Summit Point Apartments, Phase-II
504 NE Chipman Road
Lee's Summit, Missouri 64063
CFS Project No. 21-5065/19-5293

SW ¼, Section 32 Township 48 North, Range 31 West
Jackson County, Missouri
Tributary P3 to Prairie Lee Lake Watershed

Base Flood Elevation Determination in Unnumbered A Zone at Summit Point Apartments, Phase-II for Tributary P3 To Prairie Lee Lake

Prepared for:
Canyon View Properties
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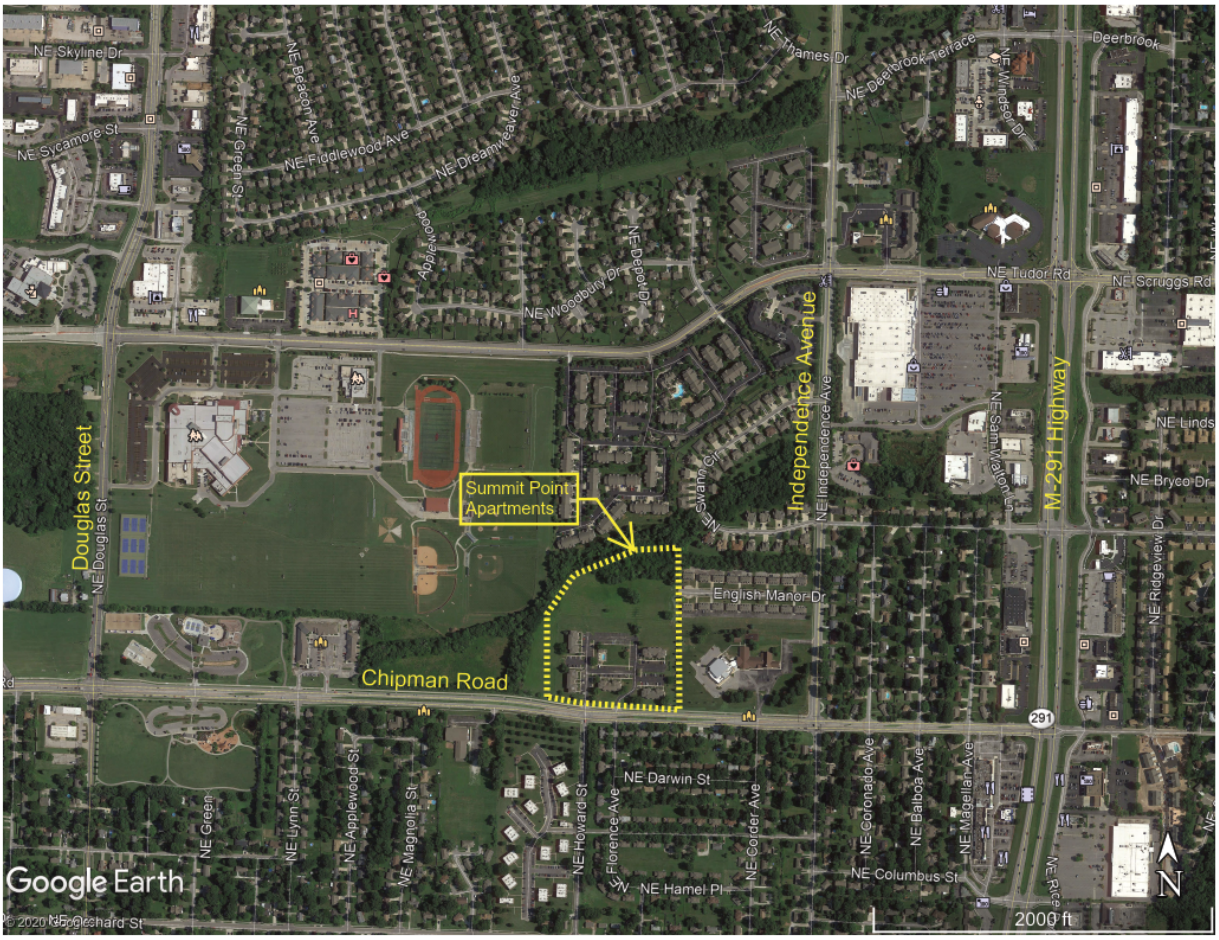
July 1, 2021

Base Flood Determination in Unnumbered A Zone
for Tributary P3 To Prairie Lee Lake
Summit Point Apartments, Phase-II
504 NE Chipman Road
City of Lee's Summit, Jackson County, Missouri 64063
CFS Project #21-5065 / #19-5293
July 1, 2021

Purpose: The purpose of the study is to determine the 100-year base flood elevations in the unnumbered Zone A on the Summit Point Apartments Phase-II property. Tributary P3 to Prairie Lee Lake flows along the northern side of the proposed Summit Point site. There is a small local flow drainage channel on the proposed Summit Point site that branches off of the main Tributary P3 channel where the 100-year base flood elevations are key to setting the finish floor elevations of the proposed apartment buildings. The City of Lee's Summit requires that all new building developments have to have finish floors a minimum of 2 ft higher than the highest 100-year base flood elevation extending onto the site.



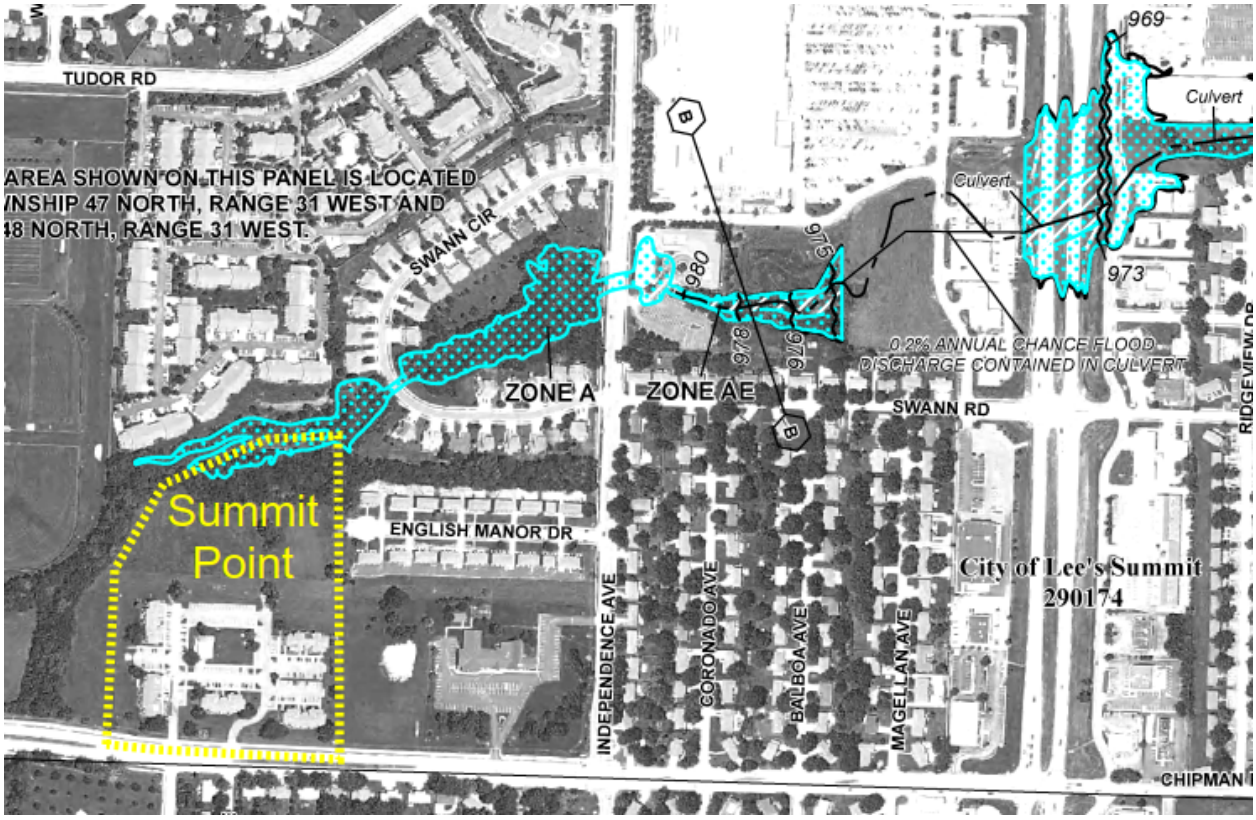
Vicinity Map of the Summit Point Apartments at 504 NE Chipman Road in Lee's Summit

General: The owners of the proposed Summit Point Apartments at 504 NE Chipman Road have proposed to develop the second phase of their property. The Phase-II addition would be constructed

directly to the north of the existing Phase-I apartments located at 504 NE Chipman Road in Lee's Summit, Missouri. Phase I included five multi-unit apartment buildings plus a swimming pool on a 6.49 acre site constructed in 1980. The proposed Phase-II addition would cover 7.21 acres and include six new multi-apartment buildings along with parking lots and service drives.

The site slopes downwards to the north where the existing Tributary P3 to Prairie Lee Lake flows eastwards along the site's northern boundary. The existing Tributary P3 creek has flowline elevations ranging between approximately 994' to 1000' along the northern side of the Summit Point Apartments, Phase II. NE Swann Circle is located directly to the east of Summit Point and NE Independence Avenue is located approximately 800 ft downstream. The creek crossing at NE Swann Circle has triple 48" HDPE culverts have upstream flowline elevations of approximately 986.91'and the top of the roadway has an overflow elevation of approximately 994'. The creek bed upstream of NE Swann Circle serves as a stormwater detention basin for the Maple Tree Manor subdivision.

A small local flow drainage channel branches off of the main Tributary P3 channel and extends onto the northern portion of the Summit Point site. The small drainage channel converges with the main channel of Tributary P3 near the northeast corner of the Summit Point site, and extends westwards approximately 420 ft. The small drainage channel has an invert elevation of approximately 987.00' at the downstream convergence point with Tributary P3, and has an upstream invert elevation of approximately 997.30'. Drainage contributing to the small drainage channel flows off of the Summit Point site to the south.



FEMA FIRM Flood Map 29095C0436G, Showing the Existing Tributary P3 to Prairie Lee Lake Flowing along the Northern Border of the Summit Point Apartments

NE Independence Avenue is located approximately 1000 ft downstream from NE Swann Circle

downstream and has a single 48" RCP culvert with an upstream flowline elevation of approximately 979.25' and an overflow elevation across the top of NE Independence Avenue of approximately 985.41'. The creek bed upstream of NE Independence Avenue serves as a stormwater detention basin for the Maple Tree Manor subdivision.

The FEMA flood map shows the defined 1% (100-year) flood elevations to the east along the creek stop short of Independence Avenue. A portion of the northern side of the site is within the FEMA 1% (100-year) floodplain, with the remaining ground above the flood limits.

HEC-RAS Model Setup: CFS Engineers created a HEC-RAS model of the study segment of Tributary P3 to Prairie Lee Lake extending from the western side of the Summit Point property downstream to Independence Avenue. The channel geometry and cross-sections were derived using the available GIS topography maps from the City of Lee's Summit and Jackson County, and also the topographic survey of the Summit Point site performed by CFS Engineers in 2019.

The City of Lee's Summit provided a HEC-RAS model of the lower reach or Tributary P3 that had been created by FEMA. The FEMA model of Tributary P3 began at the confluence with Tributary P2 located east of Barnes Drive and extended west to Independence Avenue. CFS Engineers took the FEMA model and matched in the HEC-RAS model of Tributary P3 that extended further west from Independence Avenue to the Summit Point Apartments site west of Swann Circle.

Cross-sections were cut across the digital contours to set the station-elevations. Because the FEMA model began stationing at zero at the downstream confluence point with Tributary P3, the stationing of the CFS model was revised to match into the FEMA stationing at RS 4349.92. The left and right stream bank locations were set based on the apparent break in slope locations along the sides of the main creek channel. The main channel lengths were based on the digital alignment of the creek's flowline and the left and right overbank lengths were estimated based on the general curvature of the creek alignment.

Stream flows in the portion of the HEC-RAS model created by CFS Engineers were derived using the USGS' StreamStats web-based hydrological software to determine flow rates from the Summit Point site to Independence Avenue, and the FEMA model's stream flows were used for the lower portion of the model. The flow rates for the 10, 50, 100 and 500-year storms were used in the results tables. The table below summarizes the FEMA and StreamStats flows calculated at different points along Tributary P3:

FEMA and StreamStats Channel Flow Rates in Tributary P3 to Prairie Lee Lake

River Station	10-Yr (10%)	50-Yr (2%)	100-Yr (1%)	500-Yr (0.2%)
RS 6654.43	245 cfs (SS)	418 cfs (SS)	496 cfs (SS)	680 cfs (SS)
RS 6037.05	278 cfs (SS)	472 cfs (SS)	560 cfs (SS)	767 cfs (SS)
RS 5659.57	281 cfs (SS)	479 cfs (SS)	567 cfs (SS)	777 cfs (SS)
RS 4883.89	293 cfs (SS)	498 cfs (SS)	591 cfs (SS)	811 cfs (SS)
RS 4349.92	450 cfs (FEMA)	650 cfs (FEMA)	750 cfs (FEMA)	900 cfs (FEMA)
RS 2689.02	650 cfs (FEMA)	950 cfs (FEMA)	1100 cfs (FEMA)	1300 cfs (FEMA)

Mannings Roughness Factors were determined from direct field observation of the existing channel conditions from a May 2021 site visit. Several photographs were taken at various locations along the creek in mid-spring when the foliage was nearly full grown. A photo collage including eight pictures taken at different locations along the creek have been included in the appendix of this study. After examining the photos, a Manning's Roughness Factor of n=0.045 was applied to the main channel based on the Table 3-1 recommendations for a Condition A.1.d 'Clean, winding, some pools and shoals, some weeds and stones.' CFS also used n=0.100 for the overbank flood plains based on the Table 3-1 recommendations for a Condition A.2.c.4 'Medium to dense brush in summer.'

The HEC-RAS model was setup as a 1D model with steady state flow. A mixed flow regime was used to allow for changes between subcritical and supercritical flow at different locations along the channel. Divided channel sections at RS-6235.08 (10856.09), RS-6037.05 (10658.06), RS-5874.31 (10495.32) and RS-5659.57 (10280.58) were blocked-out using the stream obstruction routines in the cross-section modeler. The roadway surfaces at Swann Circle and Independence Avenue were treated as weirs with weir-flow coefficients of 2.9 for modeling stream flows that overtopped the streets in heavy storms. Roadway surface widths were approximated from the GIS topography or from available roadway plans. The Reach Boundary conditions used the Normal Flow conditions with the approximate channel bed slopes at the upstream and downstream-most cross-sections.

Schematic Off-Site Drainage Area Map for Tributary P3 to Prairie Lee Lake

HEC-RAS Analysis: CFS Engineers created a HEC-RAS model to evaluate the water surface elevations of stormwater in the Tributary P3 to Prairie Lee Lake creek channel along the north side of

the proposed Summit Point Apartments, Phase II site. Channel cross-sections for the HEC-RAS models were cut across the surveyed ground surface, based on a recent topographic field survey of the site performed by CFS Engineers. The FEMA FIRM Flood Map of the region (FEMA FIRM Flood Map 29095C0436G, Panel 436 of 625, January 20, 2017), shows the Tributary P3 to Prairie Lee Lake directly to the north of the site as Zone A, defined as a Special Flood Hazard Area subject to inundation by the 1% annual chance flood where no base flood elevations have been determined.

The existing triple 48" HDPE culverts at NE Swann Circle and the existing 48" RCP culvert at NE Independence Avenue were also included in the HEC-RAS model to evaluate the potential back-up of flood water in the creek from the culvert crossings. Channel cross-sections were cut along the Summit Point Apartments, Phase-II site, and additional cross-sections were cut downstream to model the NE Swann Circle and NE Independence Avenue culverts. CFS surveyors measured the invert elevations of all three 48" HDPE culverts along with the top of road elevation at NE Swann Circle. Available storm sewer as-built plans were used to model the existing 48" RCP culvert at NE Independence Avenue.

Duplicate Effective Model: The FEMA HEC-RAS model given to CFS Engineers by the City. No modifications were made by CFS. The model covered Tributary P3 from the confluence with Tributary P2 to Prairie Lee Lake to Independence Avenue. The model stopped short of NE Independence Avenue and did not extend upstream to cover the Summit Point site.

Current Effective Model: The FEMA HEC-RAS model given to CFS Engineers by the City. No modifications were made by CFS. The model covered Tributary P3 from the confluence with Tributary P2 to Prairie Lee Lake to Independence Avenue. The model stopped short of NE Independence Avenue and did not extend upstream to cover the Summit Point site.

Pre-Development/Existing Conditions Model: Using the FEMA model, CFS extended it to cover Tributary P3 upstream to the proposed Summit Point site. Cross-sections were cut using the City's GIS topography and the CFS ground survey data. Stream flows at different points along the upstream extension were computed using the USGS StreamStats web-based hydrologic calculator.

Post-Development/Proposed Conditions Model: Using the model developed for the Pre-Development/ Existing Conditions, the outflow rates from the fully-developed Summit Point site were modified to account for the effects of on-site stormwater detention and the overall reduction in peak outflow rates. The following table summarizes the pre and post-development peak runoff rates from the Summit Point site:

Summit Point Apartments Phase-II Pre and Post-Development Stormwater Peak Runoff Rates

Storm Frequency Years (Percent)	Pre-Development Peak Runoff Rate	Post-Development Peak Runoff Rate	Difference
10-Yr (10%)	55.43 cfs	30.93 cfs	-24.50 cfs
50-Yr (2%)	74.32 cfs	48.77 cfs	-25.55 cfs
100-Yr (1%)	97.33 cfs	56.36 cfs	-40.97 cfs
500-Yr (0.2%)	115.27 cfs	85.44 cfs	-29.83 cfs

The calculated reductions in total peak flow rates from the Summit Point site were deducted from the total channel flows in Tributary P3 to yield the adjusted post-development stream flows. Note that RS 6654.43 was above the detention basin discharge point and the stream flows were not reduced:

Post-Development Channel Flow Rates in Tributary P3 to Prairie Lee Lake

River Station	10-Yr (10%)	50-Yr (2%)	100-Yr (1%)	500-Yr (0.2%)
RS 6654.43	245 cfs (SS)	418 cfs (SS)	496 cfs (SS)	680 cfs (SS)
RS 6037.05	253 cfs (SS)	446 cfs (SS)	519 cfs (SS)	737 cfs (SS)
RS 5659.57	257 cfs (SS)	454 cfs (SS)	528 cfs (SS)	747 cfs (SS)
RS 4883.89	268 cfs (SS)	472 cfs (SS)	550 cfs (SS)	781 cfs (SS)
RS 4349.92	425 cfs (FEMA)	624 cfs (FEMA)	709 cfs (FEMA)	870 cfs (FEMA)
RS 2689.02	625 cfs (FEMA)	924 cfs (FEMA)	1059 cfs (FEMA)	1270 cfs (FEMA)

The calculated 100-year water surface elevations for the pre and post-development conditions along the Summit Point site were tabulated in the table below. The lowest finish floor elevation for the proposed buildings on the Summit Point site was 1005.00', and the lowest elevation on the Summit Point property line that was even with the 100-year water surface elevation was approximately 1000.9'.

