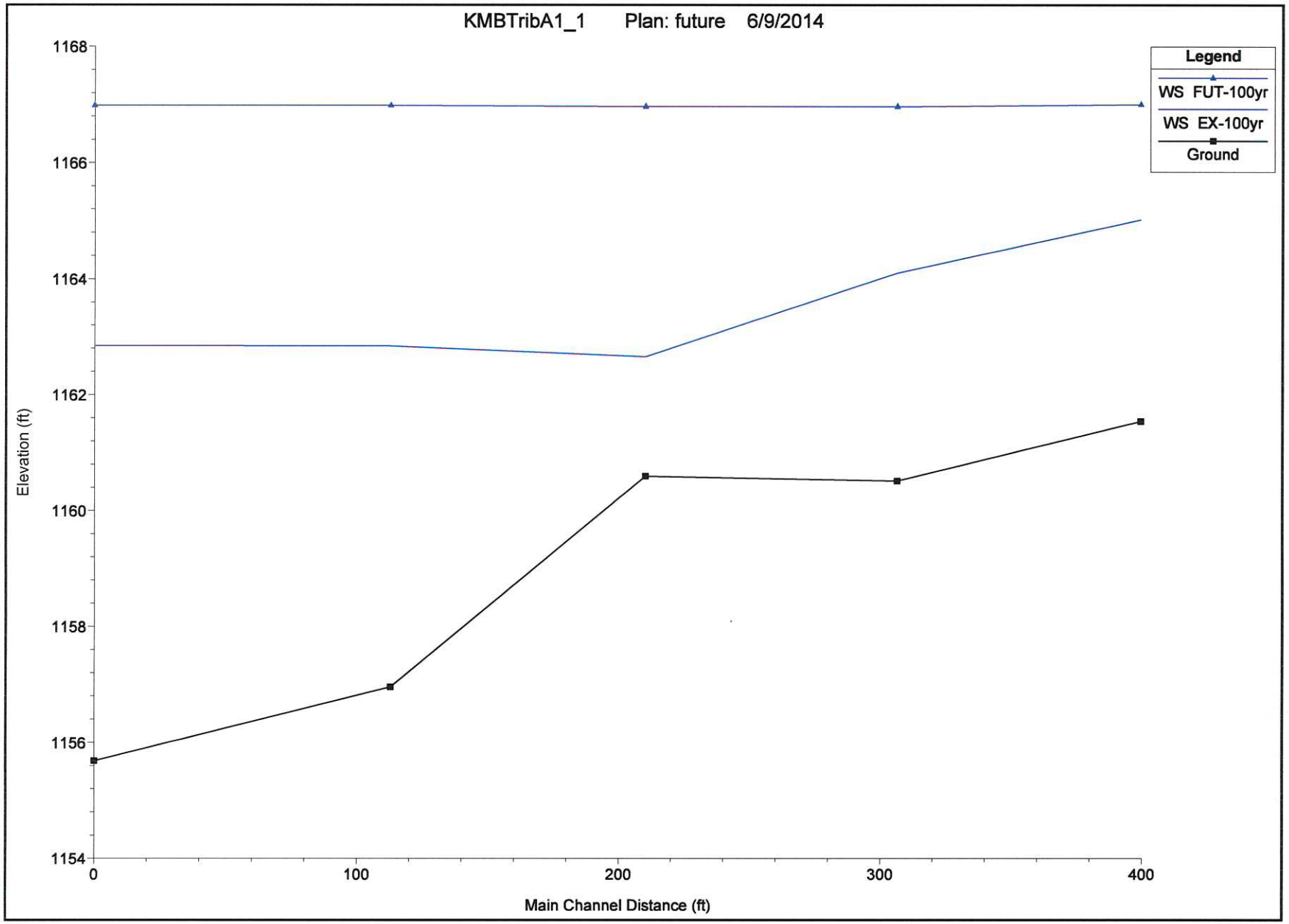

davescreek Plan: Future 3/13/2014
Legend
WS EX-100Yr
WS FUT-100yr
Ground
Elevation (ft)
1210
1200
1190
1180
1170
1160
1150
1140
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)

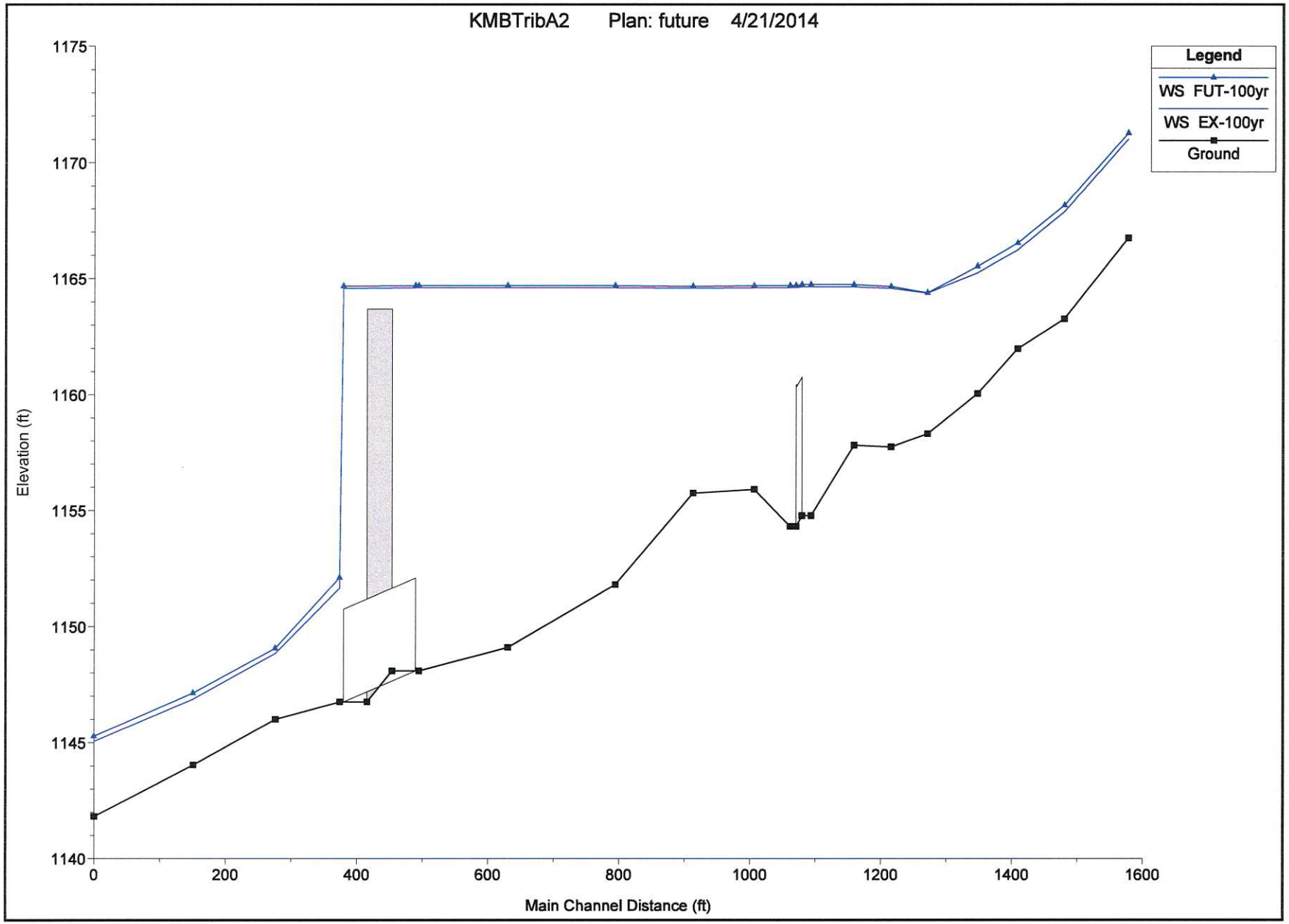

KMB Plan: Future 4/23/2014
Legend
WS EX-100yr
WS FUT-100yr
Ground
Elevation (ft)
1260
1240
1220
1200
1180
1160
1140
1120
1100
1080
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)

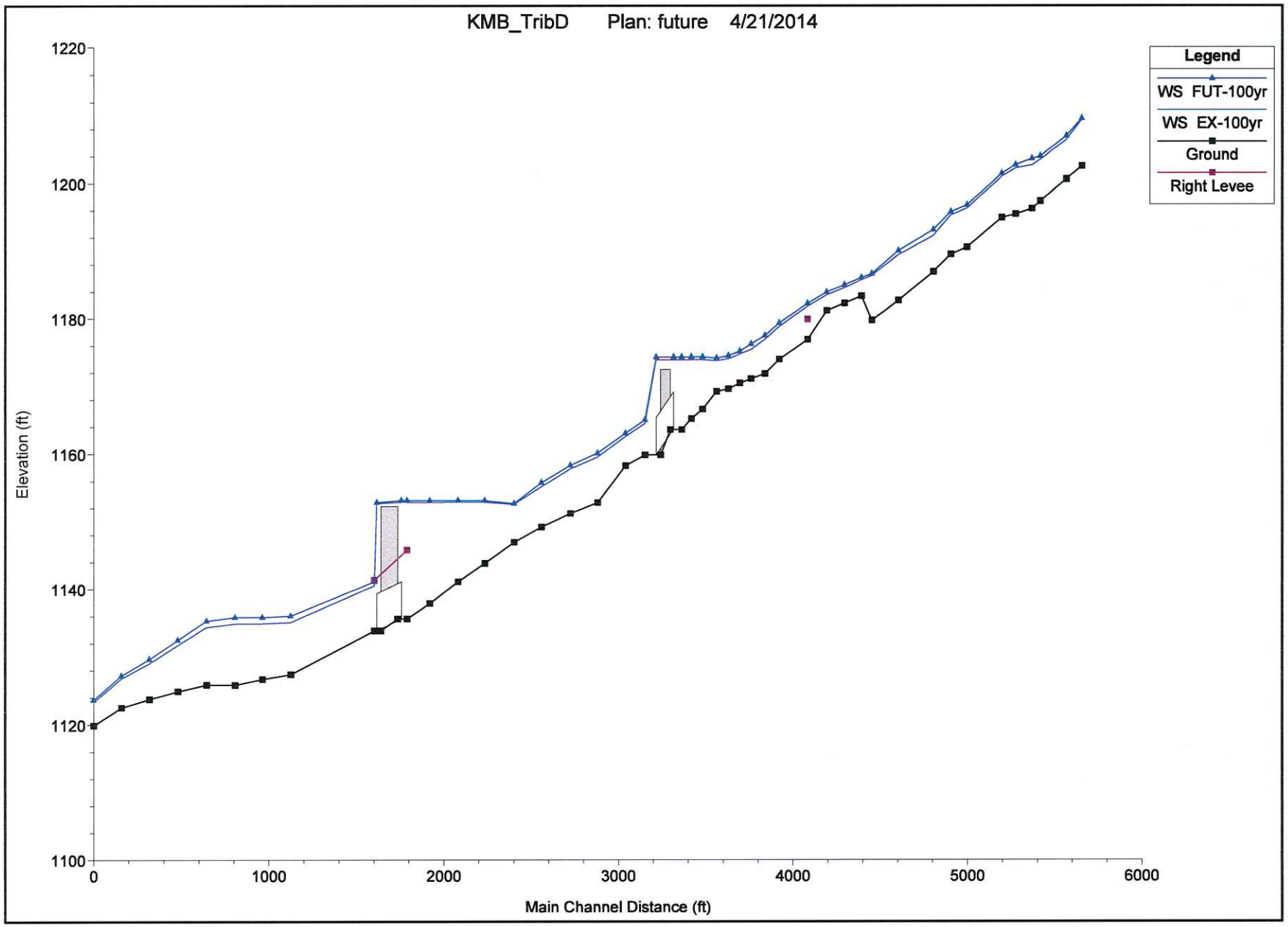

KMBTribA Plan: future 4/21/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Left Levee
Elevation (ft)
1200
1180
1160
1140
1120
1100
1080
1060
1040
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)

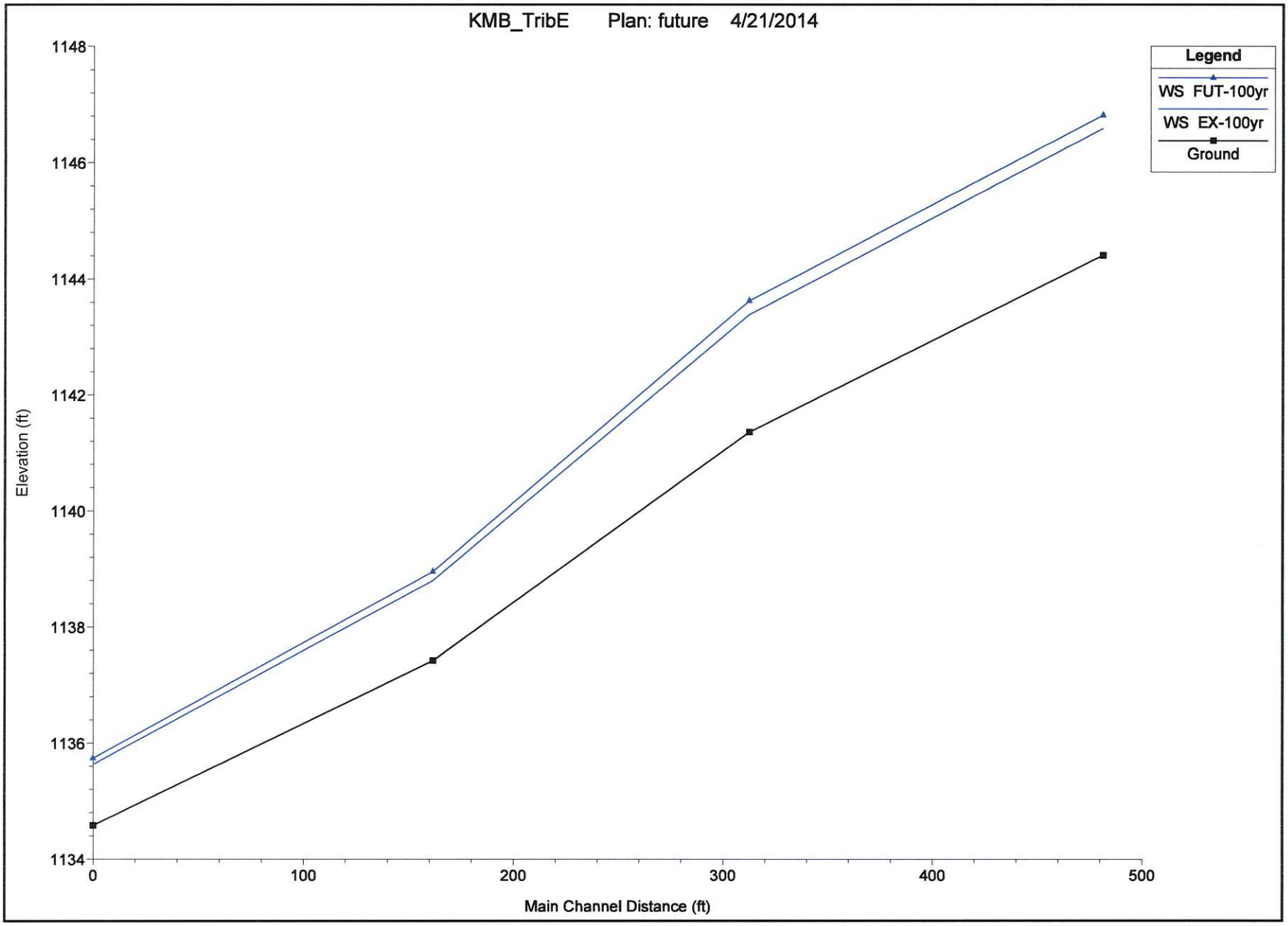

KMBTribA1 Plan: future 6/11/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1160
1150
1140
1130
1120
1110
1100
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)

