CITYWIDE DRAINAGE ANALYSIS
PROJECT ID: CEEN_2018CPST_007

by

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A Capstone Project 30% Completion Report

Submitted to

Ted Mickelson
The City of Woodland Hills

Department of Civil and Environmental Engineering
Brigham Young University

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Executive Summary

PROJECT TITLE: CITYWIDE DRAINAGE ANALYSIS
PROJECT ID: CEEn_2018CPST_007
PROJECT SPONSOR: City of Woodland Hills
TEAM NAME: SHOF

The City of Woodland Hills is a mountainous community with little storm drain infrastructure. The project is to maintain the feel of the community while better understanding the drainage patterns and improvements that would help prevent debris flows in city streets and mitigate flooding potential.

Our team determined the drainage basins and basin flows for the City of Woodland Hills. In addition, we mapped the steam network, drainage basin, and outlet points using ArcGIS Pro. The project was divided into three tasks: data collection, system analysis, and recommendations. Deliverables will include an ArcGIS map indicating drainage basins, input and output points, city boundaries, watershed delineation, and the existing drainage capacity. Further, descriptions and conceptual drawings of recommended LID improvements with unit price estimates and recommendations for culvert and rip rap sizing will be included.

Table of Contents

List of Figures

List of Tables

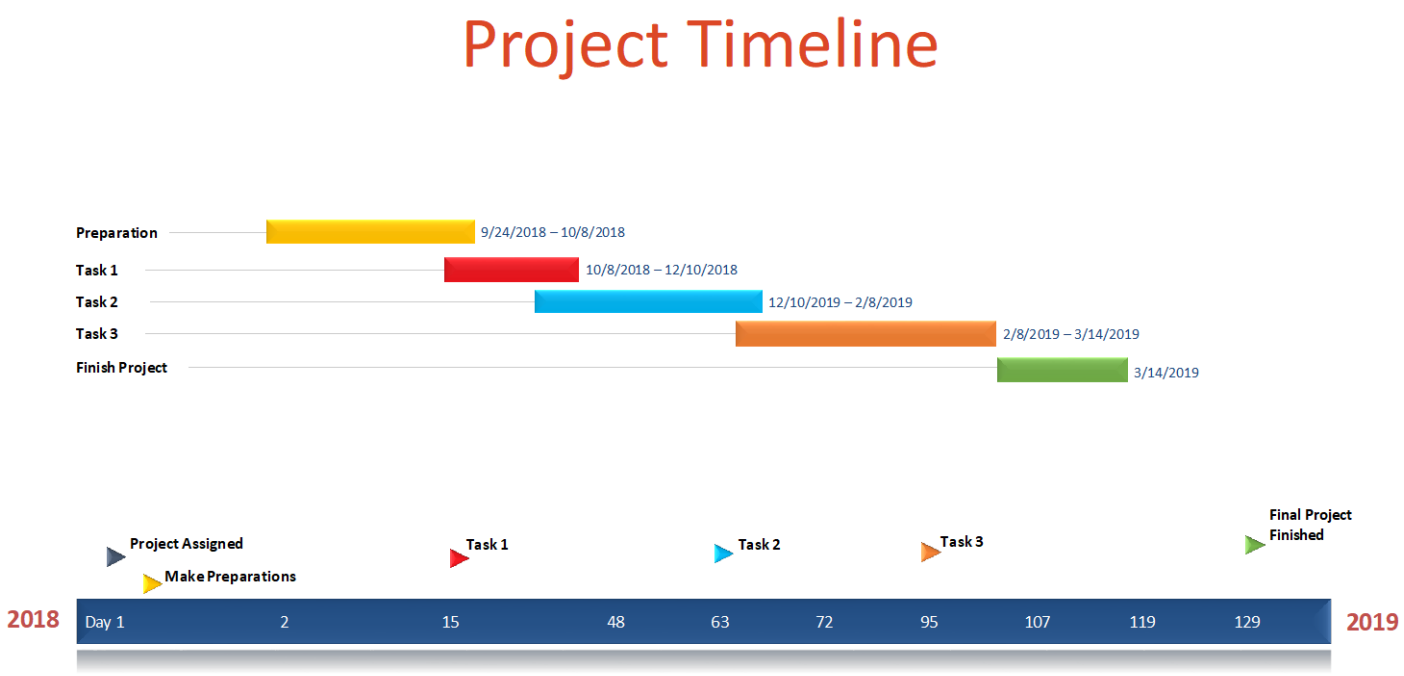
Introduction

Team SHOF worked in collaboration with Jones & DeMille Engineering and the City of Woodland Hills to assess the existing snow-runoff drainage impacts to the City and suggest drainage improvements and sizing that complement the character of the City. The analysis will be completed using a combination of analysis tools for an appropriate storm event return interval.

Dr. Dan Ames from the Department of Civil and Environmental Engineering at Brigham Young University helped provide technical and academic support to the team throughout the course of the project. The project was divided into three tasks: data collection, system analysis, and recommendations. Deliverables will include a GIS map indicating drainage basins, input and output points, city boundaries, watershed delineation, and the existing drainage capacity.

The results of the project are included in this report with drainage facilities recommendations that include culvert sizing and a typical drainage channel section. Typical design drawings and unit price estimates will be provided in the report. A preliminary map and report will be submitted on March 14, 2019 to allow the City and Jones & DeMille the opportunity to provide feedback and revisions before final submission.