100-Year Water Surface Elevations along the Summit Point Site

River Station	100-Yr Pre-Dev	100-Yr Post-Dev	Property Line
RS 6654.43	1005.11'	1005.11'	1010.67'
RS 6465.03	1003.67'	1003.69'	1003.72'
RS 6235.08	1001.63'	1001.55'	1002.17'
RS 6037.05	999.74'	999.62'	998.81'
RS 5874.31	997.32'	997.18'	996.88'
RS 5659.57	994.75'	994.64'	993.97'

100-Year Water Surface Elevations Comparison Between HEC-RAS Models

	A Dup-Eff	B Corr-Eff	C-Pre-Dev	D-Post-Dev
	FEMA	FEMA	FEMA+CFS	FEMA+CFS
	100-Yr	100-Yr	100-Yr	100-Yr
River Sta	W.S. Elev (ft)	W.S. Elev (ft)	W.S. Elev (ft)	W.S. Elev (ft)
0	921.22	921.22	921.22	921.18
379.56	925.96	925.96	925.96	925.9
1074.65	933.6	933.6	933.6	933.52
1487.09	938.75	938.75	938.75	938.67
2080.49	Culvert – Hwy-291 Downstream Enclosed Culvert			
2673.89	968.94	968.94	968.94	968.84
2689.02	968.96	968.96	968.96	968.86
2703.04	968.96	968.96	968.96	968.86
2829.11	Culvert – Highway-291 Culvert			
2955.17	973.37	973.37	973.37	973.27
3345.74	973.36	973.36	973.36	973.27
3952.68	975.12	975.12	975.12	975.06
4349.92	979.63	979.63	979.32	979.21
4602.74	Culvert – Independence Avenue Culvert			
4682.51			987.07	986.99
4883.89			987.13	987.06
5138.90			989.24	989.11
5269.21			990.73	990.61
5298.85			990.83	990.71
5411.92	Culvert – Swann Circle Culvert			
5426.87			994.75	994.64
5476.66			994.75	994.64
5659.57			994.47	994.37
5874.31			997.32	997.18
6037.05			999.74	999.62
6235.08			1001.63	1001.55
6465.03			1003.67	1003.68
6654.43			1005.11	1005.09

On-Site Small Local Flow Drainage Channel South of Tributary P3: A HEC-RAS model was created to model the small local flow drainage channel which branches south off the main Tributary P3, and to determine the maximum 100-year WSEL on the proposed site. The small channel model re-used the same cross-sections as the Tributary P3 channel except the stream obstructions were switched so that the main channel was blocked from conveying the lower amount of runoff contributed directly from the

site. The stormwater drainage and detention study for the proposed Summit Point Phase-II Apartments included pre-development and post-development runoff calculations from the 7.21 acre Phase-II site and portions of the 6.49 acre Phase-I site that drained northwards over the Phase-II site grounds. The total runoff from the Phase I and II sites was routed into the existing small channel to determine the 100-year WSEL's, which are summarized in the following table:

On-Site Small Local Flow Drainage Channel South of Tributary P3 Flows and WSEL's

Cross Section	100-Year Flow	100-Year WSEL On-Site South Channel	100-Year WSEL Main Trib P3 Channel
RS 5476.66 (10097.67)	97 cfs	994.92'	994.92'
RS 5659.57 (10280.58)	97 cfs	994.87'	994.65'
RS 5874.31 (10495.32)	65 cfs	996.88'	997.34'
RS 6037.05 (10658.06)	32 cfs	998.81'	999.79'

Summary: The HEC-RAS calculations for the Tributary P3 main channel comparing the open and clogged culvert conditions at Independence Avenue showed no change in 100-WSEL's in the channel section along the proposed Summit Point Phase-II site. The HEC-RAS calculations for the small local flow drainage channel branching off of Tributary P3 showed the highest 100-year WSEL on the site at approximately 1000.9', and the lowest proposed building had a finish floor elevations of 1005.00'. Since the Summit Point Phase-II site is providing post-development detention, and since the 7.21 acre site comprises approximately six percent of the overall contributing watershed area to Tributary P3, the existing creek would experience minimal changes between the calculated water surface elevations and flows for the pre and post-development conditions.

THE SHADED AREA DEPICTS (AS PER FEMA MAP (COMMUNITY PANEL NO. 29095C0436G) DATED JANUARY 20, 2017), THE PROPERTY LOCATED IN FEMA DESIGNATED ZONE A WHERE NO BASE FLOOD ELEVATIONS HAVE BEEN DETERMINED.

STREAM SETBACK

Pre-Development On-site Drainage Area
A = 7.21 Acres
C_N = 74.0
T_c = 8.10 minutes

Pre-Development Off-site Drainage Area
A = 4.21 Acres
C_N = 88.5
T_c = 9.00 minutes

Tract 1 unplatted

Tract 2 unplatted

Tract 4
Tract 1 of
Summit Point First Plat
Book 141, Page 60

South Line, Southeast ¼, Section 32-48-31, N88°00'27"W, 2646.66'

50' 0 50' 100'
SCALE: 1" = 50' FEET

PRE-DEVELOPMENT CONDITION
DRAINAGE AREA MAP

Sheet reference number:
DAM-1

CFS ENGINEERS
1421 E. 104th Street, Ste. 100 KCMO 64131
O: 816-333-4477 F: 816-333-6888
cfse.com

STATE OF MISSOURI
LANCE W. SCOTT
NUMBER E-25525
5/13/21

Mark	Description	Date	Appr.
	REVISED PER COMMENTS	05/13/21	
	REVISED PER COMMENTS	04/15/21	
	REVISED PER COMMENTS	03/22/21	
	CITY SUBMITTAL	02/18/21	

Rev. -
Date: 03-25-2105
Designed by: RP
Drawn by: RP
Ckd by: LWS
Reviewed by: ---
Submitted by: ---
Plot scale: 1:50
File name: P:\Development Drainage area Mapdgn
Plot date: 5/13/2021

SUMMIT POINT
504 NE Chipman Road
Lee's Summit, Missouri

Preliminary Development Plan

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THE SHADED AREA DEPICTS (AS PER FEMA MAP (COMMUNITY PANEL NO. 29095C0436G) DATED JANUARY 20, 2017), THE PROPERTY LOCATED IN FEMA DESIGNATED ZONE A WHERE NO BASE FLOOD ELEVATIONS HAVE BEEN DETERMINED.

UNDETAINED DRAINAGE AREA
A = 1.68 ACRES
CN = 75.7
Tc = 5 min.

STORMWATER DETENTION BASIN CONTRIBUTING DRAINAGE AREA

ON-SITE
A = 5.53 ACRES
CN = 90.5
Tc = 5 min.

ON-SITE
A = 4.21 ACRES
CN = 88.5
Tc = 9 min.

PEAK 100 YR WATER SURFACE ELEVATION = 1000.5
30' OVERFLOW SPILLWAY CREST = 1001.00
EMERGENCY OVERFLOW = 1002.01
TOP OF DAM = 1003.25

FF ELEV = 1005 A2
FF ELEV = 1005
FF ELEV = 1005.00 C1
FF ELEV = 1005.00
FF ELEV = 1007.5 A2-3
FF ELEV = 1008.5 B1-1
FF ELEV = 1006 C1
FF ELEV = 1008
FF ELEV = 1011.50
FF ELEV = 1012.5
FF ELEV = 1011 A2-2
FF ELEV = 1015
FF ELEV = 1023.50
POOL DECK EL = 1023.25

Tract 2 unplatted
Tract 1 unplatted
Tract A Tract 1 of Summit Point First Plat Book 141, Page 60

South Line, Southeast ¼, Section 32-48-31, N88°00'27"W, 2646.66'

50' 0 50' 100'
SCALE: 1" = 50' FEET

CFS ENGINEERS
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STATE OF MISSOURI
LANCE W. SCOTT
NUMBER E-25525
PROFESSIONAL ENGINEER
5/13/21

Mark	Description	Date	Appr.
	REVISED PER COMMENTS	05/13/21	
	REVISED PER COMMENTS	04/15/21	
	REVISED PER COMMENTS	03/22/21	
	CITY SUBMITTAL	02/18/21	

Designed by: RP
Drawn by: RP
Checked by: LWS
Reviewed by: ---
Submitted by: ---
Date: 03-25-2105
Plot scale: 1:50
Rev. -
File name: Post Development Drainage area Mapdgn
Plot date/time: 4/2021 9:26 AM

SUMMIT POINT
504 NE Chipman Road
Lee's Summit, Missouri

Preliminary Development Plan

POST-DEVELOPMENT CONDITION
DRAINAGE AREA MAP

Sheet reference number:
DAM-2

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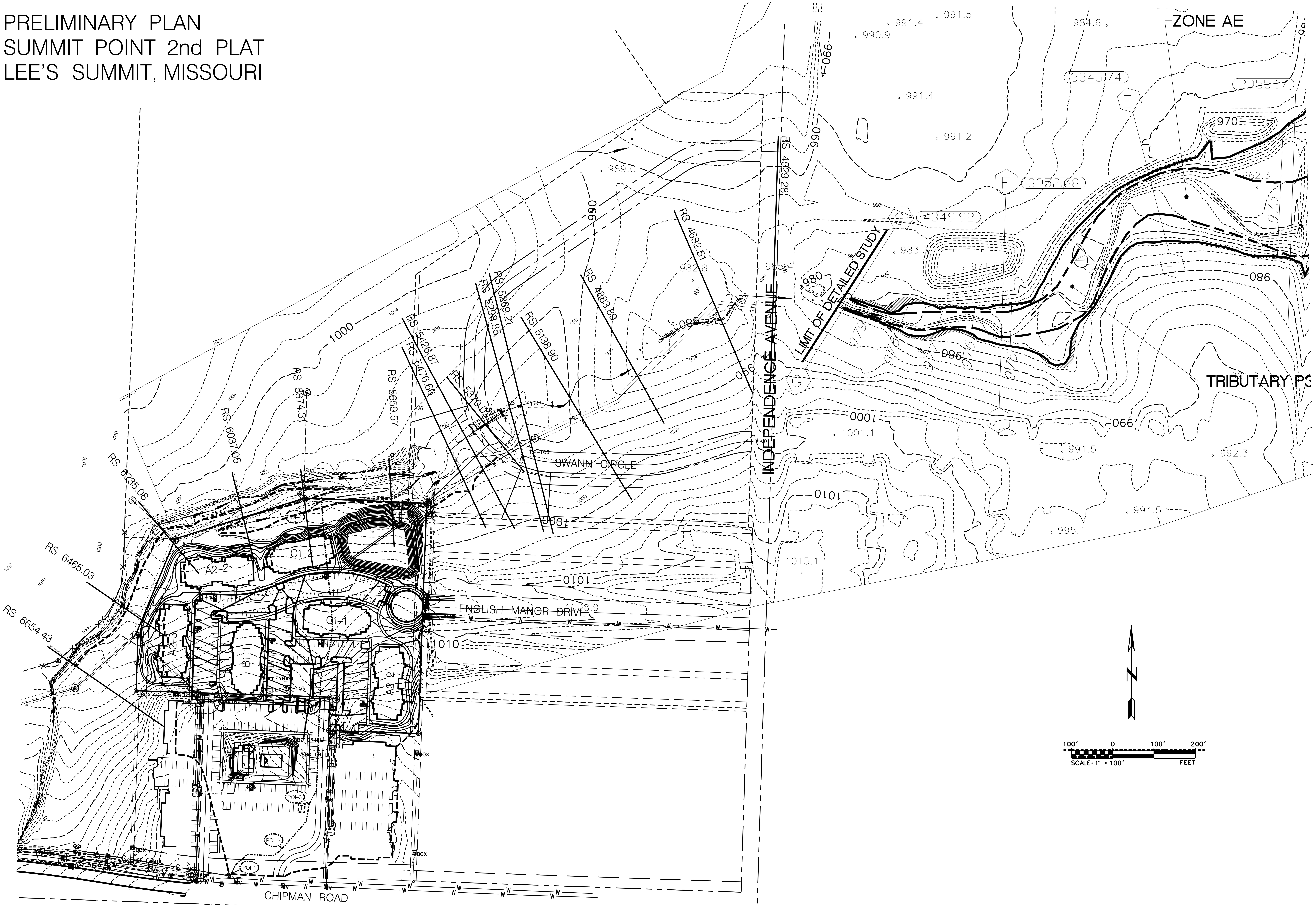
PRELIMINARY PLAN
SUMMIT POINT 2nd PLAT
LEE'S SUMMIT, MISSOURI



Mark	Description	Date	Appr.
	CITY SUBMITTAL	02/18/21	
	REVISED PER COMMENTS	03/22/21	
	REVISED PER COMMENTS	04/15/21	
	REVISED PER COMMENTS	05/13/21	
	REVISED PER COMMENTS	07/01/21	

Designed by: RP
Date: 03-25-2015
Dwn by: RP
Ckd by: LWS

SUMMIT POINT
504 NE Chipman Road
Lee's Summit, Missouri

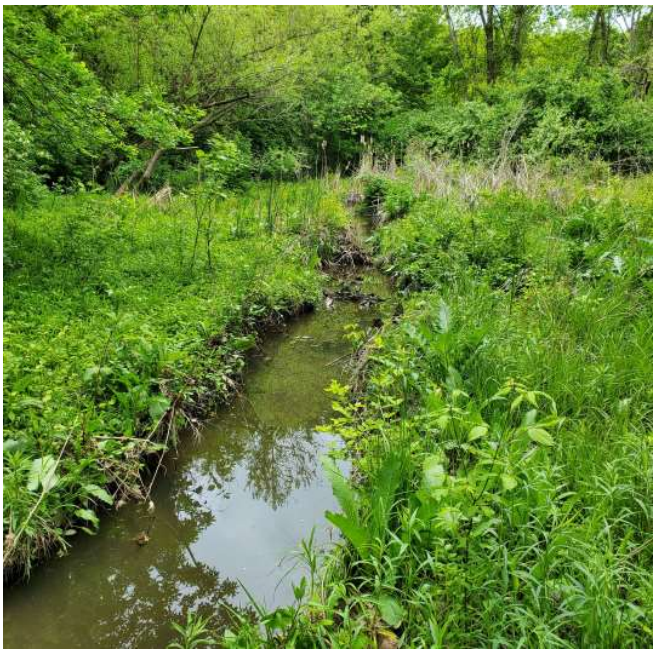
Preliminary Development Plan

HEC-RAS Cross Section Location Map

Sheet reference number:

DAM-3

HEC-RAS Study for Summit Point-II
Tributary P3 to Prairie Lee Lake
Photographs of Main Creek Channel
May, 2021



RS-10097-Main Channel by Swann Circle Detention Basin Looking DS, 05-11-21

RS-10280-Main Channel Looking DS, 05-11-21

RS-10495-1 Main Channel Looking DS, 05-11-21

RS-10495-2 South Bank near Center of Proposed Building C1-2, 05-11-21

HEC-RAS Study for Summit Point-II
Tributary P3 to Prairie Lee Lake
Photographs of Main Creek Channel
May, 2021

RS-10658-1 Main Channel Looking DS by West End of Prop Building C1-2, 05-11-21

RS-10658-2 Side Tributary Looking US, 05-11-21

RS-10856 Main Channel Looking DS, 05-11-21

RS-11275 Main Channel Looking DS, 05-11-21

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Missouri State Plane West Zone (FIPS zone 2403). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structures and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from the U.S.D.A Farm Service National Agriculture ImageryProgram (NAIP) dated 2014. Produced at scale of 1:24,000.

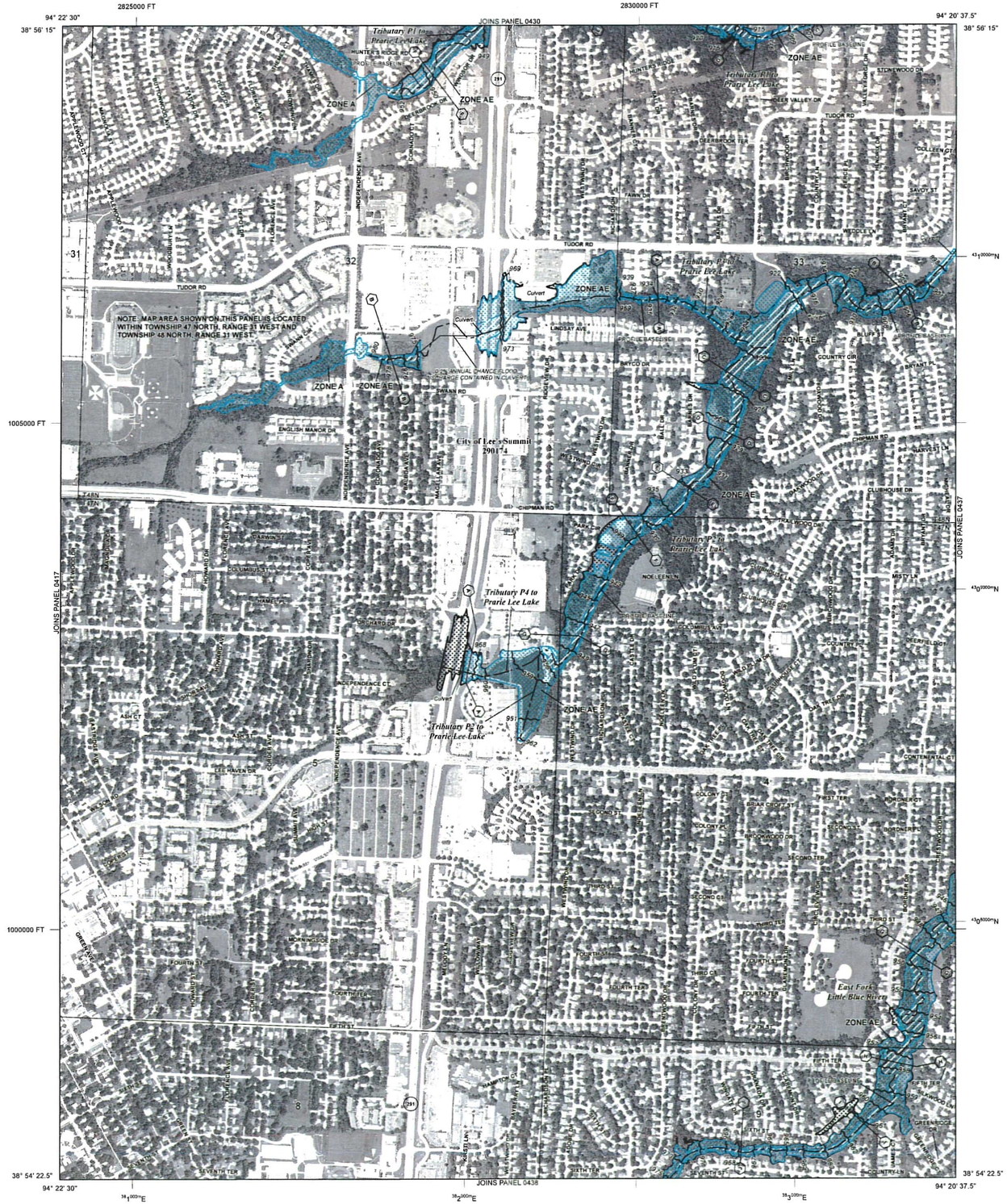
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100 year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- Culvert
- Bridge
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3100000 FT — 5000-foot ticks: Missouri State Plane West Zone (FIPS Zone 2403), Transverse Mercator projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 29, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
January 20, 2017 - to change Special Flood Hazard Areas

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0436G

FIRM

FLOOD INSURANCE RATE MAP

JACKSON COUNTY, MISSOURI AND INCORPORATED AREAS

PANEL 436 OF 625
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LEE'S SUMMIT, CITY OF	290174	0436	G

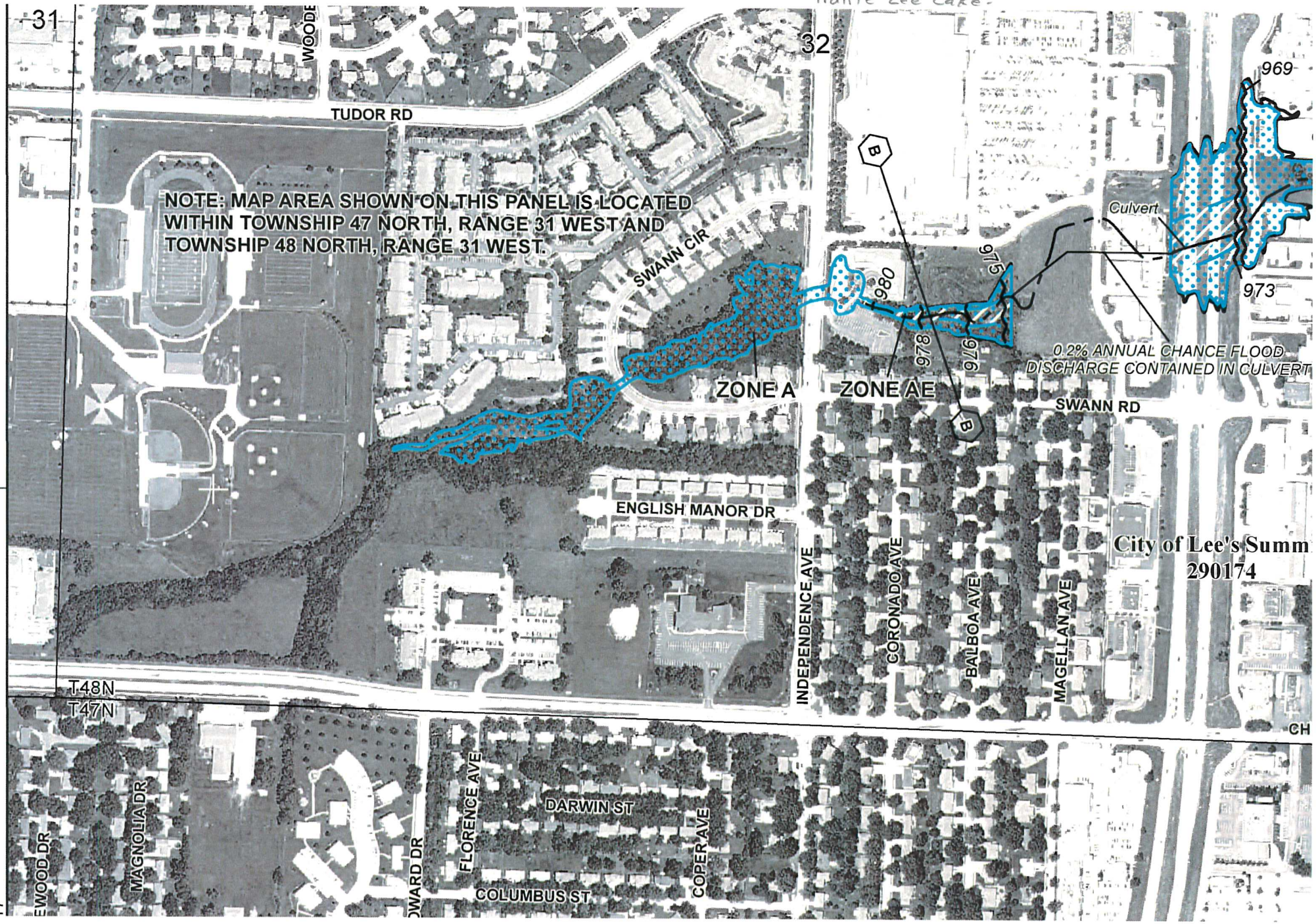
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
29095C0436G
MAP REVISED
JANUARY 20, 2017