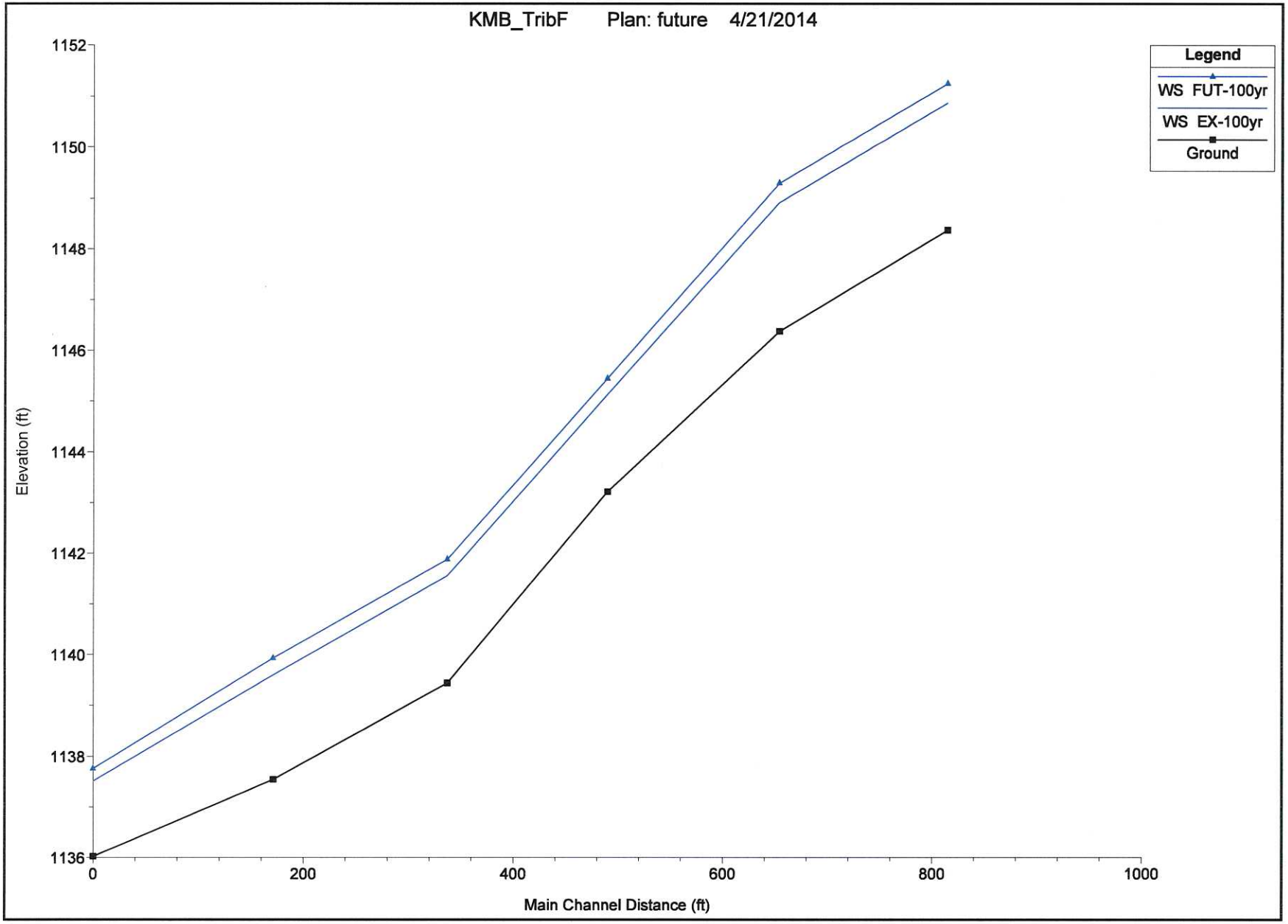

KMBTribA1_1 Plan: future_section1 6/9/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1160
1150
1140
1130
1120
1110
0
500
1000
1500
2000
Main Channel Distance (ft)

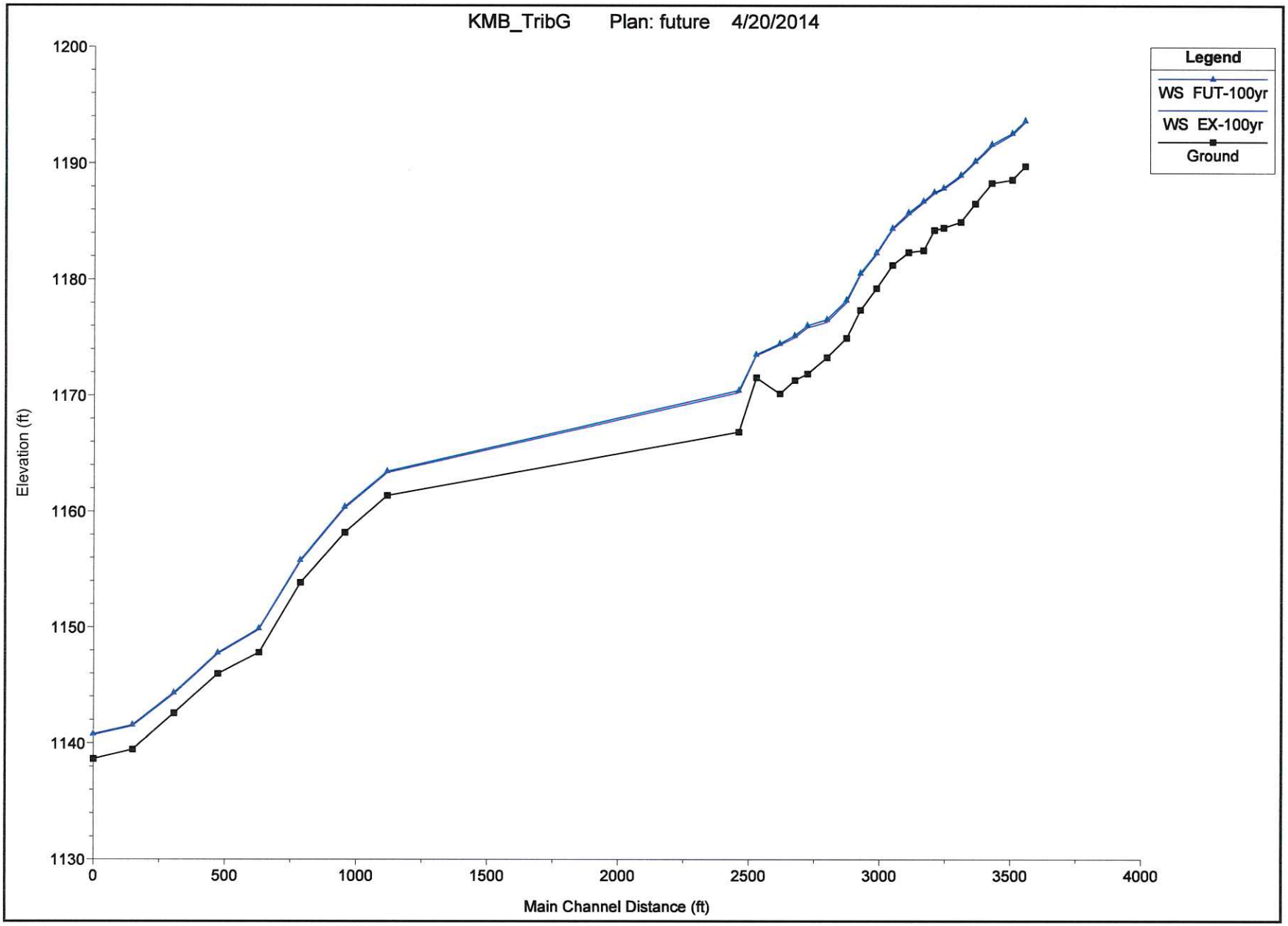

KMBTribA1_1 Plan: future 6/9/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1168
1166
1164
1162
1160
1158
1156
1154
0
100
200
300
400
Main Channel Distance (ft)

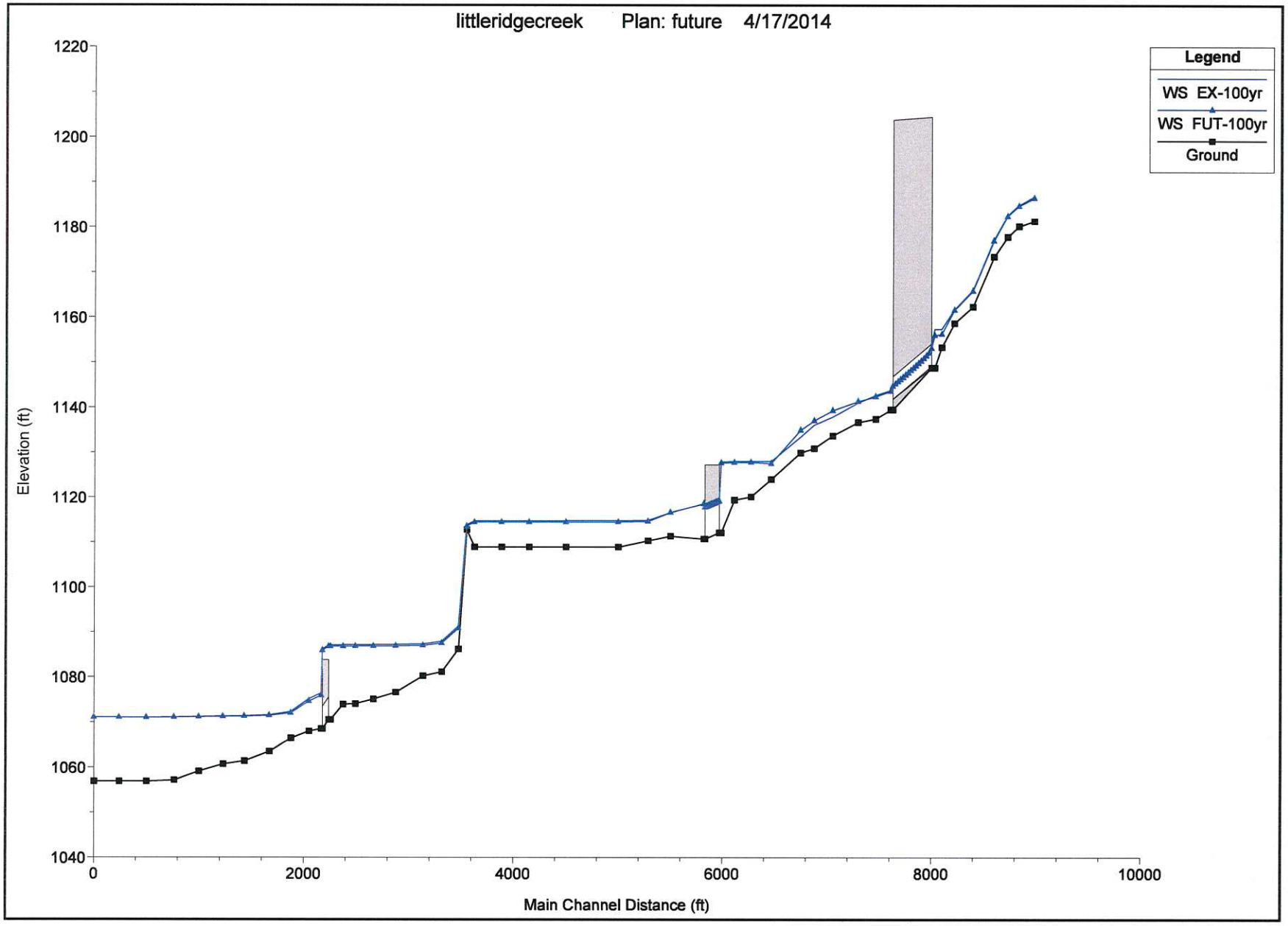

KMBTribA2 Plan: future 4/21/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1175
1170
1165
1160
1155
1150
1145
1140
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

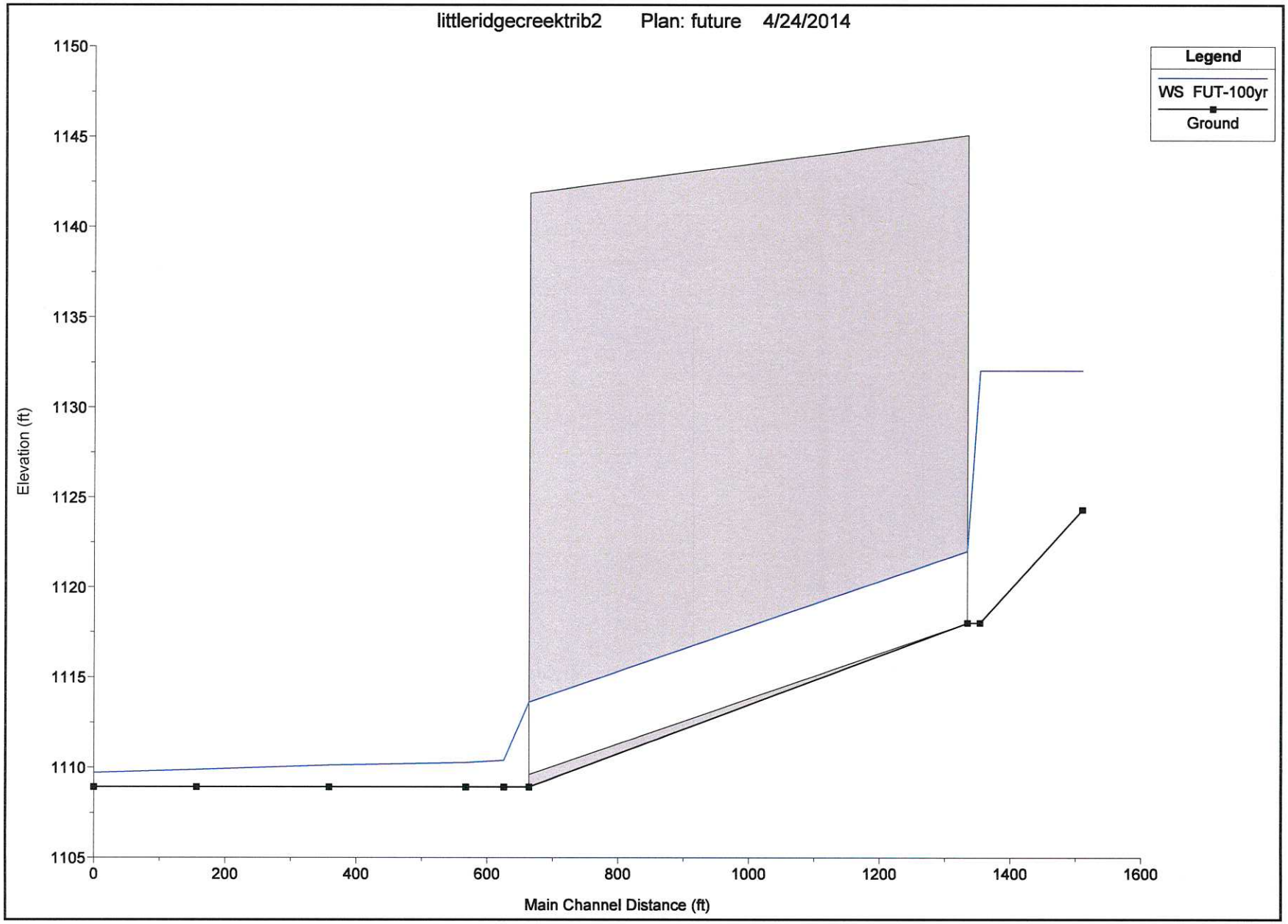

KMB_TribD Plan: future 4/21/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Right Levee
Elevation (ft)
1220
1200
1180
1160
1140
1120
1100
0
1000
2000
3000
4000
5000
6000
Main Channel Distance (ft)

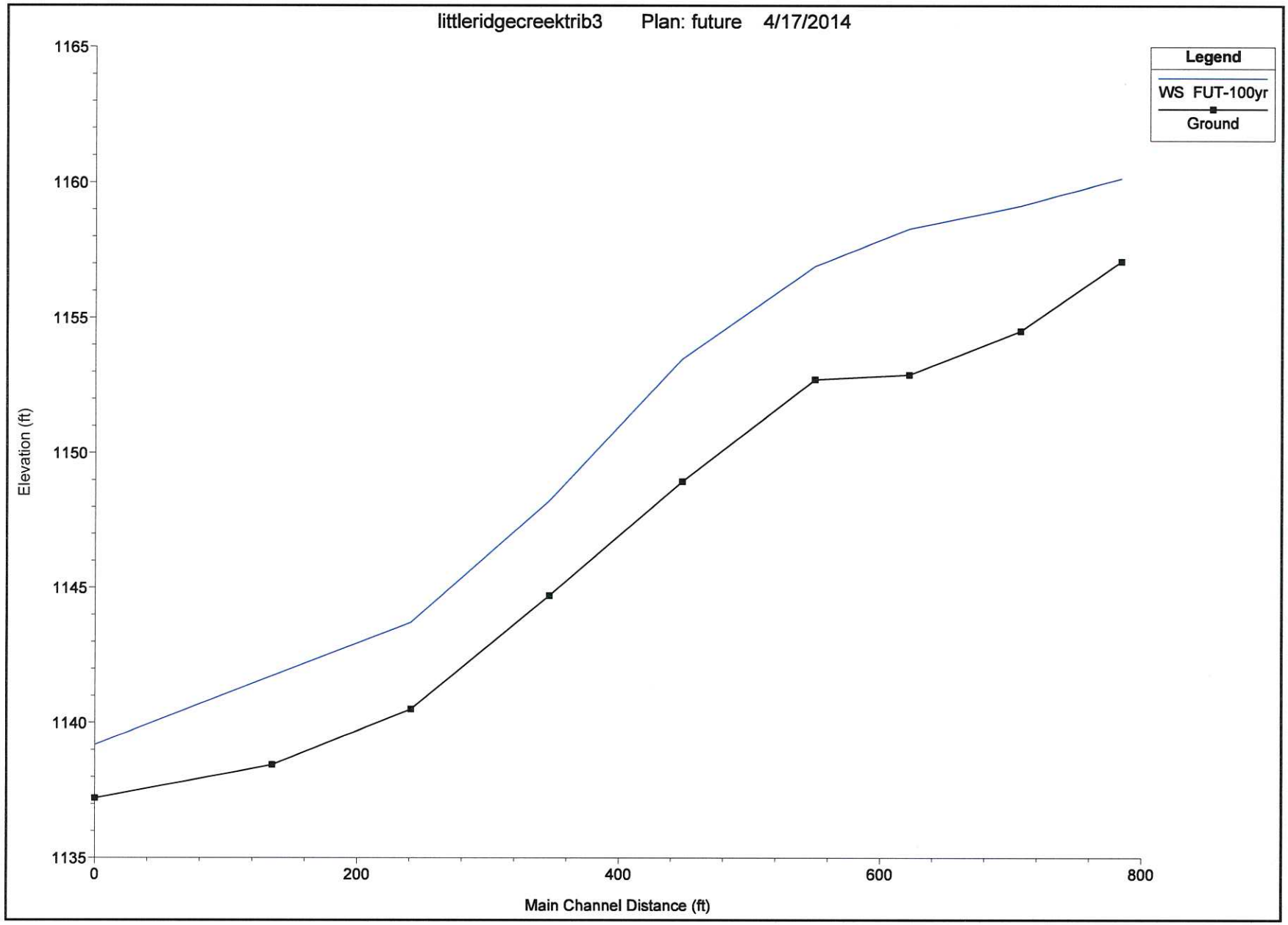

KMB_TribE Plan: future 4/21/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1148
1146
1144
1142
1140
1138
1136
1134
0
100
200
300
400
500
Main Channel Distance (ft)

