

DRAFT

APPENDIX C

Hydrologic and Hydraulic Calculations

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/10/2014 2:24 PM

Input File Name: TDA 1.fld
Project Name: ELST - S Sammamish
Analysis Title: TDA 1 Flow Analysis
Comments: STA 216+80 to STA 226+50

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 216+80 to STA 226+50 -----

-----Area(Acres) -----

Till Forest	0.330
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.330

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 216+80 to STA 226+50 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.120
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.210

Subbasin Total 0.330

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 0

*****Groundwater Recharge Summary*****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
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Subbasin: STA 216+80 to STA 22 57.218

Total: 57.218

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: STA 216+80 to STA 22	14.750

Total:	14.750

**Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)**
Predeveloped: 0.362 ac-ft/year, Post Developed: 0.093 ac-ft/year

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: STA 216+80 to STA 226+50

Scenario Postdeveloped Compliance Subbasin: STA 216+80 to STA 226+50

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	7.006E-03	2-Year	6.430E-02
5-Year	1.196E-02	5-Year	8.283E-02
10-Year	1.488E-02	10-Year	9.897E-02
25-Year	1.920E-02	25-Year	0.123
50-Year	2.311E-02	50-Year	0.129
100-Year	2.775E-02	100-Year	0.146
200-Year	3.752E-02	200-Year	0.169

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/12/2014 12:17 PM

Input File Name: TDA 2.fld
Project Name: ELST - S Sammamish
Analysis Title: TDA 2 Flow Analysis
Comments: STA 226+50 to STA 229+15

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 226+50 to STA 229+15 -----

-----Area(Acres) -----

Till Forest	0.240
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.240

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 226+50 to STA 229+15 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.240

Subbasin Total 0.240

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 0

*****Groundwater Recharge Summary*****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 226+50 to STA 22	41.613
Total:	41.613

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: STA 226+50 to STA 22	0.000

Total:	0.000

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.263 ac-ft/year, Post Developed: 0.000 ac-ft/year

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: STA 226+50 to STA 229+15

Scenario Postdeveloped Compliance Subbasin: STA 226+50 to STA 229+15

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	5.096E-03	2-Year	6.681E-02
5-Year	8.697E-03	5-Year	8.581E-02
10-Year	1.082E-02	10-Year	9.572E-02
25-Year	1.396E-02	25-Year	0.112
50-Year	1.681E-02	50-Year	0.124
100-Year	2.018E-02	100-Year	0.140
200-Year	2.729E-02	200-Year	0.148

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/12/2014 12:17 PM

Input File Name: TDA 3.fld
Project Name: ELST - S Sammamish
Analysis Title: TDA 3 Flow Analysis
Comments: STA 229+15 to STA 234+50

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing

Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097

Evaporation Station : 961040 Puget East 40 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1

HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 229+15 to STA 234+50 -----

-----Area(Acres) -----

Till Forest	0.380
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.380

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 229+15 to STA 234+50 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.180
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.200

Subbasin Total 0.380

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 0

*****Groundwater Recharge Summary*****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 229+15 to STA 23	65.887
Total:	65.887

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: STA 229+15 to STA 23	22.126

Total:	22.126

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.417 ac-ft/year, Post Developed: 0.140 ac-ft/year

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: STA 229+15 to STA 234+50

Scenario Postdeveloped Compliance Subbasin: STA 229+15 to STA 234+50

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	8.068E-03	2-Year	6.546E-02
5-Year	1.377E-02	5-Year	8.375E-02
10-Year	1.713E-02	10-Year	0.100
25-Year	2.211E-02	25-Year	0.131
50-Year	2.662E-02	50-Year	0.140
100-Year	3.195E-02	100-Year	0.152
200-Year	4.320E-02	200-Year	0.182

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/12/2014 12:16 PM

Input File Name: TDA 4.fld
Project Name: ELST - S Sammamish
Analysis Title: TDA 4 Flow Analysis
Comments: STA 234+50 to STA 239+00 with Infiltration Trench Land Use Credits Applied

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 234+50 to STA 239+00 -----

	-----Area(Acres) -----
Till Forest	0.320
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total	0.320

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 234+50 to STA 239+00 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.150
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.150

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 0

*****Groundwater Recharge Summary*****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 234+50 to STA 23	55.484
Total:	55.484

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: STA 234+50 to STA 23	18.438

Total:	18.438

**Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.351 ac-ft/year, Post Developed: 0.117 ac-ft/year**

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: STA 234+50 to STA 239+00

Scenario Postdeveloped Compliance Subbasin: STA 234+50 to STA 239+00

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	6.794E-03	2-Year	9.170E-03
5-Year	1.160E-02	5-Year	1.479E-02
10-Year	1.443E-02	10-Year	2.148E-02
25-Year	1.862E-02	25-Year	3.000E-02
50-Year	2.241E-02	50-Year	3.686E-02
100-Year	2.691E-02	100-Year	4.215E-02
200-Year	3.638E-02	200-Year	5.297E-02

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/12/2014 12:17 PM

Input File Name: TDA 5.fld
Project Name: ELST - S Sammamish
Analysis Title: TDA 5 Flow Analysis
Comments: STA 239+00 to STA 241+50

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 239+00 to STA 241+50 -----

-----Area(Acres) -----

Till Forest	0.170
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.170

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 239+00 to STA 241+50 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.080
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.090

Subbasin Total 0.170

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 0

*****Groundwater Recharge Summary*****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 239+00 to STA 24	29.476
Total:	29.476

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: STA 239+00 to STA 24	9.834

Total:	9.834

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.187 ac-ft/year, Post Developed: 0.062 ac-ft/year

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: STA 239+00 to STA 241+50

Scenario Postdeveloped Compliance Subbasin: STA 239+00 to STA 241+50

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	3.609E-03	2-Year	2.939E-02
5-Year	6.160E-03	5-Year	3.763E-02
10-Year	7.665E-03	10-Year	4.490E-02
25-Year	9.890E-03	25-Year	5.882E-02
50-Year	1.191E-02	50-Year	6.280E-02
100-Year	1.429E-02	100-Year	6.821E-02
200-Year	1.933E-02	200-Year	8.156E-02

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/12/2014 12:18 PM

Input File Name: TDA 6.fld
Project Name: ELST - S Sammamish
Analysis Title: TDA 6 Flow Analysis
Comments: STA 241+50 to STA 244+05 with 50% Impervious, 50% Grass for Basic
Dispersion of Trail Impervious surface

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 241+50 to STA 244+05 -----
-----Area(Acres) -----

Till Forest	0.210
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.210

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 241+50 to STA 244+05 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.160
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.050

Subbasin Total 0.210

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 0

*****Groundwater Recharge Summary*****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
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Subbasin: STA 241+50 to STA 24 36.411

Total: 36.411

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: STA 241+50 to STA 24	19.667
Total:	19.667

**Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.230 ac-ft/year, Post Developed: 0.124 ac-ft/year**

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: STA 241+50 to STA 244+05

Scenario Postdeveloped Compliance Subbasin: STA 241+50 to STA 244+05

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	4.459E-03	2-Year	2.246E-02
5-Year	7.610E-03	5-Year	3.139E-02
10-Year	9.469E-03	10-Year	4.014E-02
25-Year	1.222E-02	25-Year	5.470E-02
50-Year	1.471E-02	50-Year	6.267E-02
100-Year	1.766E-02	100-Year	6.713E-02
200-Year	2.388E-02	200-Year	8.500E-02