Federal Emergency Management Agency

#19-5293
~~#18-5289~~ Summit Point Apartments

Tributary P3 to
Prairie Lee Lake



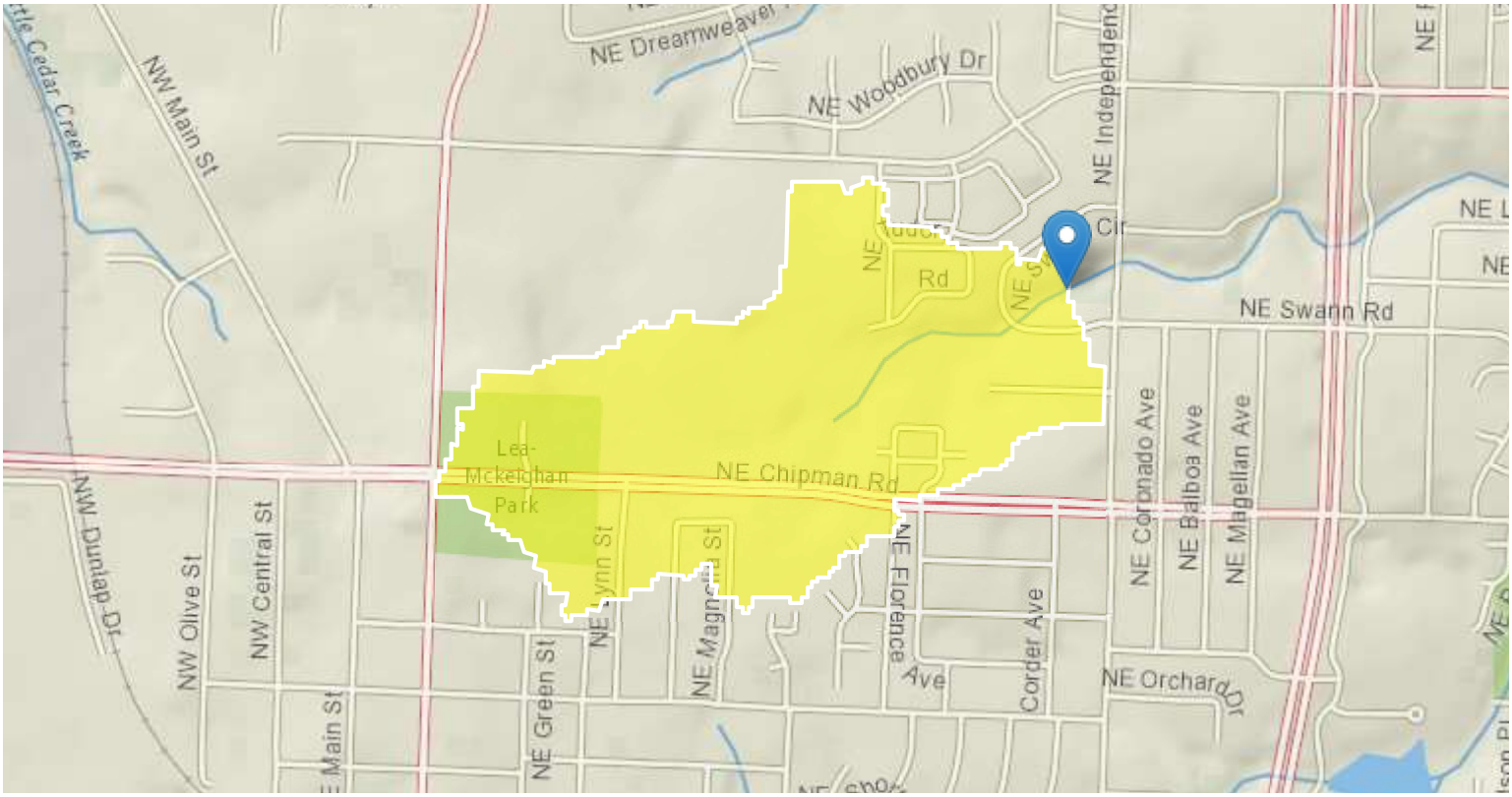
403P
FEDERAL EMERGENCY MANAGEMENT AGENCY
JACKSON COUNTY, MO
AND INCORPORATED AREAS
FLOOD PROFILES
TRIBUTARY P3 TO PRAIRIE LEE LAKE
ELEVATION IN FEET (NAVD88)
STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH TRIBUTARY P2 TO PRAIRIE LEE LAKE
1% ANNUAL CHANCE BACKWATER EFFECTS FROM TRIBUTARY P2 TO PRAIRIE LEE LAKE
CONFLUENCE WITH TRIBUTARY P2 TO PRAIRIE LEE LAKE
NORTHEAST RICE ROAD
STATE HIGHWAY 291
RITTER PLAZA
LIMIT OF DETAILED STUDY
CULVERT
CULVERT
CULVERT
NOTE: THE 2% AND 0.2% ANNUAL CHANCE FLOOD PROFILES ARE TOO CLOSE TO THE 1% ANNUAL CHANCE FLOOD ELEVATION TO BE SHOWN SEPARATELY
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
4% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
A
B
A
1000
990
980
970
960
950
940
930
920
910
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500

TABLE 3 – SUMMARY OF DISCHARGES (CONT'D)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK ANNUAL CHANCE DISCHARGES (CFS) 10-Percent Annual Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent Annual-Chance
TRIBUTARY P1 TO PRAIRIE LEE LAKE (CONT'D)						
Approximately 750 feet downstream of State HWY 291	0.6	700	N/A	1,000	1,100	1,400
TRIBUTARY P2 TO PRAIRIE LEE LAKE						
At confluence with Prairie Lee Lake	2.9	2,400	N/A	3,400	3,900	1,800
Approximately 0.5 miles upstream of confluence with Prairie Lee Lake	2.7	2,200	N/A	3,200	3,700	4,400
At confluence of Tributary P3 to Prairie Lee Lake	1.9	1,900	N/A	2,800	3,200	3,800
Approximately 1,900 feet downstream of confluence of Tributary P4 to Prairie Lee Lake	1.7	1,800	N/A	2,600	3,000	3,600
At confluence of Tributary P4 to Prairie Lee Lake	0.7	1,000	N/A	1,400	1,600	1,900
TRIBUTARY P3 TO PRAIRIE LEE LAKE						
At confluence with Tributary P2 to Prairie Lee Lake	0.6	650	N/A	950	1,100	1,300
At State HWY 291	0.4	450	N/A	650	750	900
TRIBUTARY P4 TO PRAIRIE LEE LAKE						
At confluence with Triburary P2 to Prairie Lee Lake	0.8	1,100	N/A	1,500	1,700	2,100

StreamStats Report Tributary P3 to Prairie Lee Lake @ RS 4883.89 (9566.40)

Region ID: MO
Workspace ID: MO20210630191645065000
Clicked Point (Latitude, Longitude): 38.92818, -94.36604
Time: 2021-06-30 14:17:03 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.22	square miles
BSHAPE	Basin Shape Factor for Area	3.55	dimensionless
IMPNLCD01	Percentage of impervious area determined from NLCD 2001 impervious dataset	26.9	percent

Peak-Flow Statistics Parameters [Peak Rural Statewide Region 1 SIR 2014 5165]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.22	square miles	0.11	8212.38
BSHAPE	Basin Shape Factor	3.55	dimensionless	2.25	26.59

Peak-Flow Statistics Parameters [Peak Urban Statewide SIR 2010 5073]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.22	square miles	0.28	189
IMPNLCD01	Percent Impervious NLCD2001	26.9	percent	2.3	46

Peak-Flow Statistics Flow Report [Peak Rural Statewide Region 1 SIR 2014 5165]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
50-percent AEP flood	108	ft^3/s	38.4
20-percent AEP flood	211	ft^3/s	30.8
10-percent AEP flood	293	ft^3/s	29.1
4-percent AEP flood	407	ft^3/s	28.8
2-percent AEP flood	498	ft^3/s	28.7
1-percent AEP flood	591	ft^3/s	29.8
0.5-percent AEP flood	684	ft^3/s	31
0.2-percent AEP flood	811	ft^3/s	33.2

Peak-Flow Statistics Disclaimers [Peak Urban Statewide SIR 2010 5073]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Peak Urban Statewide SIR 2010 5073]

Statistic	Value	Unit
50-percent AEP flood	181	ft^3/s
20-percent AEP flood	284	ft^3/s
10-percent AEP flood	366	ft^3/s
4-percent AEP flood	445	ft^3/s
2-percent AEP flood	543	ft^3/s
1-percent AEP flood	609	ft^3/s
0.2-percent AEP flood	807	ft^3/s

Peak-Flow Statistics Citations

Southard, R.E.,2010, Estimation of the Magnituude and Frequency of Floods in Urban Basins in Missouri: U.S. Geological Survey Scientific Investigations Report 2010-5073, 27 p. (http://pubs.usgs.gov/sir/2010/5073/)

Southard, R.E., and Veilleux, A.G.,2014, Methods for estimating annual exceedance-probability discharges and largest recorded floods for unregulated streams in rural Missouri: U.S. Geological Survey Scientific Investigations Report 2014–5165, 39 p. (http://pubs.usgs.gov/sir/2014/5165/)

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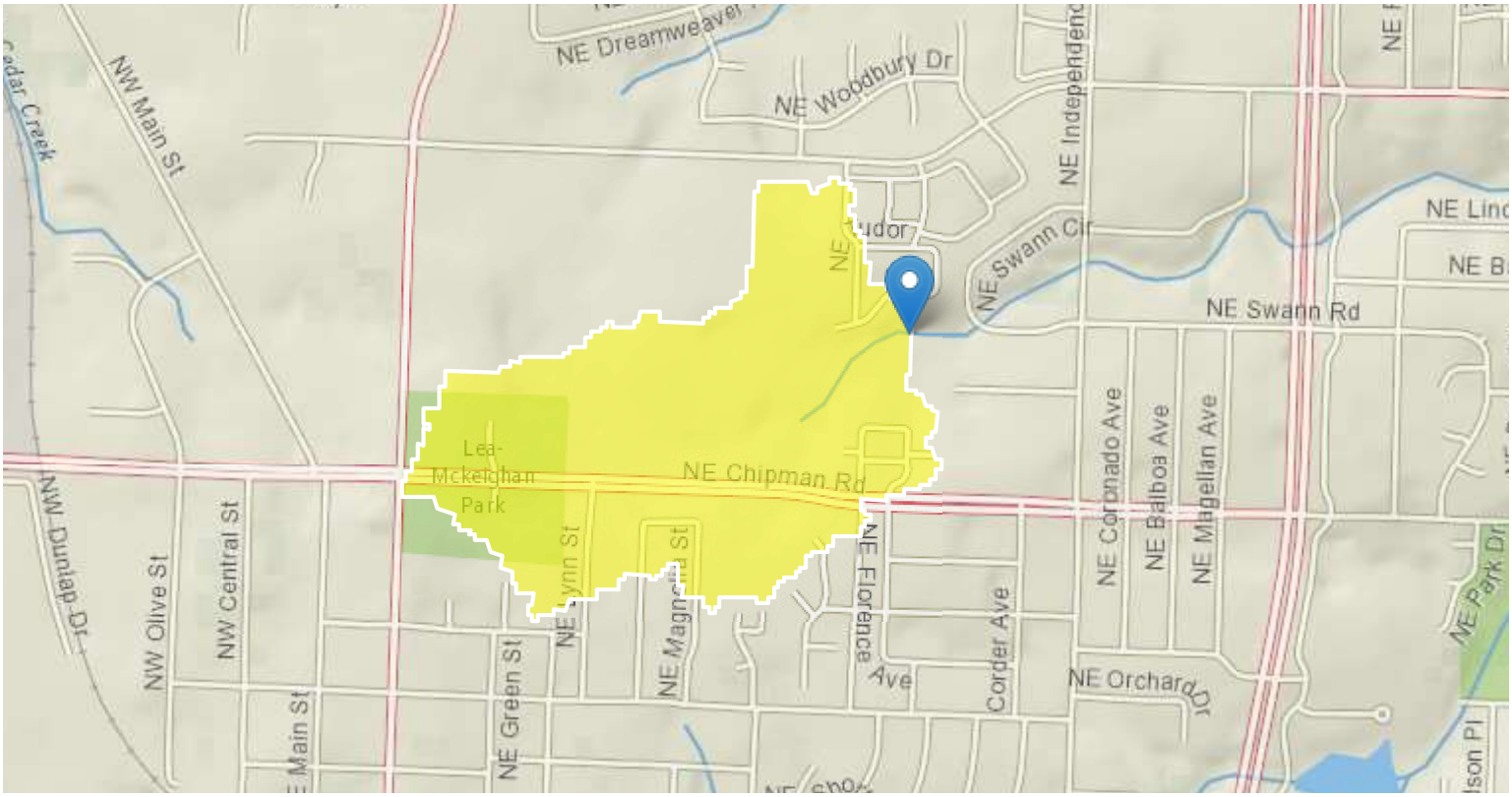
USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.5.3
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

StreamStats Report Tributary P3 to Prairie Lee Lake @ RS 5659.57 (10280.58)

Region ID: MO
Workspace ID: MO20210701123700200000
Clicked Point (Latitude, Longitude): 38.92745, -94.36876
Time: 2021-07-01 07:37:20 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.18	square miles
BSHAPE	Basin Shape Factor for Area	2.64	dimensionless
IMPNLCD01	Percentage of impervious area determined from NLCD 2001 impervious dataset	23.7	percent

Peak-Flow Statistics Parameters [Peak Rural Statewide Region 1 SIR 2014 5165]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.18	square miles	0.11	8212.38
BSHAPE	Basin Shape Factor	2.64	dimensionless	2.25	26.59

Peak-Flow Statistics Parameters [Peak Urban Statewide SIR 2010 5073]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.18	square miles	0.28	189
IMPNLCD01	Percent Impervious NLCD2001	23.7	percent	2.3	46

Peak-Flow Statistics Flow Report [Peak Rural Statewide Region 1 SIR 2014 5165]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
50-percent AEP flood	103	ft^3/s	38.4
20-percent AEP flood	203	ft^3/s	30.8
10-percent AEP flood	281	ft^3/s	29.1
4-percent AEP flood	391	ft^3/s	28.8
2-percent AEP flood	479	ft^3/s	28.7
1-percent AEP flood	567	ft^3/s	29.8
0.5-percent AEP flood	656	ft^3/s	31
0.2-percent AEP flood	777	ft^3/s	33.2

Peak-Flow Statistics Disclaimers [Peak Urban Statewide SIR 2010 5073]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Peak Urban Statewide SIR 2010 5073]

Statistic	Value	Unit
50-percent AEP flood	144	ft^3/s
20-percent AEP flood	232	ft^3/s
10-percent AEP flood	302	ft^3/s
4-percent AEP flood	372	ft^3/s
2-percent AEP flood	454	ft^3/s
1-percent AEP flood	512	ft^3/s
0.2-percent AEP flood	682	ft^3/s

Peak-Flow Statistics Citations

Southard, R.E.,2010, Estimation of the Magnituude and Frequency of Floods in Urban Basins in Missouri: U.S. Geological Survey Scientific Investigations Report 2010-5073, 27 p. (http://pubs.usgs.gov/sir/2010/5073/)

Southard, R.E., and Veilleux, A.G.,2014, Methods for estimating annual exceedance-probability discharges and largest recorded floods for unregulated streams in rural Missouri: U.S. Geological Survey Scientific Investigations Report 2014–5165, 39 p. (http://pubs.usgs.gov/sir/2014/5165/)

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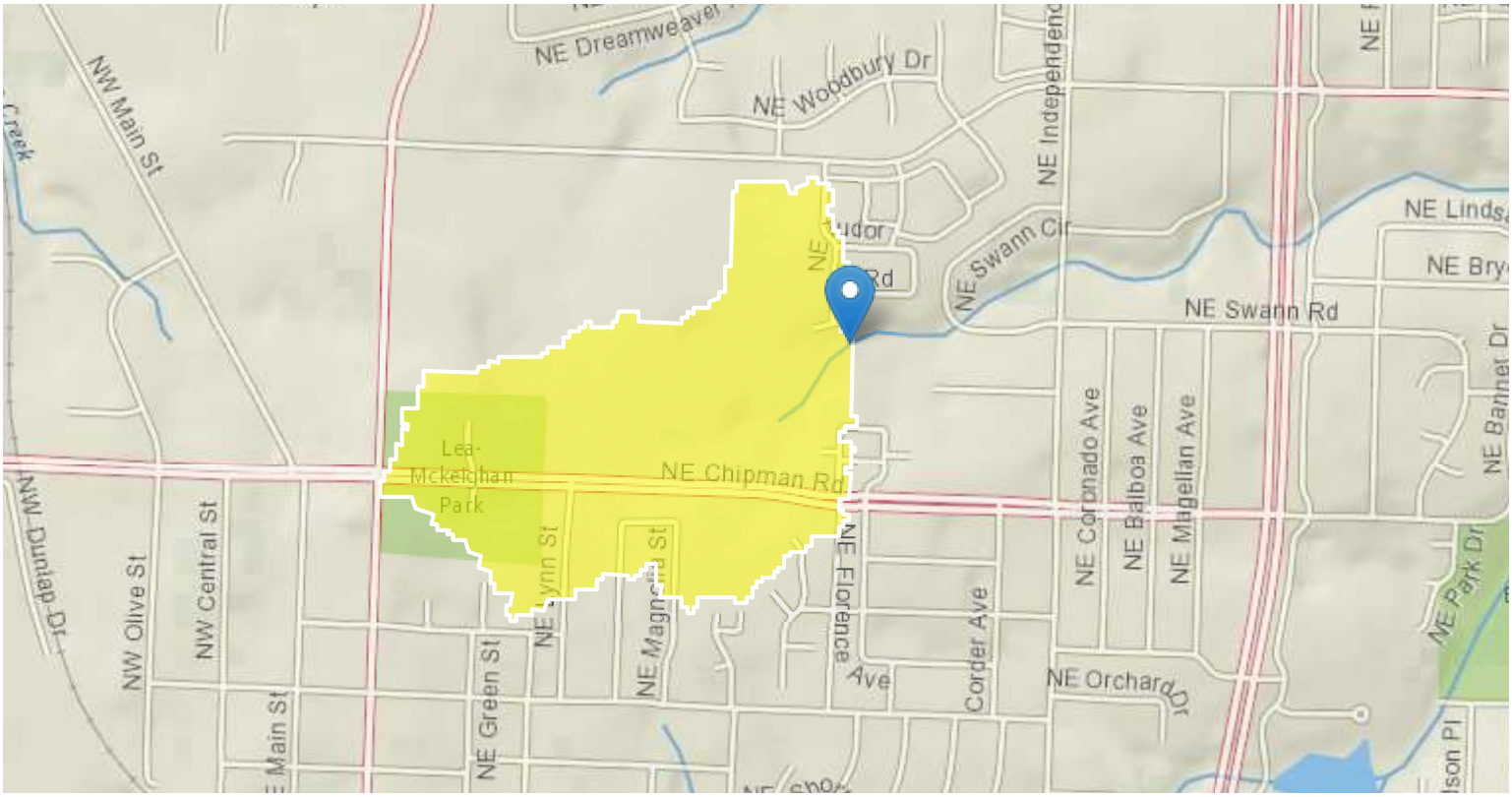
Application Version: 4.5.3
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