Schedule



- Weekly team meetings on Fridays at 12pm
- Biweekly meetings with Dr. Ames on Fridays at 10am
- Biweekly meetings with Ted Mickelsen
- Meetings with the Woodland Hills city council

Milestones and Accomplishments

- Site visit with Ted Micklesen on November 30th, 2018 to visually see the drainage basins that will have the most effect on the city.
- Finalizing the map in ArcGIS Pro.
- Starting Task 2 of determining and analyzing the drainage flows.

Assumptions & Limitations

The following limitations and assumptions were made throughout the duration of the project.

Due to limited data collection capabilities and equipment, all watersheds, stream paths, and flow data for this project were acquired from streamstats.usgs.gov. The data was then entered into ArcGIS Pro in order to create the drainage basin map, Figure 2. The team was not practiced in using GIS nor with watershed analysis, and therefore relied on the expertise of Dr. Ames and Ted Mickelsen in providing relevant data and creating figures pertaining to the project.

In addition, it was assumed that three major water sheds impact the city; all data and design were based off of these three watersheds.

Per suggestion of Ted Mickelsen, culvert sizing was designed for the 10-year storm event.

Design, Analysis & Results

Task One: Creating the GIS Map

To delineate the watersheds, we used a variety of methods to identify critical drainage areas and estimate the flow. Initially, five main watersheds were identified with the public software, StreamStats, using five approximated outlet points. These watersheds are shown in Figure 1 outlined as white polygons together with debris flow lines shown in purple.

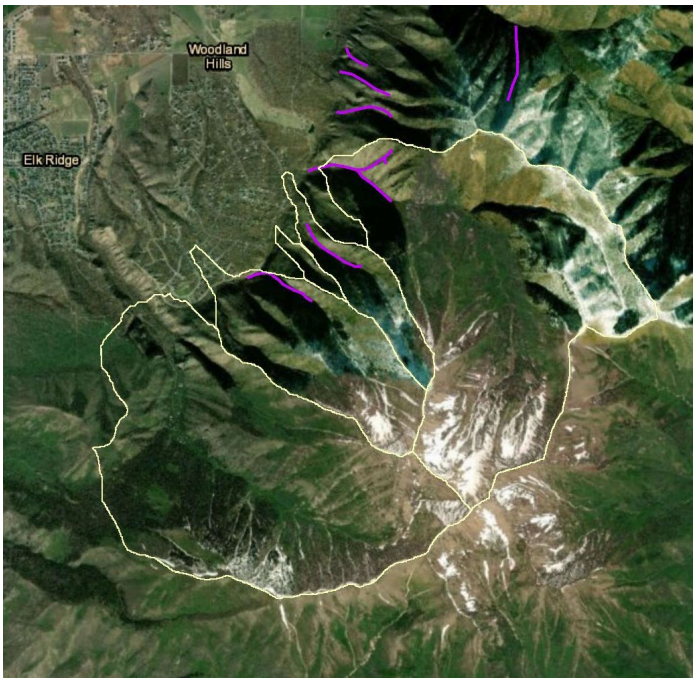


Figure 1: Preliminary Watersheds

With these watersheds as a basemap, the team met with Ted Mickelson from Jones and DeMille Engineering in Woodland Hills to become familiar with the feel of the community and identify specific outlet points. The north and south watersheds were deemed irrelevant to the study since their drainage paths enter Maple and Loafer Canyons, respectively. The three, smaller watersheds drain into the City and will be assessed for improvements. They will be referred to as Basins North, Central, and South. An outlet point was identified for each basin. An outlet point was identified with Ted for each basin based on where the flow typically entered the city and caused flooding on streets. Figure 2 shows an updated GIS map with the identified outlet points and relevant watershed basins.

Figure 2: Watershed Basin Outlet Locations

Task Two: Determining Flow Design Parameters

Data was downloaded from StreamStats[1] for each outlet point. The data was used to create monthly flow duration curves for 20, 50 and 80 percent exceedances, average monthly flow curves, and storm event plots. These figures will be presented to Ted and city personnel to determine flow design criteria that mitigates risk of overflow and economy for culverts at critical locations. Figures 3, 4, and 5 show sample curves of the mean monthly flow, storm event flow, and the March flow duration for the South Basin. Spreadsheets containing the complete data have been submitted in conjunction with this report.

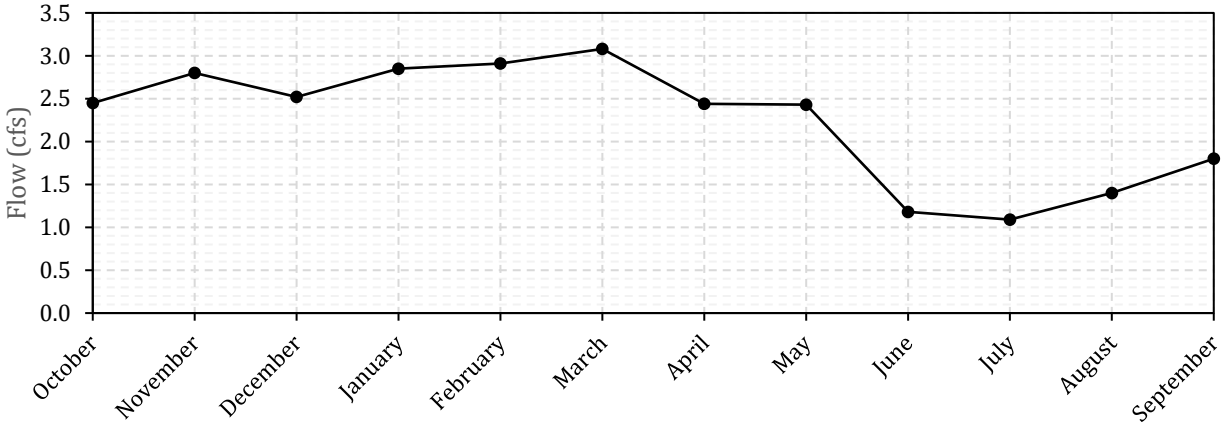


Figure 3: South Basin Mean Monthly Flow (streamstats.usgs.gov)

[1] U.S. Geological Survey, 2016, The StreamStats program, online at http://streamstats.usgs.gov, accessed on December 3, 2018.