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/12/2014 12:18 PM

Input File Name: TDA 7.fld
Project Name: ELST - S Sammamish
Analysis Title: TDA 7 Flow Analysis
Comments: STA 244+05 to STA 249+25 with Infiltration Trench Land Use Credits Applied

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 244+05 to STA 249+25 -----

-----Area(Acres) -----

Till Forest	0.360
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.360

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 244+05 to STA 249+25 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.170
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.170

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 0

*****Groundwater Recharge Summary*****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 244+05 to STA 24	62.419
Total:	62.419

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: STA 244+05 to STA 24	20.896

Total:	20.896

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.395 ac-ft/year, Post Developed: 0.132 ac-ft/year

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: STA 244+05 to STA 249+25

Scenario Postdeveloped Compliance Subbasin: STA 244+05 to STA 249+25

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	7.643E-03	2-Year	1.039E-02
5-Year	1.305E-02	5-Year	1.676E-02
10-Year	1.623E-02	10-Year	2.434E-02
25-Year	2.094E-02	25-Year	3.400E-02
50-Year	2.522E-02	50-Year	4.177E-02
100-Year	3.027E-02	100-Year	4.777E-02
200-Year	4.093E-02	200-Year	6.003E-02

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/12/2014 12:18 PM

Input File Name: TDA 8.fld
Project Name: ELST - S Sammamish
Analysis Title: TDA 8 Flow Analysis
Comments: STA 249+25 to STA 261+50, Impervious areas to Infiltration Trenches are excluded from this analysis.

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 249+25 to STA 261+50 -----
-----Area(Acres) -----

Till Forest	0.400
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.340
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.740

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 249+25 to STA 261+50 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.150
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.140
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.290

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 0

*****Groundwater Recharge Summary *****

Recharge is computed as input to PerInd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
---------------	--

Subbasin: STA 249+25 to STA 26 159.754

Total: 159.754

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: STA 249+25 to STA 26	65.082
Total:	65.082

**Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)**
Predeveloped: 1.011 ac-ft/year, Post Developed: 0.412 ac-ft/year

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: STA 249+25 to STA 261+50

Scenario Postdeveloped Compliance Subbasin: STA 249+25 to STA 261+50

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	8.503E-03	2-Year	9.395E-03
5-Year	1.450E-02	5-Year	1.652E-02
10-Year	1.806E-02	10-Year	2.590E-02
25-Year	2.340E-02	25-Year	3.280E-02
50-Year	2.804E-02	50-Year	4.253E-02
100-Year	3.387E-02	100-Year	6.312E-02
200-Year	4.563E-02	200-Year	7.880E-02

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/12/2014 12:20 PM

Input File Name: TDA 9.fld
Project Name: ELST - S Sammamish
Analysis Title: TDA 9 Flow Analysis
Comments: STA 261+50 to STA 283+02 with Infiltration Trench Land Use Credits Applied

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 261+50 to STA 283+02 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	1.650
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 1.650

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 261+50 to STA 283+02 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.830
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.830

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 0

*****Groundwater Recharge Summary*****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 261+50 to STA 28	438.701
Total:	438.701

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: STA 261+50 to STA 28	276.530

Total:	276.530

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 2.777 ac-ft/year, Post Developed: 1.750 ac-ft/year

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 0

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: STA 261+50 to STA 283+02

Scenario Postdeveloped Compliance Subbasin: STA 261+50 to STA 283+02

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	3.238E-04	2-Year	1.954E-03
5-Year	3.305E-04	5-Year	9.235E-03
10-Year	3.322E-04	10-Year	2.210E-02
25-Year	7.696E-04	25-Year	4.567E-02
50-Year	1.527E-03	50-Year	6.412E-02
100-Year	2.362E-03	100-Year	0.136
200-Year	4.249E-03	200-Year	0.157

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/08/2014 3:41 PM

Input File Name: IT1-TDA4.fld
Project Name: ELST - S Sammamish
Analysis Title: Infiltration Trench Sizing
Comments: TDA 4 Infiltration trench 1 from STA 234+75 to STA 238+67

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected

Climatic Region Number: 13

Full Period of Record Available used for Routing

Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097

Evaporation Station : 961040 Puget East 40 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1

HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : TDA 4 -----
-----Area(Acres) -----
Till Forest 0.170
Till Pasture 0.000
Till Grass 0.000
Outwash Forest 0.000
Outwash Pasture 0.000
Outwash Grass 0.000
Wetland 0.000
Green Roof 0.000
User 0.000
Impervious 0.000

Subbasin Total 0.170

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : TDA 4 -----
-----Area(Acres) -----
Till Forest 0.000
Till Pasture 0.000
Till Grass 0.000
Outwash Forest 0.000
Outwash Pasture 0.000
Outwash Grass 0.000
Wetland 0.000
Green Roof 0.000
User 0.000
Impervious 0.170

Subbasin Total 0.170

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

Link Name: Infil Trench 1

Link Type: Infiltration Trench

Downstream Link: None

Trench Type : Trench on Embankment Sideslope
Trench Length (ft) : 392.00
Trench Width (ft) : 3.00
Trench Depth (ft) : 2.00
Trench Bottom Elev (ft) : 100.00
Trench Rockfill Porosity (%) : 30.00

Constant Infiltration Option Used

Infiltration Rate (in/hr): 0.50

Structure Stage, Storage Discharge Tables

Link: Lnk1 Infil Trench 1

Elev (ft)	Storage (ac-ft)	Discharge (cfs)	Infil Discharge (cfs)
--------------	--------------------	--------------------	--------------------------

100.000	0.000	0.000	0.000
100.010	8.099E-05	5.000E-08	1.370E-02
100.020	1.620E-04	1.000E-07	1.379E-02
100.040	3.240E-04	2.000E-07	1.397E-02
100.080	6.479E-04	4.000E-07	1.434E-02
100.120	9.719E-04	6.000E-07	1.470E-02
100.160	1.296E-03	8.000E-07	1.506E-02
100.200	1.620E-03	1.000E-06	1.543E-02
100.240	1.944E-03	1.200E-06	1.579E-02
100.280	2.268E-03	1.400E-06	1.615E-02
100.320	2.592E-03	1.600E-06	1.651E-02
100.360	2.916E-03	1.800E-06	1.688E-02
100.400	3.240E-03	2.000E-06	1.724E-02
100.440	3.564E-03	2.200E-06	1.760E-02
100.480	3.888E-03	2.400E-06	1.797E-02
100.520	4.212E-03	2.600E-06	1.833E-02
100.560	4.536E-03	2.800E-06	1.869E-02
100.600	4.860E-03	3.000E-06	1.906E-02
100.640	5.183E-03	3.200E-06	1.942E-02
100.680	5.507E-03	3.400E-06	1.978E-02
100.720	5.831E-03	3.600E-06	2.014E-02
100.760	6.155E-03	3.800E-06	2.051E-02
100.800	6.479E-03	4.000E-06	2.087E-02
100.840	6.803E-03	4.200E-06	2.123E-02
100.880	7.127E-03	4.400E-06	2.160E-02
100.920	7.451E-03	4.600E-06	2.196E-02
100.960	7.775E-03	4.800E-06	2.232E-02
101.000	8.099E-03	5.000E-06	2.269E-02
101.040	8.423E-03	5.200E-06	2.305E-02
101.080	8.747E-03	5.400E-06	2.341E-02
101.120	9.071E-03	5.600E-06	2.377E-02
101.160	9.395E-03	5.800E-06	2.414E-02
101.200	9.719E-03	6.000E-06	2.450E-02
101.240	1.004E-02	6.200E-06	2.486E-02
101.280	1.037E-02	6.400E-06	2.523E-02
101.320	1.069E-02	6.600E-06	2.559E-02
101.360	1.101E-02	6.800E-06	2.595E-02
101.400	1.134E-02	7.000E-06	2.631E-02
101.440	1.166E-02	7.200E-06	2.668E-02
101.480	1.199E-02	7.400E-06	2.704E-02
101.520	1.231E-02	7.600E-06	2.740E-02
101.560	1.263E-02	7.800E-06	2.777E-02
101.600	1.296E-02	8.000E-06	2.813E-02
101.640	1.328E-02	8.200E-06	2.849E-02
101.680	1.361E-02	8.400E-06	2.886E-02
101.720	1.393E-02	8.600E-06	2.922E-02
101.760	1.425E-02	8.800E-06	2.958E-02
101.800	1.458E-02	9.000E-06	2.994E-02
101.840	1.490E-02	9.200E-06	3.031E-02
101.880	1.523E-02	9.400E-06	3.067E-02
101.920	1.555E-02	9.600E-06	3.103E-02
101.960	1.587E-02	9.800E-06	3.140E-02
102.000	1.620E-02	1.000E-05	3.176E-02
102.005	1.624E-02	0.277	3.176E-02
102.010	1.628E-02	0.784	3.176E-02