StreamStats Report Tributary P3 to Prairie Lee Lake @ RS 6037.05 (10658.06)

Region ID: MO
Workspace ID: MO20210630183152236000
Clicked Point (Latitude, Longitude): 38.92727, -94.36955
Time: 2021-06-30 13:32:10 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.17	square miles
BSHAPE	Basin Shape Factor for Area	2.44	dimensionless
IMPNLCD01	Percentage of impervious area determined from NLCD 2001 impervious dataset	22.6	percent

Peak-Flow Statistics Parameters [Peak Rural Statewide Region 1 SIR 2014 5165]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.17	square miles	0.11	8212.38
BSHAPE	Basin Shape Factor	2.44	dimensionless	2.25	26.59

Peak-Flow Statistics Parameters [Peak Urban Statewide SIR 2010 5073]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.17	square miles	0.28	189
IMPNLCD01	Percent Impervious NLCD2001	22.6	percent	2.3	46

Peak-Flow Statistics Flow Report [Peak Rural Statewide Region 1 SIR 2014 5165]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
50-percent AEP flood	102	ft^3/s	38.4
20-percent AEP flood	200	ft^3/s	30.8
10-percent AEP flood	278	ft^3/s	29.1
4-percent AEP flood	386	ft^3/s	28.8
2-percent AEP flood	472	ft^3/s	28.7
1-percent AEP flood	560	ft^3/s	29.8
0.5-percent AEP flood	648	ft^3/s	31
0.2-percent AEP flood	767	ft^3/s	33.2

Peak-Flow Statistics Disclaimers [Peak Urban Statewide SIR 2010 5073]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Peak Urban Statewide SIR 2010 5073]

Statistic	Value	Unit
50-percent AEP flood	135	ft^3/s
20-percent AEP flood	219	ft^3/s
10-percent AEP flood	284	ft^3/s
4-percent AEP flood	352	ft^3/s
2-percent AEP flood	430	ft^3/s
1-percent AEP flood	486	ft^3/s
0.2-percent AEP flood	648	ft^3/s

Peak-Flow Statistics Citations

Southard, R.E.,2010, Estimation of the Magnituude and Frequency of Floods in Urban Basins in Missouri: U.S. Geological Survey Scientific Investigations Report 2010-5073, 27 p. (http://pubs.usgs.gov/sir/2010/5073/)

Southard, R.E., and Veilleux, A.G.,2014, Methods for estimating annual exceedance-probability discharges and largest recorded floods for unregulated streams in rural Missouri: U.S. Geological Survey Scientific Investigations Report 2014–5165, 39 p. (http://pubs.usgs.gov/sir/2014/5165/)

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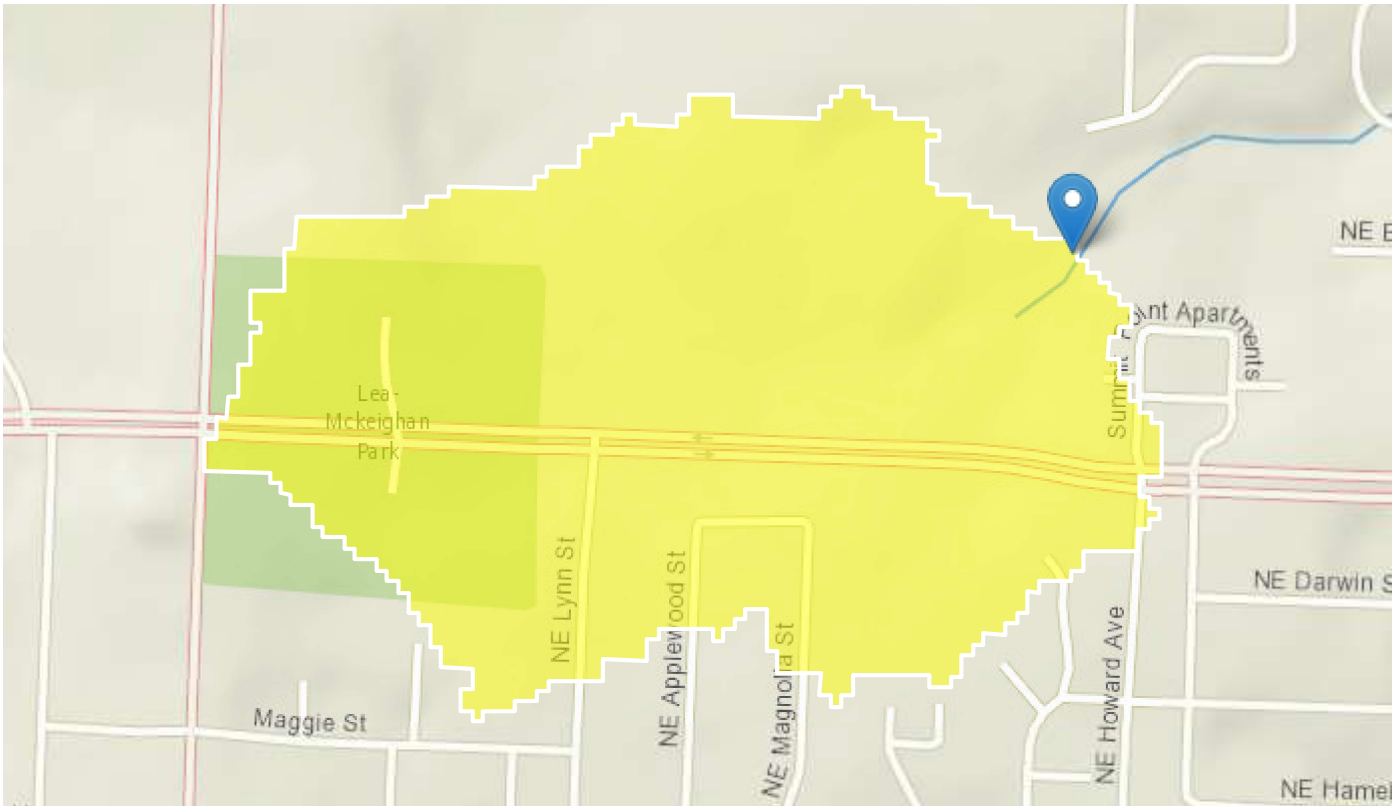
Application Version: 4.5.3
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

StreamStats Report Tributary P3 to Prairie Lee Lake @ RS 6654.43 (11275.44)

Region ID: MO
Workspace ID: MO20210701123004598000
Clicked Point (Latitude, Longitude): 38.92643, -94.37050
Time: 2021-07-01 07:30:23 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.13	square miles
BSHAPE	Basin Shape Factor for Area	2.18	dimensionless
IMPNLCD01	Percentage of impervious area determined from NLCD 2001 impervious dataset	22.7	percent

Peak-Flow Statistics Parameters [Peak Rural Statewide Region 1 SIR 2014 5165]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.13	square miles	0.11	8212.38
BSHAPE	Basin Shape Factor	2.18	dimensionless	2.25	26.59

Peak-Flow Statistics Parameters [Peak Urban Statewide SIR 2010 5073]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.13	square miles	0.28	189
IMPNLCD01	Percent Impervious NLCD2001	22.7	percent	2.3	46

Peak-Flow Statistics Disclaimers [Peak Rural Statewide Region 1 SIR 2014 5165]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Peak Rural Statewide Region 1 SIR 2014 5165]

Statistic	Value	Unit
50-percent AEP flood	89.3	ft^3/s
20-percent AEP flood	176	ft^3/s
10-percent AEP flood	245	ft^3/s
4-percent AEP flood	341	ft^3/s
2-percent AEP flood	418	ft^3/s
1-percent AEP flood	496	ft^3/s
0.5-percent AEP flood	573	ft^3/s
0.2-percent AEP flood	680	ft^3/s

Peak-Flow Statistics Disclaimers [Peak Urban Statewide SIR 2010 5073]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Peak Urban Statewide SIR 2010 5073]

Statistic	Value	Unit
50-percent AEP flood	115	ft^3/s
20-percent AEP flood	187	ft^3/s
10-percent AEP flood	243	ft^3/s
4-percent AEP flood	300	ft^3/s
2-percent AEP flood	366	ft^3/s
1-percent AEP flood	413	ft^3/s

Statistic	Value	Unit
0.2-percent AEP flood	550	ft^3/s

Peak-Flow Statistics Citations

Southard, R.E.,2010, Estimation of the Magnituude and Frequency of Floods in Urban Basins in Missouri: U.S. Geological Survey Scientific Investigations Report 2010-5073, 27 p. (http://pubs.usgs.gov/sir/2010/5073/)
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Application Version: 4.5.3
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

Tributary P-3 to Prairie Lee Lake
Open Channel Manning's Roughness Coefficients Sensitivity Comparison
Summit Point Apartments, Phase-II
05/12/21
CFS Project No. 19-5293 / 21-5065

	Minimum	Normal	Maximum
	n = 0.035 (MC) N = 0.070 (OB)	n = 0.045 (MC) N = 0.100 (OB)	n = 0.050 (MC) N = 0.160 (OB)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)		W.S. Elev (ft)		W.S. Elev (ft)
SummitPoint	8693.92	100yr	643	970	975.56		976.15		976.53
SummitPoint	8833.36	100yr	643	972.75	979.06		979.04		979.27
SummitPoint	8962.51	100yr	643	974.61	980.34		981.09		981.28
SummitPoint	9223.75		Culvert – Independence Avenue						
SummitPoint	9303.52	100yr	602	978.2	987.34		987.33		987.34
SummitPoint	9566.40	100yr	602	979.3	987.34		987.38		987.46
SummitPoint	9759.91	100yr	602	984	989.33		989.34		989.33
SummitPoint	9890.22	100yr	602	986	990.6		990.82		991
SummitPoint	10032.93		Culvert – Swann Circle						
SummitPoint	10097.67	100yr	602	987	994.89		994.92		994.94
SummitPoint	10280.58	100yr	602	989.9	994.59		994.65		994.69
SummitPoint	10495.32	100yr	574	993.4	997.21		997.34		997.61
SummitPoint	10658.06	100yr	574	995.9	999.35		999.79		999.88
SummitPoint	10856.09	100yr	513	997.5	1001.27		1001.68		1001.89
SummitPoint	11086.04	100yr	513	999.6	1003.44		1003.71		1003.84
SummitPoint	11275.44	100yr	513	1000.7	1004.66		1005.15		1005.35

Channel Roughness Coefficients Selection (Taken from Table 3-1, Mannings 'n' Values, from Chapter 3-Basic Data Requirements HEC-RAS River Analysis Systems, Hydraulic Reference Manual, Version 4.1, January 2010)

Main Channel – Condition-d, Clean, winding, some pools and shoals, some weeds and stones
Minimum n=0.035, Normal n=0.045, Maximum n=0.050

Flood Plains – Condition-c, Brush, No. 5, Medium to dense brush, in summer
Minimum n=0.070, Normal n=0.100, Maximum n=0.160

Table 3-1 Manning's 'n' Values

Type of Channel and Description	Minimum	Normal	Maximum
A. *Natural Streams*			
1. **Main Channels**			
a. Clean, straight, full, no rifts or deep pools	0.025	0.030	0.033
b. Same as above, but more stones and weeds	0.030	0.035	0.040
c. Clean, winding, some pools and shoals	0.033	0.040	0.045
d. Same as above, but some weeds and stones	0.035	0.045	0.050
e. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. Same as "d" but more stones	0.045	0.050	0.060
g. Sluggish reaches, weedy. deep pools	0.050	0.070	0.080
h. Very weedy reaches, deep pools, or floodways with heavy stands of timber and brush	0.070	0.100	0.150
2. **Flood Plains**			
a. Pasture no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
2. Same as above, but heavy sprouts	0.050	0.060	0.080
3. Heavy stand of timber, few down trees, little undergrowth, flow below branches	0.080	0.100	0.120
4. Same as above, but with flow into branches	0.100	0.120	0.160
5. Dense willows, summer, straight	0.110	0.150	0.200
3. **Mountain Streams, no vegetation in channel, banks usually steep, with trees and brush on banks submerged**			
a. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. Bottom: cobbles with large boulders	0.040	0.050	0.070

Tributary P3 to Prairie Lee Lake
C-Pre-Dev/Existing Conditions

HEC-RAS Plan: Pre ExtendAddXS River: Reach #15 Reach: STREAM 15 (P3)

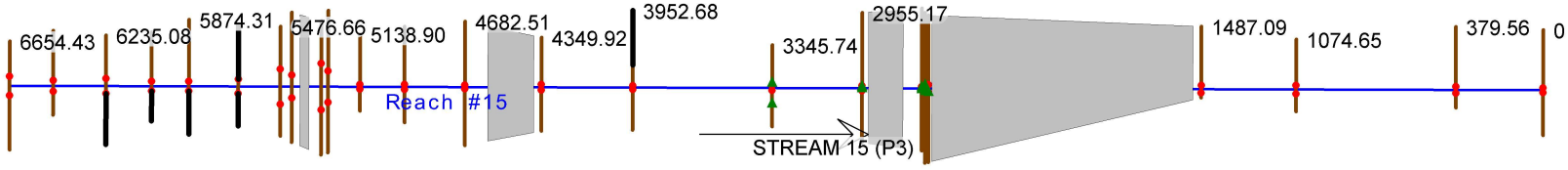
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
STREAM 15 (P3)	0	PF 1-10yr	650.00	917.00	920.52	920.52	921.20	0.008007	7.66	136.67	121.49	0.79
STREAM 15 (P3)	0	PF 2-50yr	950.00	917.00	921.04	921.04	921.70	0.007187	8.09	212.81	173.10	0.77
STREAM 15 (P3)	0	PF 3-100yr	1100.00	917.00	921.22	921.22	921.89	0.007118	8.34	246.97	191.79	0.77
STREAM 15 (P3)	0	PF 4-500yr	1300.00	917.00	921.43	921.43	922.12	0.007201	8.71	288.37	212.25	0.79
STREAM 15 (P3)	379.56	PF 1-10yr	650.00	922.00	925.28	925.28	925.97	0.008062	7.18	123.11	101.35	0.78
STREAM 15 (P3)	379.56	PF 2-50yr	950.00	922.00	925.76	925.76	926.52	0.007726	7.87	178.68	128.55	0.79
STREAM 15 (P3)	379.56	PF 3-100yr	1100.00	922.00	925.96	925.96	926.74	0.007727	8.19	204.31	139.31	0.79
STREAM 15 (P3)	379.56	PF 4-500yr	1300.00	922.00	926.18	926.18	927.01	0.007694	8.55	237.54	149.11	0.80
STREAM 15 (P3)	1074.65	PF 1-10yr	650.00	930.00	932.67	932.67	933.70	0.013609	8.19	81.39	44.07	0.98
STREAM 15 (P3)	1074.65	PF 2-50yr	950.00	930.00	933.30	933.30	934.57	0.011892	9.10	111.72	51.15	0.96
STREAM 15 (P3)	1074.65	PF 3-100yr	1100.00	930.00	933.60	933.60	934.95	0.011186	9.44	127.34	54.44	0.95
STREAM 15 (P3)	1074.65	PF 4-500yr	1300.00	930.00	933.94	933.94	935.42	0.010739	9.93	146.68	58.25	0.94
STREAM 15 (P3)	1487.09	PF 1-10yr	650.00	933.86	937.77		938.21	0.007717	5.40	131.54	52.11	0.51
STREAM 15 (P3)	1487.09	PF 2-50yr	950.00	933.86	938.47	937.33	939.05	0.008338	6.34	170.13	59.10	0.55
STREAM 15 (P3)	1487.09	PF 3-100yr	1100.00	933.86	938.75	937.63	939.41	0.008667	6.76	187.48	61.91	0.57
STREAM 15 (P3)	1487.09	PF 4-500yr	1300.00	933.86	939.14	938.01	939.87	0.008796	7.20	211.95	65.68	0.58
STREAM 15 (P3)	2080.49		Culvert									
STREAM 15 (P3)	2673.89	PF 1-10yr	650.00	951.36	966.41	954.03	966.43	0.000026	1.14	1270.42	320.25	0.05
STREAM 15 (P3)	2673.89	PF 2-50yr	950.00	951.36	968.39	954.86	968.41	0.000023	1.16	2184.32	401.66	0.05
STREAM 15 (P3)	2673.89	PF 3-100yr	1100.00	951.36	968.94	955.25	968.95	0.000025	1.22	2405.02	407.19	0.05
STREAM 15 (P3)	2673.89	PF 4-500yr	1300.00	951.36	969.57	955.67	969.58	0.000027	1.31	2663.64	413.58	0.06
STREAM 15 (P3)	2689.02	PF 1-10yr	650.00	952.00	966.43	954.68	966.44	0.000010	0.74	1477.28	327.46	0.03
STREAM 15 (P3)	2689.02	PF 2-50yr	950.00	952.00	968.41	955.45	968.41	0.000007	0.67	2514.80	393.58	0.03
STREAM 15 (P3)	2689.02	PF 3-100yr	1100.00	952.00	968.96	955.81	968.96	0.000008	0.71	2733.85	407.69	0.03
STREAM 15 (P3)	2689.02	PF 4-500yr	1300.00	952.00	969.59	956.25	969.59	0.000009	0.77	2996.52	423.99	0.03
STREAM 15 (P3)	2703.04	PF 1-10yr	450.00	953.34	966.44	958.39	966.44	0.000003	0.39	2047.02	330.78	0.02
STREAM 15 (P3)	2703.04	PF 2-50yr	650.00	953.34	968.41	959.79	968.41	0.000003	0.42	2749.17	377.15	0.02
STREAM 15 (P3)	2703.04	PF 3-100yr	750.00	953.34	968.96	960.43	968.96	0.000003	0.44	2957.92	386.04	0.02
STREAM 15 (P3)	2703.04	PF 4-500yr	900.00	953.34	969.59	961.36	969.59	0.000003	0.49	3205.16	396.32	0.02
STREAM 15 (P3)	2829.11		Culvert									
STREAM 15 (P3)	2955.17	PF 1-10yr	450.00	957.54	968.80	962.59	969.31	0.000717	5.71	78.82	292.62	0.30
STREAM 15 (P3)	2955.17	PF 2-50yr	650.00	957.54	973.08	963.99	973.08	0.000001	0.29	3178.22	335.68	0.01
STREAM 15 (P3)	2955.17	PF 3-100yr	750.00	957.54	973.37	964.65	973.37	0.000002	0.33	3273.96	338.59	0.02
STREAM 15 (P3)	2955.17	PF 4-500yr	900.00	957.54	973.63	965.55	973.63	0.000002	0.39	3362.16	341.25	0.02
STREAM 15 (P3)	3345.74	PF 1-10yr	450.00	964.00	969.70	967.17	969.75	0.000284	2.08	301.79	131.16	0.16
STREAM 15 (P3)	3345.74	PF 2-50yr	650.00	964.00	973.08	967.68	973.10	0.000064	1.38	605.84	168.80	0.08
STREAM 15 (P3)	3345.74	PF 3-100yr	750.00	964.00	973.36	967.82	973.39	0.000074	1.53	631.35	171.94	0.09
STREAM 15 (P3)	3345.74	PF 4-500yr	900.00	964.00	973.63	968.03	973.64	0.000064	1.44	962.57	174.85	0.08
STREAM 15 (P3)	3952.68	PF 1-10yr	450.00	971.00	974.60	974.60	975.18	0.009024	7.07	96.23	87.90	0.77
STREAM 15 (P3)	3952.68	PF 2-50yr	650.00	971.00	974.97	974.97	975.63	0.009246	7.82	130.41	93.44	0.80
STREAM 15 (P3)	3952.68	PF 3-100yr	750.00	971.00	975.12	975.12	975.82	0.009652	8.24	143.74	95.52	0.82
STREAM 15 (P3)	3952.68	PF 4-500yr	900.00	971.00	975.32	975.32	976.08	0.010013	8.75	163.31	98.48	0.84
STREAM 15 (P3)	4349.92	PF 1-10yr	450.00	974.61	978.53	978.42	979.51	0.012171	7.92	57.75	28.50	0.92
STREAM 15 (P3)	4349.92	PF 2-50yr	650.00	974.61	979.04	979.04	980.39	0.013035	9.36	72.93	32.00	0.99
STREAM 15 (P3)	4349.92	PF 3-100yr	750.00	974.61	979.32	979.32	980.79	0.012530	9.78	82.23	33.97	0.98
STREAM 15 (P3)	4349.92	PF 4-500yr	900.00	974.61	979.71	979.71	981.36	0.011986	10.36	96.09	36.71	0.98
STREAM 15 (P3)	4602.74		Culvert									
STREAM 15 (P3)	4682.51	PF 1-10yr	293.00	978.20	986.43	982.41	986.44	0.000137	1.23	672.84	281.98	0.09
STREAM 15 (P3)	4682.51	PF 2-50yr	498.00	978.20	986.90	983.42	986.92	0.000250	1.75	806.13	293.92	0.12
STREAM 15 (P3)	4682.51	PF 3-100yr	591.00	978.20	987.07	983.71	987.09	0.000302	1.95	856.47	298.31	0.13
STREAM 15 (P3)	4682.51	PF 4-500yr	811.00	978.20	987.34	984.17	987.38	0.000447	2.44	939.52	305.41	0.16
STREAM 15 (P3)	4883.89	PF 1-10yr	293.00	979.30	986.47		986.52	0.000500	2.07	269.90	147.46	0.16
STREAM 15 (P3)	4883.89	PF 2-50yr	498.00	979.30	986.95		987.05	0.000915	2.97	347.16	169.97	0.22
STREAM 15 (P3)	4883.89	PF 3-100yr	591.00	979.30	987.13		987.26	0.001095	3.32	378.63	178.33	0.24
STREAM 15 (P3)	4883.89	PF 4-500yr	811.00	979.30	987.44		987.62	0.001577	4.12	435.46	192.50	0.29
STREAM 15 (P3)	5138.90	PF 1-10yr	282.00	984.00	987.84	987.84	988.80	0.027112	7.87	35.84	19.08	1.01
STREAM 15 (P3)	5138.90	PF 2-50yr	480.00	984.00	988.92	988.92	989.83	0.015388	7.88	83.19	75.98	0.82
STREAM 15 (P3)	5138.90	PF 3-100yr	569.00	984.00	989.24	989.24	990.14	0.013802	8.01	110.51	95.34	0.79
STREAM 15 (P3)	5138.90	PF 4-500yr	780.00	984.00	989.80	989.80	990.69	0.012373	8.43	172.58	128.94	0.77
STREAM 15 (P3)	5269.21	PF 1-10yr	282.00	986.00	989.70		989.77	0.002768	2.23	126.53	86.69	0.33
STREAM 15 (P3)	5269.21	PF 2-50yr	480.00	986.00	990.47		990.56	0.002201	2.37	202.30	106.27	0.30
STREAM 15 (P3)	5269.21	PF 3-100yr	569.00	986.00	990.73		990.83	0.002125	2.47	230.71	111.36	0.30