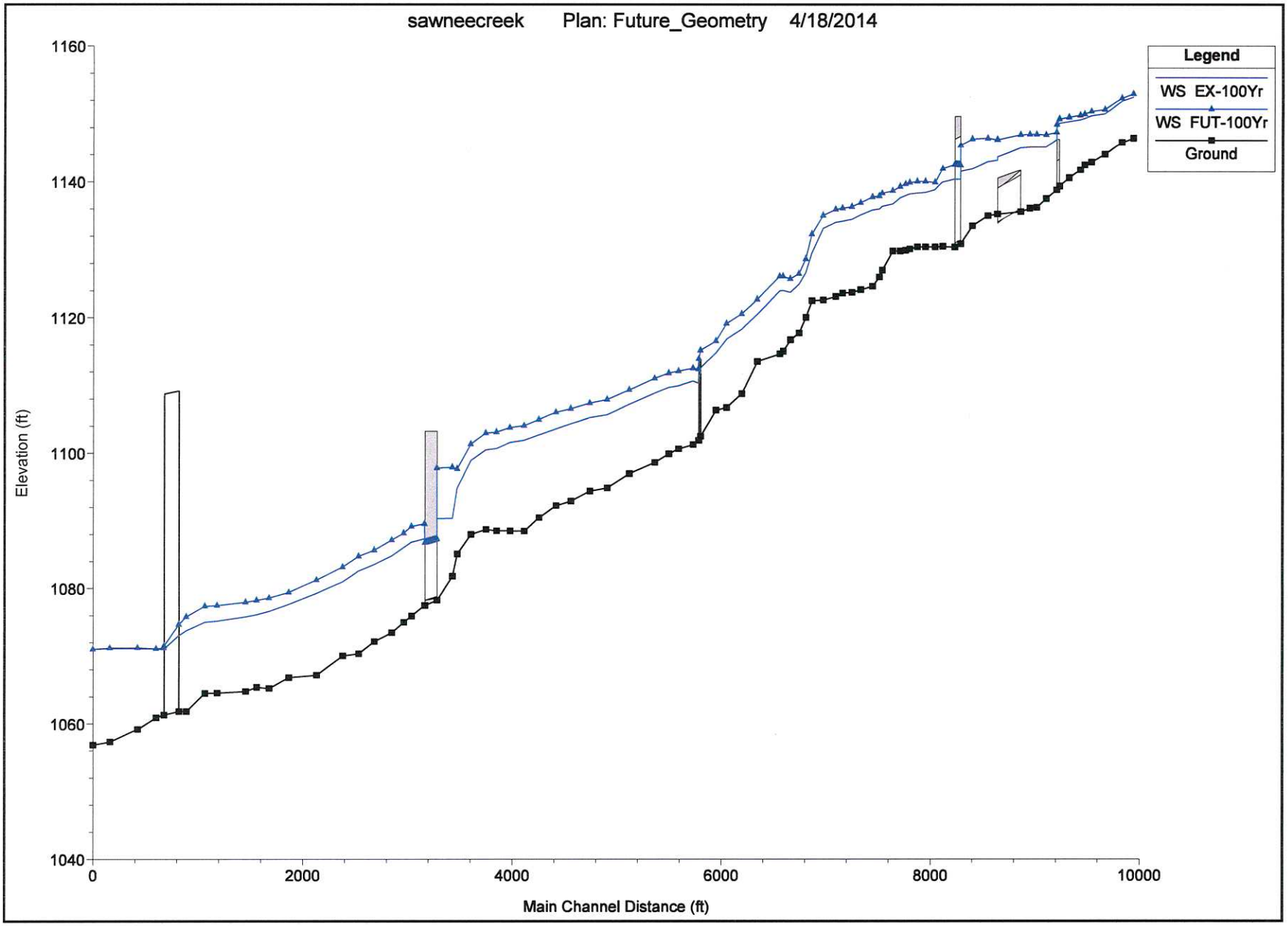

KMB_TribF Plan: future 4/21/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1152
1150
1148
1146
1144
1142
1140
1138
1136
0
200
400
600
800
1000
Main Channel Distance (ft)

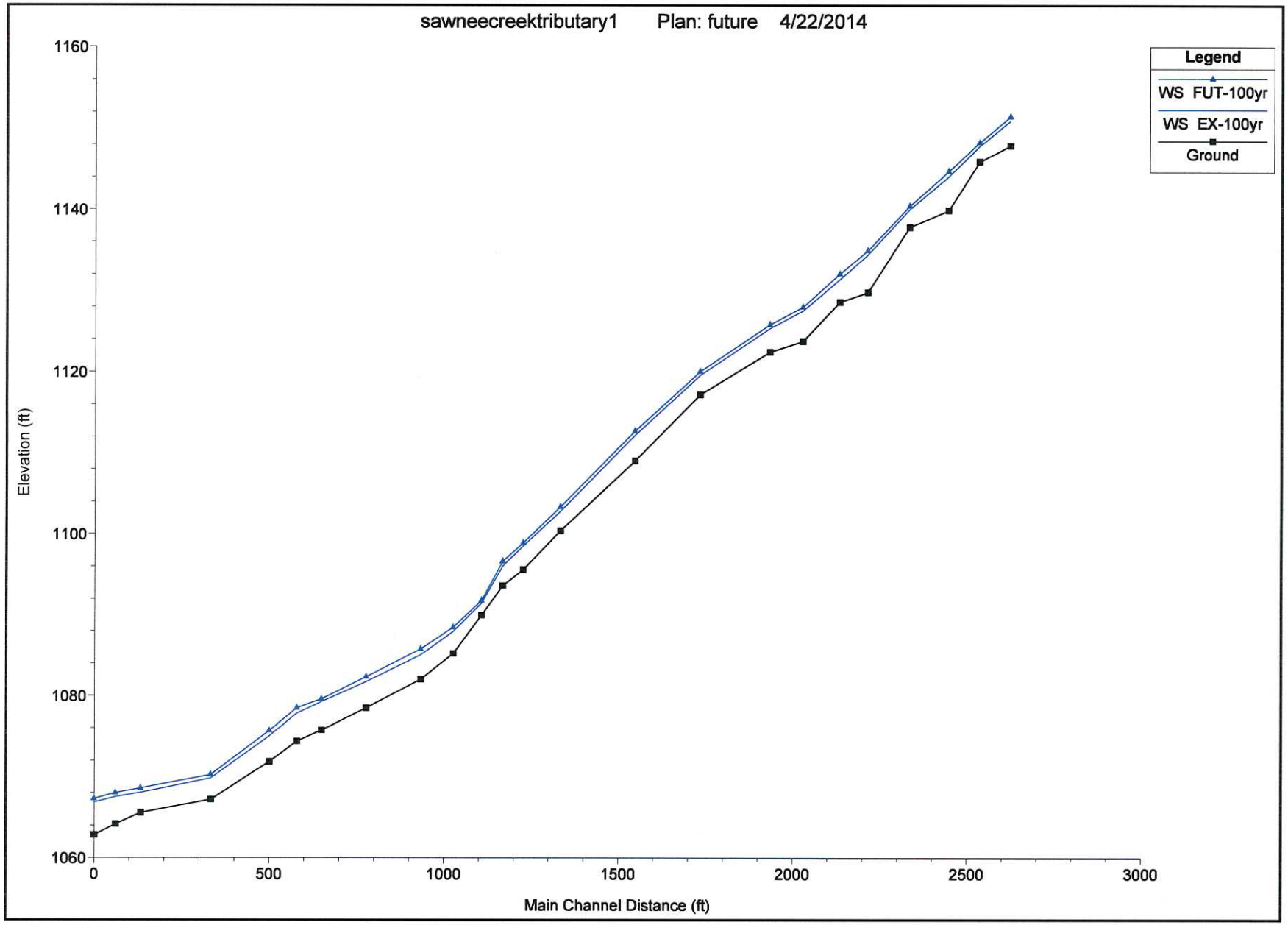

KMB_TribG Plan: future 4/20/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1200
1190
1180
1170
1160
1150
1140
1130
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)

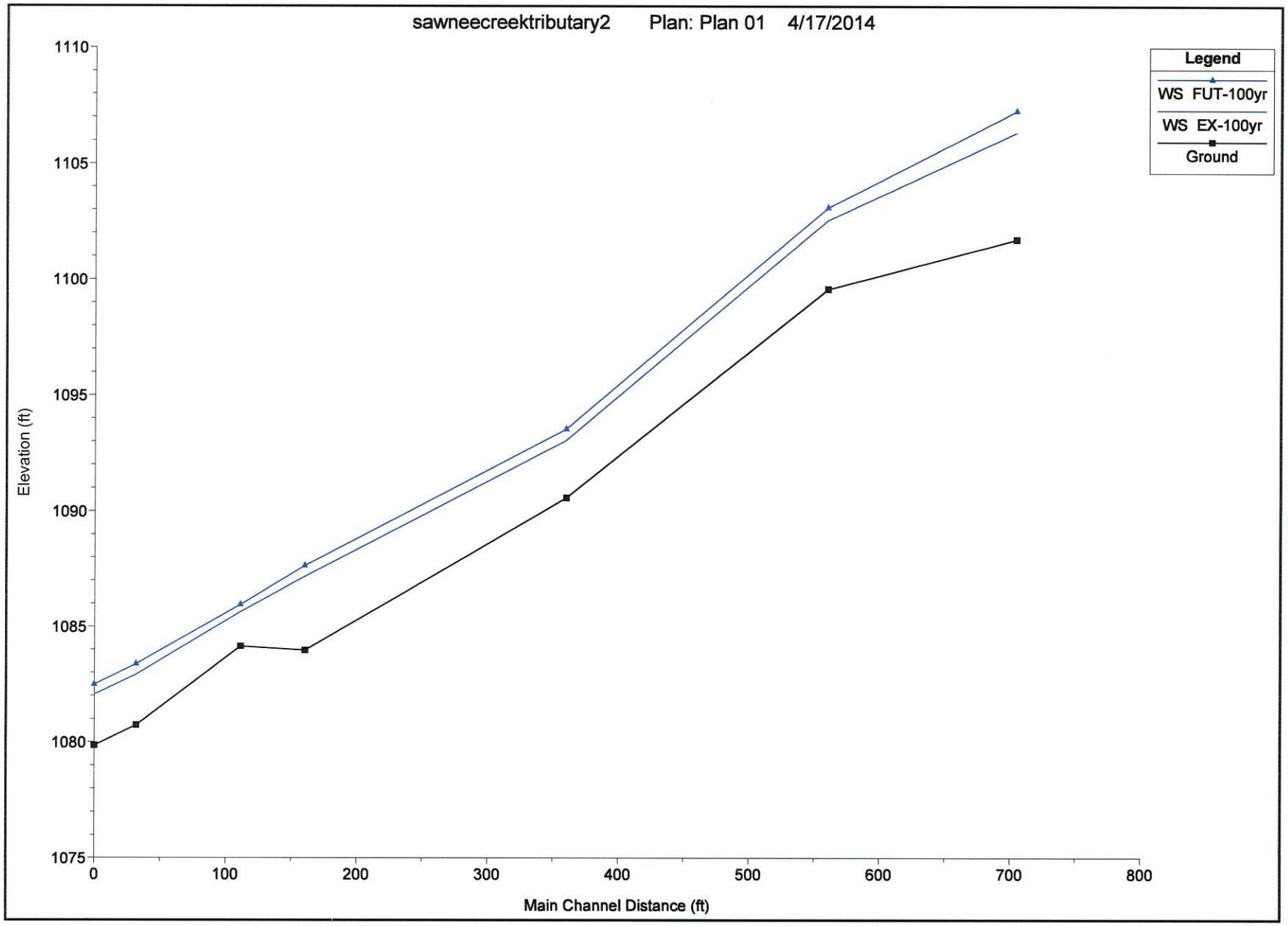

littleridgecreek Plan: future 4/17/2014
Legend
WS EX-100yr
WS FUT-100yr
Ground
Elevation (ft)
1220
1200
1180
1160
1140
1120
1100
1080
1060
1040
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)

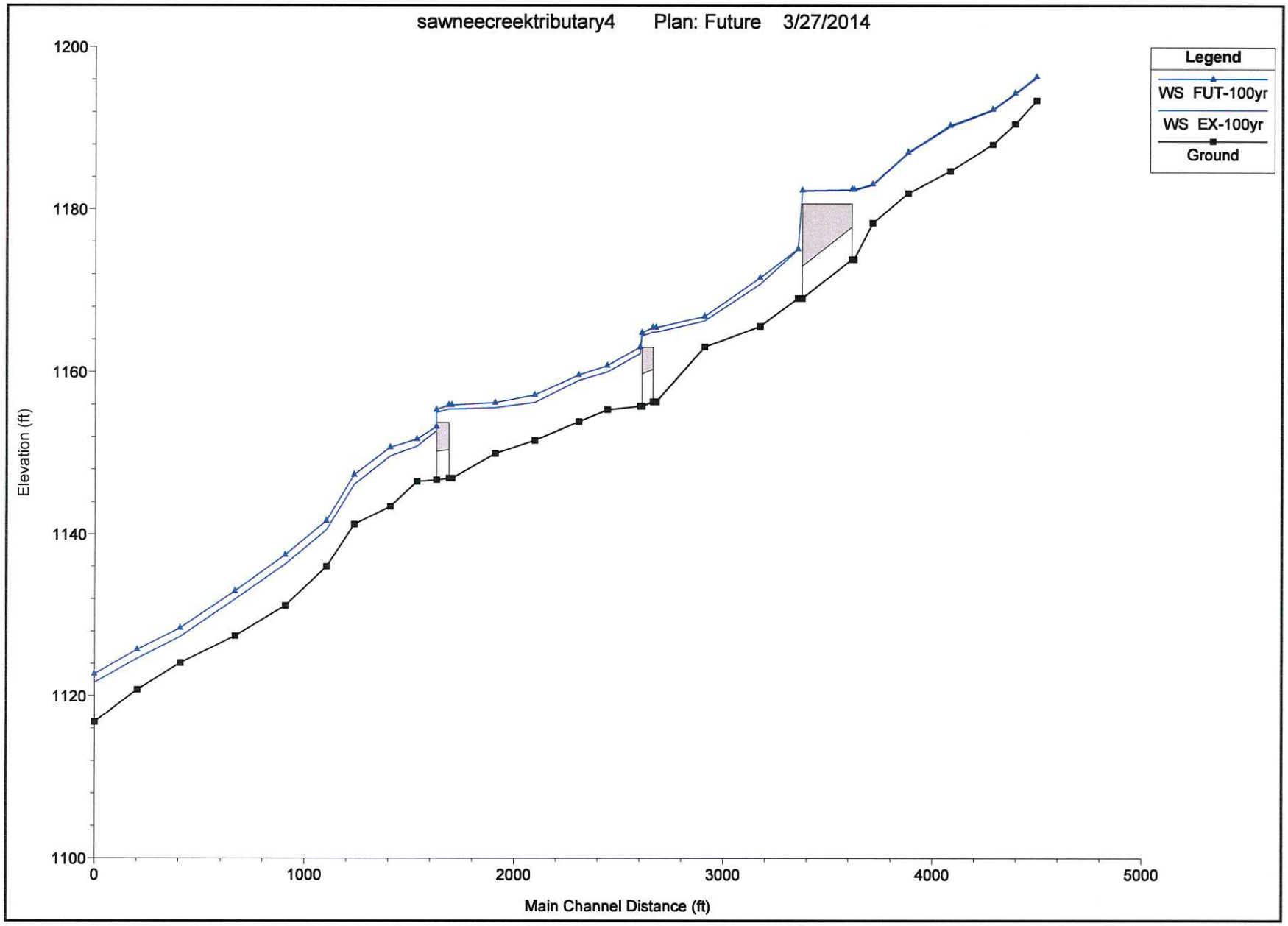

littleridgecreektrib2 Plan: future 4/24/2014
Legend
WS FUT-100yr
Ground
Elevation (ft)
1150
1145
1140
1135
1130
1125
1120
1115
1110
1105
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