102.015	1.632E-02	1.440	3.176E-02
102.020	1.636E-02	2.217	3.176E-02
102.025	1.640E-02	3.099	3.176E-02
102.030	1.644E-02	4.074	3.176E-02
102.035	1.648E-02	5.134	3.176E-02
102.040	1.652E-02	6.272	3.176E-02
102.045	1.656E-02	7.484	3.176E-02
102.050	1.660E-02	8.765	3.176E-02
102.055	1.664E-02	10.113	3.176E-02
102.060	1.668E-02	11.522	3.176E-02
102.065	1.672E-02	12.992	3.176E-02
102.070	1.677E-02	14.520	3.176E-02
102.075	1.681E-02	16.103	3.176E-02
102.080	1.685E-02	17.740	3.176E-02
102.085	1.689E-02	19.429	3.176E-02
102.090	1.693E-02	21.168	3.176E-02
102.095	1.697E-02	22.956	3.176E-02
102.100	1.701E-02	24.792	3.176E-02

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

Number of Links: 1

*****Groundwater Recharge Summary *****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: TDA 4	29.476
Total:	29.476

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: TDA 4	0.000
Link: Infiltration Trench 1	75.078
Total:	75.078

**Total Predevelopment Recharge is Less than Post Developed
Average Recharge Per Year, (Number of Years= 158)**

Predeveloped: 0.187 ac-ft/year, Post Developed: 0.475 ac-ft/year

*****Water Quality Facility Data *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

***** Link: Infil Trench 1 *****

Infiltration/Filtration Statistics-----

Total Runoff Volume (ac-ft): 75.08

Total Runoff Infiltrated (ac-ft): 75.08, 100.00%

Total Runoff Filtered (ac-ft): 0.00, 0.00%

Percent Treated (Infiltrated+Filtered)/Total Volume: 100.00%

*****Compliance Point Results *****

Scenario Predeveloped Compliance Subbasin: TDA 4

Scenario Postdeveloped Compliance Link: Infil Trench 1

****Point of Compliance Annual Maxima Flow Data ****

Predevelopment Runoff		Postdevelopment Runoff	
Date	Annual Max Q (cfs)	Date	Annual Max Q (cfs)
04/30/1940	4.623E-03	04/30/1940	0.000
01/31/1941	1.769E-03	09/02/1941	0.000
12/15/1941	5.220E-03	12/15/1941	0.000
02/10/1943	1.839E-03	11/13/1942	0.000
01/23/1944	1.393E-03	01/22/1944	0.000
02/07/1945	5.855E-03	02/07/1945	0.000
02/05/1946	3.597E-03	01/24/1946	0.000
02/02/1947	3.624E-03	02/02/1947	0.000
03/21/1948	6.487E-03	10/18/1947	0.000
02/22/1949	3.088E-03	02/16/1949	0.000
03/03/1950	1.436E-02	03/03/1950	0.000
02/09/1951	5.223E-03	02/09/1951	0.000
01/24/1952	1.295E-03	06/29/1952	0.000
01/11/1953	1.973E-03	09/30/1953	0.000
01/22/1954	3.099E-03	02/12/1954	0.000
04/12/1955	1.466E-03	11/05/1954	0.000
03/04/1956	3.329E-03	11/02/1955	0.000
02/25/1957	2.793E-03	11/16/1956	0.000
04/20/1958	3.689E-03	01/16/1958	0.000
01/12/1959	3.732E-03	01/24/1959	0.000
12/15/1959	4.012E-03	01/29/1960	0.000
02/14/1961	3.534E-03	02/14/1961	0.000
03/04/1962	1.756E-03	07/05/1962	0.000
02/03/1963	1.952E-03	11/25/1962	0.000
01/01/1964	3.369E-03	09/17/1964	0.000
02/26/1965	3.891E-03	08/19/1965	0.000
01/05/1966	2.549E-03	06/28/1966	0.000

01/19/1967	6.293E-03	01/19/1967	0.000
02/03/1968	3.227E-03	10/10/1967	0.000
12/03/1968	3.542E-03	12/03/1968	0.000
01/13/1970	2.750E-03	01/14/1970	0.000
12/06/1970	3.118E-03	12/05/1970	0.000
02/28/1972	8.306E-03	02/27/1972	0.000
01/13/1973	2.921E-03	01/13/1973	0.000
02/18/1974	4.317E-03	10/06/1973	0.000
12/26/1974	5.596E-03	12/27/1974	0.000
01/27/1976	3.622E-03	01/27/1976	0.000
05/31/1977	5.212E-04	08/26/1977	0.000
12/15/1977	3.108E-03	09/22/1978	0.000
03/04/1979	3.019E-03	10/23/1978	0.000
12/17/1979	4.946E-03	12/15/1979	0.000
12/26/1980	2.126E-03	11/21/1980	0.000
10/06/1981	6.795E-03	10/06/1981	0.000
01/05/1983	3.540E-03	10/28/1982	0.000
03/14/1984	3.617E-03	02/20/1984	0.000
02/11/1985	2.215E-03	06/07/1985	0.000
01/18/1986	7.300E-03	01/18/1986	0.000
11/24/1986	6.644E-03	11/24/1986	0.000
04/06/1988	3.163E-03	11/11/1987	0.000
04/05/1989	3.516E-03	08/21/1989	0.000
01/09/1990	1.181E-02	01/09/1990	0.000
11/24/1990	1.023E-02	11/24/1990	0.000
01/27/1992	3.146E-03	01/27/1992	0.000
06/09/1993	2.531E-03	06/09/1993	0.000
03/03/1994	1.929E-03	12/01/1993	0.000
02/19/1995	4.127E-03	02/18/1995	0.000
02/08/1996	9.793E-03	02/08/1996	0.000
01/02/1997	6.181E-03	01/02/1997	0.000
02/28/1998	2.159E-03	10/29/1997	0.000
11/25/1998	5.863E-03	11/04/1998	0.000
02/06/2000	3.309E-03	02/06/2000	0.000
05/05/2001	2.486E-03	12/20/2000	0.000
05/03/2002	9.302E-03	05/03/2002	0.000
02/06/2003	7.064E-03	11/23/2002	0.000
01/23/2004	1.663E-03	09/21/2004	0.000
02/05/2005	3.191E-03	02/05/2005	0.000
02/27/2006	3.679E-03	11/27/2005	0.000
12/14/2006	2.856E-03	12/14/2006	0.000
03/21/2008	5.125E-03	03/22/2008	0.000
02/17/2009	7.054E-03	02/17/2009	0.000
01/10/2010	4.764E-03	06/10/2010	0.000
11/17/2010	6.373E-03	11/16/2010	0.000
01/31/2012	4.314E-03	10/22/2011	0.000
01/20/2013	9.304E-03	01/20/2013	0.000
12/06/2013	4.064E-03	11/16/2013	0.000
03/30/2015	2.254E-03	02/28/2015	0.000
01/04/2016	6.782E-03	01/04/2016	0.000
03/07/2017	1.907E-03	06/14/2017	0.000
01/31/2018	3.596E-03	12/25/2017	0.000
02/14/2019	3.461E-03	11/09/2018	0.000
04/14/2020	2.235E-03	12/12/2019	0.000
02/10/2021	5.732E-03	02/10/2021	0.000
03/26/2022	1.614E-03	12/20/2021	0.000