Tributary P3 to Prairie Lee Lake
C-Pre-Dev/Existing Conditions

HEC-RAS Plan: Pre ExtendAddXS River: Reach #15 Reach: STREAM 15 (P3) (Continued)

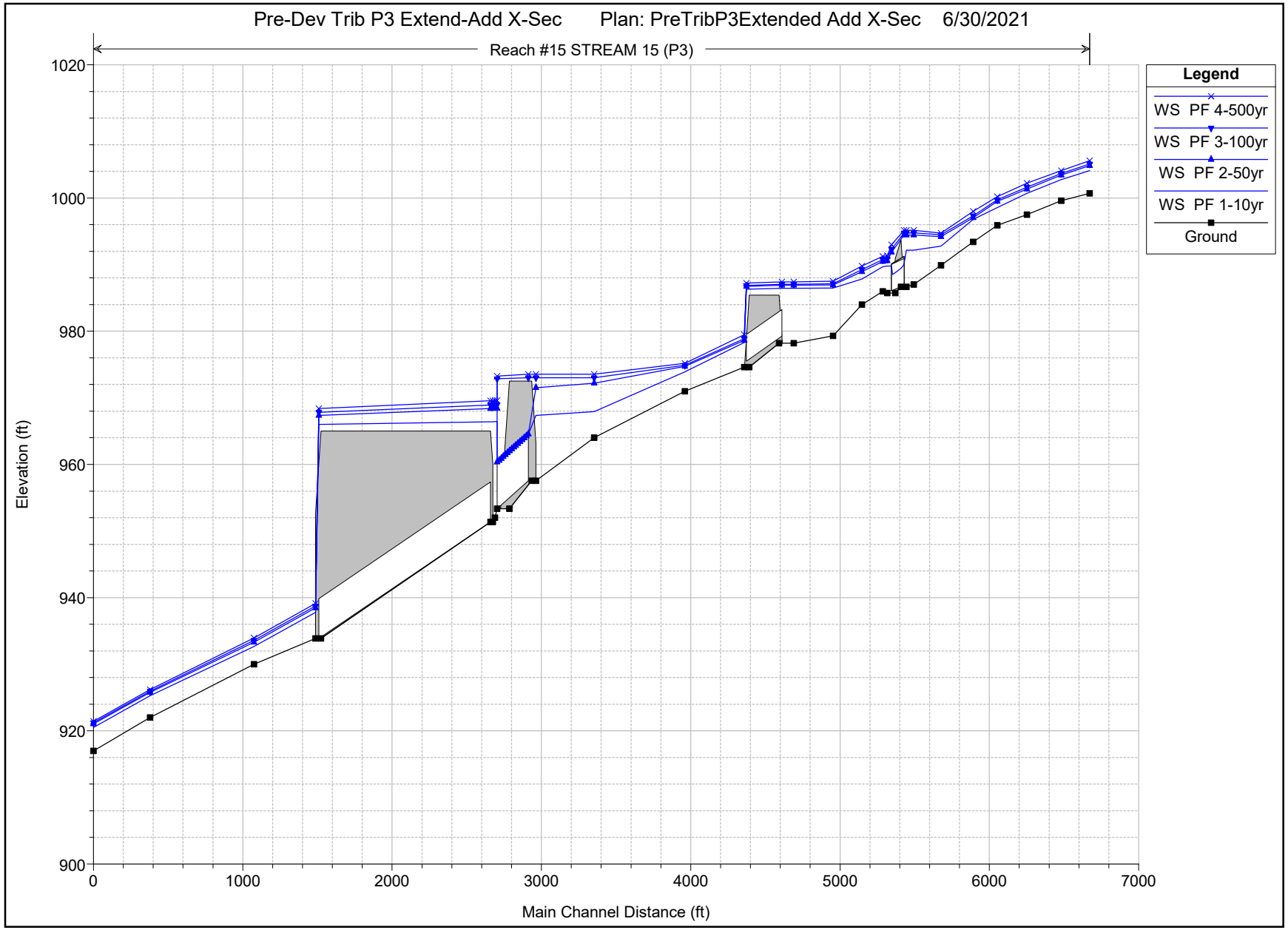
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
STREAM 15 (P3)	5269.21	PF 4-500yr	780.00	986.00	991.24		991.35	0.002086	2.69	290.10	121.31	0.31
STREAM 15 (P3)	5298.85	PF 1-10yr	282.00	985.73	989.78		989.79	0.000093	0.59	480.92	192.56	0.07
STREAM 15 (P3)	5298.85	PF 2-50yr	480.00	985.73	990.57		990.57	0.000111	0.75	644.34	226.94	0.07
STREAM 15 (P3)	5298.85	PF 3-100yr	569.00	985.73	990.83		990.84	0.000119	0.82	706.72	239.63	0.08
STREAM 15 (P3)	5298.85	PF 4-500yr	780.00	985.73	991.36		991.37	0.000138	0.97	839.52	264.62	0.09
STREAM 15 (P3)	5411.92		Culvert									
STREAM 15 (P3)	5426.87	PF 1-10yr	282.00	986.67	992.16	988.29	992.16	0.000061	0.65	548.66	232.39	0.06
STREAM 15 (P3)	5426.87	PF 2-50yr	480.00	986.67	994.46	988.69	994.46	0.000030	0.62	1230.91	356.91	0.04
STREAM 15 (P3)	5426.87	PF 3-100yr	569.00	986.67	994.75	988.84	994.76	0.000035	0.69	1338.13	370.48	0.05
STREAM 15 (P3)	5426.87	PF 4-500yr	780.00	986.67	995.15	989.16	995.16	0.000052	0.88	1488.07	388.67	0.06
STREAM 15 (P3)	5476.66	PF 1-10yr	282.00	987.00	992.16		992.17	0.000263	0.91	309.16	138.20	0.11
STREAM 15 (P3)	5476.66	PF 2-50yr	480.00	987.00	994.46		994.47	0.000074	0.74	651.41	174.38	0.06
STREAM 15 (P3)	5476.66	PF 3-100yr	569.00	987.00	994.75		994.76	0.000083	0.82	704.88	188.64	0.07
STREAM 15 (P3)	5476.66	PF 4-500yr	780.00	987.00	995.15		995.16	0.000118	1.03	783.04	207.73	0.08
STREAM 15 (P3)	5659.57	PF 1-10yr	282.00	989.90	992.77	992.77	993.51	0.027178	6.93	40.71	27.44	1.00
STREAM 15 (P3)	5659.57	PF 2-50yr	480.00	989.90	994.19		994.65	0.010312	5.41	88.73	42.00	0.66
STREAM 15 (P3)	5659.57	PF 3-100yr	569.00	989.90	994.47		994.96	0.010958	5.64	100.95	47.13	0.68
STREAM 15 (P3)	5659.57	PF 4-500yr	780.00	989.90	994.72	994.31	995.45	0.015778	6.87	113.57	51.90	0.82
STREAM 15 (P3)	5874.31	PF 1-10yr	278.00	993.40	996.79	996.31	997.16	0.011338	4.89	56.82	33.62	0.66
STREAM 15 (P3)	5874.31	PF 2-50yr	472.00	993.40	997.04	996.93	997.85	0.021724	7.21	65.45	35.21	0.93
STREAM 15 (P3)	5874.31	PF 3-100yr	560.00	993.40	997.32	997.18	998.17	0.020041	7.41	75.61	36.73	0.91
STREAM 15 (P3)	5874.31	PF 4-500yr	767.00	993.40	998.01	997.67	998.88	0.015776	7.51	102.14	40.51	0.83
STREAM 15 (P3)	6037.05	PF 1-10yr	278.00	995.90	998.56		998.90	0.010121	4.71	59.00	34.26	0.63
STREAM 15 (P3)	6037.05	PF 2-50yr	472.00	995.90	999.48		999.88	0.007839	5.07	93.07	39.77	0.58
STREAM 15 (P3)	6037.05	PF 3-100yr	560.00	995.90	999.74		1000.19	0.008151	5.41	103.48	41.26	0.60
STREAM 15 (P3)	6037.05	PF 4-500yr	767.00	995.90	1000.21	999.39	1000.80	0.008901	6.18	135.17	151.92	0.64
STREAM 15 (P3)	6235.08	PF 1-10yr	245.00	997.50	1000.69		1001.02	0.011340	4.67	52.47	33.60	0.66
STREAM 15 (P3)	6235.08	PF 2-50yr	418.00	997.50	1001.35		1001.80	0.012354	5.39	77.57	42.82	0.71
STREAM 15 (P3)	6235.08	PF 3-100yr	496.00	997.50	1001.63		1002.10	0.011853	5.49	90.41	47.13	0.70
STREAM 15 (P3)	6235.08	PF 4-500yr	680.00	997.50	1002.22		1002.72	0.010561	5.62	120.98	55.84	0.67
STREAM 15 (P3)	6465.03	PF 1-10yr	245.00	999.60	1002.77		1002.96	0.006418	3.54	69.18	44.13	0.50
STREAM 15 (P3)	6465.03	PF 2-50yr	418.00	999.60	1003.44		1003.70	0.005902	4.14	103.26	60.58	0.50
STREAM 15 (P3)	6465.03	PF 3-100yr	496.00	999.60	1003.67		1003.97	0.005824	4.40	119.87	87.76	0.51
STREAM 15 (P3)	6465.03	PF 4-500yr	680.00	999.60	1004.12		1004.48	0.005758	4.92	170.73	134.69	0.52
STREAM 15 (P3)	6654.43	PF 1-10yr	245.00	1000.70	1004.10		1004.42	0.008797	4.55	53.83	29.12	0.59
STREAM 15 (P3)	6654.43	PF 2-50yr	418.00	1000.70	1004.84		1005.26	0.011326	5.16	80.99	44.31	0.67
STREAM 15 (P3)	6654.43	PF 3-100yr	496.00	1000.70	1005.11		1005.55	0.012127	5.27	94.11	52.71	0.70
STREAM 15 (P3)	6654.43	PF 4-500yr	680.00	1000.70	1005.61		1006.08	0.012859	5.46	124.64	69.61	0.72

Tributary P3 to Prairie Lee Lake
C-Pre-Dev/Existing Conditions

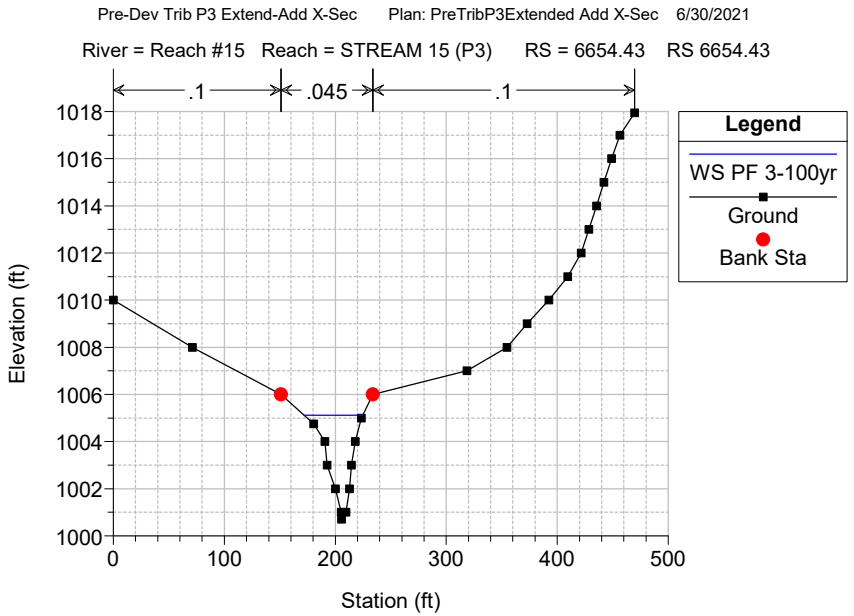


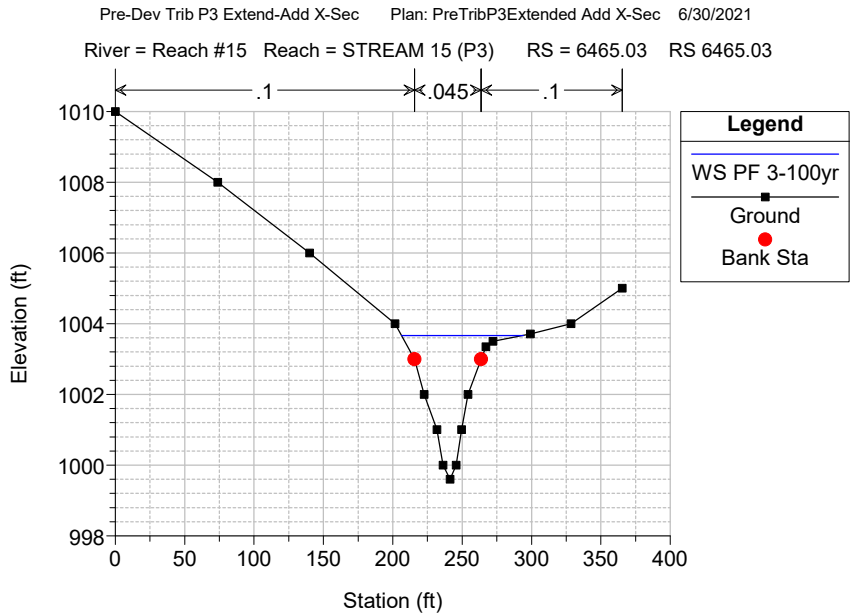
Some schematic data outside default extents (see View/Set Schematic Plot Extents...)
None of the XS's are Geo-Referenced (- Geo-Ref user entered XS - Geo-Ref interpolated XS - Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)

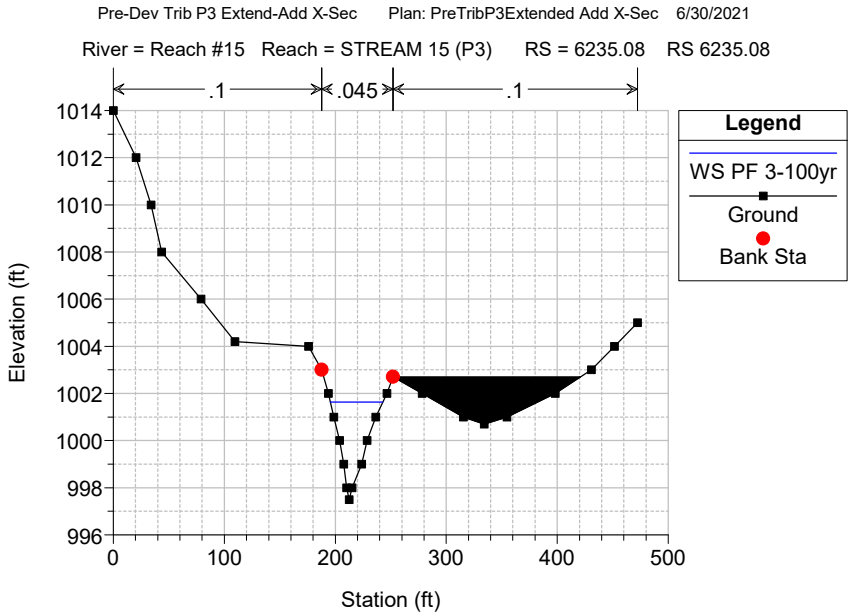
Tributary P3 to Prairie Lee Lake
C-Pre-Dev/Existing Conditions