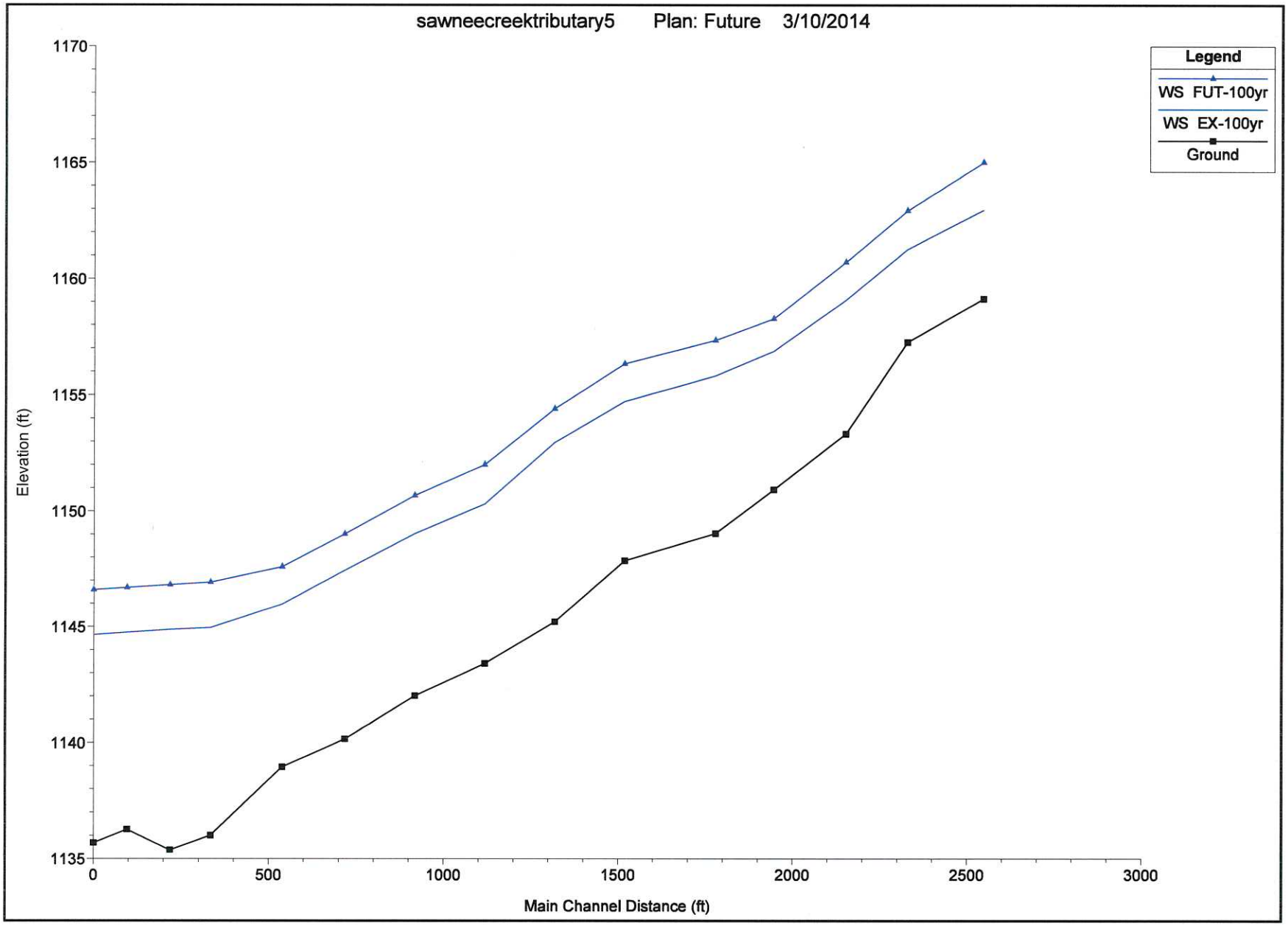

littleridgecreektrib3 Plan: future 4/17/2014
Legend
WS FUT-100yr
Ground
Elevation (ft)
1165
1160
1155
1150
1145
1140
1135
0
200
400
600
800
Main Channel Distance (ft)

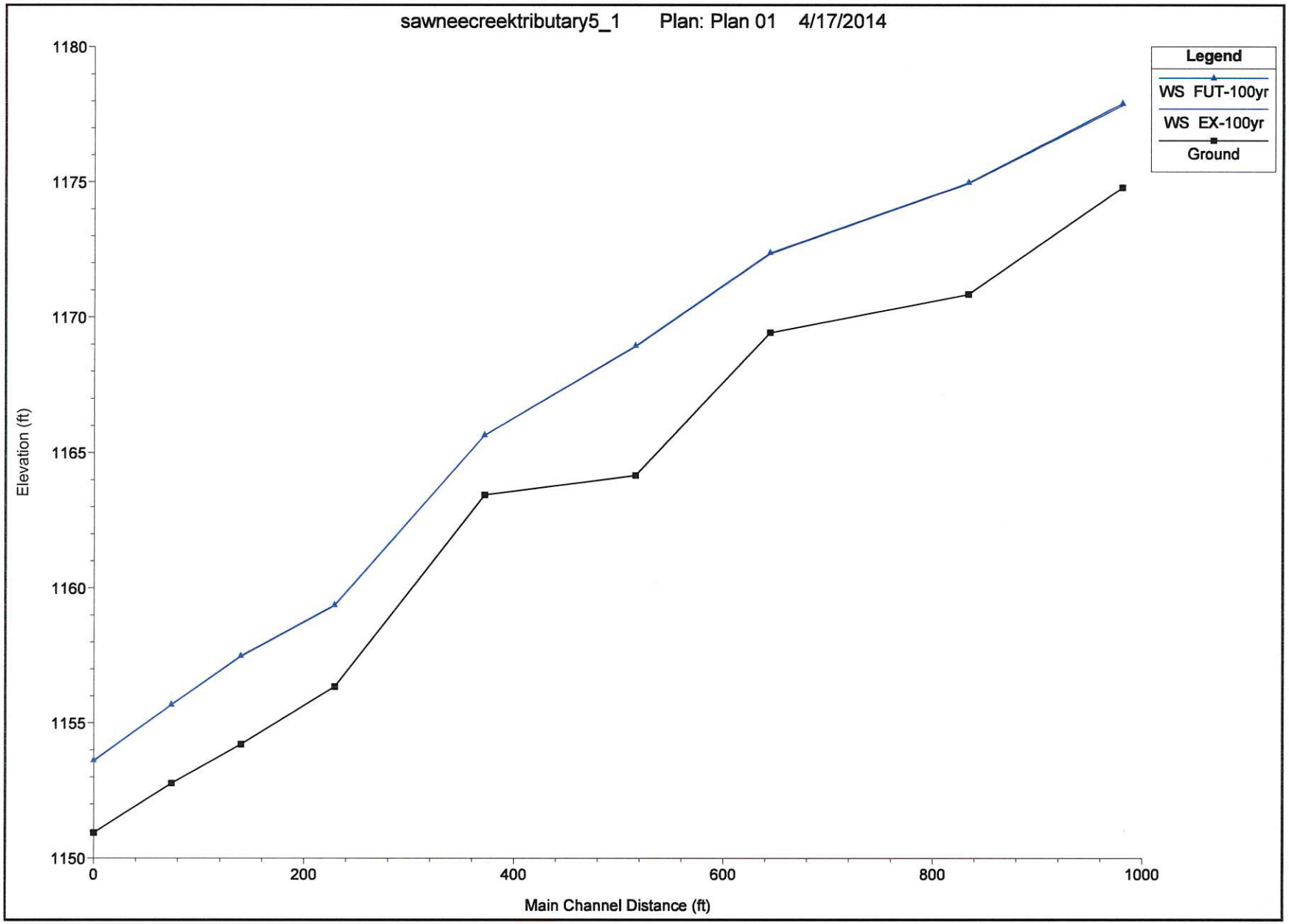

sawneecreek Plan: Future_Geometry 4/18/2014
Legend
WS EX-100Yr
WS FUT-100Yr
Ground
Elevation (ft)
1160
1140
1120
1100
1080
1060
1040
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)


sawneecreektributary1 Plan: future 4/22/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1160
1140
1120
1100
1080
1060
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)


sawneecreektributary2 Plan: Plan 01 4/17/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1110
1105
1100
1095
1090
1085
1080
1075
0
100
200
300
400
500
600
700
800
Main Channel Distance (ft)


sawneecreektributary4 Plan: Future 3/27/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1200
1180
1160
1140
1120
1100
0
1000
2000
3000
4000
5000
Main Channel Distance (ft)


sawneecreektributary5 Plan: Future 3/10/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1170
1165
1160
1155
1150
1145
1140
1135
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)


sawneecreektributary5_1 Plan: Plan 01 4/17/2014
Legend
WS FUT-100yr
WS EX-100yr
Ground
Elevation (ft)
1180
1175
1170
1165
1160
1155
1150
0
200
400
600
800
1000
Main Channel Distance (ft)

Appendix D – Survey Data

ATKINS

LIMITED DETAIL STUDY
HYDRAULIC STRUCTURE DATA WORKSHEET

Date	03/20/2014	**Stream Name**	BALD RIDGE CREEK TRIB.
Time	12:25 p.m.	**Road Name**	MARKET PL BLVD
Taken By	STEVE PAYNE	**Structure Number**	BT2_0100
County	FORSYTH	**GPS Point Number**	11031 - 11034
Type of Structure	Bridge	(Culvert) Weir	Dam Other
Hydraulic Width (ft)	126'(S), 102'(N)	(Length from US side to DS side of structure)	
Approximate Skew	40°(S), 15°(N)	(Angle btwn structure CL & road CL. 0-90°. 90° = ⊥)	
Railing Height (ft)	3.5'	(Height of railing on bridge or culvert)	
Deck Thickness (ft)	N/A	(Distance from top of road to top of culvert or low chord of bridge)	

Culverts: (See back of sheet for descriptions, diagrams, and sketch space if required)

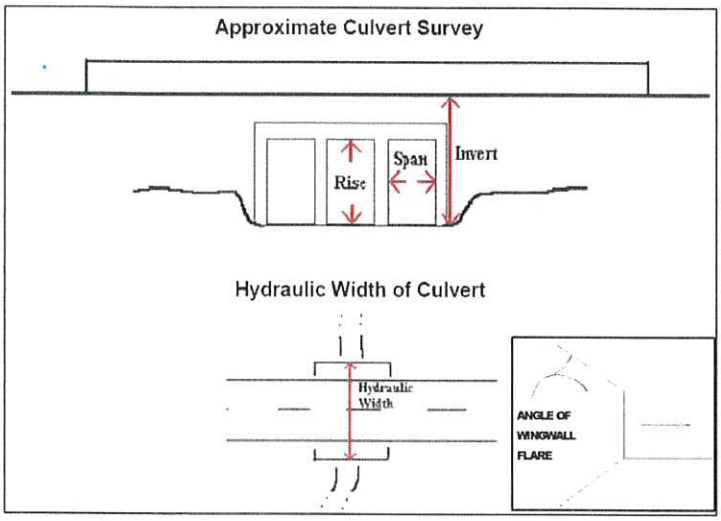
	Barrel #1	Barrel #2	Barrel #3	Barrel #4	Barrel #5
Barrel Type	BOX (S)	BOX (N)			
Inlet Type	HEADWALL/ WINGWALL	HEADWALL/ WINGWALL			
Rise or Diameter (ft)	RISE: 6.00	6.5			
Span (ft)	7.00	8.00			
Invert (ft) (Dist from road to invert)	35	32.5			
% Blocked	5%	3%			

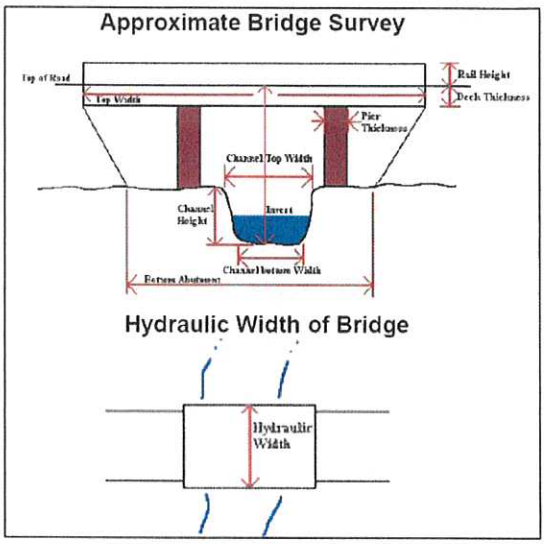
Bridges: (See back of sheet for descriptions, diagrams, and sketch space if required)

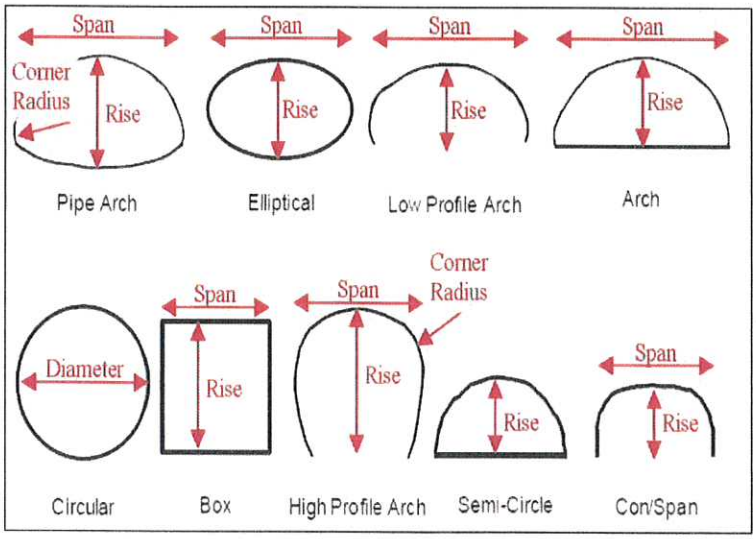
Rail Height (ft)		**Top Width (ft)**	
Deck Thickness (ft)		**Bottom Abutment Width (ft)**	
Number and Type of Piers		**Channel Top Width (ft)**	
Pier Thickness (ft)		**Channel Bottom Width (ft)**	
Invert (ft) (Dist from road to invert)		**Channel Height (ft)**	

Photograph Log

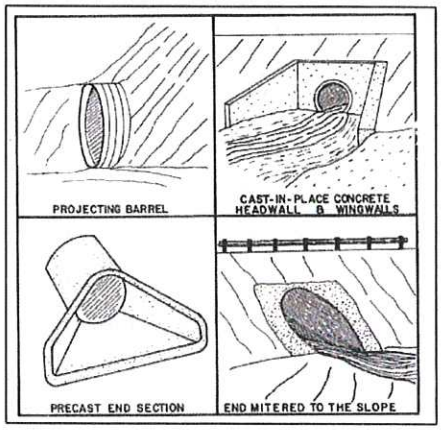
Picture Number	Description
BT2_0100_DSFACE(S) BT2_0100_DSFACE(N)	Downstream of structure looking upstream at structure (required)
BT2_0100_USFACE(S) BT2_0100_USFACE(N)	Upstream of structure looking downstream at structure (required)
BT2_0100_USCH(S) BT2_0100_USCH(N)	From structure looking upstream (required)
BT2_0100_DSCH(S) BT2_0100_DSCH(N)	From structure looking downstream (required)
BT2_0100_OTXS	OVER TOPPING CROSS SECTION







Inlet Types



Pier Shapes

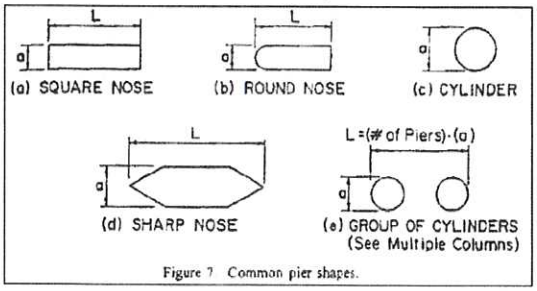
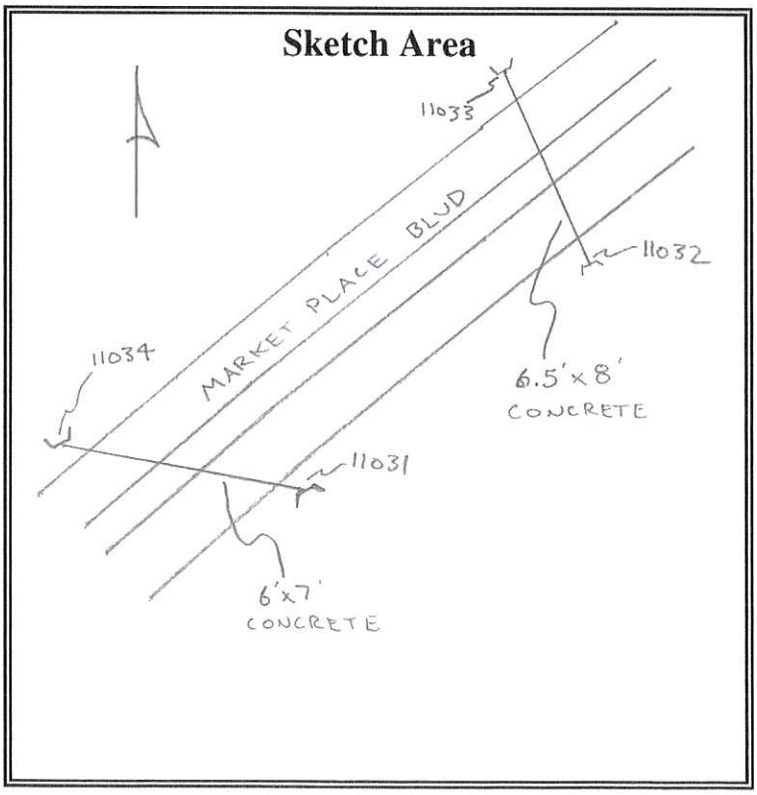


Figure 7 Common pier shapes.