03/30/2023	4.006E-03	11/25/2022	0.000
01/19/2024	3.206E-03	01/19/2024	0.000
12/22/2024	6.859E-03	12/22/2024	0.000
03/09/2026	4.200E-03	03/09/2026	0.000
01/27/2027	3.735E-03	03/15/2027	0.000
02/19/2028	4.579E-03	02/19/2028	0.000
12/04/2028	3.588E-03	10/11/2028	0.000
02/16/2030	4.730E-03	11/04/2029	0.000
12/30/2030	4.499E-03	09/24/2031	0.000
01/20/2032	7.060E-03	01/20/2032	0.000
03/01/2033	1.976E-03	12/23/2032	0.000
01/15/2034	8.298E-03	01/15/2034	0.000
02/19/2035	3.760E-03	02/19/2035	0.000
12/04/2035	3.632E-03	12/04/2035	0.000
03/08/2037	1.274E-04	05/15/2037	0.000
12/14/2037	2.814E-03	11/24/2037	0.000
02/07/2039	1.998E-03	02/07/2039	0.000
01/14/2040	7.792E-03	01/14/2040	0.000
12/25/2040	4.198E-03	12/24/2040	0.000
02/20/2042	4.584E-03	11/11/2041	0.000
03/31/2043	7.267E-03	07/19/2043	0.000
05/01/2044	2.552E-03	09/05/2044	0.000
02/11/2045	2.924E-03	11/02/2044	0.000
02/16/2046	3.716E-03	12/06/2045	0.000
02/01/2047	2.359E-03	11/24/2046	0.000
04/21/2048	2.066E-03	12/02/2047	0.000
03/16/2049	2.245E-03	07/31/2049	0.000
12/04/2049	4.069E-03	12/04/2049	0.000
04/06/2051	3.033E-03	02/02/2051	0.000
04/16/2052	1.982E-03	10/25/2051	0.000
06/04/2053	9.392E-03	06/04/2053	0.000
04/08/2054	1.294E-03	12/08/2053	0.000
02/17/2055	6.185E-03	10/27/2054	0.000
02/07/2056	1.120E-02	11/11/2055	0.000
11/19/2056	1.207E-02	11/19/2056	0.000
01/24/2058	4.619E-03	01/24/2058	0.000
01/17/2059	4.850E-03	11/26/2058	0.000
01/19/2060	1.722E-03	05/15/2060	0.000
01/10/2061	3.899E-03	09/01/2061	0.000
02/03/2062	2.185E-02	02/03/2062	0.000
12/29/2062	3.050E-03	09/16/2063	0.000
12/23/2063	5.709E-03	07/21/2064	0.000
11/30/2064	2.772E-03	11/29/2064	0.000
01/13/2066	1.421E-03	10/14/2065	0.000
01/19/2067	3.753E-03	01/19/2067	0.000
01/18/2068	7.909E-03	01/18/2068	0.000
01/04/2069	2.050E-03	10/05/2068	0.000
04/09/2070	1.723E-03	09/03/2070	0.000
02/14/2071	1.892E-03	09/27/2071	0.000
04/28/2072	2.416E-03	04/28/2072	0.000
12/25/2072	8.677E-03	12/25/2072	0.000
03/16/2074	4.826E-03	12/15/2073	0.000
03/15/2075	1.061E-03	08/27/2075	0.000
03/24/2076	5.488E-03	03/24/2076	0.000
03/02/2077	5.945E-04	08/24/2077	0.000
12/02/2077	1.967E-03	11/25/2077	0.000

02/25/2079	2.653E-03	11/03/2078	0.000
12/17/2079	9.574E-03	12/17/2079	0.000
11/21/2080	4.434E-03	11/06/2080	0.000
02/13/2082	5.249E-03	10/31/2081	0.000
02/19/2083	3.201E-03	03/29/2083	0.000
11/26/2083	4.019E-03	11/26/2083	0.000
12/14/2084	2.702E-03	09/06/2085	0.000
01/18/2086	3.867E-03	09/23/2086	0.000
12/21/2086	3.755E-03	11/19/2086	0.000
01/14/2088	2.514E-03	01/14/2088	0.000
11/05/2088	4.380E-03	11/05/2088	0.000
12/03/2089	1.978E-03	09/16/2090	0.000
12/04/2090	3.602E-03	12/04/2090	0.000
04/28/2092	7.147E-03	06/29/2092	0.000
03/22/2093	1.665E-03	11/18/2092	0.000
03/01/2094	1.452E-03	10/23/2093	0.000
12/27/2094	2.350E-03	07/25/2095	0.000
01/14/2096	2.907E-03	08/02/2096	0.000
01/29/2097	6.894E-03	01/30/2097	0.000

***Point of Compliance Ranked Maxima Flow Data ***

Predevelopment		Postdevelopment	
Tr (yrs)	Q (cfs)	Tr (yrs)	Q (cfs)
1.004	1.274E-04	1.004	0.000
1.010	5.212E-04	1.010	0.000
1.016	5.945E-04	1.016	0.000
1.023	1.061E-03	1.023	0.000
1.030	1.294E-03	1.030	0.000
1.036	1.295E-03	1.036	0.000
1.043	1.393E-03	1.043	0.000
1.050	1.421E-03	1.050	0.000
1.057	1.452E-03	1.057	0.000
1.064	1.466E-03	1.064	0.000
1.072	1.614E-03	1.072	0.000
1.079	1.663E-03	1.079	0.000
1.086	1.665E-03	1.086	0.000
1.094	1.722E-03	1.094	0.000
1.101	1.723E-03	1.101	0.000
1.109	1.756E-03	1.109	0.000
1.117	1.769E-03	1.117	0.000
1.125	1.839E-03	1.125	0.000
1.133	1.892E-03	1.133	0.000
1.141	1.907E-03	1.141	0.000
1.149	1.929E-03	1.149	0.000
1.158	1.952E-03	1.158	0.000
1.166	1.967E-03	1.166	0.000
1.175	1.973E-03	1.175	0.000
1.184	1.976E-03	1.184	0.000
1.193	1.978E-03	1.193	0.000
1.202	1.982E-03	1.202	0.000
1.211	1.998E-03	1.211	0.000
1.220	2.050E-03	1.220	0.000
1.230	2.066E-03	1.230	0.000
1.240	2.126E-03	1.240	0.000