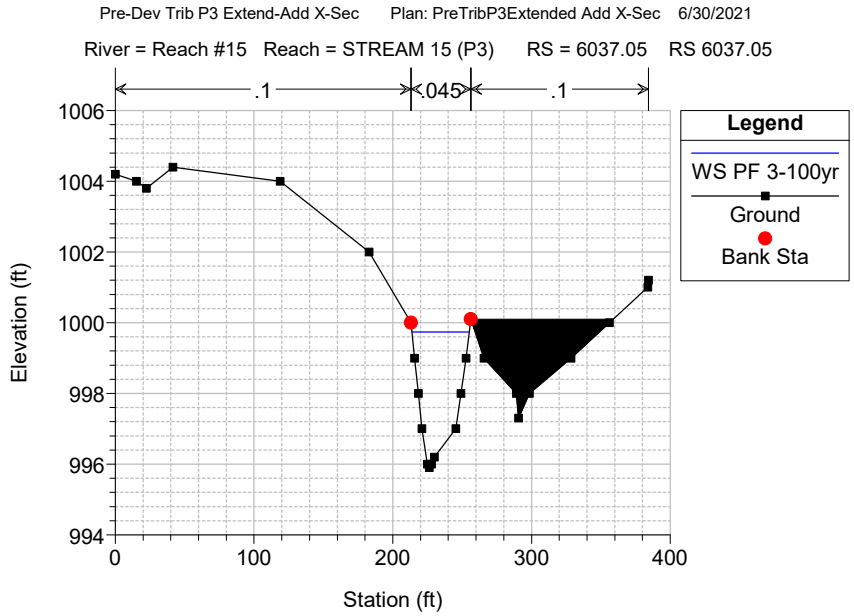


Tributary P3 to Prairie Lee Lake
C-Pre-Dev/Existing Conditions

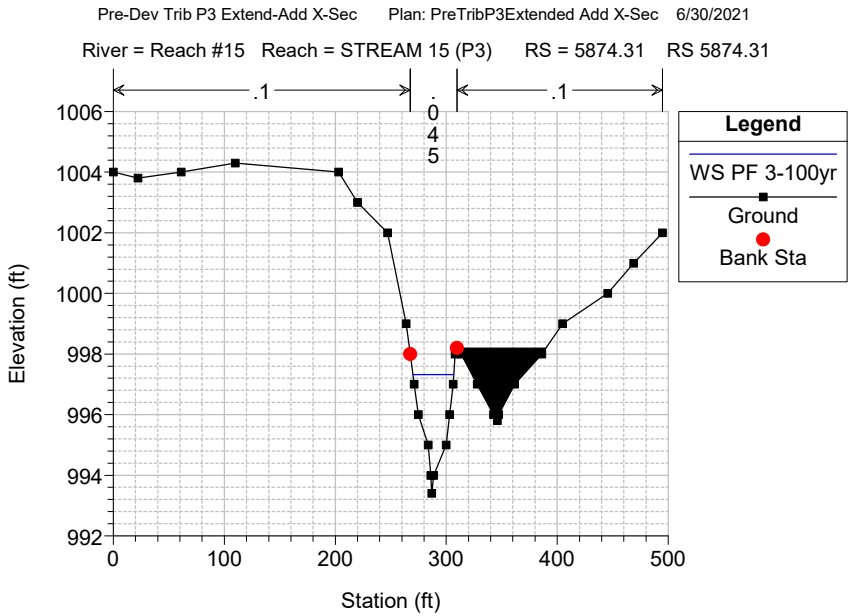


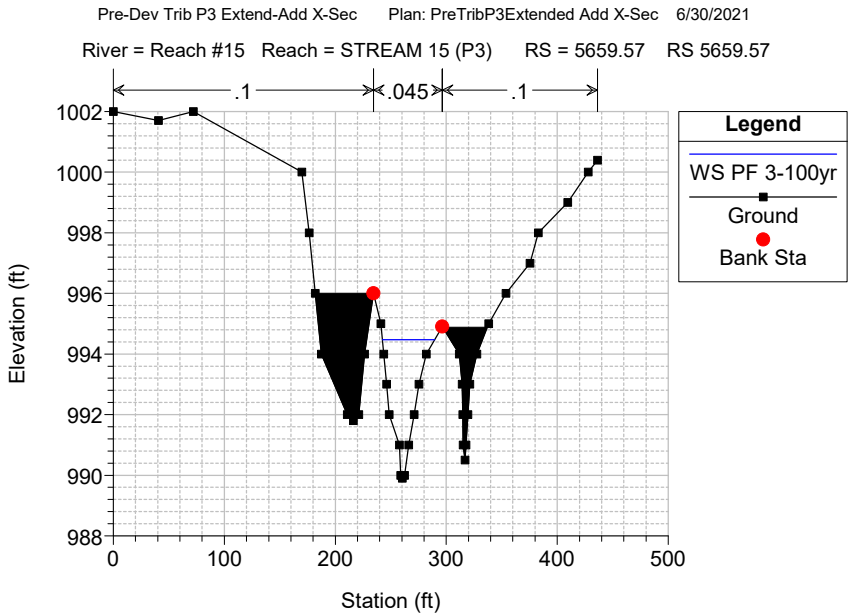


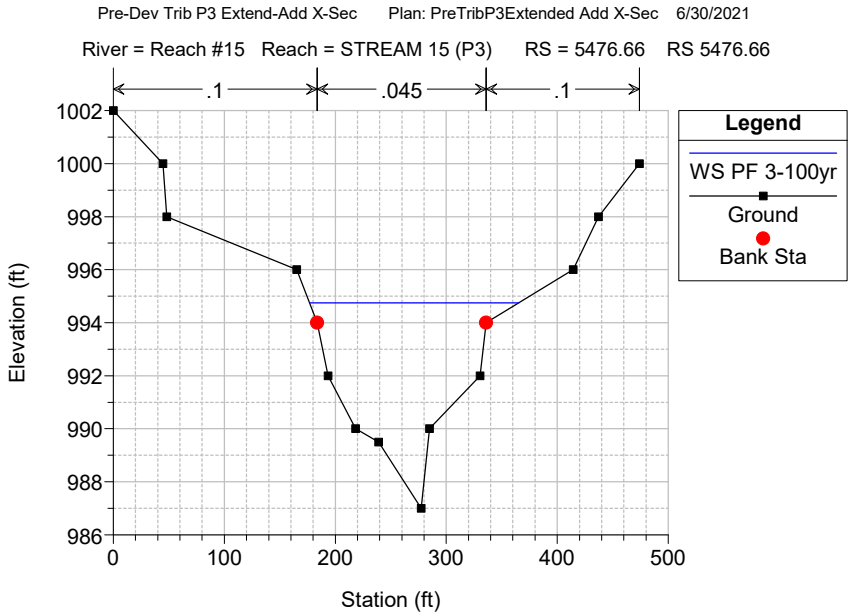


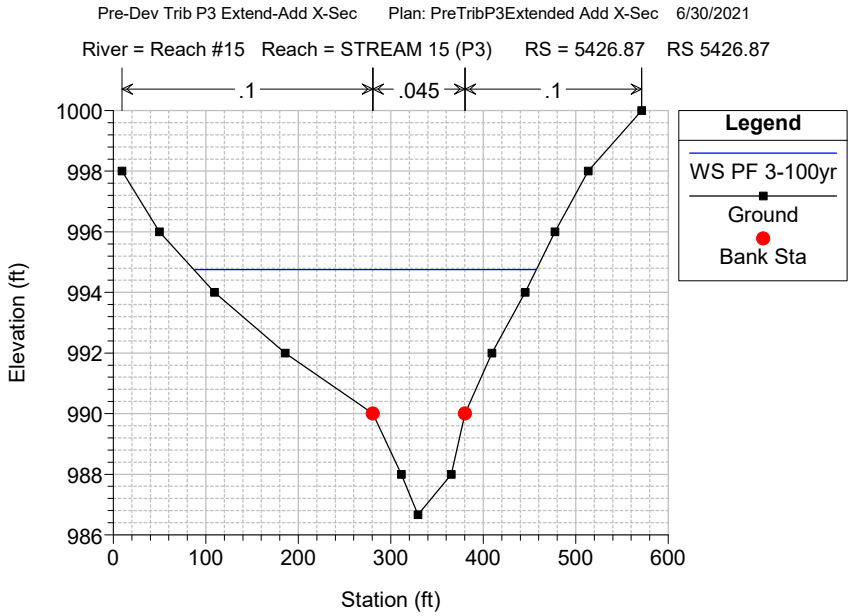


Tributary P3 to Prairie Lee Lake
C-Pre-Dev/Existing Conditions









Errors Warnings and Notes for Plan : Pre ExtendAddXS

Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 6654.43 Profile: PF 1-10yr
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 6465.03 Profile: PF 1-10yr
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 6235.08 Profile: PF 1-10yr
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 6037.05 Profile: PF 1-10yr
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5874.31 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5659.57 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5476.66 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5411.92 Profile: PF 1-10yr Culv: Culvert #1
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5411.92 Profile: PF 1-10yr Culv: Culvert #2
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5411.92 Profile: PF 1-10yr Culv: Culvert #3
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5298.85 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5269.21 Profile: PF 1-10yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5138.90 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.

Errors Warnings and Notes for Plan : Pre ExtendAddXS (Continued)

Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 4883.89 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 4602.74 Profile: PF 1-10yr Culv: Culvert #1
Note:	During supercritical analysis, the culvert direct step method went to normal depth. The program then
	assumed normal depth at the outlet.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 4349.92 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 3952.68 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 3345.74 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy
	was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2955.17 Profile: PF 1-10yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2703.04 Profile: PF 1-10yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2689.02 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy
	was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2673.89 Profile: PF 1-10yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2080.49 Profile: PF 1-10yr Culv: CULVERT#1
Warning:	During the culvert inlet control computations, the program could not balance the culvert/weir flow.
	The reported inlet energy grade answer may not be valid.
Note:	The normal depth exceeds the height of the culvert. The program assumes that the normal depth is
	equal to the height of the culvert.

Errors Warnings and Notes for Plan : Pre ExtendAddXS (Continued)

Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 1487.09 Profile: PF 1-10yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 1074.65 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 379.56 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.

Tributary P3 to Prairie Lee Lake
D-Post-Dev/Proposed Conditions

HEC-RAS Plan: PostExtAddXsQ River: Reach #15 Reach: STREAM 15 (P3)

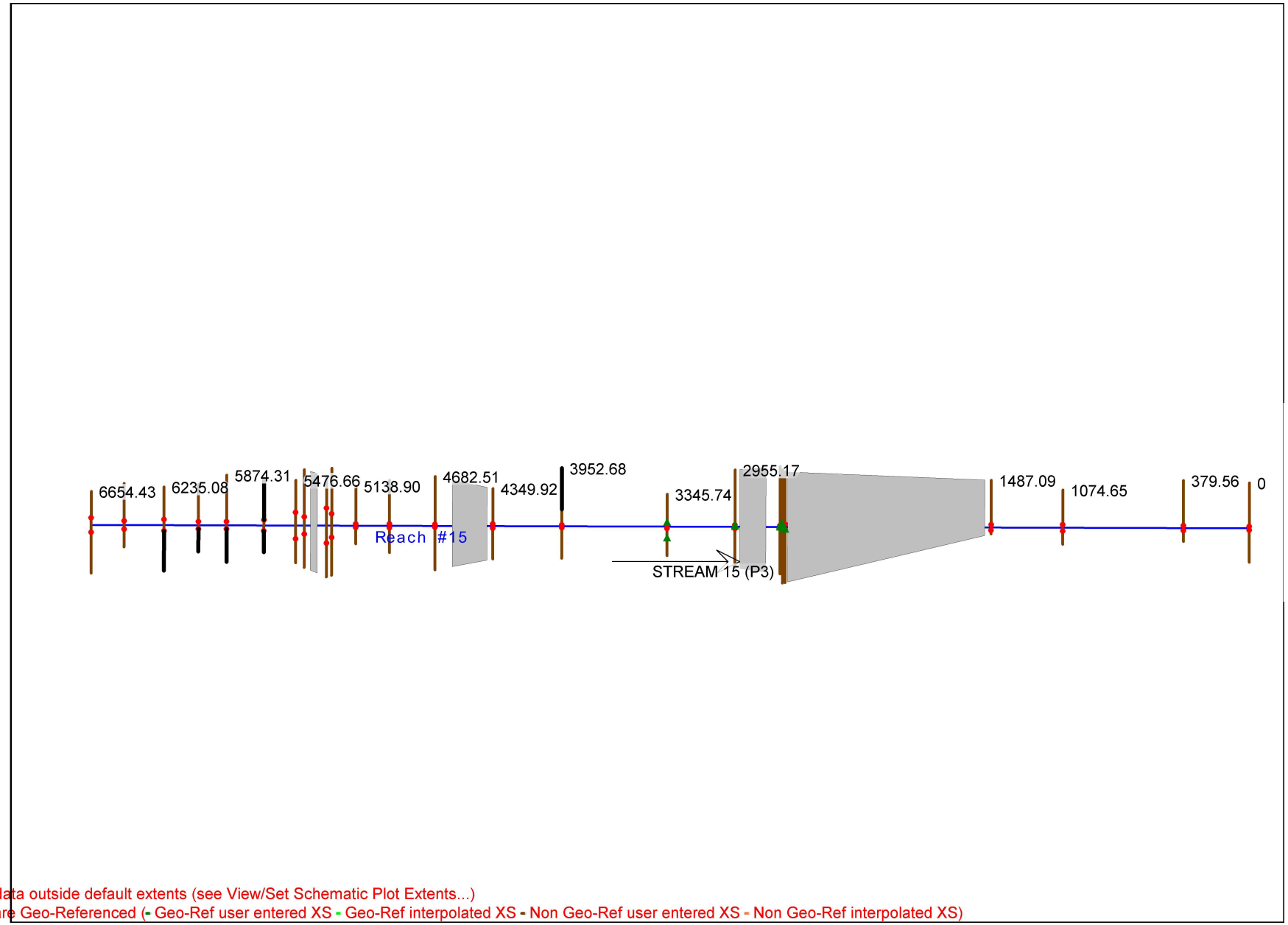
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
STREAM 15 (P3)	0	PF 1-10yr	625.00	917.00	920.47	920.46	921.15	0.008003	7.57	131.25	116.96	0.79
STREAM 15 (P3)	0	PF 2-50yr	924.00	917.00	921.00	921.00	921.66	0.007213	8.05	206.62	169.49	0.77
STREAM 15 (P3)	0	PF 3-100yr	1059.00	917.00	921.18	921.18	921.84	0.007122	8.27	237.93	187.03	0.77
STREAM 15 (P3)	0	PF 4-500yr	1270.00	917.00	921.40	921.40	922.09	0.007178	8.65	282.46	209.45	0.78
STREAM 15 (P3)	379.56	PF 1-10yr	625.00	922.00	925.24	925.24	925.92	0.007979	7.07	119.25	99.18	0.78
STREAM 15 (P3)	379.56	PF 2-50yr	924.00	922.00	925.73	925.73	926.48	0.007739	7.81	174.04	126.50	0.79
STREAM 15 (P3)	379.56	PF 3-100yr	1059.00	922.00	925.90	925.90	926.68	0.007796	8.13	196.56	136.14	0.80
STREAM 15 (P3)	379.56	PF 4-500yr	1270.00	922.00	926.14	926.14	926.97	0.007848	8.55	230.70	147.29	0.81
STREAM 15 (P3)	1074.65	PF 1-10yr	625.00	930.00	932.61	932.61	933.62	0.013786	8.10	78.89	43.44	0.99
STREAM 15 (P3)	1074.65	PF 2-50yr	924.00	930.00	933.26	933.26	934.50	0.011945	9.02	109.30	50.62	0.96
STREAM 15 (P3)	1074.65	PF 3-100yr	1059.00	930.00	933.52	933.52	934.85	0.011325	9.34	123.23	53.59	0.95
STREAM 15 (P3)	1074.65	PF 4-500yr	1270.00	930.00	933.89	933.89	935.35	0.010831	9.87	143.63	57.67	0.95
STREAM 15 (P3)	1487.09	PF 1-10yr	625.00	933.86	937.71		938.13	0.007660	5.31	128.10	51.40	0.51
STREAM 15 (P3)	1487.09	PF 2-50yr	924.00	933.86	938.41	937.27	938.98	0.008328	6.28	166.65	58.52	0.55
STREAM 15 (P3)	1487.09	PF 3-100yr	1059.00	933.86	938.67	937.55	939.31	0.008608	6.65	182.59	61.13	0.56
STREAM 15 (P3)	1487.09	PF 4-500yr	1270.00	933.86	939.09	937.95	939.80	0.008746	7.12	208.63	65.18	0.58
STREAM 15 (P3)	2080.49		Culvert									
STREAM 15 (P3)	2673.89	PF 1-10yr	625.00	951.36	966.14	953.97	966.16	0.000027	1.14	1198.87	307.06	0.05
STREAM 15 (P3)	2673.89	PF 2-50yr	924.00	951.36	968.25	954.80	968.26	0.000023	1.15	2125.71	400.18	0.05
STREAM 15 (P3)	2673.89	PF 3-100yr	1059.00	951.36	968.84	955.14	968.85	0.000024	1.20	2365.16	406.20	0.05
STREAM 15 (P3)	2673.89	PF 4-500yr	1270.00	951.36	969.46	955.63	969.48	0.000027	1.30	2618.72	412.48	0.06
STREAM 15 (P3)	2689.02	PF 1-10yr	625.00	952.00	966.16	954.60	966.17	0.000011	0.74	1408.81	317.99	0.03
STREAM 15 (P3)	2689.02	PF 2-50yr	924.00	952.00	968.26	955.38	968.27	0.000007	0.67	2457.62	389.81	0.03
STREAM 15 (P3)	2689.02	PF 3-100yr	1059.00	952.00	968.86	955.72	968.86	0.000008	0.70	2693.74	405.14	0.03
STREAM 15 (P3)	2689.02	PF 4-500yr	1270.00	952.00	969.48	956.18	969.48	0.000009	0.76	2950.50	421.18	0.03
STREAM 15 (P3)	2703.04	PF 1-10yr	425.00	953.34	966.17	958.21	966.17	0.000003	0.38	1959.53	324.00	0.02
STREAM 15 (P3)	2703.04	PF 2-50yr	624.00	953.34	968.27	959.60	968.27	0.000003	0.41	2694.30	374.77	0.02
STREAM 15 (P3)	2703.04	PF 3-100yr	709.00	953.34	968.86	960.18	968.86	0.000003	0.43	2919.86	384.44	0.02
STREAM 15 (P3)	2703.04	PF 4-500yr	870.00	953.34	969.48	961.18	969.48	0.000003	0.48	3162.13	394.55	0.02
STREAM 15 (P3)	2829.11		Culvert									
STREAM 15 (P3)	2955.17	PF 1-10yr	425.00	957.54	968.23	962.39	968.73	0.000760	5.68	74.82	286.53	0.31
STREAM 15 (P3)	2955.17	PF 2-50yr	624.00	957.54	972.98	963.82	972.98	0.000001	0.29	3143.14	334.60	0.01
STREAM 15 (P3)	2955.17	PF 3-100yr	709.00	957.54	973.27	964.37	973.27	0.000002	0.32	3241.34	337.60	0.01
STREAM 15 (P3)	2955.17	PF 4-500yr	870.00	957.54	973.59	965.37	973.60	0.000002	0.37	3351.37	340.93	0.02
STREAM 15 (P3)	3345.74	PF 1-10yr	425.00	964.00	969.15	967.09	969.21	0.000436	2.38	252.34	123.53	0.20
STREAM 15 (P3)	3345.74	PF 2-50yr	624.00	964.00	972.98	967.63	973.00	0.000062	1.35	596.43	167.64	0.08
STREAM 15 (P3)	3345.74	PF 3-100yr	709.00	964.00	973.27	967.77	973.29	0.000070	1.46	622.68	170.88	0.09
STREAM 15 (P3)	3345.74	PF 4-500yr	870.00	964.00	973.59	967.99	973.61	0.000060	1.40	957.05	174.50	0.08
STREAM 15 (P3)	3952.68	PF 1-10yr	425.00	971.00	974.57	974.57	975.12	0.008536	6.82	93.67	87.48	0.75
STREAM 15 (P3)	3952.68	PF 2-50yr	624.00	971.00	974.93	974.93	975.58	0.009159	7.72	126.64	92.85	0.79
STREAM 15 (P3)	3952.68	PF 3-100yr	709.00	971.00	975.06	975.06	975.74	0.009459	8.07	138.57	94.72	0.81
STREAM 15 (P3)	3952.68	PF 4-500yr	870.00	971.00	975.26	975.26	976.03	0.010190	8.73	158.02	97.69	0.85
STREAM 15 (P3)	4349.92	PF 1-10yr	425.00	974.61	978.44	978.34	979.39	0.012554	7.82	55.01	27.82	0.93
STREAM 15 (P3)	4349.92	PF 2-50yr	624.00	974.61	978.96	978.96	980.28	0.013224	9.25	70.45	31.46	0.99
STREAM 15 (P3)	4349.92	PF 3-100yr	709.00	974.61	979.21	979.21	980.63	0.012700	9.60	78.47	33.19	0.98
STREAM 15 (P3)	4349.92	PF 4-500yr	870.00	974.61	979.63	979.63	981.25	0.012133	10.26	93.17	36.15	0.98
STREAM 15 (P3)	4602.74		Culvert									
STREAM 15 (P3)	4682.51	PF 1-10yr	268.00	978.20	986.36	982.22	986.37	0.000123	1.16	652.67	280.13	0.08
STREAM 15 (P3)	4682.51	PF 2-50yr	472.00	978.20	986.86	983.33	986.87	0.000234	1.68	794.23	292.88	0.11
STREAM 15 (P3)	4682.51	PF 3-100yr	550.00	978.20	986.99	983.59	987.02	0.000279	1.86	834.76	296.43	0.13
STREAM 15 (P3)	4682.51	PF 4-500yr	781.00	978.20	987.38	984.10	987.42	0.000400	2.31	952.63	306.51	0.15
STREAM 15 (P3)	4883.89	PF 1-10yr	268.00	979.30	986.39		986.44	0.000450	1.94	259.01	144.00	0.15
STREAM 15 (P3)	4883.89	PF 2-50yr	472.00	979.30	986.91		987.00	0.000856	2.86	339.70	167.93	0.21
STREAM 15 (P3)	4883.89	PF 3-100yr	550.00	979.30	987.06		987.17	0.001017	3.17	364.92	174.74	0.23
STREAM 15 (P3)	4883.89	PF 4-500yr	781.00	979.30	987.47		987.64	0.001423	3.93	441.59	193.97	0.28
STREAM 15 (P3)	5138.90	PF 1-10yr	257.00	984.00	987.72	987.72	988.63	0.026829	7.66	33.55	18.45	1.00
STREAM 15 (P3)	5138.90	PF 2-50yr	454.00	984.00	988.80	988.80	989.73	0.016551	7.93	73.98	68.22	0.84
STREAM 15 (P3)	5138.90	PF 3-100yr	528.00	984.00	989.11	989.11	990.00	0.014377	7.94	98.05	87.05	0.80
STREAM 15 (P3)	5138.90	PF 4-500yr	750.00	984.00	989.72	989.72	990.62	0.012587	8.39	163.24	124.46	0.77
STREAM 15 (P3)	5269.21	PF 1-10yr	257.00	986.00	989.56		989.63	0.002953	2.24	114.75	81.91	0.33
STREAM 15 (P3)	5269.21	PF 2-50yr	454.00	986.00	990.39		990.48	0.002224	2.34	193.90	104.71	0.30
STREAM 15 (P3)	5269.21	PF 3-100yr	528.00	986.00	990.61		990.70	0.002162	2.43	217.58	109.04	0.30