Sketch Area



ATKINS

LIMITED DETAIL STUDY
HYDRAULIC STRUCTURE DATA WORKSHEET

Date	03/20/2014	**Stream Name**	KELLY MILL BRANCH TRIB
Time	2:30 P.m	**Road Name**	CASTLEBERRY RD
Taken By	STEVE PAYNE	**Structure Number**	KA1_0100
County	FORSYTH	**GPS Point Number**	11078 & 11076
Type of Structure	Bridge	Culvert	Weir Dam Other
Hydraulic Width (ft)	410	(Length from US side to DS side of structure)	
Approximate Skew	45°	(Angle btwn structure CL & road CL. 0-90°. 90° = ⊥)	
Railing Height (ft)	—	(Height of railing on bridge or culvert)	
Deck Thickness (ft)	N/A	(Distance from top of road to top of culvert or low chord of bridge)	

Culverts: (See back of sheet for descriptions, diagrams, and sketch space if required)

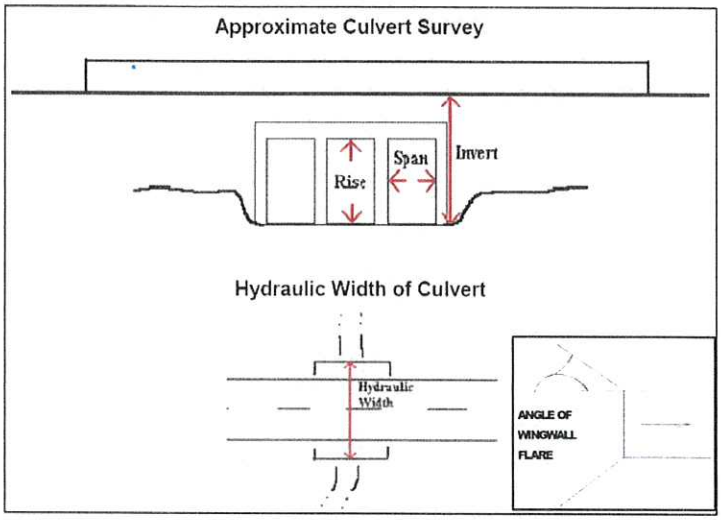
	Barrel #1	Barrel #2	Barrel #3	Barrel #4	Barrel #5
Barrel Type	BOX/CIRCULAR				
Inlet Type	HEADWALL/ WINGWALL				
Rise or Diameter (ft)	5'/6'				
Span (ft)	10'				
Invert (ft) (Dist from road to invert)	25				
% Blocked	0%				

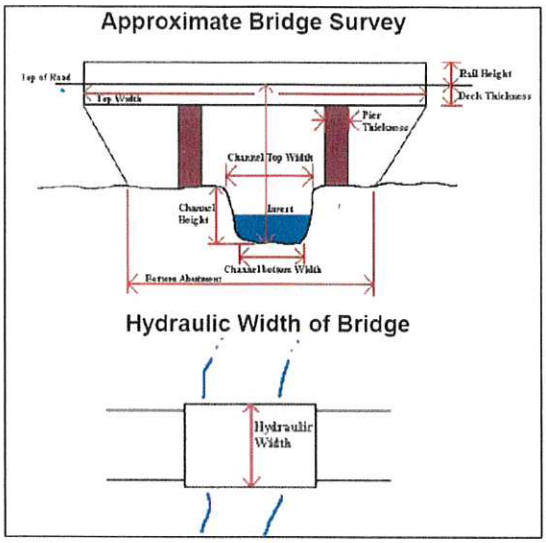
Bridges: (See back of sheet for descriptions, diagrams, and sketch space if required)

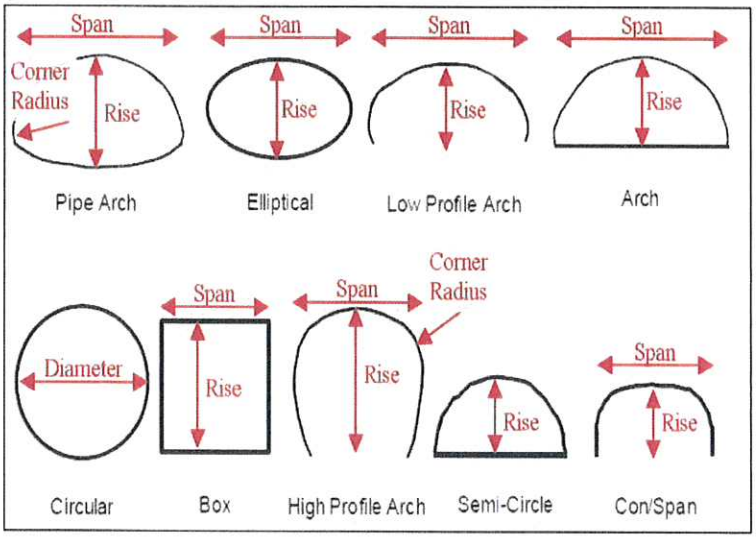
Rail Height (ft)		**Top Width (ft)**	
Deck Thickness (ft)		**Bottom Abutment Width (ft)**	
Number and Type of Piers		**Channel Top Width (ft)**	
Pier Thickness (ft)		**Channel Bottom Width (ft)**	
Invert (ft) (Dist from road to invert)		**Channel Height (ft)**	

Photograph Log

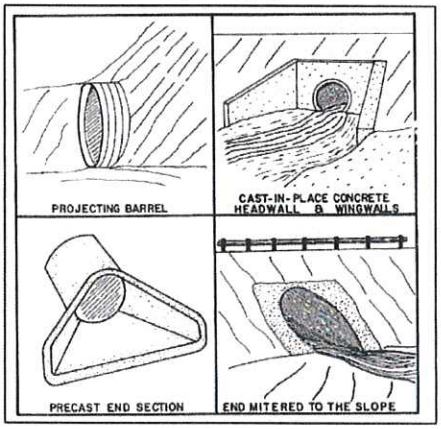
Picture Number	Description
KA1_0100_DSFACE	Downstream of structure looking upstream at structure (required)
KA1_0100_USFACE	Upstream of structure looking downstream at structure (required)
KA1_0100_USCH	From structure looking upstream (required)
KA1_0100_DSCH	From structure looking downstream (required)
KA1_0100_OTXS	OVER TOPPING CROSS SECTION







Inlet Types



Pier Shapes

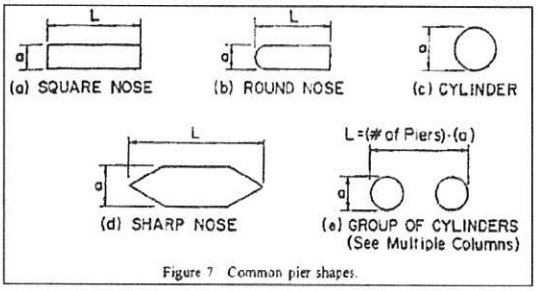
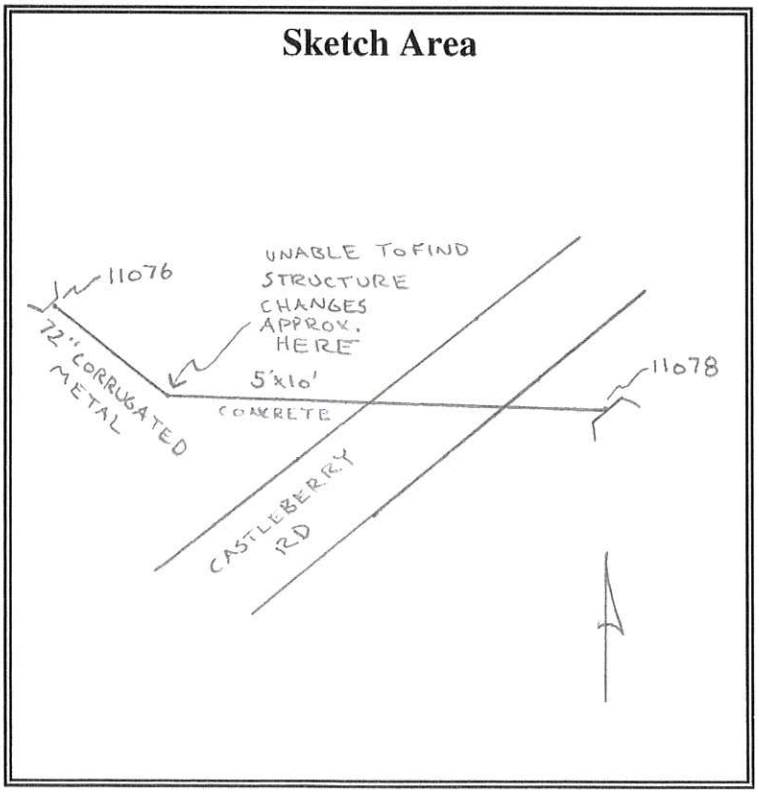


Figure 7 Common pier shapes.

Sketch Area



ATKINS

LIMITED DETAIL STUDY
HYDRAULIC STRUCTURE DATA WORKSHEET

Date	03/20/2014	**Stream Name**	KELLY MILL BRANCH TRIB
Time	1:25 p.m	**Road Name**	N/A
Taken By	STEVE PAYNE	**Structure Number**	KA2_0100
County	FORSYTH	**GPS Point Number**	11075 & 11074
Type of Structure	Bridge	Culvert	Weir Dam Other
Hydraulic Width (ft)	9.3'	(Length from US side to DS side of structure)	
Approximate Skew	90°	(Angle btwn structure CL & road CL. 0-90°. 90° = ⊥)	
Railing Height (ft)	5.00'	(Height of railing on bridge or culvert)	
Deck Thickness (ft)	N/A	(Distance from top of road to top of culvert or low chord of bridge)	

Culverts: (See back of sheet for descriptions, diagrams, and sketch space if required)

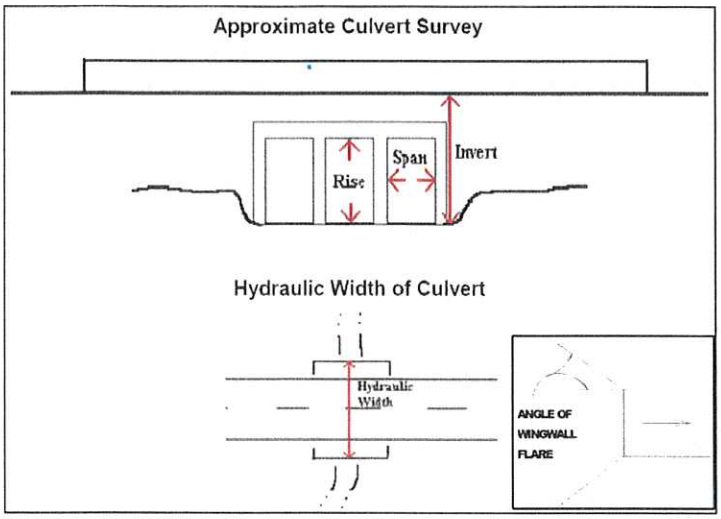
	Barrel #1	Barrel #2	Barrel #3	Barrel #4	Barrel #5
Barrel Type	CIRCULAR				
Inlet Type	HEADWALL/ WINGWALL				
Rise or Diameter (ft)	6				
Span (ft)	6				
Invert (ft) (Dist from road to invert)	8				
% Blocked	0%				

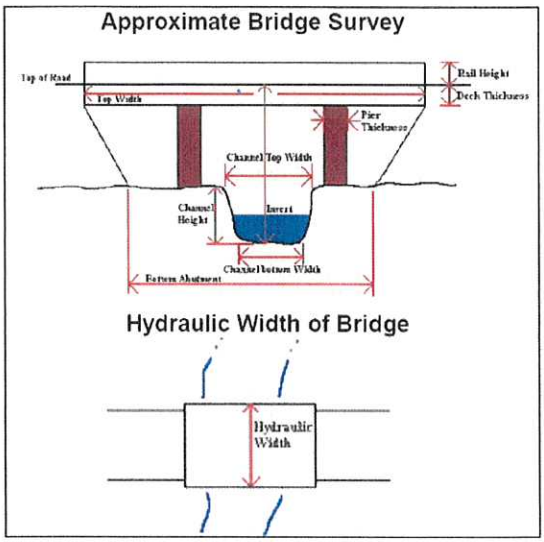
Bridges: (See back of sheet for descriptions, diagrams, and sketch space if required)

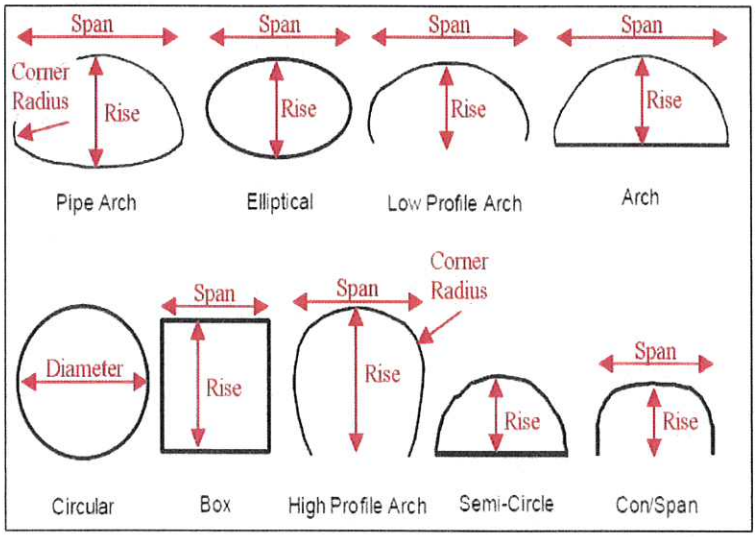
Rail Height (ft)		**Top Width (ft)**	
Deck Thickness (ft)		**Bottom Abutment Width (ft)**	
Number and Type of Piers		**Channel Top Width (ft)**	
Pier Thickness (ft)		**Channel Bottom Width (ft)**	
Invert (ft) (Dist from road to invert)		**Channel Height (ft)**	

Photograph Log

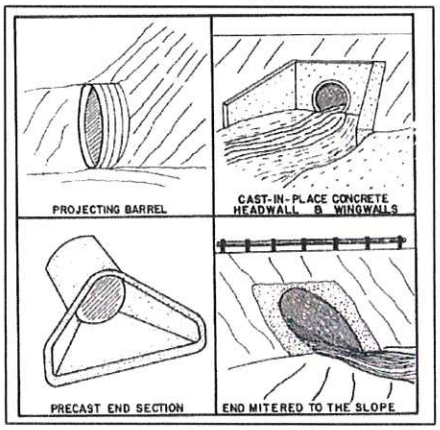
Picture Number	Description
KA2_0100_DSFACE	Downstream of structure looking upstream at structure (required)
KA2_0100_USFACE	Upstream of structure looking downstream at structure (required)
KA2_0100_USCH	From structure looking upstream (required)
KA2_0100_DSCH	From structure looking downstream (required)
KA2_0100_OTXS	OVER TOPPING CROSS SECTION







Inlet Types



Pier Shapes

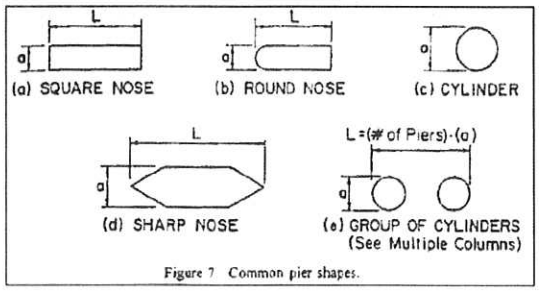
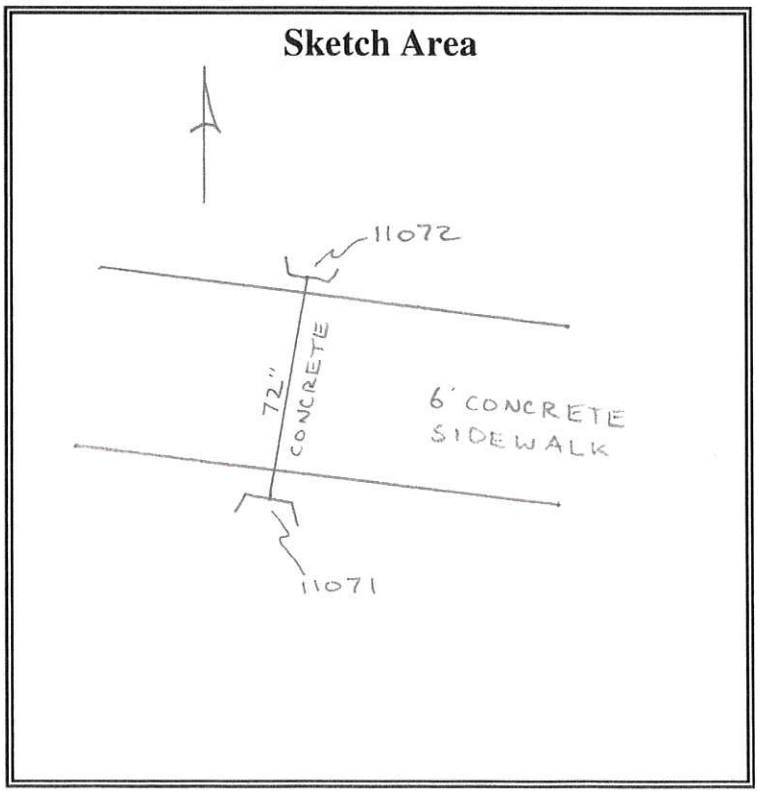


Figure 7 Common pier shapes.