1.249	2.159E-03	1.249	0.000
1.259	2.215E-03	1.259	0.000
1.269	2.235E-03	1.269	0.000
1.280	2.245E-03	1.280	0.000
1.290	2.254E-03	1.290	0.000
1.301	2.350E-03	1.301	0.000
1.312	2.359E-03	1.312	0.000
1.323	2.416E-03	1.323	0.000
1.334	2.486E-03	1.334	0.000
1.345	2.514E-03	1.345	0.000
1.357	2.531E-03	1.357	0.000
1.368	2.549E-03	1.368	0.000
1.380	2.552E-03	1.380	0.000
1.392	2.653E-03	1.392	0.000
1.405	2.702E-03	1.405	0.000
1.417	2.750E-03	1.417	0.000
1.430	2.772E-03	1.430	0.000
1.443	2.793E-03	1.443	0.000
1.457	2.814E-03	1.457	0.000
1.470	2.856E-03	1.470	0.000
1.484	2.907E-03	1.484	0.000
1.498	2.921E-03	1.498	0.000
1.512	2.924E-03	1.512	0.000
1.527	3.019E-03	1.527	0.000
1.542	3.033E-03	1.542	0.000
1.557	3.050E-03	1.557	0.000
1.572	3.088E-03	1.572	0.000
1.588	3.099E-03	1.588	0.000
1.604	3.108E-03	1.604	0.000
1.621	3.118E-03	1.621	0.000
1.638	3.146E-03	1.638	0.000
1.655	3.163E-03	1.655	0.000
1.672	3.191E-03	1.672	0.000
1.690	3.201E-03	1.690	0.000
1.708	3.206E-03	1.708	0.000
1.727	3.227E-03	1.727	0.000
1.746	3.309E-03	1.746	0.000
1.766	3.329E-03	1.766	0.000
1.785	3.369E-03	1.785	0.000
1.806	3.461E-03	1.806	0.000
1.827	3.516E-03	1.827	0.000
1.848	3.534E-03	1.848	0.000
1.870	3.540E-03	1.870	0.000
1.892	3.542E-03	1.892	0.000
1.915	3.588E-03	1.915	0.000
1.939	3.596E-03	1.939	0.000
1.963	3.597E-03	1.963	0.000
1.987	3.602E-03	1.987	0.000
2.013	3.617E-03	2.013	0.000
2.039	3.622E-03	2.039	0.000
2.065	3.624E-03	2.065	0.000
2.093	3.632E-03	2.093	0.000
2.121	3.679E-03	2.121	0.000
2.150	3.689E-03	2.150	0.000
2.179	3.716E-03	2.179	0.000
2.210	3.732E-03	2.210	0.000

2.241	3.735E-03	2.241	0.000
2.273	3.753E-03	2.273	0.000
2.306	3.755E-03	2.306	0.000
2.340	3.760E-03	2.340	0.000
2.376	3.867E-03	2.376	0.000
2.412	3.891E-03	2.412	0.000
2.449	3.899E-03	2.449	0.000
2.488	4.006E-03	2.488	0.000
2.527	4.012E-03	2.527	0.000
2.569	4.019E-03	2.569	0.000
2.611	4.064E-03	2.611	0.000
2.655	4.069E-03	2.655	0.000
2.700	4.127E-03	2.700	0.000
2.747	4.198E-03	2.747	0.000
2.796	4.200E-03	2.796	0.000
2.846	4.314E-03	2.846	0.000
2.898	4.317E-03	2.898	0.000
2.952	4.380E-03	2.952	0.000
3.008	4.434E-03	3.008	0.000
3.067	4.499E-03	3.067	0.000
3.127	4.579E-03	3.127	0.000
3.190	4.584E-03	3.190	0.000
3.256	4.619E-03	3.256	0.000
3.325	4.623E-03	3.325	0.000
3.396	4.730E-03	3.396	0.000
3.471	4.764E-03	3.471	0.000
3.548	4.826E-03	3.548	0.000
3.630	4.850E-03	3.630	0.000
3.715	4.946E-03	3.715	0.000
3.805	5.125E-03	3.805	0.000
3.898	5.220E-03	3.898	0.000
3.997	5.223E-03	3.997	0.000
4.101	5.249E-03	4.101	0.000
4.210	5.488E-03	4.210	0.000
4.325	5.596E-03	4.325	0.000
4.447	5.709E-03	4.447	0.000
4.575	5.732E-03	4.575	0.000
4.712	5.855E-03	4.712	0.000
4.856	5.863E-03	4.856	0.000
5.010	6.181E-03	5.010	0.000
5.174	6.185E-03	5.174	0.000
5.349	6.293E-03	5.349	0.000
5.536	6.373E-03	5.536	0.000
5.737	6.487E-03	5.737	0.000
5.953	6.644E-03	5.953	0.000
6.186	6.782E-03	6.186	0.000
6.438	6.795E-03	6.438	0.000
6.711	6.859E-03	6.711	0.000
7.009	6.894E-03	7.009	0.000
7.334	7.054E-03	7.334	0.000
7.691	7.060E-03	7.691	0.000
8.084	7.064E-03	8.084	0.000
8.519	7.147E-03	8.519	0.000
9.005	7.267E-03	9.005	0.000
9.548	7.300E-03	9.548	0.000
10.162	7.792E-03	10.162	0.000

10.860	7.909E-03	10.860	0.000
11.661	8.298E-03	11.661	0.000
12.589	8.306E-03	12.589	0.000
13.678	8.677E-03	13.678	0.000
14.973	9.302E-03	14.973	0.000
16.540	9.304E-03	16.540	0.000
18.472	9.392E-03	18.472	0.000
20.915	9.574E-03	20.915	0.000
24.104	9.793E-03	24.104	0.000
28.439	1.023E-02	28.439	0.000
34.675	1.120E-02	34.675	0.000
44.416	1.181E-02	44.416	0.000
61.766	1.207E-02	61.766	0.000
101.359	1.436E-02	101.359	0.000
282.357	2.185E-02	282.357	0.000

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	3.609E-03	2-Year	3.302E-06
5-Year	6.160E-03	5-Year	5.333E-06
10-Year	7.665E-03	10-Year	6.567E-06
25-Year	9.890E-03	25-Year	8.208E-06
50-Year	1.191E-02	50-Year	9.390E-06
100-Year	1.429E-02	100-Year	9.569E-06
200-Year	1.933E-02	200-Year	9.781E-06

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

***** Point of Compliance Flow Duration Data *****

Predevelopment Runoff		Postdevelopment Runoff	
Discharge	Exceedance	Discharge	Exceedance
(cfs)	Probability	(cfs)	