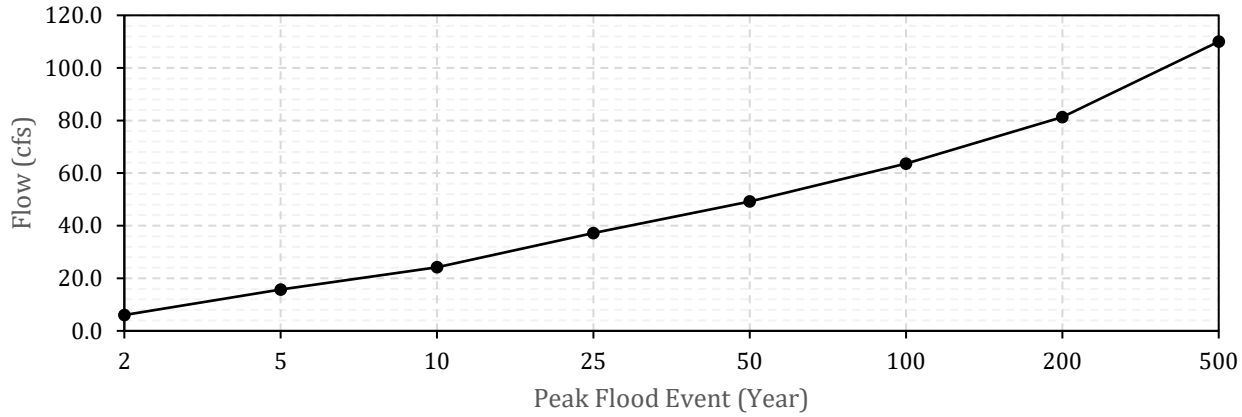


Figure 4: South Basin Storm Event Flow (streamstats.usgs.gov)

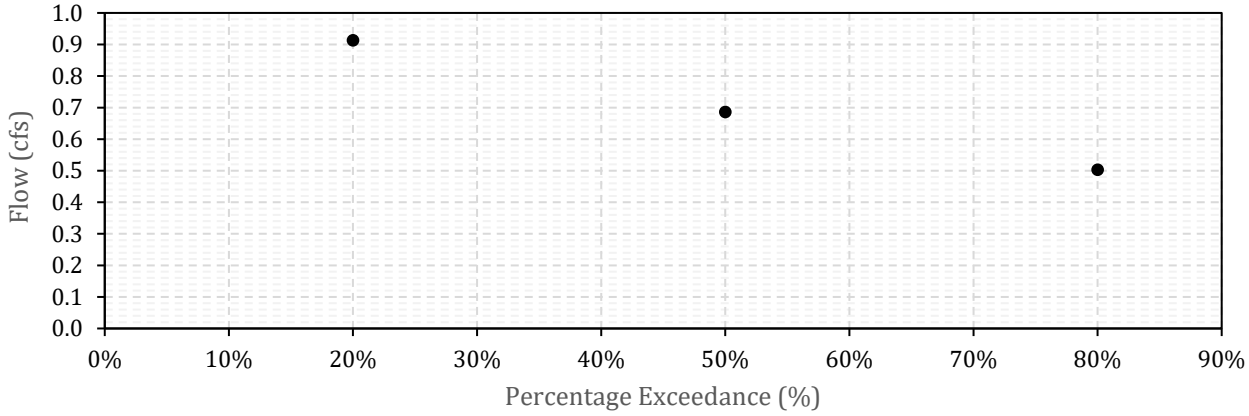


Figure 5: South Basin March Flow Duration Curve (streamstats.usgs.gov)

The team recommends that the 10-year storm event flow and the mean monthly flows be primarily considered in determining culvert flow capacity for several reasons. First, the data used to generate the flow duration curves was typically much lower than other reported flows. Designing with these parameters could severely underestimate the actual flows in the future. Additionally, the data from StreamStats only includes percentage exceedance up to 20% whereas 10% would be preferred. Finally, the data reported that several figures did not conform to expected values and could have errors.

Lessons Learned

At the initial stages of the project, the greatest challenge was defining the scope and process of the project. Our team has only taken the introductory GIS course and two of our team are currently in Hydraulics, so at first it was difficult to understand what the deliverables would be. As we met with the client, developed the Statement of Work, and met with Dr. Ames, we became familiar with the expectations of the project and the scope that would be presented. A valuable lesson has been to develop regular communication with the client and mentor to have a united understanding of expectations and status. This communication has considerably supplemented our inexperience in the area and by so doing we have learned how to use ArcGIS Pro, watershed delineation, and flow determination.

Determining the appropriate GIS software to use was another challenge. Initially, we tried to use ArcGIS 10.6 downloaded to our personal computers through the licensure provided by the University. However, the software was slow and made sharing data difficult even when saved on the shared J-drive. We have since transitioned to using ArcGIS Pro through the Citrix network and saving files on dropbox, so they are easily accessible each team member.

In addition to GIS software challenges, we had to learn to use StreamStats software in delineating watersheds and identifying flow quantities. While we initially used Hydroshare to delineate the watersheds, StreamStats provided flow data associated with the basins for analysis. As we have collected data from StreamStats, it became apparent that some of the data (in particular the flow duration) is unreliable and should not be used for culvert design.