Tributary P3 to Prairie Lee Lake
D-Post-Dev/Proposed Conditions

HEC-RAS Plan: PostExtAddXsQ River: Reach #15 Reach: STREAM 15 (P3) (Continued)

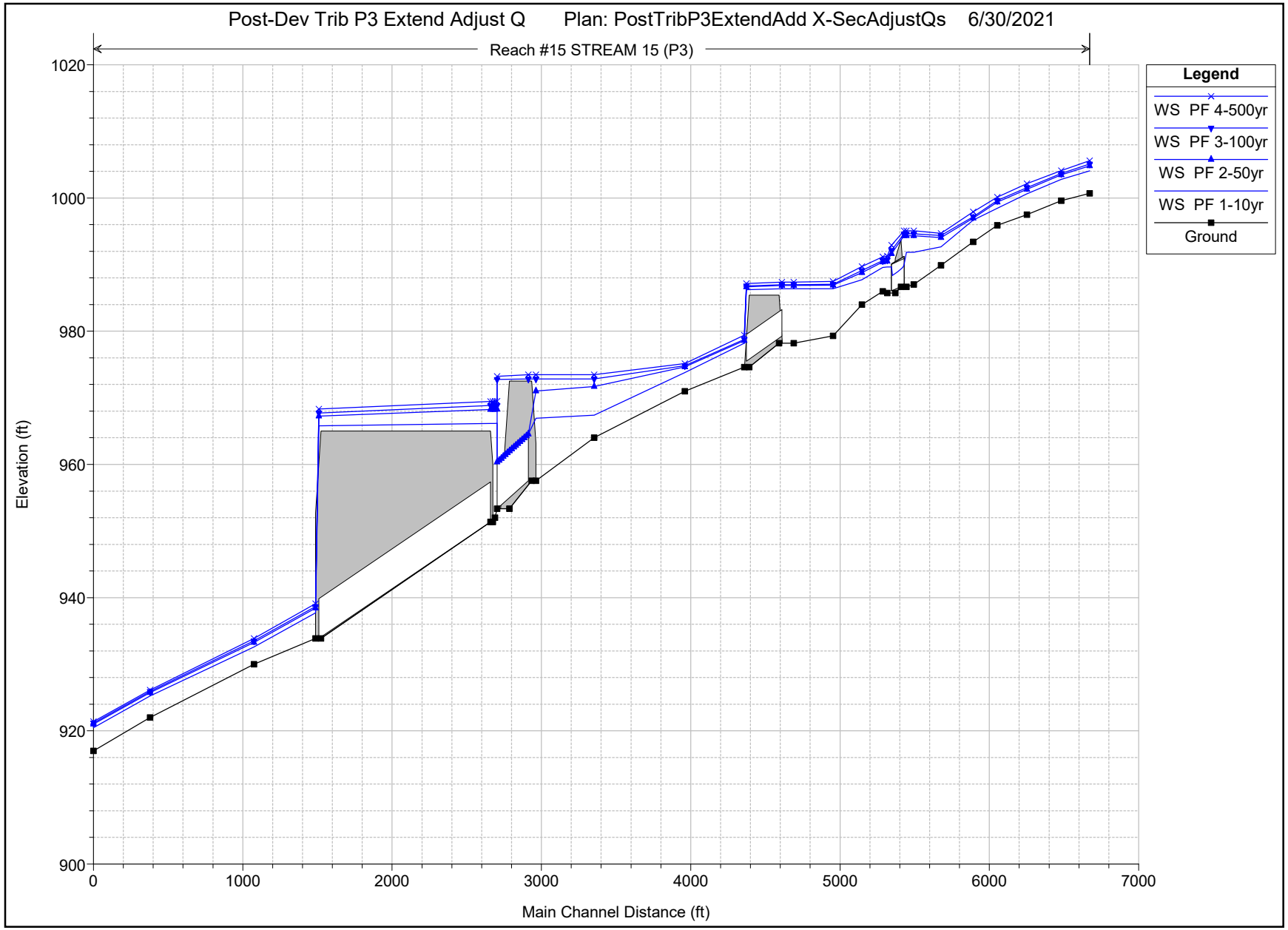
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
STREAM 15 (P3)	5269.21	PF 4-500yr	750.00	986.00	991.18		991.29	0.002081	2.66	282.38	120.07	0.31
STREAM 15 (P3)	5298.85	PF 1-10yr	257.00	985.73	989.64		989.65	0.000090	0.57	454.55	187.75	0.06
STREAM 15 (P3)	5298.85	PF 2-50yr	454.00	985.73	990.48		990.49	0.000109	0.73	625.95	223.06	0.07
STREAM 15 (P3)	5298.85	PF 3-100yr	528.00	985.73	990.71		990.72	0.000116	0.79	677.89	233.85	0.08
STREAM 15 (P3)	5298.85	PF 4-500yr	750.00	985.73	991.29		991.31	0.000135	0.95	822.04	261.47	0.08
STREAM 15 (P3)	5411.92		Culvert									
STREAM 15 (P3)	5426.87	PF 1-10yr	257.00	986.67	991.85	988.23	991.86	0.000068	0.65	480.00	214.28	0.06
STREAM 15 (P3)	5426.87	PF 2-50yr	454.00	986.67	994.34	988.65	994.34	0.000029	0.60	1187.75	351.29	0.04
STREAM 15 (P3)	5426.87	PF 3-100yr	528.00	986.67	994.64	988.77	994.64	0.000033	0.66	1295.69	365.17	0.05
STREAM 15 (P3)	5426.87	PF 4-500yr	750.00	986.67	995.09	989.12	995.10	0.000050	0.85	1464.66	385.89	0.06
STREAM 15 (P3)	5476.66	PF 1-10yr	257.00	987.00	991.85		991.87	0.000332	0.96	267.38	131.76	0.12
STREAM 15 (P3)	5476.66	PF 2-50yr	454.00	987.00	994.34		994.34	0.000073	0.72	630.53	168.49	0.06
STREAM 15 (P3)	5476.66	PF 3-100yr	528.00	987.00	994.64		994.65	0.000078	0.78	683.46	183.06	0.07
STREAM 15 (P3)	5476.66	PF 4-500yr	750.00	987.00	995.09		995.10	0.000114	1.01	770.59	204.81	0.08
STREAM 15 (P3)	5659.57	PF 1-10yr	257.00	989.90	992.65	992.65	993.38	0.028357	6.84	37.58	26.66	1.02
STREAM 15 (P3)	5659.57	PF 2-50yr	454.00	989.90	994.07		994.53	0.010427	5.43	83.63	39.67	0.66
STREAM 15 (P3)	5659.57	PF 3-100yr	528.00	989.90	994.37		994.83	0.010466	5.48	96.31	45.25	0.66
STREAM 15 (P3)	5659.57	PF 4-500yr	750.00	989.90	994.68	994.23	995.38	0.015294	6.74	111.26	51.06	0.80
STREAM 15 (P3)	5874.31	PF 1-10yr	253.00	993.40	996.69	996.23	997.04	0.011102	4.72	53.63	33.00	0.65
STREAM 15 (P3)	5874.31	PF 2-50yr	446.00	993.40	996.96	996.85	997.75	0.021799	7.09	62.87	34.77	0.93
STREAM 15 (P3)	5874.31	PF 3-100yr	519.00	993.40	997.18	997.07	998.02	0.020993	7.35	70.64	36.00	0.92
STREAM 15 (P3)	5874.31	PF 4-500yr	737.00	993.40	997.92		998.79	0.016017	7.46	98.78	39.99	0.84
STREAM 15 (P3)	6037.05	PF 1-10yr	253.00	995.90	998.44		998.77	0.010231	4.59	55.09	33.55	0.63
STREAM 15 (P3)	6037.05	PF 2-50yr	446.00	995.90	999.39		999.77	0.007814	4.98	89.56	39.25	0.58
STREAM 15 (P3)	6037.05	PF 3-100yr	519.00	995.90	999.62		1000.05	0.007975	5.25	98.86	40.60	0.59
STREAM 15 (P3)	6037.05	PF 4-500yr	737.00	995.90	1000.15	999.32	1000.72	0.008922	6.09	124.59	125.26	0.64
STREAM 15 (P3)	6235.08	PF 1-10yr	245.00	997.50	1000.63		1001.00	0.012329	4.83	50.78	32.96	0.69
STREAM 15 (P3)	6235.08	PF 2-50yr	418.00	997.50	1001.29		1001.77	0.013291	5.55	75.32	42.02	0.73
STREAM 15 (P3)	6235.08	PF 3-100yr	496.00	997.50	1001.55		1002.06	0.013183	5.72	86.67	45.91	0.73
STREAM 15 (P3)	6235.08	PF 4-500yr	680.00	997.50	1002.18		1002.69	0.011174	5.74	118.39	55.18	0.69
STREAM 15 (P3)	6465.03	PF 1-10yr	245.00	999.60	1002.78		1002.98	0.006263	3.51	69.84	44.37	0.49
STREAM 15 (P3)	6465.03	PF 2-50yr	418.00	999.60	1003.46		1003.72	0.005733	4.10	104.36	61.46	0.50
STREAM 15 (P3)	6465.03	PF 3-100yr	496.00	999.60	1003.69		1003.98	0.005655	4.36	121.63	90.57	0.50
STREAM 15 (P3)	6465.03	PF 4-500yr	680.00	999.60	1004.13		1004.49	0.005699	4.91	167.02	119.09	0.52
STREAM 15 (P3)	6654.43	PF 1-10yr	245.00	1000.70	1004.09		1004.41	0.008837	4.56	53.69	29.03	0.59
STREAM 15 (P3)	6654.43	PF 2-50yr	418.00	1000.70	1004.84		1005.25	0.011417	5.18	80.62	44.07	0.68
STREAM 15 (P3)	6654.43	PF 3-100yr	496.00	1000.70	1005.11		1005.54	0.012213	5.29	93.75	52.48	0.70
STREAM 15 (P3)	6654.43	PF 4-500yr	680.00	1000.70	1005.61		1006.08	0.012866	5.46	124.61	69.60	0.72

Tributary P3 to Prairie Lee Lake
D-Post-Dev/Proposed Conditions

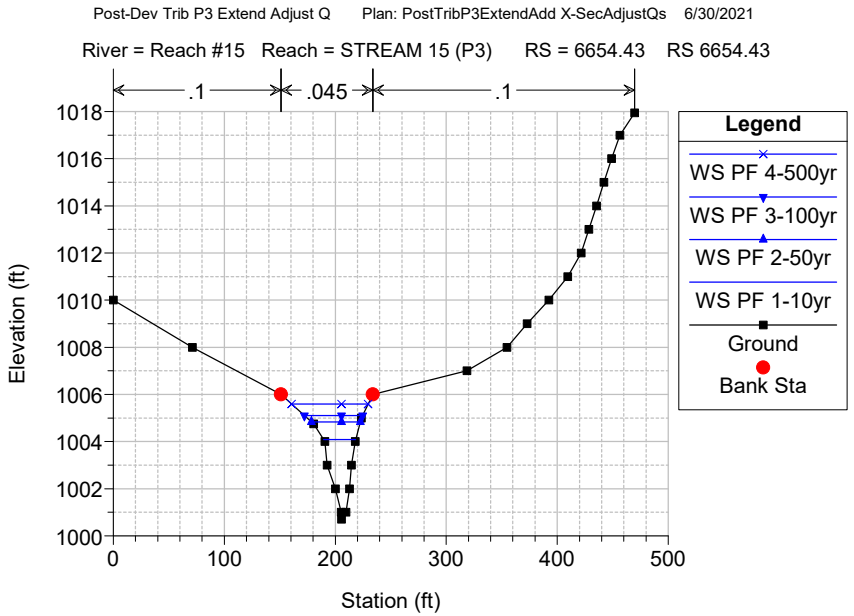


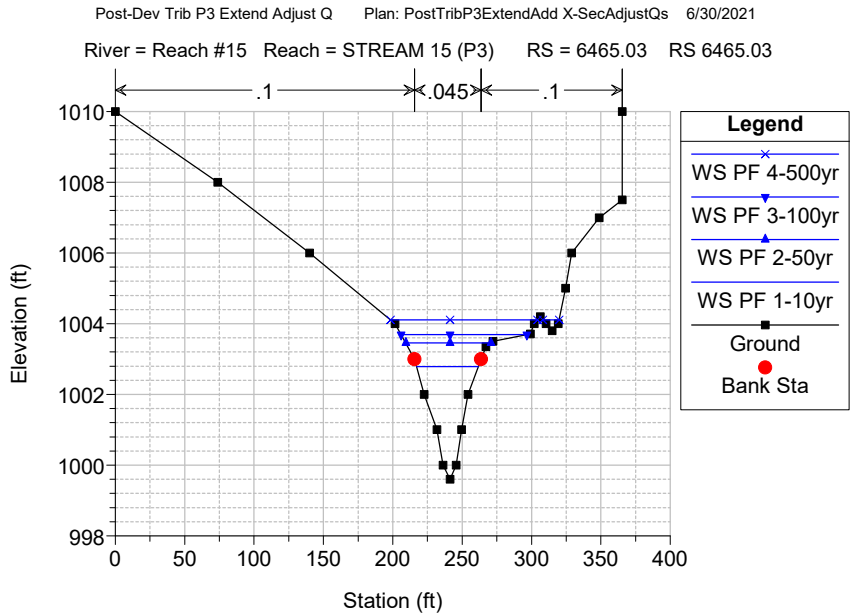
Some schematic data outside default extents (see View/Set Schematic Plot Extents...)
None of the XS's are Geo-Referenced (- Geo-Ref user entered XS - Geo-Ref interpolated XS - Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)

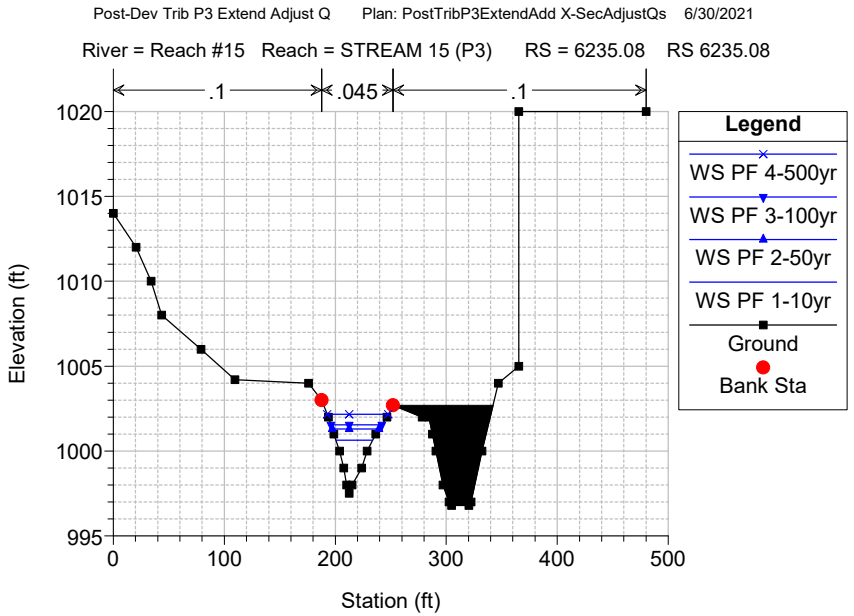
Tributary P3 to Prairie Lee Lake
D-Post-Dev/Proposed Conditions