0.000E+00	1.0000E+00	0.000E+00	1.0000E+00
1.093E-04	2.0367E-01	0.000E+00	9.3174E-01
2.185E-04	1.4823E-01	0.000E+00	8.6813E-01
3.278E-04	1.1504E-01	0.000E+00	8.0887E-01
4.370E-04	9.1541E-02	0.000E+00	7.5365E-01
5.463E-04	7.4211E-02	0.000E+00	7.0220E-01
6.555E-04	6.1055E-02	0.000E+00	6.5427E-01
7.648E-04	5.0780E-02	0.000E+00	6.0961E-01
8.741E-04	4.2533E-02	0.000E+00	5.6799E-01
9.833E-04	3.5811E-02	0.000E+00	5.2922E-01
1.093E-03	3.0279E-02	0.000E+00	4.9309E-01
1.202E-03	2.5649E-02	0.000E+00	4.5943E-01
1.311E-03	2.1900E-02	0.000E+00	4.2807E-01
1.420E-03	1.8725E-02	0.000E+00	3.9885E-01
1.530E-03	1.6048E-02	0.000E+00	3.7162E-01
1.639E-03	1.3743E-02	0.000E+00	3.4625E-01
1.748E-03	1.1863E-02	0.000E+00	3.2261E-01

1.805E-03	1.1014E-02	0.000E+00	3.0059E-01
1.967E-03	8.9427E-03	0.000E+00	2.8007E-01
2.076E-03	7.7940E-03	0.000E+00	2.6095E-01
2.185E-03	6.8489E-03	0.000E+00	2.4314E-01
2.294E-03	6.0554E-03	0.000E+00	2.2654E-01
2.404E-03	5.3406E-03	0.000E+00	2.1108E-01
2.513E-03	4.7522E-03	0.000E+00	1.9667E-01
2.622E-03	4.2280E-03	0.000E+00	1.8324E-01
2.731E-03	3.7472E-03	0.000E+00	1.7073E-01
2.841E-03	3.3255E-03	0.000E+00	1.5908E-01
2.950E-03	2.9725E-03	0.000E+00	1.4822E-01
3.059E-03	2.6548E-03	0.000E+00	1.3810E-01
3.168E-03	2.3963E-03	0.000E+00	1.2867E-01
3.278E-03	2.1523E-03	0.000E+00	1.1989E-01
3.387E-03	1.9422E-03	0.000E+00	1.1171E-01
3.496E-03	1.7451E-03	0.000E+00	1.0408E-01
3.609E-03	1.5557E-03	0.000E+00	9.6975E-02
3.715E-03	1.4101E-03	0.000E+00	9.0355E-02
3.824E-03	1.2917E-03	0.000E+00	8.4187E-02
3.933E-03	1.1906E-03	0.000E+00	7.8440E-02
4.043E-03	1.0931E-03	0.000E+00	7.3085E-02
4.152E-03	1.0115E-03	0.000E+00	6.8096E-02
4.261E-03	9.3716E-04	0.000E+00	6.3448E-02
4.370E-03	8.6712E-04	0.000E+00	5.9116E-02
4.480E-03	7.8554E-04	0.000E+00	5.5081E-02
4.589E-03	7.2489E-04	0.000E+00	5.1321E-02
4.698E-03	6.7651E-04	0.000E+00	4.7817E-02
4.807E-03	6.2958E-04	0.000E+00	4.4553E-02
4.917E-03	5.8410E-04	0.000E+00	4.1512E-02
5.026E-03	5.5305E-04	0.000E+00	3.8678E-02
5.135E-03	5.1984E-04	0.000E+00	3.6038E-02
5.244E-03	4.8085E-04	0.000E+00	3.3578E-02
5.354E-03	4.5125E-04	0.000E+00	3.1285E-02
5.463E-03	4.1876E-04	0.000E+00	2.9150E-02
5.572E-03	3.8555E-04	0.000E+00	2.7160E-02
5.681E-03	3.5883E-04	0.000E+00	2.5306E-02
5.791E-03	3.3645E-04	0.000E+00	2.3578E-02
5.900E-03	3.1118E-04	0.000E+00	2.1969E-02
6.009E-03	2.9024E-04	0.000E+00	2.0469E-02
6.160E-03	2.6400E-04	0.000E+00	1.9072E-02
6.228E-03	2.5342E-04	0.000E+00	1.7770E-02
6.337E-03	2.3465E-04	0.000E+00	1.6557E-02
6.446E-03	2.1443E-04	0.000E+00	1.5427E-02
6.555E-03	2.0072E-04	0.000E+00	1.4373E-02
6.665E-03	1.9061E-04	0.000E+00	1.3392E-02
6.774E-03	1.7400E-04	0.000E+00	1.2478E-02
6.883E-03	1.5884E-04	0.000E+00	1.1626E-02
6.992E-03	1.4007E-04	0.000E+00	1.0833E-02
7.102E-03	1.2779E-04	0.000E+00	1.0093E-02
7.211E-03	1.1335E-04	0.000E+00	9.4041E-03
7.320E-03	1.0397E-04	0.000E+00	8.7621E-03
7.430E-03	9.3860E-05	0.000E+00	8.1640E-03
7.539E-03	8.5196E-05	0.000E+00	7.6067E-03
7.648E-03	7.6532E-05	0.000E+00	7.0874E-03
7.757E-03	7.0034E-05	0.000E+00	6.6036E-03
7.867E-03	6.3536E-05	0.000E+00	6.1528E-03

7.976E-03	5.7038E-05	0.000E+00	5.7328E-03
8.085E-03	5.1262E-05	0.000E+00	5.3414E-03
8.194E-03	4.5486E-05	0.000E+00	4.9768E-03
8.304E-03	4.0432E-05	0.000E+00	4.6371E-03
8.413E-03	3.6822E-05	0.000E+00	4.3205E-03
8.522E-03	3.1768E-05	0.000E+00	4.0256E-03
8.631E-03	2.5992E-05	0.000E+00	3.7508E-03
8.741E-03	2.2382E-05	0.000E+00	3.4947E-03
8.850E-03	2.0938E-05	0.000E+00	3.2562E-03
8.959E-03	1.8772E-05	0.000E+00	3.0339E-03
9.068E-03	1.8050E-05	0.000E+00	2.8268E-03
9.178E-03	1.5884E-05	0.000E+00	2.6338E-03
9.287E-03	1.4440E-05	0.000E+00	2.4540E-03
9.396E-03	1.1552E-05	0.000E+00	2.2865E-03
9.505E-03	1.0830E-05	0.000E+00	2.1304E-03
9.615E-03	1.0108E-05	0.000E+00	1.9850E-03
9.724E-03	8.6640E-06	0.000E+00	1.8495E-03
9.833E-03	7.9420E-06	0.000E+00	1.7232E-03
9.942E-03	7.9420E-06	0.000E+00	1.6056E-03
1.005E-02	7.9420E-06	0.000E+00	1.4960E-03
1.016E-02	7.9420E-06	0.000E+00	1.3939E-03
1.027E-02	7.2200E-06	0.000E+00	1.2987E-03
1.038E-02	7.2200E-06	0.000E+00	1.2101E-03
1.049E-02	7.2200E-06	0.000E+00	1.1275E-03
1.060E-02	7.2200E-06	0.000E+00	1.0505E-03
1.071E-02	6.4980E-06	0.000E+00	9.7878E-04
1.082E-02	6.4980E-06	0.000E+00	9.1196E-04
1.093E-02	6.4980E-06	0.000E+00	8.4971E-04
1.104E-02	5.7760E-06	0.000E+00	7.9170E-04
1.114E-02	5.7760E-06	0.000E+00	7.3766E-04
1.125E-02	5.0540E-06	0.000E+00	6.8730E-04
1.136E-02	5.0540E-06	0.000E+00	6.4038E-04
1.147E-02	5.0540E-06	0.000E+00	5.9667E-04
1.158E-02	5.0540E-06	0.000E+00	5.5594E-04
1.169E-02	5.0540E-06	0.000E+00	5.1799E-04
1.180E-02	4.3320E-06	0.000E+00	4.8263E-04
1.191E-02	3.6127E-06	0.000E+00	4.4968E-04
1.202E-02	3.6100E-06	0.000E+00	4.1898E-04
1.213E-02	2.8880E-06	0.000E+00	3.9038E-04
1.224E-02	2.8880E-06	0.000E+00	3.6373E-04
1.235E-02	2.8880E-06	0.000E+00	3.3890E-04
1.246E-02	2.8880E-06	0.000E+00	3.1577E-04
1.256E-02	2.8880E-06	0.000E+00	2.9421E-04
1.267E-02	2.8880E-06	0.000E+00	2.7413E-04
1.278E-02	2.8880E-06	0.000E+00	2.5541E-04
1.289E-02	2.8880E-06	0.000E+00	2.3798E-04
1.300E-02	2.1660E-06	0.000E+00	2.2173E-04
1.311E-02	2.1660E-06	0.000E+00	2.0660E-04
1.322E-02	2.1660E-06	0.000E+00	1.9249E-04
1.333E-02	2.1660E-06	0.000E+00	1.7935E-04
1.344E-02	2.1660E-06	0.000E+00	1.6711E-04
1.355E-02	2.1660E-06	0.000E+00	1.5570E-04
1.366E-02	2.1660E-06	0.000E+00	1.4507E-04
1.377E-02	2.1660E-06	0.000E+00	1.3517E-04
1.388E-02	2.1660E-06	0.000E+00	1.2594E-04
1.398E-02	2.1660E-06	0.000E+00	1.1734E-04