Conclusions

Final conclusions have not been made at this point, but it has been determined that there are three main watersheds impacting the city. As such, design for future culverts will be based off of the indicated watersheds and the 10-year storm event associated with them.

Recommendations

Our plan for the recommendation is to provide a map of various culvert and rip rap sizing that will be for specific areas in Woodland Hills to route the water drainage next to and underneath the streets. Details for the rip rap sizing will be included with descriptions and conceptual drawings of the recommended Low Impact Development (LID) improvements. Unit price estimates will be provided for all recommendations. Currently, we are looking at LID rip rap that will be similar to what is currently being used in the newer developments. Figures 6, 7, and 8 are examples of existing LID rip rap that we plan on basing our design off of. We will be looking at recommending specific sizes of culverts that are the same material and type of culvert currently being used in the newer developments.

Figure 6: LID rip rap alongside a road.

Figure 7: Rip rap going into a culvert.

Figure 8: Rip rap alongside a culvert.

Appendix A

StreamStats Output Report for Central Basin

State/Region ID	UT	
Workspace ID	UT20181203234053241000	
Latitude	40.00924	
Longitude	-111.64354	
Time	12/3/2018	4:41:06 PM

Basin Characteristics for Central Basin

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.0895	square miles
OCTAVPRE	Mean October Precipitation	2.39	inches
NOVAVPRE	Mean November Precipitation	2.53	inches
DECAVPRE	Mean December Precipitation	2.23	inches
JANAVPRE	Mean January Precipitation	2.43	inches
FEBAVPRE	Mean February Precipitation	2.55	inches
LU92HRBN	Percent Natural Herbaceous Upland from NLCD1992	0	percent
FOREST	Percentage of area covered by forest	99.9	percent
ELEV	Mean Basin Elevation	6860	feet
PRECIP	Mean Annual Precipitation	27.7	inches
SEPAVPRE	Mean September Precipitation	1.7	inches
APRAVPRE	Mean April Precipitation	2.36	inches
AUGAVPRE	Mean August Precipitation	1.26	inches
BSLDEM10M	Mean basin slope computed from 10 m DEM	55.4	percent
JULAVPRE	Mean July Precipitation	0.94	inches
JUNAVPRE	Mean June Precipitation	1.16	inches
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.00906	percent
MARAVPRE	Mean March Precipitation	2.73	inches
MAYAVPRE	Mean May Precipitation	2.49	inches
SLOP30_10M	Percent area with slopes greater than 30 percent from 10-meter NED	94.4	percent

October Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
OCTAVPRE	Mean October Precipitation	2.39	inches	1.71	2.78

***** October Flow-Duration Statistics Disclaimers *****

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

October Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
October 80 Percent Duration	0.113	ft^3/s
October 50 Percent Duration	0.105	ft^3/s
October 20 Percent Duration	0.106	ft^3/s

November Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
NOVAVPRE	Mean November Precipitation	2.53	inches	1.7	3.23

***** November Flow-Duration Statistics Disclaimers *****

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

November Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
November 80 Percent Duration	0.101	ft^3/s
November 50 Percent Duration	0.0831	ft^3/s

November 20 Percent Duration	0.0765	ft^3/s

December Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
DECAVPRE	Mean December Precipitation	2.23	inches	1.45	2.83

***** December Flow-Duration Statistics Disclaimers *****

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

December Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
December 80 Percent Duration	0.0892	ft^3/s
December 50 Percent Duration	0.0861	ft^3/s
December 20 Percent Duration	0.0875	ft^3/s

January Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
JANAVPRE	Mean January Precipitation	2.43	inches	1.65	3.25

***** January Flow-Duration Statistics Disclaimers *****

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

January Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
January 80 Percent Duration	0.04	ft^3/s
January 50 Percent Duration	0.051	ft^3/s

January 20 Percent Duration	0.0565	ft^3/s

February Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
FEBAVPRE	Mean February Precipitation	2.55	inches	1.67	3.11

***** February Flow-Duration Statistics Disclaimers *****

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

February Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
February 80 Percent Duration	0.032	ft^3/s
February 50 Percent Duration	0.0393	ft^3/s
February 20 Percent Duration	0.0525	ft^3/s

March Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
LU92HRBN	Percent Nat Herb Upland from NLCD1992	0	percent	0.21	19

***** March Flow-Duration Statistics Disclaimers *****

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

March Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
March 80 Percent Duration	0.0315	ft^3/s
March 50 Percent Duration	0.0435	ft^3/s
March 20 Percent Duration	0.0521	ft^3/s

April Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450

***** April Flow-Duration Statistics Disclaimers *****

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

April Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
April 80 Percent Duration	0.167	ft^3/s
April 50 Percent Duration	0.197	ft^3/s
April 20 Percent Duration	0.257	ft^3/s

May Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
FOREST	Percent Forest	99.9	percent	8.26	90.4

***** May Flow-Duration Statistics Disclaimers *****

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

May Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
May 80 Percent Duration	0.451	ft^3/s
May 50 Percent Duration	1.2	ft^3/s
May 20 Percent Duration	2.35	ft^3/s

June Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
ELEV	Mean Basin Elevation	6860	feet	5990	9570

***** June Flow-Duration Statistics Disclaimers *****

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

June Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
June 80 Percent Duration	0.0807	ft^3/s
June 50 Percent Duration	0.172	ft^3/s
June 20 Percent Duration	0.271	ft^3/s

July Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
PRECIP	Mean Annual Precipitation	27.7	inches	19.1	31.7

***** July Flow-Duration Statistics Disclaimers *****

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

July Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
July 80 Percent Duration	0.0474	ft^3/s
July 50 Percent Duration	0.139	ft^3/s
July 20 Percent Duration	0.287	ft^3/s

August Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
PRECIP	Mean Annual Precipitation	27.7	inches	19.1	31.7

***** August Flow-Duration Statistics Disclaimers *****

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

August Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
August 80 Percent Duration	0.102	ft^3/s
August 50 Percent Duration	0.141	ft^3/s
August 20 Percent Duration	0.197	ft^3/s

September Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450
SEPAVPRE	Mean September Precipitation	1.7	inches	1.4	2.11

***** September Flow-Duration Statistics Disclaimers *****

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

September Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
September 80 Percent Duration	0.0563	ft^3/s
September 50 Percent Duration	0.0632	ft^3/s
September 20 Percent Duration	0.0833	ft^3/s

Annual Flow Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	1.98	450

***** Annual Flow Statistics Disclaimers *****

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

Annual Flow Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
Mean Annual Flow	0.239	ft^3/s

Peak-Flow Statistics Parameters **100 Percent Region 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0895	square miles	0.91	629
LU92HRBN	Percent Nat Herb Upland from NLCD1992	0	percent	2.14	15.6

***** Peak-Flow Statistics Disclaimers *****

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

Peak-Flow Statistics Flow Report **100 Percent Region 5**

Statistic	Value	Unit
2 Year Peak Flood	0.96	ft^3/s
5 Year Peak Flood	2.92	ft^3/s
10 Year Peak Flood	4.82	ft^3/s
25 Year Peak Flood	7.86	ft^3/s
50 Year Peak Flood	10.5	ft^3/s
100 Year Peak Flood	14.5	ft^3/s
200 Year Peak Flood	19.2	ft^3/s
500 Year Peak Flood	27.1	ft^3/s

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Application Version: 4.2.1

StreamStats Output Report for Northern Basin

State/Region ID	UT	
Workspace ID	UT20181203234644473000	
Latitude	40.01232	
Longitude	-111.64135	
Time	12/3/2018	4:46:57 PM

Basin Characteristics for Northern Basin

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.45	square miles
OCTAVPRE	Mean October Precipitation	2.49	inches
NOVAVPRE	Mean November Precipitation	2.87	inches
DECAVPRE	Mean December Precipitation	2.62	inches
JANAVPRE	Mean January Precipitation	2.92	inches
FEBAVPRE	Mean February Precipitation	2.98	inches
LU92HRBN	Percent Natural Herbaceous Upland from NLCD1992	0.0426	percent
FOREST	Percentage of area covered by forest	90.4	percent
ELEV	Mean Basin Elevation	8030	feet
PRECIP	Mean Annual Precipitation	27.1	inches
SEPAVPRE	Mean September Precipitation	1.88	inches
APRAVPRE	Mean April Precipitation	2.5	inches
AUGAVPRE	Mean August Precipitation	1.41	inches
BSLDEM10M	Mean basin slope computed from 10 m DEM	60.7	percent
JULAVPRE	Mean July Precipitation	1.11	inches
JUNAVPRE	Mean June Precipitation	1.22	inches
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.0163	percent
MARAVPRE	Mean March Precipitation	3.15	inches
MAYAVPRE	Mean May Precipitation	2.48	inches
SLOP30_10M	Percent area with slopes greater than 30 percent from 10-meter NED	97.2	percent

October Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
OCTAVPRE	Mean October Precipitation	2.49	inches	1.71	2.78

***** October Flow-Duration Statistics Disclaimers *****

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

October Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
October 80 Percent Duration	0.379	ft^3/s
October 50 Percent Duration	0.386	ft^3/s
October 20 Percent Duration	0.411	ft^3/s

November Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
NOVAVPRE	Mean November Precipitation	2.87	inches	1.7	3.23

***** November Flow-Duration Statistics Disclaimers *****

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

November Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
November 80 Percent Duration	0.438	ft^3/s
November 50 Percent Duration	0.391	ft^3/s
November 20 Percent Duration	0.374	ft^3/s

December Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
DECAVPRE	Mean December Precipitation	2.62	inches	1.45	2.83

***** December Flow-Duration Statistics Disclaimers *****

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

December Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
December 80 Percent Duration	0.403	ft^3/s
December 50 Percent Duration	0.394	ft^3/s
December 20 Percent Duration	0.4	ft^3/s

January Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
JANAVPRE	Mean January Precipitation	2.92	inches	1.65	3.25

***** January Flow-Duration Statistics Disclaimers *****

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

January Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
January 80 Percent Duration	0.23	ft^3/s
January 50 Percent Duration	0.267	ft^3/s
January 20 Percent Duration	0.292	ft^3/s

February Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
FEBAVPRE	Mean February Precipitation	2.98	inches	1.67	3.11

***** February Flow-Duration Statistics Disclaimers *****

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

February Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
February 80 Percent Duration	0.182	ft^3/s
February 50 Percent Duration	0.212	ft^3/s
February 20 Percent Duration	0.258	ft^3/s

March Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
LU92HRBN	Percent Nat Herb Upland from NLCD1992	0.0426	percent	0.21	19

***** March Flow-Duration Statistics Disclaimers *****

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

March Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
March 80 Percent Duration	0.172	ft^3/s
March 50 Percent Duration	0.236	ft^3/s
March 20 Percent Duration	0.301	ft^3/s

April Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450

***** April Flow-Duration Statistics Disclaimers *****

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

April Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
April 80 Percent Duration	0.48	ft^3/s
April 50 Percent Duration	0.622	ft^3/s
April 20 Percent Duration	0.901	ft^3/s

May Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
FOREST	Percent Forest	90.4	percent	8.26	90.4