Sketch Area



ATKINS

LIMITED DETAIL STUDY
HYDRAULIC STRUCTURE DATA WORKSHEET

Date	3/20/14	**Stream Name**	LITTLERIDGE CREEK
Time	10:30	**Road Name**	SANDERS RD
Taken By	Steve Payne	**Structure Number**	LRC 0100
County	FORSYTH	**GPS Point Number**	11027, 11030
Type of Structure	Bridge	Culvert	Weir Dam Other
Hydraulic Width (ft)	60'	(Length from US side to DS side of structure)	
Approximate Skew	90°	(Angle btwn structure CL & road CL. 0-90°. 90° = ⊥)	
Railing Height (ft)	N/A	(Height of railing on bridge or culvert)	
Deck Thickness (ft)	N/A	(Distance from top of road to top of culvert or low chord of bridge)	

Culverts: (See back of sheet for descriptions, diagrams, and sketch space if required)

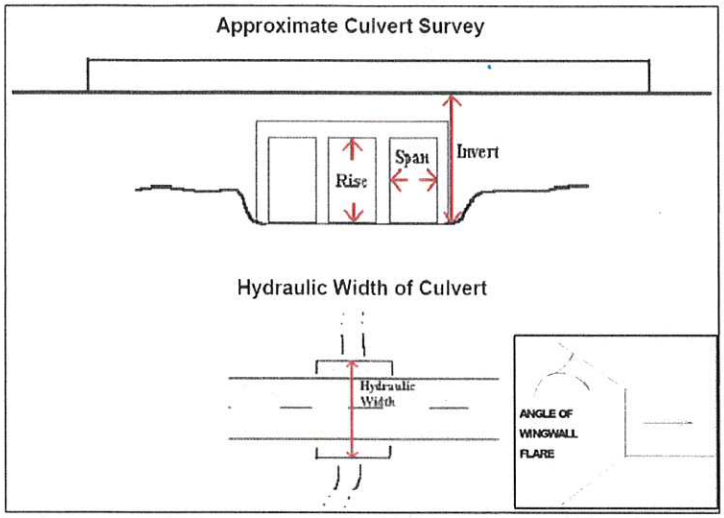
	Barrel #1	Barrel #2	Barrel #3	Barrel #4	Barrel #5
Barrel Type	CIRCULAR				
Inlet Type	PROJECTING				
Rise or Diameter (ft)	5				
Span (ft)	5				
Invert (ft) (Dist from road to invert)	13				
% Blocked	70%				

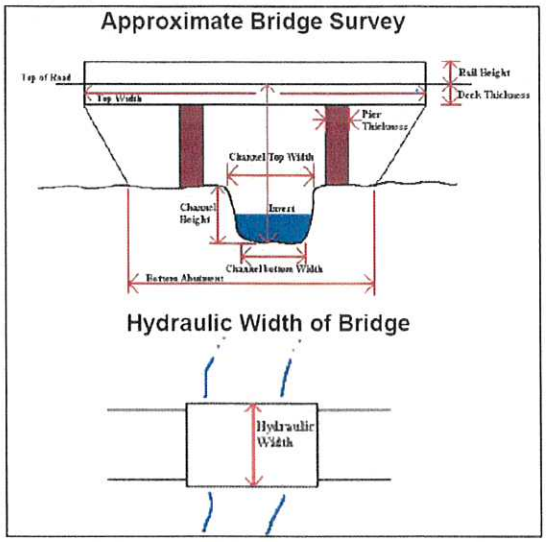
Bridges: (See back of sheet for descriptions, diagrams, and sketch space if required)

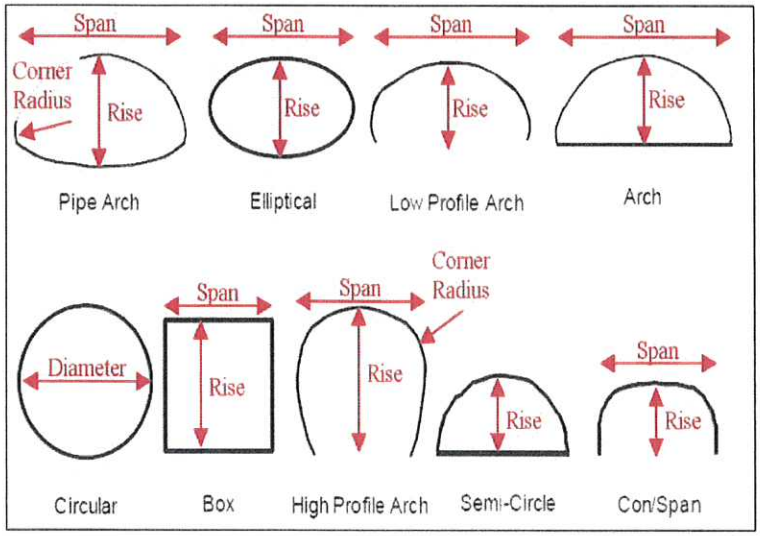
Rail Height (ft)		**Top Width (ft)**	
Deck Thickness (ft)		**Bottom Abutment Width (ft)**	
Number and Type of Piers		**Channel Top Width (ft)**	
Pier Thickness (ft)		**Channel Bottom Width (ft)**	
Invert (ft) (Dist from road to invert)		**Channel Height (ft)**	

Photograph Log

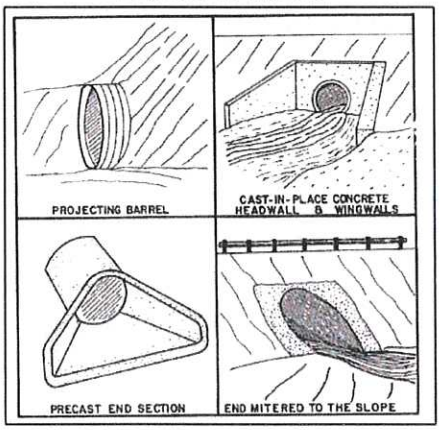
Picture Number	Description
LRC_0100_DSFACE	Downstream of structure looking upstream at structure (required)
LRC_0100_USFACE	Upstream of structure looking downstream at structure (required)
LRC_0100_USCH	From structure looking upstream (required)
LRC_0100_DSCH	From structure looking downstream (required)
LRC_0100_OTXS	OVERTOPPING CROSS SECTION







Inlet Types



Pier Shapes

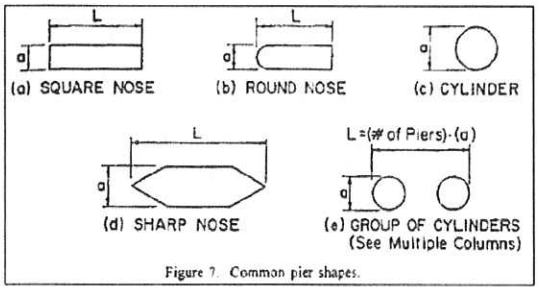
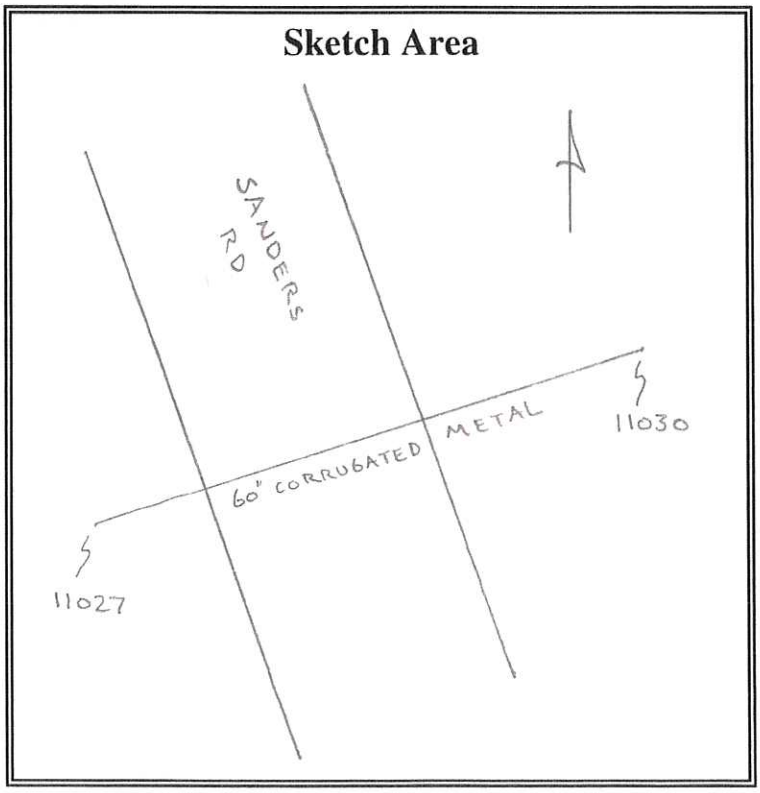


Figure 7. Common pier shapes.

Sketch Area



ATKINS

LIMITED DETAIL STUDY
HYDRAULIC STRUCTURE DATA WORKSHEET

Date	3/18/14	**Stream Name**	LITTLERIDGE CREEK
Time	4:00	**Road Name**	BUFORD DAM RD
Taken By	Steve Payne	**Structure Number**	LRC_0300
County	FORSYTH	**GPS Point Number**	11000, 11023
Type of Structure	Bridge	Culvert (circled)	Weir Dam Other
Hydraulic Width (ft)	137	(Length from US side to DS side of structure)	
Approximate Skew	45	(Angle btwn structure CL & road CL. 0-90°. 90° = ⊥)	
Railing Height (ft)	4	(Height of railing on bridge or culvert)	
Deck Thickness (ft)	N/A	(Distance from top of road to top of culvert or low chord of bridge)	

Culverts: (See back of sheet for descriptions, diagrams, and sketch space if required)

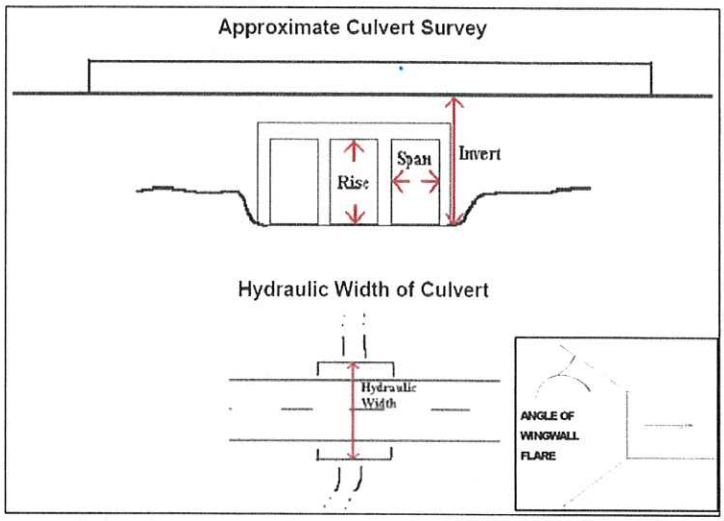
	Barrel #1	Barrel #2	Barrel #3	Barrel #4	Barrel #5
Barrel Type	ARCH				
Inlet Type	MITRED				
Rise or Diameter (ft)	7				
Span (ft)	15				
Invert (ft) (Dist from road to invert)	18				
% Blocked	5%				

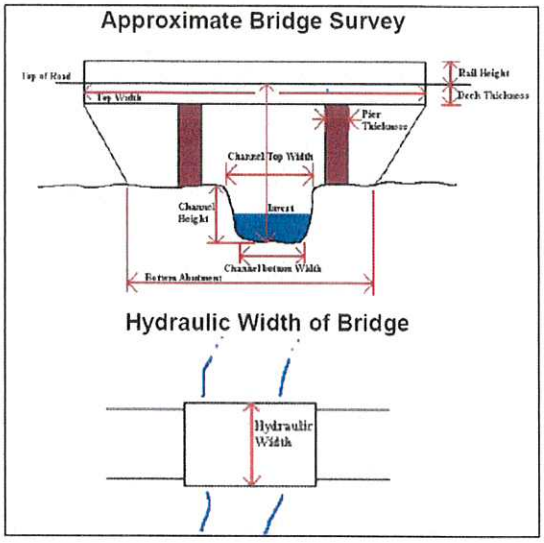
Bridges: (See back of sheet for descriptions, diagrams, and sketch space if required)

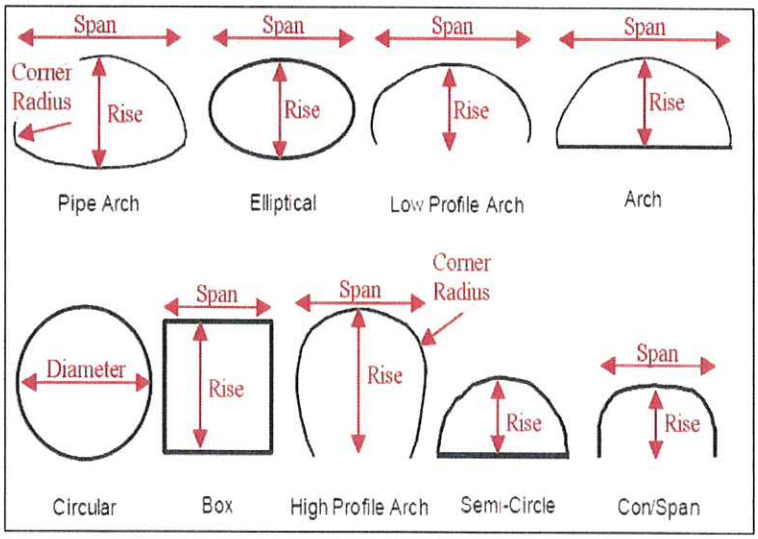
Rail Height (ft)		**Top Width (ft)**	
Deck Thickness (ft)		**Bottom Abutment Width (ft)**	
Number and Type of Piers		**Channel Top Width (ft)**	
Pier Thickness (ft)		**Channel Bottom Width (ft)**	
Invert (ft) (Dist from road to invert)		**Channel Height (ft)**	

Photograph Log

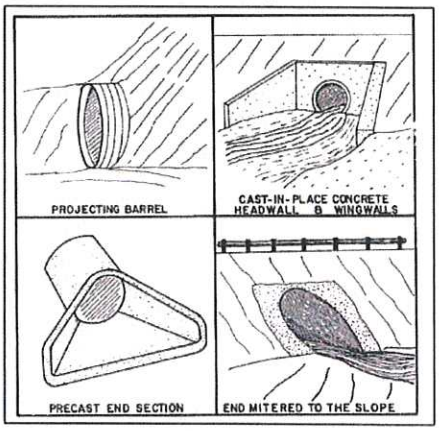
Picture Number	Description
LRC-0300_DSFACE	Downstream of structure looking upstream at structure (required)
LRC-0300-USFACE	Upstream of structure looking downstream at structure (required)
LRC-0300-USCH	From structure looking upstream (required)
LRC-0300-DSCH	From structure looking downstream (required)
LRC-0300_OTXS	OVER TOPPING CROSS SECTION







Inlet Types



Pier Shapes

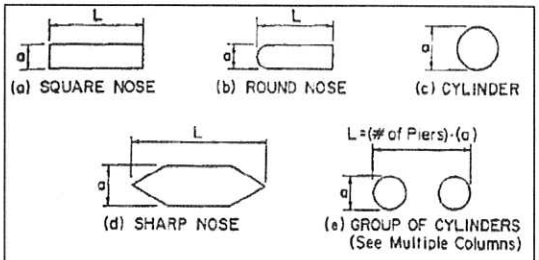
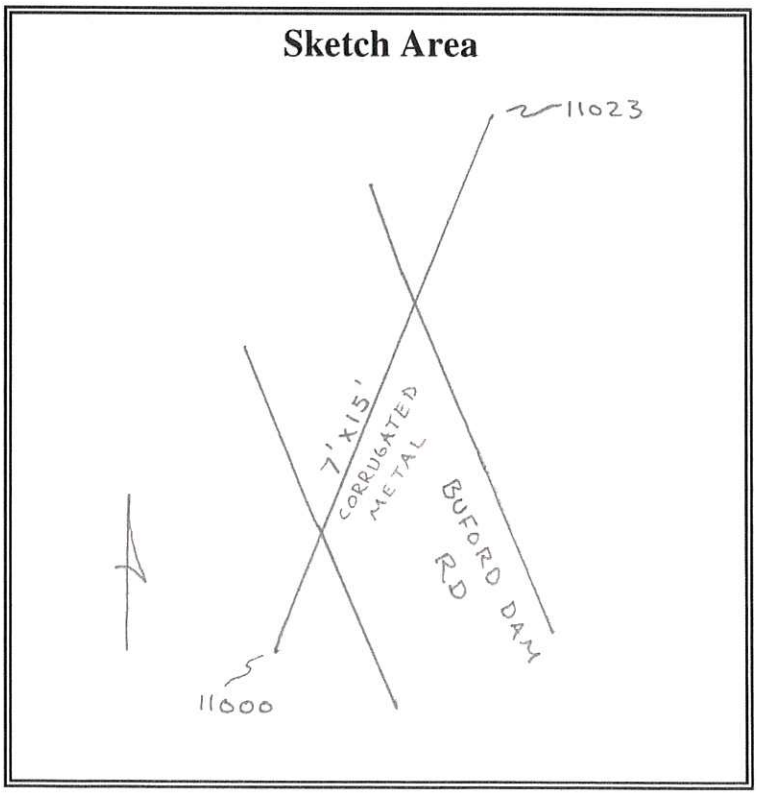


Figure 7 Common pier shapes.