1.409E-02	2.1660E-06	0.000E+00	1.0933E-04
1.420E-02	2.1660E-06	0.000E+00	1.0187E-04
1.431E-02	2.1660E-06	0.000E+00	9.4917E-05
1.442E-02	1.4440E-06	0.000E+00	8.8437E-05
1.453E-02	1.4440E-06	0.000E+00	8.2400E-05
1.464E-02	1.4440E-06	0.000E+00	7.6775E-05
1.475E-02	1.4440E-06	0.000E+00	7.1534E-05
1.486E-02	1.4440E-06	0.000E+00	6.6651E-05
1.497E-02	1.4440E-06	0.000E+00	6.2101E-05
1.508E-02	1.4440E-06	0.000E+00	5.7862E-05
1.519E-02	1.4440E-06	0.000E+00	5.3912E-05
1.530E-02	1.4440E-06	0.000E+00	5.0232E-05
1.541E-02	1.4440E-06	0.000E+00	4.6803E-05
1.551E-02	1.4440E-06	0.000E+00	4.3608E-05
1.562E-02	1.4440E-06	0.000E+00	4.0631E-05
1.573E-02	1.4440E-06	0.000E+00	3.7857E-05
1.584E-02	1.4440E-06	0.000E+00	3.5273E-05
1.595E-02	1.4440E-06	0.000E+00	3.2865E-05
1.606E-02	1.4440E-06	0.000E+00	3.0621E-05
1.617E-02	1.4440E-06	0.000E+00	2.8531E-05
1.628E-02	1.4440E-06	0.000E+00	2.6583E-05
1.639E-02	1.4440E-06	0.000E+00	2.4769E-05
1.650E-02	1.4440E-06	0.000E+00	2.3078E-05
1.661E-02	1.4440E-06	0.000E+00	2.1502E-05
1.672E-02	1.4440E-06	0.000E+00	2.0035E-05
1.683E-02	1.4440E-06	0.000E+00	1.8667E-05
1.693E-02	7.2200E-07	0.000E+00	1.7393E-05
1.704E-02	7.2200E-07	0.000E+00	1.6205E-05
1.715E-02	7.2200E-07	0.000E+00	1.5099E-05
1.726E-02	7.2200E-07	0.000E+00	1.4068E-05
1.737E-02	7.2200E-07	0.000E+00	1.3108E-05
1.748E-02	7.2200E-07	0.000E+00	1.2213E-05
1.759E-02	7.2200E-07	0.000E+00	1.1379E-05
1.770E-02	7.2200E-07	0.000E+00	1.0603E-05
1.781E-02	7.2200E-07	0.000E+00	9.8789E-06
1.792E-02	7.2200E-07	0.000E+00	9.2045E-06
1.803E-02	7.2200E-07	0.000E+00	8.5762E-06
1.814E-02	7.2200E-07	0.000E+00	7.9907E-06
1.825E-02	7.2200E-07	0.000E+00	7.4452E-06
1.836E-02	7.2200E-07	0.000E+00	6.9370E-06
1.846E-02	7.2200E-07	0.000E+00	6.4635E-06
1.857E-02	7.2200E-07	0.000E+00	6.0222E-06
1.868E-02	7.2200E-07	0.000E+00	5.6111E-06
1.879E-02	7.2200E-07	0.000E+00	5.2281E-06
1.890E-02	7.2200E-07	0.000E+00	4.8712E-06
1.901E-02	7.2200E-07	0.000E+00	4.5387E-06
1.912E-02	7.2200E-07	0.000E+00	4.2288E-06
1.923E-02	7.2200E-07	0.000E+00	3.9402E-06
1.934E-02	7.2200E-07	0.000E+00	3.6712E-06
1.945E-02	7.2200E-07	0.000E+00	3.4206E-06
1.956E-02	7.2200E-07	0.000E+00	3.1871E-06
1.967E-02	7.2200E-07	0.000E+00	2.9695E-06
1.978E-02	7.2200E-07	0.000E+00	2.7668E-06
1.988E-02	7.2200E-07	0.000E+00	2.5779E-06
1.999E-02	7.2200E-07	0.000E+00	2.4019E-06
2.010E-02	7.2200E-07	0.000E+00	2.2380E-06

2.021E-02	7.2200E-07	0.000E+00	2.0852E-06
2.032E-02	7.2200E-07	0.000E+00	1.9429E-06
2.043E-02	7.2200E-07	0.000E+00	1.8102E-06
2.054E-02	7.2200E-07	0.000E+00	1.6867E-06
2.065E-02	7.2200E-07	0.000E+00	1.5715E-06
2.076E-02	7.2200E-07	0.000E+00	1.4642E-06
2.087E-02	7.2200E-07	0.000E+00	1.3643E-06
2.098E-02	7.2200E-07	0.000E+00	1.2711E-06
2.109E-02	7.2200E-07	0.000E+00	1.1844E-06
2.120E-02	7.2200E-07	0.000E+00	1.1035E-06
2.131E-02	7.2200E-07	0.000E+00	1.0282E-06
2.141E-02	7.2200E-07	0.000E+00	9.5800E-07
2.152E-02	7.2200E-07	0.000E+00	8.9261E-07
2.163E-02	7.2200E-07	0.000E+00	8.3167E-07
2.174E-02	7.2200E-07	0.000E+00	7.7490E-07
2.185E-02	7.2200E-07	2.000E-04	7.2200E-07

**** Flow Duration Performance ****

Excursion at Predeveloped 50%Q2 (Must be Less Than 0%):	0.0%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than 0%):	0.0%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	0.0%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