***** May Flow-Duration Statistics Disclaimers *****

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

May Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
May 80 Percent Duration	1.21	ft^3/s
May 50 Percent Duration	3	ft^3/s
May 20 Percent Duration	5.83	ft^3/s

June Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
ELEV	Mean Basin Elevation	8030	feet	5990	9570

***** June Flow-Duration Statistics Disclaimers *****

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

June Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
June 80 Percent Duration	0.49	ft^3/s
June 50 Percent Duration	1.07	ft^3/s
June 20 Percent Duration	1.83	ft^3/s

100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Name	Value	Units	Min Limit	Max Limit
Drainage Area	0.45	square miles	1.98	450
Mean Annual Precipitation	27.1	inches	19.1	31.7

***** July Flow-Duration Statistics Disclaimers *****

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

July Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
July 80 Percent Duration	0.182	ft^3/s
July 50 Percent Duration	0.464	ft^3/s
July 20 Percent Duration	0.893	ft^3/s

August Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
PRECIP	Mean Annual Precipitation	27.1	inches	19.1	31.7

***** August Flow-Duration Statistics Disclaimers *****

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

August Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
August 80 Percent Duration	0.293	ft^3/s
August 50 Percent Duration	0.419	ft^3/s
August 20 Percent Duration	0.591	ft^3/s

September Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450
SEPAVPRE	Mean September Precipitation	1.88	inches	1.4	2.11

***** September Flow-Duration Statistics Disclaimers *****

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

September Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
September 80 Percent Duration	0.27	ft^3/s
September 50 Percent Duration	0.319	ft^3/s
September 20 Percent Duration	0.407	ft^3/s

Annual Flow Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	1.98	450

***** Annual Flow Statistics Disclaimers *****

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

Annual Flow Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
Mean Annual Flow	0.744	ft^3/s

Peak-Flow Statistics Parameters 100 Percent Region 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.45	square miles	0.91	629
LU92HRBN	Percent Nat Herb Upland from NLCD1992	0.0426	percent	2.14	15.6

***** Peak-Flow Statistics Disclaimers *****

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

Peak-Flow Statistics Flow Report 100 Percent Region 5

Statistic	Value	Unit
2 Year Peak Flood	2.68	ft^3/s
5 Year Peak Flood	7.52	ft^3/s
10 Year Peak Flood	12	ft^3/s
25 Year Peak Flood	19	ft^3/s
50 Year Peak Flood	25.4	ft^3/s
100 Year Peak Flood	33.7	ft^3/s
200 Year Peak Flood	43.8	ft^3/s
500 Year Peak Flood	60.5	ft^3/s

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Application Version: 4.2.1

StreamStats Output Report for Southern Basin

State/Region ID	UT	
Workspace ID	UT20181203232837091000	
Latitude	40.00305	
Longitude	-111.65206	
Time	12/3/2018	4:28:50 PM

Basin Characteristics for Southern Basin

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.25	square miles
OCTAVPRE	Mean October Precipitation	2.45	inches
NOVAVPRE	Mean November Precipitation	2.8	inches
DECAVPRE	Mean December Precipitation	2.52	inches
JANAVPRE	Mean January Precipitation	2.85	inches
FEBAVPRE	Mean February Precipitation	2.91	inches
LU92HRBN	Percent Natural Herbaceous Upland from NLCD1992	0.47	percent
FOREST	Percentage of area covered by forest	88.2	percent
ELEV	Mean Basin Elevation	8190	feet
PRECIP	Mean Annual Precipitation	27.2	inches
SEPAVPRE	Mean September Precipitation	1.8	inches
APRAVPRE	Mean April Precipitation	2.44	inches
AUGAVPRE	Mean August Precipitation	1.4	inches
BSLDEM10M	Mean basin slope computed from 10 m DEM	59.3	percent
JULAVPRE	Mean July Precipitation	1.09	inches
JUNAVPRE	Mean June Precipitation	1.18	inches
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0	percent
MARAVPRE	Mean March Precipitation	3.08	inches
MAYAVPRE	Mean May Precipitation	2.43	inches
SLOP30_10M	Percent area with slopes greater than 30 percent from 10-meter NED	95.1	percent

October Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
OCTAVPRE	Mean October Precipitation	2.45	inches	1.71	2.78

***** October Flow-Duration Statistics Disclaimers *****

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

October Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
October 80 Percent Duration	0.707	ft^3/s
October 50 Percent Duration	0.77	ft^3/s
October 20 Percent Duration	0.857	ft^3/s

November Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
NOVAVPRE	Mean November Precipitation	2.8	inches	1.7	3.23

***** November Flow-Duration Statistics Disclaimers *****

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

November Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
November 80 Percent Duration	0.806	ft^3/s
November 50 Percent Duration	0.787	ft^3/s
November 20 Percent Duration	0.8	ft^3/s

December Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
DECAVPRE	Mean December Precipitation	2.52	inches	1.45	2.83

***** December Flow-Duration Statistics Disclaimers *****

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

December Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
December 80 Percent Duration	0.72	ft^3/s
December 50 Percent Duration	0.749	ft^3/s
December 20 Percent Duration	0.799	ft^3/s

January Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
JANAVPRE	Mean January Precipitation	2.85	inches	1.65	3.25

***** January Flow-Duration Statistics Disclaimers *****

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

January Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
January 80 Percent Duration	0.472	ft^3/s
January 50 Percent Duration	0.56	ft^3/s
January 20 Percent Duration	0.63	ft^3/s

February Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
FEBAVPRE	Mean February Precipitation	2.91	inches	1.67	3.11