Sketch Area



ATKINS

LIMITED DETAIL STUDY
HYDRAULIC STRUCTURE DATA WORKSHEET

Date	3/18/14	**Stream Name**	LITTLE RIDGE CREEK
Time	3:00 PM	**Road Name**	MARKET PLACE BLVD
Taken By	Steve Payne	**Structure Number**	LRC 0400
County	FORSYTH	**GPS Point Number**	10050, 10051, 10053, 10054
Type of Structure	Bridge (Culvert) Weir Dam Other		
Hydraulic Width (ft)	369.5	(Length from US side to DS side of structure)	
Approximate Skew	80°	(Angle btwn structure CL & road CL. 0-90°. 90° = ⊥)	
Railing Height (ft)	N/A	(Height of railing on bridge or culvert)	
Deck Thickness (ft)	N/A	(Distance from top of road to top of culvert or low chord of bridge)	

Culverts: (See back of sheet for descriptions, diagrams, and sketch space if required)

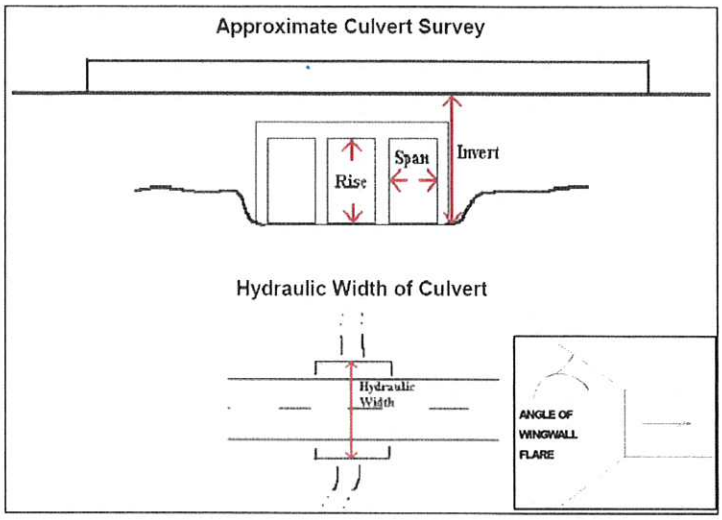
	Barrel #1	Barrel #2	Barrel #3	Barrel #4	Barrel #5
Barrel Type	CIRCULAR	CIRCULAR			
Inlet Type	CAST IN PLACE	CAST IN PLACE			
Rise or Diameter (ft)	5	5			
Span (ft)	5	5			
Invert (ft) (Dist from road to invert)	60	60			
% Blocked	0%	0%			

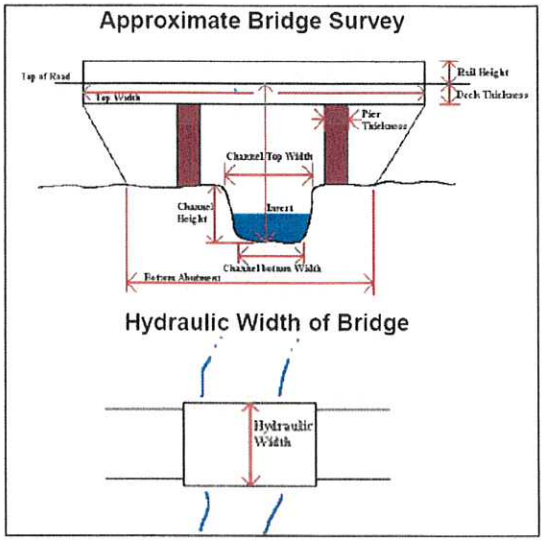
Bridges: (See back of sheet for descriptions, diagrams, and sketch space if required)

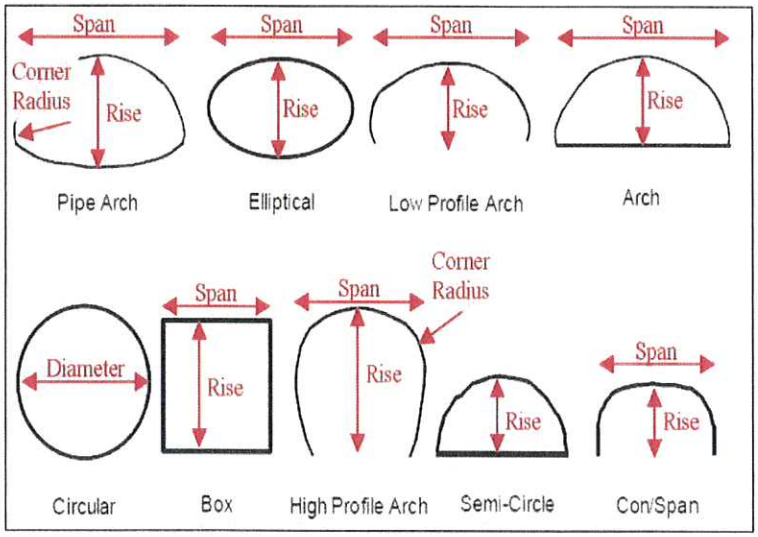
Rail Height (ft)		**Top Width (ft)**	
Deck Thickness (ft)		**Bottom Abutment Width (ft)**	
Number and Type of Piers		**Channel Top Width (ft)**	
Pier Thickness (ft)		**Channel Bottom Width (ft)**	
Invert (ft) (Dist from road to invert)		**Channel Height (ft)**	

Photograph Log

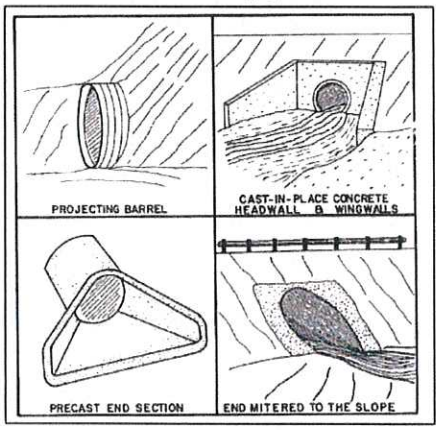
Picture Number	Description
LRC-0400-DSFACE	Downstream of structure looking upstream at structure (required)
LRC-0400-USFACE	Upstream of structure looking downstream at structure (required)
LRC-0400-USCH	From structure looking upstream (required)
LRC-0400-DSCH	From structure looking downstream (required)
LRC.0400-OTXS	OVER TOPPING CROSS SECTION







Inlet Types



Pier Shapes

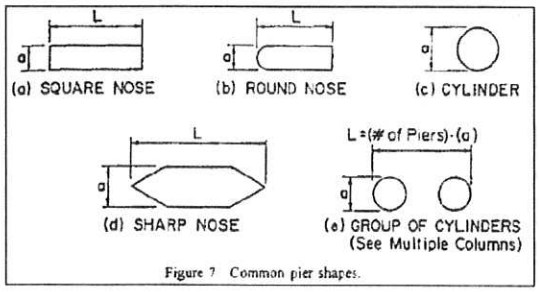
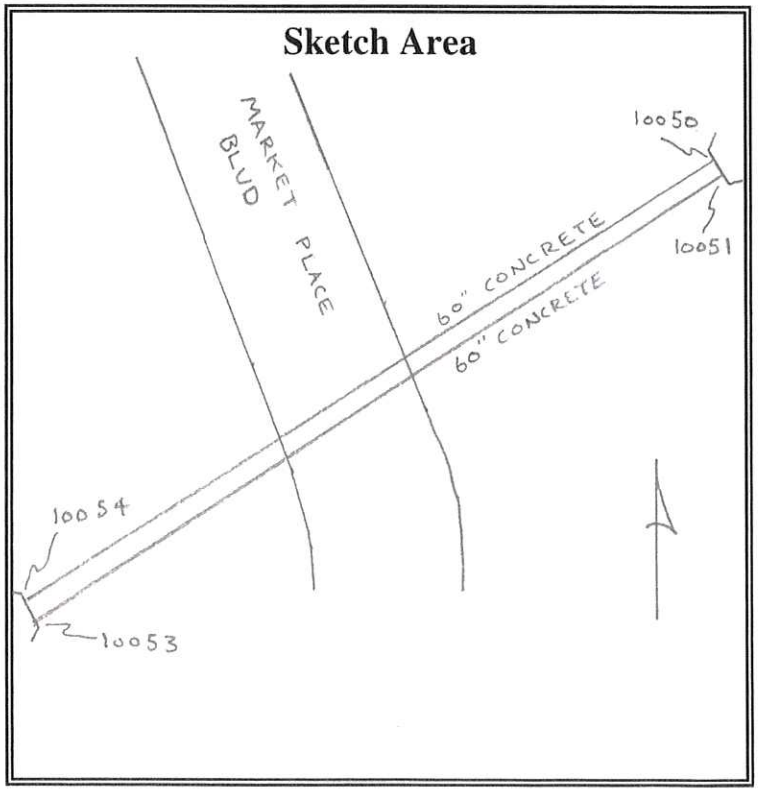


Figure 7 Common pier shapes.

Sketch Area



ATKINS

LIMITED DETAIL STUDY
HYDRAULIC STRUCTURE DATA WORKSHEET

Date	03/20/2014	**Stream Name**	SAWNEE CREEK TRIB
Time	3:10 p.m	**Road Name**	OAKWOOD DR
Taken By	STEVE PAYNE	**Structure Number**	ST4_0100
County	FORSYTH	**GPS Point Number**	11083 & 11084
Type of Structure	Bridge	Culvert	Weir Dam Other
Hydraulic Width (ft)	59.0	(Length from US side to DS side of structure)	
Approximate Skew	45°	(Angle btwn structure CL & road CL. 0-90°. 90° = ⊥)	
Railing Height (ft)	N/A	(Height of railing on bridge or culvert)	
Deck Thickness (ft)	N/A	(Distance from top of road to top of culvert or low chord of bridge)	

Culverts: (See back of sheet for descriptions, diagrams, and sketch space if required)

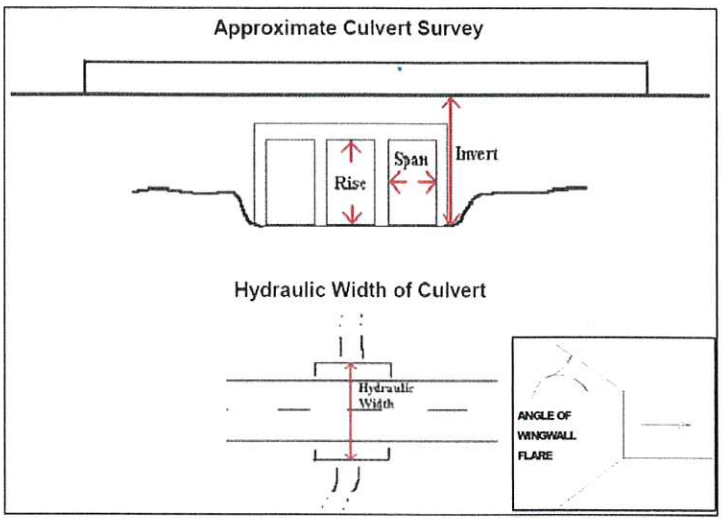
	Barrel #1	Barrel #2	Barrel #3	Barrel #4	Barrel #5
Barrel Type	CIRCULAR				
Inlet Type	HEADWALL/ WINGWALL				
Rise or Diameter (ft)	3.5'				
Span (ft)	3.5'				
Invert (ft) (Dist from road to invert)	7				
% Blocked	0%				

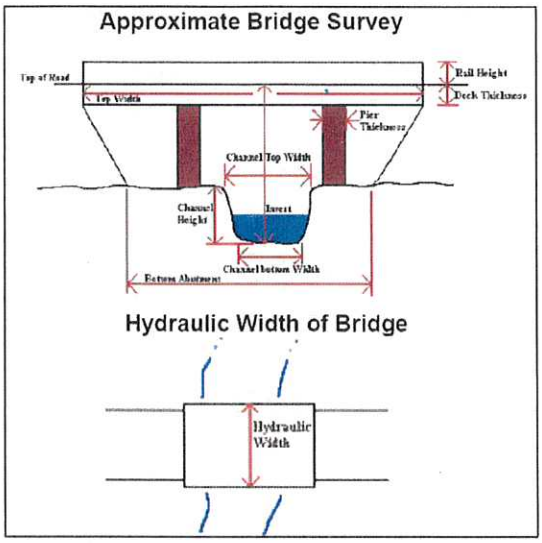
Bridges: (See back of sheet for descriptions, diagrams, and sketch space if required)

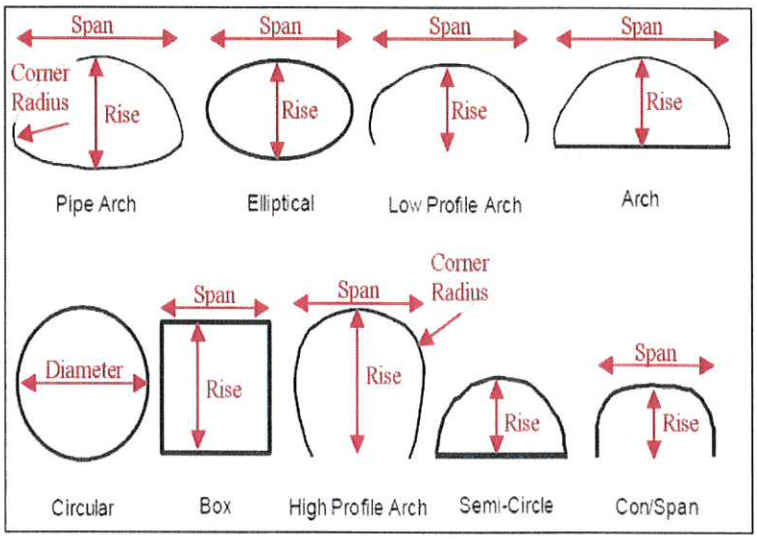
Rail Height (ft)		**Top Width (ft)**	
Deck Thickness (ft)		**Bottom Abutment Width (ft)**	
Number and Type of Piers		**Channel Top Width (ft)**	
Pier Thickness (ft)		**Channel Bottom Width (ft)**	
Invert (ft) (Dist from road to invert)		**Channel Height (ft)**	

Photograph Log

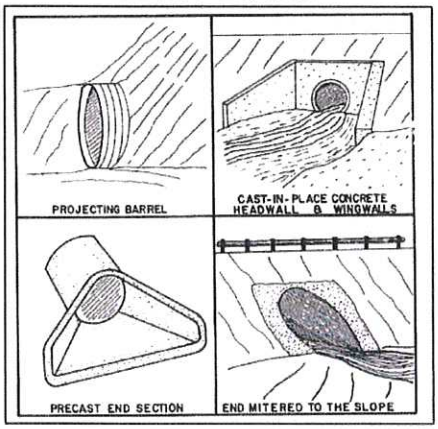
Picture Number	Description
ST4_0100_DSFACE	Downstream of structure looking upstream at structure (required)
ST4_0100_USFACE	Upstream of structure looking downstream at structure (required)
ST4_0100_USCH	From structure looking upstream (required)
ST4_0100_DSCH	From structure looking downstream (required)
ST4_0100_OTXS	OVER TOPPING CROSS SECTION







Inlet Types



Pier Shapes

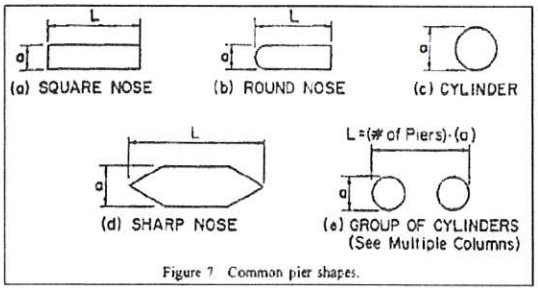
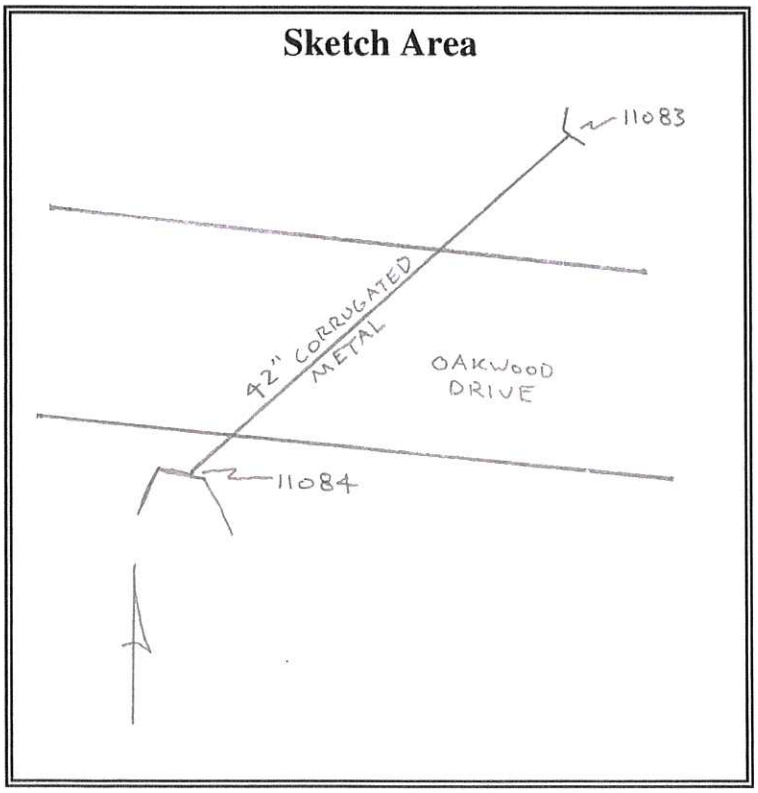


Figure 7 Common pier shapes.