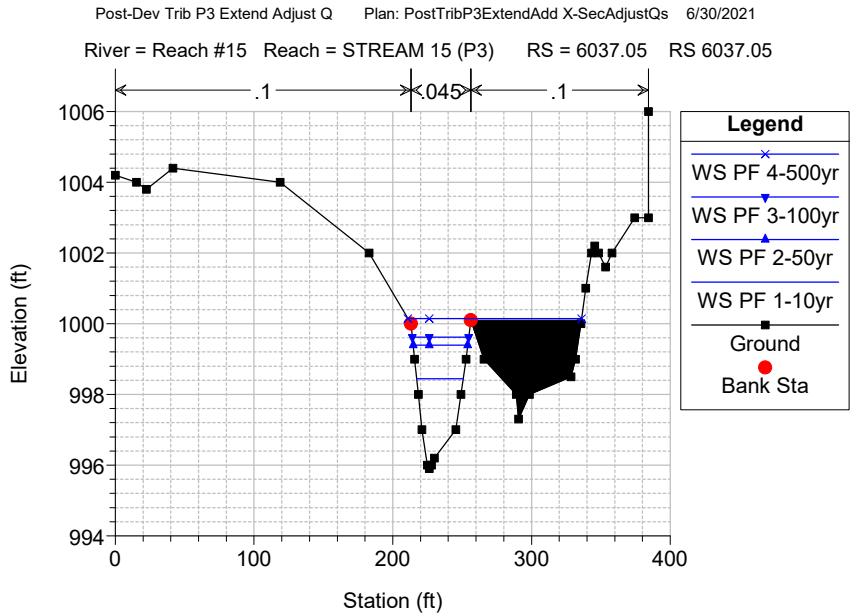


Tributary P3 to Prairie Lee Lake
D-Post-Dev/Proposed Conditions

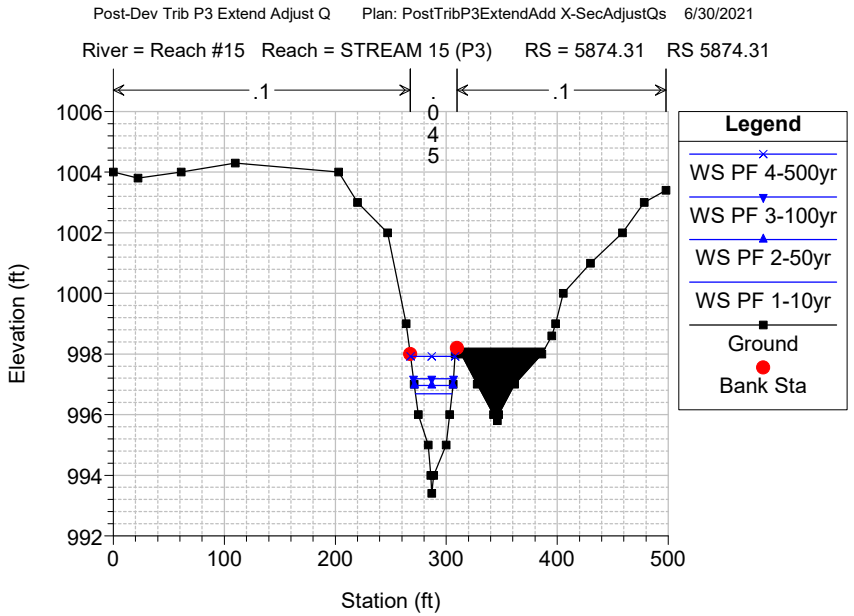


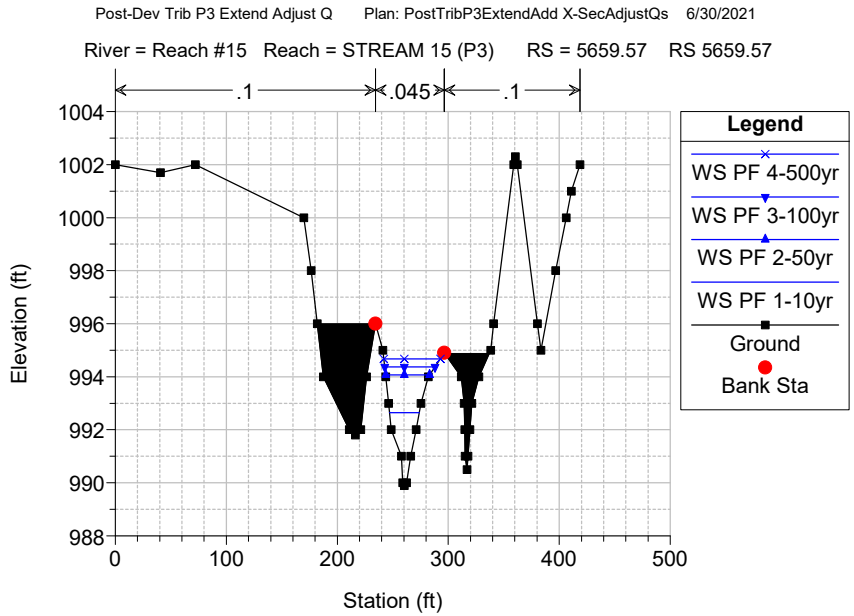


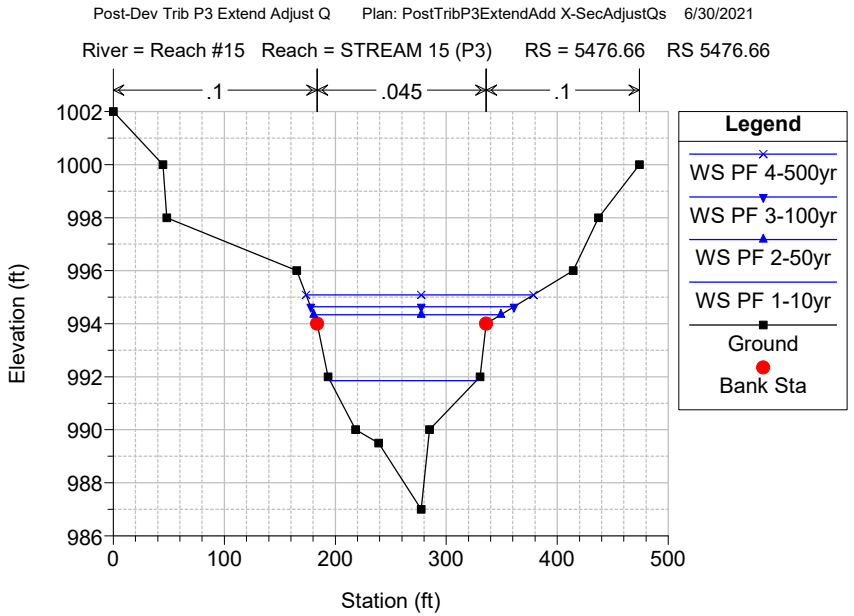


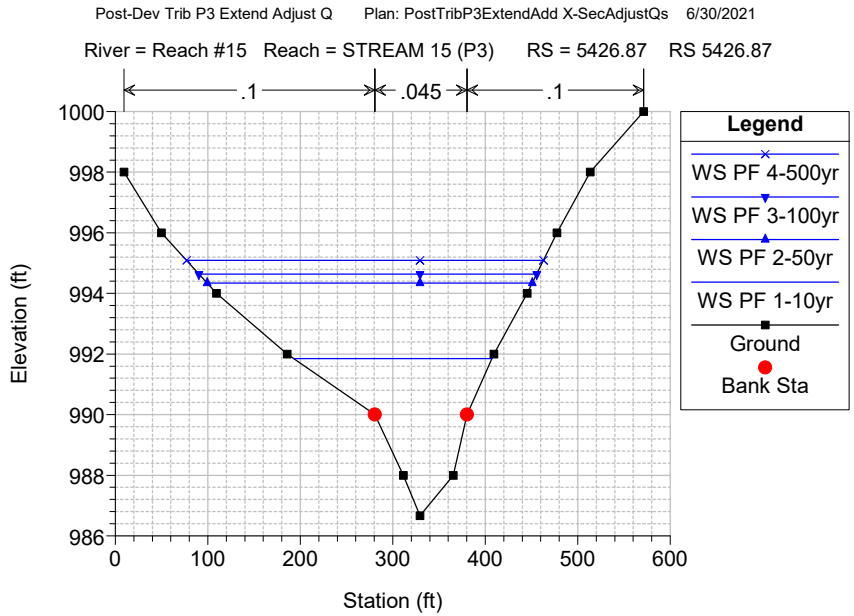


Tributary P3 to Prairie Lee Lake
D-Post-Dev/Proposed Conditions









Errors Warnings and Notes for Plan : PostExtAddXsQ

Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 6654.43 Profile: PF 1-10yr
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 6465.03 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 6235.08 Profile: PF 1-10yr
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 6037.05 Profile: PF 1-10yr
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5874.31 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5659.57 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5476.66 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5411.92 Profile: PF 1-10yr Culv: Culvert #1
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5411.92 Profile: PF 1-10yr Culv: Culvert #2
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5411.92 Profile: PF 1-10yr Culv: Culvert #3
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5298.85 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5269.21 Profile: PF 1-10yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 5138.90 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.

Errors Warnings and Notes for Plan : PostExtAddXsQ (Continued)

Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 4883.89 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 4602.74 Profile: PF 1-10yr Culv: Culvert #1
Note:	During supercritical analysis, the culvert direct step method went to normal depth. The program then
	assumed normal depth at the outlet.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 4349.92 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 3952.68 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 3345.74 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy
	was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2955.17 Profile: PF 1-10yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2703.04 Profile: PF 1-10yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2689.02 Profile: PF 1-10yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy
	was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2673.89 Profile: PF 1-10yr
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 2080.49 Profile: PF 1-10yr Culv: CULVERT#1

Errors Warnings and Notes for Plan : PostExtAddXsQ (Continued)

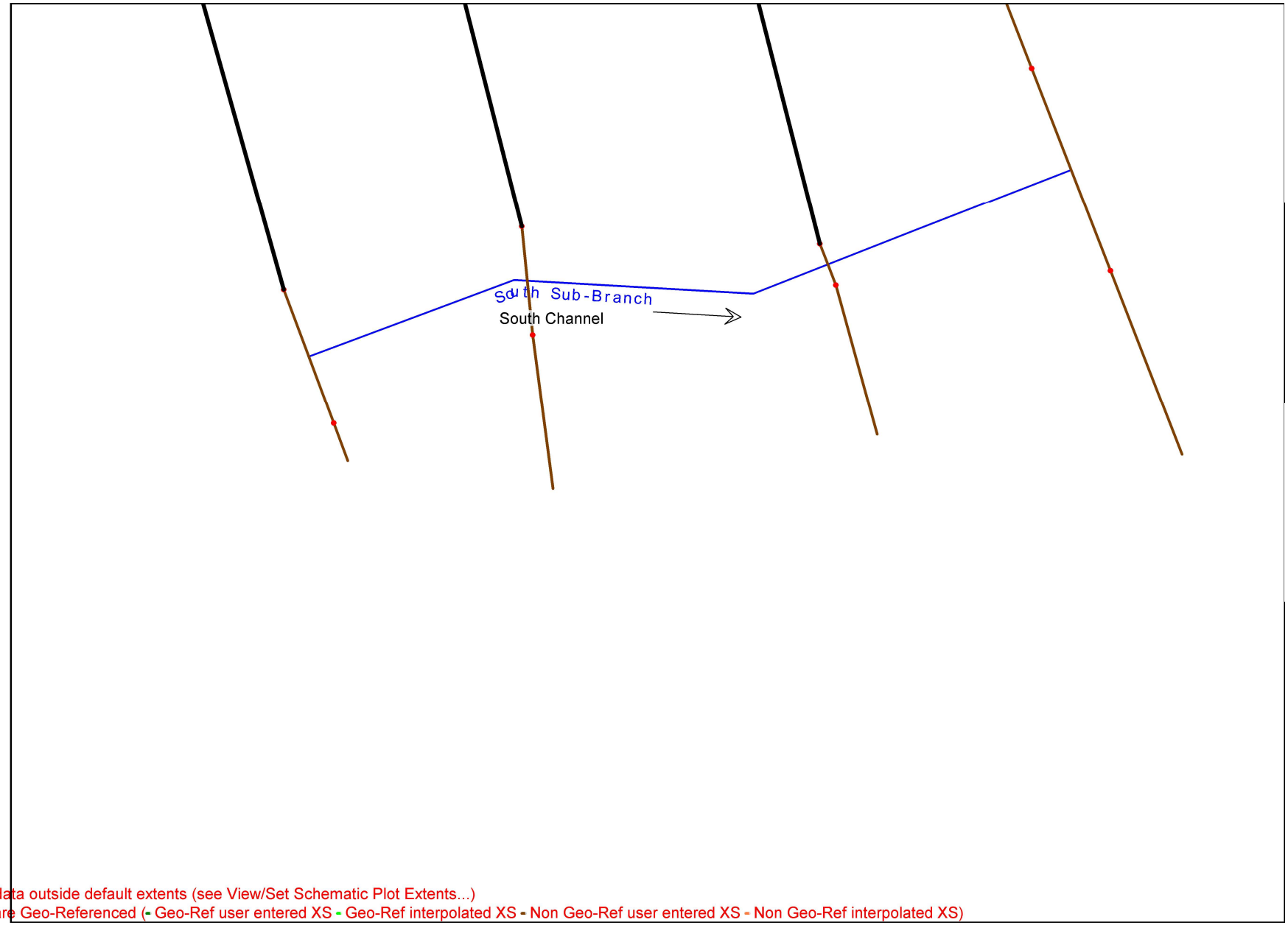
Warning:	During the culvert inlet control computations, the program could not balance the culvert/weir flow.
	The reported inlet energy grade answer may not be valid.
Note:	The normal depth exceeds the height of the culvert. The program assumes that the normal depth is
	equal to the height of the culvert.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 1487.09 Profile: PF 1-10yr
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
	additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 1074.65 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: Reach #15 Reach: STREAM 15 (P3) RS: 379.56 Profile: PF 1-10yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.

Small Local Flow Drainage Channel on Summit Point Phase-II Site

HEC-RAS Plan: OnSiteChan River: South Sub-Branch Reach: South Channel

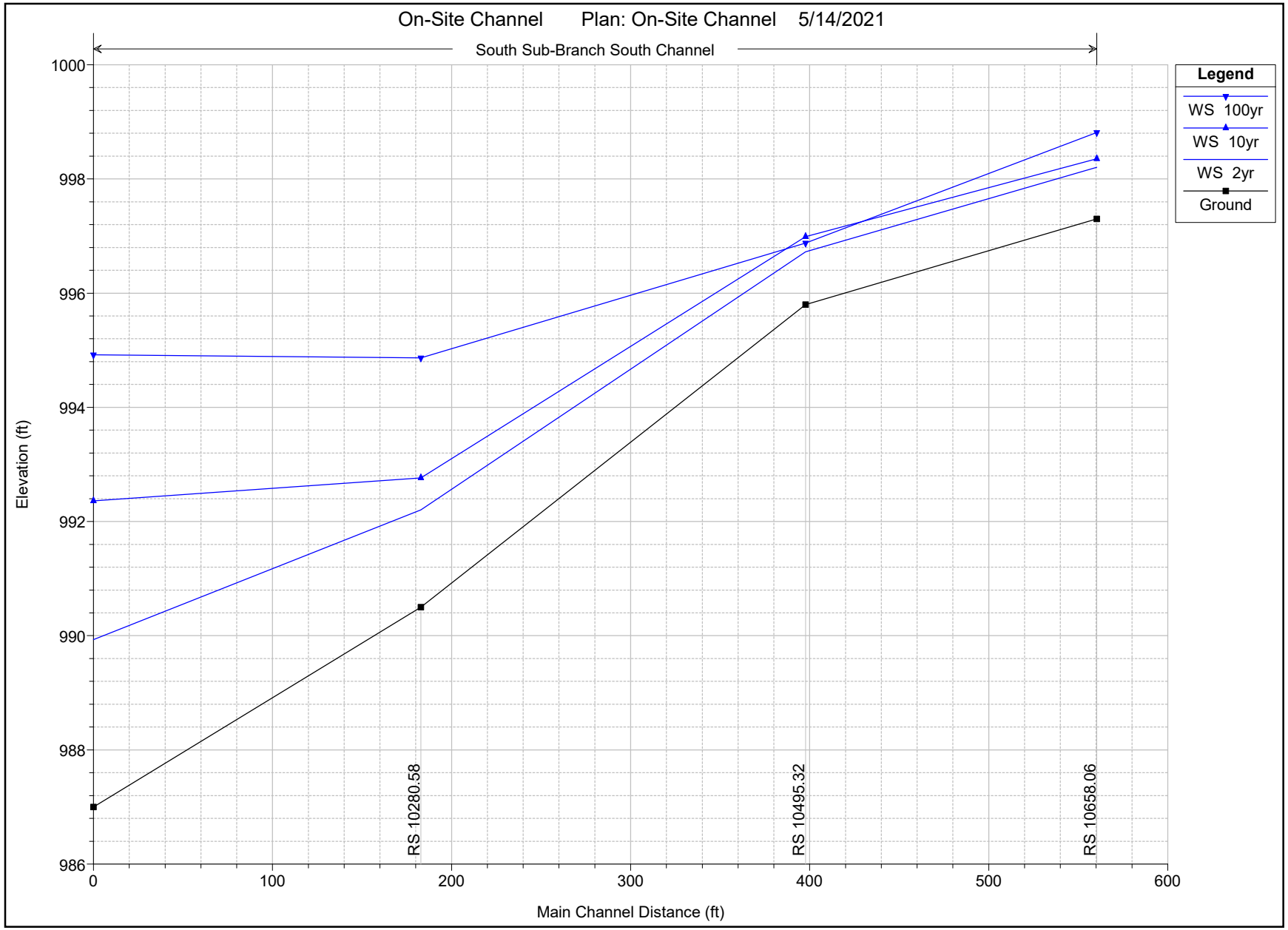
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South Channel	10097.67	2yr	30.00	987.00	989.93	987.93	989.93	0.000099	0.38	79.22	63.54	0.06
South Channel	10097.67	10yr	55.00	987.00	992.36	988.18	992.36	0.000008	0.16	337.19	139.74	0.02
South Channel	10097.67	100yr	97.00	987.00	994.92	988.48	994.92	0.000002	0.13	737.08	196.73	0.01
South Channel	10280.58	2yr	30.00	990.50	992.21	992.21	992.73	0.041033	5.81	5.16	5.03	1.01
South Channel	10280.58	10yr	55.00	990.50	992.76	992.76	993.45	0.039018	6.64	8.29	6.20	1.01
South Channel	10280.58	100yr	97.00	990.50	994.87		994.95	0.003608	2.30	45.18	39.69	0.35
South Channel	10495.32	2yr	20.00	995.80	996.72		996.77	0.008413	1.76	11.39	25.71	0.47
South Channel	10495.32	10yr	37.00	995.80	996.99		997.05	0.007130	1.92	19.24	33.48	0.45
South Channel	10495.32	100yr	65.00	995.80	996.88	996.88	997.14	0.038070	4.15	15.66	30.19	1.02
South Channel	10658.06	2yr	10.00	997.30	998.21		998.24	0.010659	1.56	6.40	20.47	0.49
South Channel	10658.06	10yr	18.00	997.30	998.35		998.40	0.012010	1.80	10.00	28.35	0.53
South Channel	10658.06	100yr	32.00	997.30	998.81		998.83	0.002600	1.12	28.66	52.88	0.27

Small Local Flow Drainage Channel
on Summit Point Phase-II Site

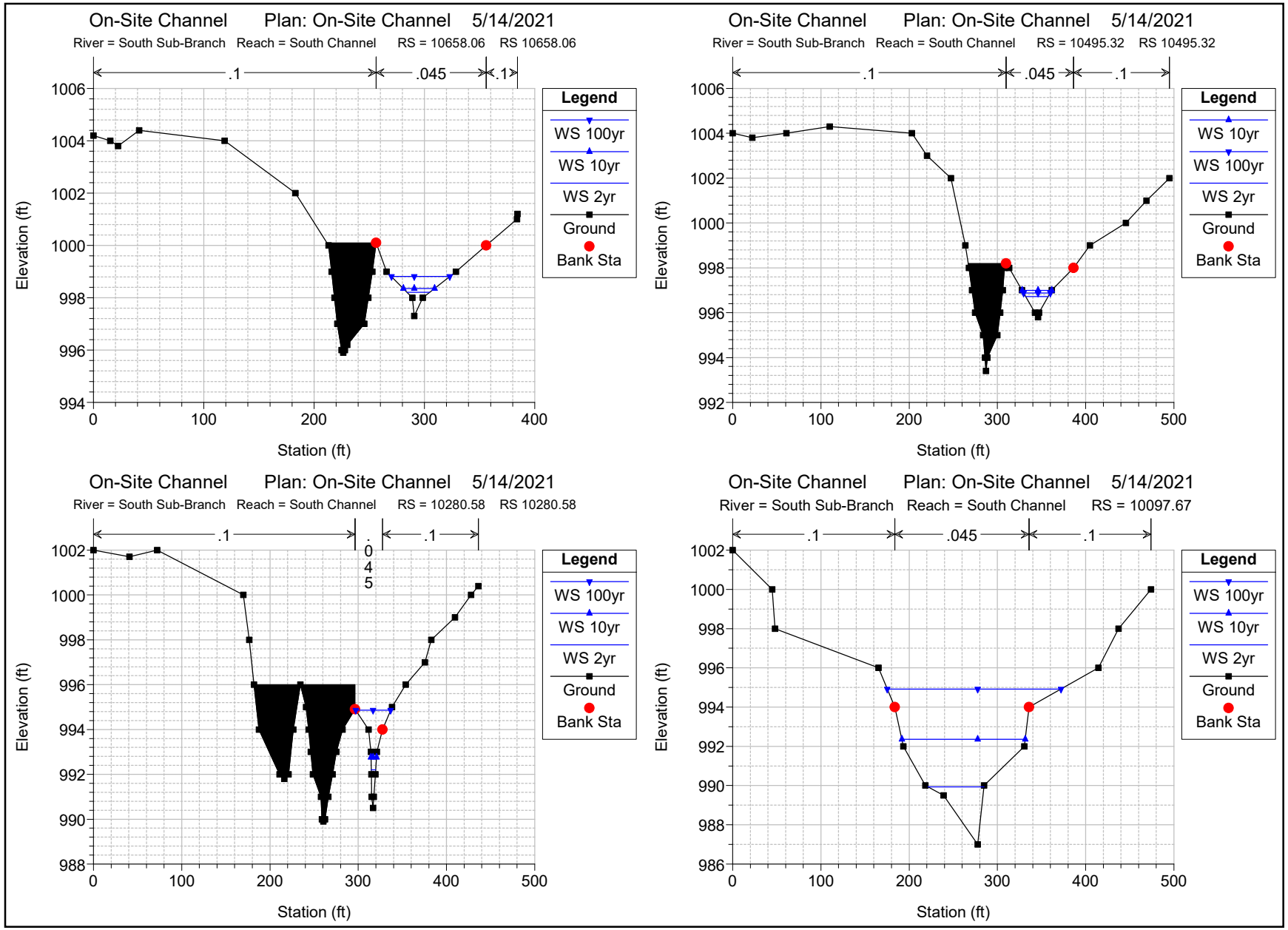


Some schematic data outside default extents (see View/Set Schematic Plot Extents...)
None of the XS's are Geo-Referenced (- Geo-Ref user entered XS - Geo-Ref interpolated XS - Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)

Small Local Flow Drainage Channel
on Summit Point Phase-II Site



Small Local Flow Drainage Channel on Summit Point Phase-II Site



Small Local Flow Drainage Channel on Summit Point Phase-II Site

Errors Warnings and Notes for Plan : OnSiteChan

Location:	River: South Sub-Branch Reach: South Channel RS: 10658.06 Profile: 100yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: South Sub-Branch Reach: South Channel RS: 10495.32 Profile: 100yr
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	used critical depth for the water surface and continued on with the calculations.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: South Sub-Branch Reach: South Channel RS: 10280.58 Profile: 100yr
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.