***** February Flow-Duration Statistics Disclaimers *****

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

February Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
February 80 Percent Duration	0.405	ft^3/s
February 50 Percent Duration	0.481	ft^3/s
February 20 Percent Duration	0.584	ft^3/s

March Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
LU92HRBN	Percent Nat Herb Upland from NLCD1992	0.47	percent	0.21	19

***** March Flow-Duration Statistics Disclaimers *****

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

March Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
March 80 Percent Duration	0.503	ft^3/s
March 50 Percent Duration	0.686	ft^3/s
March 20 Percent Duration	0.913	ft^3/s

April Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450

***** April Flow-Duration Statistics Disclaimers *****

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

April Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
April 80 Percent Duration	0.937	ft^3/s
April 50 Percent Duration	1.29	ft^3/s
April 20 Percent Duration	1.99	ft^3/s

May Flow-Duration Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
FOREST	Percent Forest	88.2	percent	8.26	90.4

***** May Flow-Duration Statistics Disclaimers *****

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

May Flow-Duration Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
May 80 Percent Duration	2.34	ft^3/s
May 50 Percent Duration	5.62	ft^3/s
May 20 Percent Duration	11	ft^3/s

June Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
ELEV	Mean Basin Elevation	8190	feet	5990	9570

***** June Flow-Duration Statistics Disclaimers *****

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

June Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
June 80 Percent Duration	1.14	ft^3/s
June 50 Percent Duration	2.44	ft^3/s
June 20 Percent Duration	4.25	ft^3/s

July Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
PRECIP	Mean Annual Precipitation	27.2	inches	19.1	31.7

***** July Flow-Duration Statistics Disclaimers *****

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

July Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
July 80 Percent Duration	0.452	ft^3/s
July 50 Percent Duration	1.04	ft^3/s
July 20 Percent Duration	1.91	ft^3/s

August Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
PRECIP	Mean Annual Precipitation	27.2	inches	19.1	31.7

***** August Flow-Duration Statistics Disclaimers *****

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

August Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
August 80 Percent Duration	0.603	ft^3/s
August 50 Percent Duration	0.873	ft^3/s
August 20 Percent Duration	1.24	ft^3/s

September Flow-Duration Statistics Parameters **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450
SEPAVPRE	Mean September Precipitation	1.8	inches	1.4	2.11

***** September Flow-Duration Statistics Disclaimers *****

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

September Flow-Duration Statistics Flow Report **100 Percent Mean Flow SIR08 5230 Regions 3 and 5**

Statistic	Value	Unit
September 80 Percent Duration	0.466	ft^3/s
September 50 Percent Duration	0.576	ft^3/s
September 20 Percent Duration	0.753	ft^3/s

Annual Flow Statistics Parameters 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	1.98	450

***** Annual Flow Statistics Disclaimers *****

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

Annual Flow Statistics Flow Report 100 Percent Mean Flow SIR08 5230 Regions 3 and 5

Statistic	Value	Unit
Mean Annual Flow	1.52	ft^3/s

Peak-Flow Statistics Parameters 100 Percent Region 5

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.25	square miles	0.91	629
LU92HRBN	Percent Nat Herb Upland from NLCD1992	0.47	percent	2.14	15.6

***** Peak-Flow Statistics Disclaimers *****

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

Peak-Flow Statistics Flow Report 100 Percent Region 5

Statistic	Value	Unit
2 Year Peak Flood	6.03	ft^3/s
5 Year Peak Flood	15.7	ft^3/s
10 Year Peak Flood	24.2	ft^3/s
25 Year Peak Flood	37.2	ft^3/s
50 Year Peak Flood	49.2	ft^3/s
100 Year Peak Flood	63.6	ft^3/s
200 Year Peak Flood	81.3	ft^3/s
500 Year Peak Flood	110	ft^3/s

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Application Version: 4.2.1

Ryan A. Smart

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Summary

I am a Civil Engineering student at Brigham Young University specializing in Structural Engineering. I like to solve problems and enjoy the sense of accomplishment in building, translating plans into reality, and creating new things.

Education

B.S. IN CIVIL ENGINEERING | BRIGHAM YOUNG UNIVERSITY

- Major: Structural Engineering
- Anticipated graduation date: December 2019
- Capstone project of citywide drain analysis for the city of Woodland Hills in Utah.

AUGUST 2011-APRIL 2012; JANUARY 2015-APRIL 2016| UTAH VALLEY UNIVERSITY

- Completed Pre-Engineering courses through April 2016

Experience

STUDENT ASSISTANT | LDS PHILANTHROPIES | MAY 2016-PRESENT

- Support the Executive Assistant to the Managing Director of LDS Philanthropies

LABORER - CARPENTRY | ARTISAN BUILDERS & CONSTRUCTORS | SEPT. 2015 – MAY 2016

- Constructed various remodels and basement finishing in Utah county

LABORER | CHRISTENSEN BROS. CONSTRUCTION | JUNE 2015 – SEPT. 2015

- Prepared and installed a radiant heating system for a driveway remodel

INSULATION INSTALLER | SUNROC BUILDING MATERIALS | NOV. 2014 – MAY 2015

- Installed insulation in Utah and Salt Lake counties

Skills & Abilities

- **Revit and AutoCAD skills**
- **Tagalog language**
- **Woodworking skills**
- **Graphic Design**
- **Wiki Pages**

References

RYAN DEWEY – ENTREPRENEUR, FORMER COO KT TAPE – 801-494-9429

DR. CRAIG COOK – SURGEON, INTERMOUNTAIN HEALTHCARE COMPANY – 801-368-2559

Nicole Hastings

www.linkedin.com/in/nhastings3 -:- (503) 519-3530 -:- nicole.hastings@byu.edu

Education

April 2019
Provo, Utah

B.S. Civil and Environmental Engineering *Brigham Young University*
Relevant courses:
Hydraulic Engineering, Foundation Engineering, Reinforced Concrete Design, Structural Analysis, Fluid Mechanics, Concrete and Steel Properties