Sketch Area



ATKINS

LIMITED DETAIL STUDY
HYDRAULIC STRUCTURE DATA WORKSHEET

Date	03/20/2014	**Stream Name**	SAWNEECREEK TRIB
Time	4:15 P.M.	**Road Name**	FRANKLIN WAY
Taken By	STEVE PAYNE	**Structure Number**	ST4_0200
County	FORSYTH	**GPS Point Number**	11089 - 11090
Type of Structure	Bridge	Culvert Weir Dam Other	
Hydraulic Width (ft)	52.0'	(Length from US side to DS side of structure)	
Approximate Skew	15°	(Angle btwn structure CL & road CL. 0-90°. 90° = ⊥)	
Railing Height (ft)	N/A	(Height of railing on bridge or culvert)	
Deck Thickness (ft)	N/A	(Distance from top of road to top of culvert or low chord of bridge)	

Culverts: (See back of sheet for descriptions, diagrams, and sketch space if required)

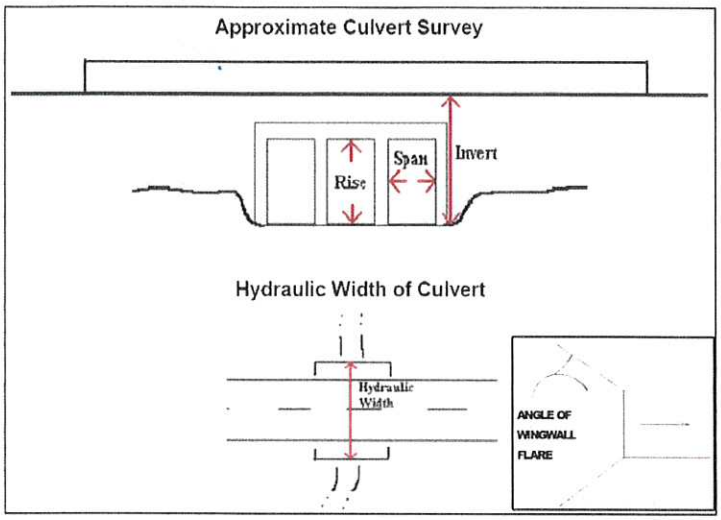
	Barrel #1	Barrel #2	Barrel #3	Barrel #4	Barrel #5
Barrel Type	CIRCULAR				
Inlet Type	PROJECTING BARREL				
Rise or Diameter (ft)	4'				
Span (ft)	4'				
Invert (ft) (Dist from road to invert)	7				
% Blocked	0%				

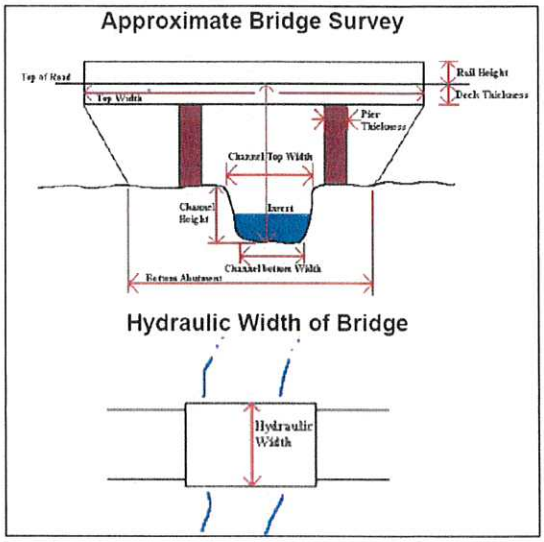
Bridges: (See back of sheet for descriptions, diagrams, and sketch space if required)

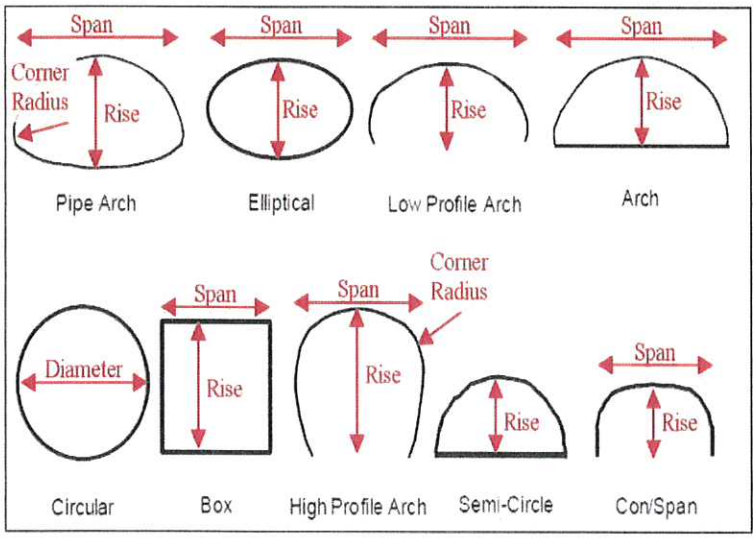
Rail Height (ft)		**Top Width (ft)**	
Deck Thickness (ft)		**Bottom Abutment Width (ft)**	
Number and Type of Piers		**Channel Top Width (ft)**	
Pier Thickness (ft)		**Channel Bottom Width (ft)**	
Invert (ft) (Dist from road to invert)		**Channel Height (ft)**	

Photograph Log

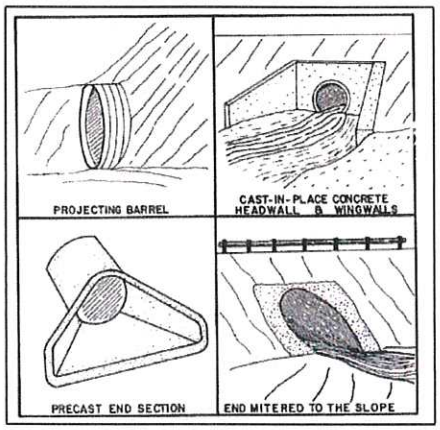
Picture Number	Description
ST4_0200_DSFACE	Downstream of structure looking upstream at structure (required)
ST4_0200_USFACE	Upstream of structure looking downstream at structure (required)
ST4_0200_USCH	From structure looking upstream (required)
ST4_0200_DSCH	From structure looking downstream (required)
ST4_0200_OTXS	OVER TOPPING CROSS SECTION







Inlet Types



Pier Shapes

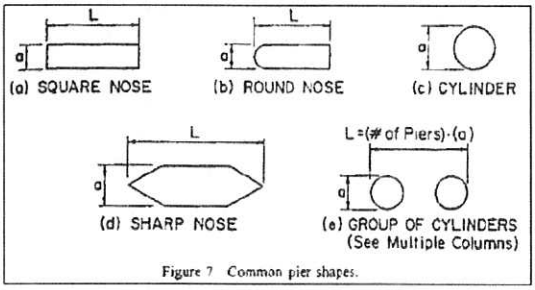
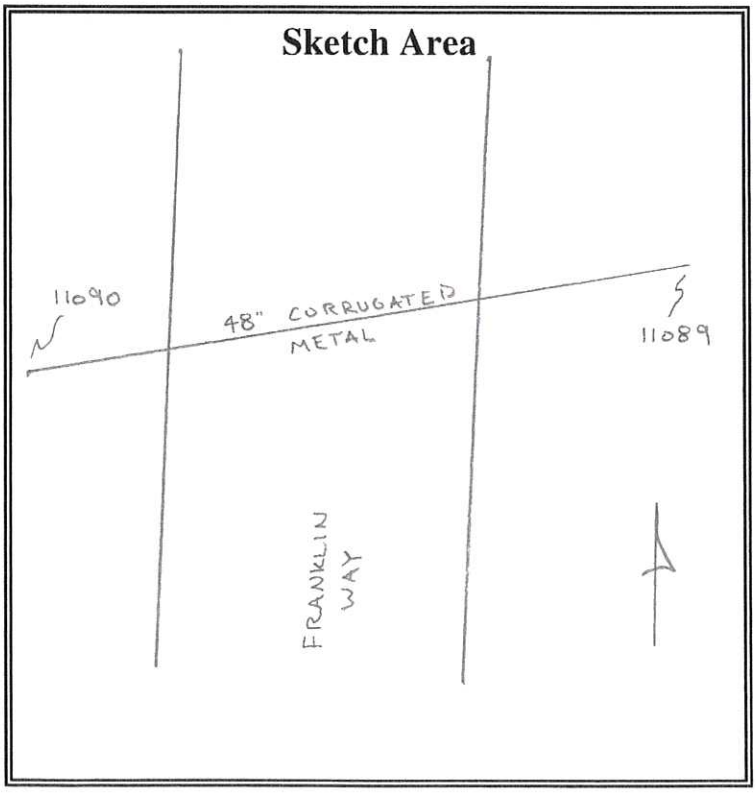


Figure 7 Common pier shapes.

Sketch Area



ATKINS

LIMITED DETAIL STUDY
HYDRAULIC STRUCTURE DATA WORKSHEET

Date	03/20/2014	**Stream Name**	SAWNEE CREEK TRIB
Time	5:30 pm	**Road Name**	CHARLES PL
Taken By	STEVE PAYNE	**Structure Number**	ST4-0300
County	FORSYTH	**GPS Point Number**	11104 - 11105
Type of Structure	Bridge	Culvert	Weir Dam Other
Hydraulic Width (ft)	237 (S) 62 (N)	(Length from US side to DS side of structure)	
Approximate Skew	20° (S) 30° (N)	(Angle btwn structure CL & road CL. 0-90°. 90° = ⊥)	
Railing Height (ft)	N/A	(Height of railing on bridge or culvert)	
Deck Thickness (ft)	N/A	(Distance from top of road to top of culvert or low chord of bridge)	

Culverts: (See back of sheet for descriptions, diagrams, and sketch space if required)

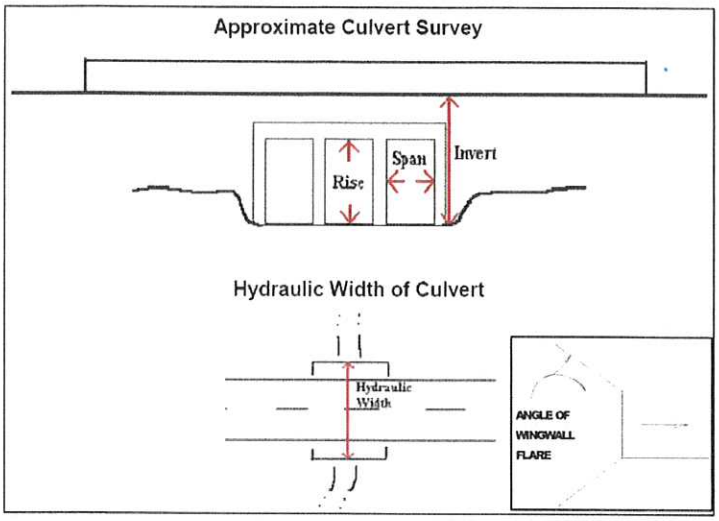
	Barrel #1	Barrel #2	Barrel #3	Barrel #4	Barrel #5
Barrel Type	CIRCULAR				
Inlet Type	PROJECTED HEADWALL				
Rise or Diameter (ft)	4(S)/3(N)				
Span (ft)	4(S)/3(N)				
Invert (ft) (Dist from road to invert)	7.5(S) 4.5(N)				
% Blocked	0%				

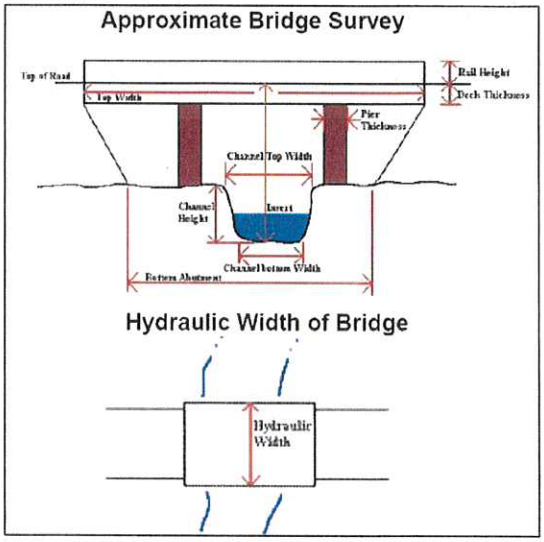
Bridges: (See back of sheet for descriptions, diagrams, and sketch space if required)

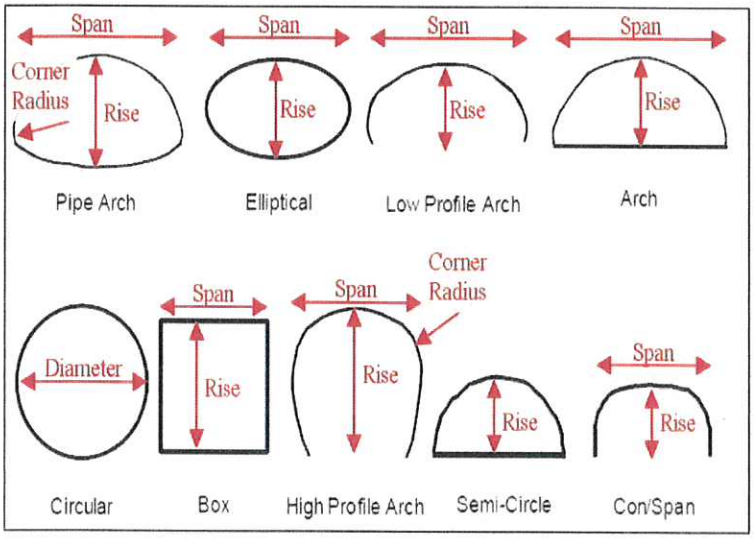
Rail Height (ft)		**Top Width (ft)**	
Deck Thickness (ft)		**Bottom Abutment Width (ft)**	
Number and Type of Piers		**Channel Top Width (ft)**	
Pier Thickness (ft)		**Channel Bottom Width (ft)**	
Invert (ft) (Dist from road to invert)		**Channel Height (ft)**	

Photograph Log

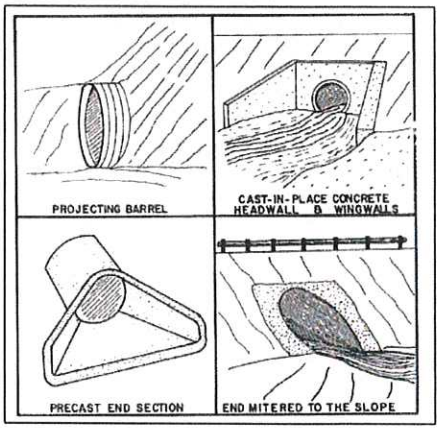
Picture Number	Description
ST4-0300-DSFACE(S) ST4-0300-DSFACE(N)	Downstream of structure looking upstream at structure (required)
ST4-0300-USFACE(S) ST4-0300-USFACE(N)	Upstream of structure looking downstream at structure (required)
ST4-0300-USCH(S)	From structure looking upstream (required)
ST4-0300-DSCH(S) ST4-0300-DSCH(N)	From structure looking downstream (required)
ST4-0300-OTXS(S) ST4-0300-OTXS(N)	OVER TOPPING CROSS SECTION







Inlet Types



Pier Shapes

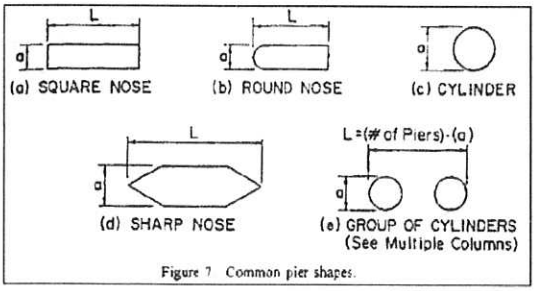


Figure 7 Common pier shapes.

Sketch Area