Experience

June 2018 - Present
Provo, Utah

Research Assistant
Brigham Young University – C-UAS Prism Lab
- Learning to pilot unmanned aerial vehicles (UAV's) to further research
- Creating 3D models of buildings and areas using Agisoft PhotoScan and Bentley ContextCapture from pictures and videos taken by UAV's
- Traveled to Italy in June 2018 to survey and fly UAV's over landslides and city ruins caused by the earthquakes in 2016

Feb 2018 - June 2018
Provo, Utah

Civil Engineering Intern
Brigham Young University – Physical Facilities
- Surveyed storm drains and manholes for storm drain inventory and analysis project
- Created topographic surfaces for project planning
- Updated master utility and site plans to maintain validity

May 2016 - Feb 2018
Provo, Utah

Computer Technician
Brigham Young University – Physical Facilities
- Assisted with 7+ service calls a day for network and hardware problems
- Communicated with coworkers and clients about computer issues daily
- Kept printers operational by exchanging toner or parts

Skills

Computer
- Working proficiency in Bentley ContextCapture and Agisoft PhotoScan
- Working proficiency in Microsoft Word and Excel
- Working proficiency in AutoCAD Civil 3D
- Basic proficiency in Revit and ArcGIS
- Basic knowledge of C++, Python and VBA
- Working proficiency in Troubleshooting

General
- Organizational skills
- Learn new programs quickly
- Moderate proficiency in modern surveying
- Passed Utah FE Exam in March 2018
- Licensed Amateur Ham Radio Operator

HANNA OPDAHL
(503) 369-4155
HOPDAHL12@GMAIL.COM

EDUCATION

- **B.S. Civil Engineering**, Brigham Young University; Provo, UT — April 2019
  -Cumulative GPA 3.93/4.00
- Materials Engineering Research, University of Cambridge; Cambridge, UK — July 2018
- Tau Beta Pi; Engineering Honors Society

WORK

TA/Lab Director, Civil Engineering Department, BYU; Provo, UT — Jan 2018-Current

- Tutor a junior level course covering properties of engineering materials
- Lead weekly lab of 10 students testing metals, wood, concrete and asphalt

Engineering Intern, Lower Columbia Engineering; St Helens, OR — 2014-Current

- Research and compile a Water System Master Plan for a population of 2,200
- Technical calculations for lateral and vertical engineering
- Civil site development and field surveying using Total Station and RTK equipment
- Reference: Andrew Niemi (503) 366-0399

MEP Drafter, Electrical Engineering Department, BYU; Provo UT — Oct 2016-April 2017

- AutoDesk software (Visual, REVIT and AutoCAD)
- Prepare cost estimates for commercial projects of value up to $500,000
- Develop software program for team communication and project status

VOLUNTEER

Global Engineering Outreach, BYU & Navajo Nations; Bluff, UT — March 2018

- Construct a community center from rammed earth methods

ASCE Member, BYU Student Chapter; Provo, UT — Sept 2013-Current

- Residential building projects with Habitat for Humanity
- Provide engineering activities for children through Provo Community Action

Full-time Representative, ASPERSUD; Trujillo, Peru — Feb 2015-Aug 2016

- Provide 12-week training to new volunteers
- Record and follow-up with the individual progress of 15+ clients
- Develop strategies, manuals, and goals for 150 volunteers

QUALIFICATIONS

- Fluent in Spanish
- Structural Analysis using SAP2000
- Computer Programing with VBA
- HAM radio certified

Daniel Fiso

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731 N University Ave Provo, UT 84601
www.linkedin.com/in/daniel-fiso

EDUCATION

Aug '16 – Dec '19
Provo, UT

BRIGHAM YOUNG UNIVERSITY
Bachelor of Science, Civil Engineering
Minor, Mandarin Chinese

- Related Courses: Reinforced Concrete Design, Structural Analysis, Revit, AutoCAD, Statics, Material Science, Fluid Mechanics, Transportation Engineering
- Capstone Project: Woodland Hills Drainage Study
- Extra-Curricular: ASCE member

EXPERIENCE

May '18 – Aug '18
Pleasant Grove, UT

HORROCKS ENGINEERS
Structural Engineering Intern

- Analyzed details meticulously when checking shop drawings for compliance to structural drawings
- Designed retaining wall using Enercalc
- Calculated cost estimates for multiple projects
- Drafted various details in response to RFIs using AutoCAD and Revit

Aug '15 – Sept '17
Provo, UT

NU SKIN ENTERPRISES
Mandarin Distributor Support Representative

- Maintained excellent customer service ratings over the phone in Mandarin
- Solved problems for 25+ customers daily
- Consulted customers on how to maximize income and take advantage of company opportunities
- Composed detailed and organized notes regarding interactions with customers

Aug '14 – Aug '15
Provo, UT

RIMPORTS LLC.
Production Worker

- Maintained high quality of products through close attention to details
- Collaborated on Safety committee to ensure well-being of employees
- Certified to operate forklifts and other factory equipment
- Accomplished deadlines for production while self-monitoring work quality

SERVICE

- 2-year Religious Mission in Taiwan
  - Established standards as a leader of 40+ missionaries
  - Professionally speak, read, and write Mandarin Chinese
- Eagle Scout Project
  - Organized clothing drive for families in need

SKILLS

- Working proficiency in AutoCAD and Revit
- Reliable, independent worker
- Excellent organizational skills