**** LID Duration Performance ****

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	0.0%	PASS
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	0.0%	PASS

MEETS ALL LID DURATION DESIGN CRITERIA: PASS

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/09/2014 8:25 AM

Input File Name: IT2-TDA7.fld
Project Name: ELST - S Sammamish
Analysis Title: Infiltration Trench Sizing
Comments: Infiltration trench 2 in TDA 7 from STA 244+20 to STA 249+25

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 244+05 to STA 249+25 -----

-----Area(Acres) -----

Till Forest	0.190
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.190

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 244+05 to STA 249+25 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.190

Subbasin Total 0.190

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 2

Link Name: Infilt Trench 2

Link Type: Infiltration Trench

Downstream Link Name: TDA 7 POC

Trench Type	:	Trench on Embankment Sideslope
Trench Length (ft)	:	505.00
Trench Width (ft)	:	2.00
Trench Depth (ft)	:	2.00
Trench Bottom Elev (ft)	:	100.00
Trench Rockfill Porosity (%)	:	30.00

Constant Infiltration Option Used

Infiltration Rate (in/hr): 0.50

Link Name: TDA 7 POC

Link Type: Copy

Downstream Link: None

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1
Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1
Number of Links: 2

*****Groundwater Recharge Summary *****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 244+05 to STA 24	32.944
Total:	32.944

Model Element	Total Post Developed Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 244+05 to STA 24	0.000
Link: Infiltration Trench 2	Not Computed
Link: TDA 7 POC	Not Applicable
Total:	0.000

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.209 ac-ft/year, Post Developed: 0.000 ac-ft/year

*****Water Quality Facility Data *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 2

*****Compliance Point Results *****

Scenario Predeveloped Compliance Subbasin: STA 244+05 to STA 249+25

Scenario Postdeveloped Compliance Link: TDA 7 POC

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	4.034E-03	2-Year	4.586E-06
5-Year	6.885E-03	5-Year	6.933E-06
10-Year	8.567E-03	10-Year	8.595E-06
25-Year	1.105E-02	25-Year	9.865E-06
50-Year	1.331E-02	50-Year	1.291E-02
100-Year	1.598E-02	100-Year	2.221E-02
200-Year	2.160E-02	200-Year	2.936E-02

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than 0%):	-100.0%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than 0%):	-99.7%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	-20.1%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

****** LID Duration Performance ******

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	-100.0%	PASS
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	-100.0%	PASS

MEETS ALL LID DURATION DESIGN CRITERIA: PASS

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/09/2014 8:29 AM

Input File Name: IT3-TDA8.fld
Project Name: ELST - S Sammamish
Analysis Title: Infiltration Trench Sizing
Comments: Infiltration trench 3 in TDA 8 from STA 249+25 to STA 261+27

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 249+25 to STA 261+50 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.450
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.450

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

----- Subbasin : STA 249+25 to STA 261+50 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.450

Subbasin Total 0.450

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 2

Link Name: Culvert at Sta 256+35

Link Type: Copy

Downstream Link: None

Link Name: Infil Trench 3

Link Type: Infiltration Trench

Downstream Link Name: Culvert at Sta 256+35

Trench Type	:	Trench on Embankment Sideslope
Trench Length (ft)	:	1202.00
Trench Width (ft)	:	2.00
Trench Depth (ft)	:	2.00
Trench Bottom Elev (ft)	:	100.00
Trench Rockfill Porosity (%)	:	30.00

Constant Infiltration Option Used

Infiltration Rate (in/hr): 10.00

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1
Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 1
Number of Links: 2

*****Groundwater Recharge Summary *****

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 249+25 to STA 26	119.646
Total:	119.646

Model Element	Total Post Developed Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: STA 249+25 to STA 26	0.000
Link: Culvert at Sta 256+3	Not Applicable
Link: Infil Trench 3	Not Computed
Total:	0.000

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.757 ac-ft/year, Post Developed: 0.000 ac-ft/year

*****Water Quality Facility Data *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 2

*****Compliance Point Results *****

Scenario Predeveloped Compliance Subbasin: STA 249+25 to STA 261+50

Scenario Postdeveloped Compliance Link: Culvert at Sta 256+35

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	8.830E-05	2-Year	1.490E-08
5-Year	9.014E-05	5-Year	1.490E-08
10-Year	9.061E-05	10-Year	1.490E-08
25-Year	2.099E-04	25-Year	1.490E-08
50-Year	4.164E-04	50-Year	2.980E-08
100-Year	6.440E-04	100-Year	2.980E-08
200-Year	1.159E-03	200-Year	2.980E-08

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than 0%):	0.0%	PASS	
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than 0%):		0.0%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	0.0%	PASS	
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS	

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

****** LID Duration Performance ******

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	0.0%	PASS
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	0.0%	PASS

MEETS ALL LID DURATION DESIGN CRITERIA: PASS

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/09/2014 9:42 AM

Input File Name: IT456-TDA9.fld
Project Name: ELST - S Sammamish
Analysis Title: Infiltration Trench Sizing
Comments: Infiltration trenches in TDA 9 from STA 261+72 to STA 282+62

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 1

----- Subbasin : TDA 9 -----	-----Area(Acres) -----
Till Forest	0.000
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.820
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total	0.820

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 2

----- Subbasin : TDA 9 -----
-----Area(Acres) -----
Till Forest 0.000
Till Pasture 0.000
Till Grass 0.000
Outwash Forest 0.000
Outwash Pasture 0.000
Outwash Grass 0.000
Wetland 0.000
Green Roof 0.000
User 0.000
Impervious 0.790

Subbasin Total 0.790

----- Subbasin : SE 33rd St Sidewalk -----
-----Area(Acres) -----
Till Forest 0.000
Till Pasture 0.000
Till Grass 0.000
Outwash Forest 0.000
Outwash Pasture 0.000
Outwash Grass 0.000
Wetland 0.000
Green Roof 0.000
User 0.000
Impervious 0.030

Subbasin Total 0.030

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED

Number of Links: 0

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 3

Link Name: Infilt Trench 5
Link Type: Infiltration Trench
Downstream Link Name: TDA 9 POC

Trench Type : Trench on Embankment Sideslope

Trench Length (ft) : 2082.00
Trench Width (ft) : 2.00
Trench Depth (ft) : 2.00
Trench Bottom Elev (ft) : 100.00
Trench Rockfill Porosity (%) : 30.00

Constant Infiltration Option Used
Infiltration Rate (in/hr): 10.00

Link Name: TDA 9 POC

Link Type: Copy
Downstream Link: None

Link Name: Infil Trenches 5 and 6

Link Type: Infiltration Trench
Downstream Link Name: TDA 9 POC

Trench Type : Trench on Embankment Sideslope
Trench Length (ft) : 147.00
Trench Width (ft) : 2.00
Trench Depth (ft) : 2.00
Trench Bottom Elev (ft) : 100.00
Trench Rockfill Porosity (%) : 30.00

Constant Infiltration Option Used
Infiltration Rate (in/hr): 10.00

*******FLOOD FREQUENCY AND DURATION STATISTICS*******

-----**SCENARIO: PREDEVELOPED**

Number of Subbasins: 1
Number of Links: 0

-----**SCENARIO: POSTDEVELOPED**

Number of Subbasins: 2
Number of Links: 3

******* Subbasin: TDA 9 *******

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.220
5-Year	0.282
10-Year	0.315
25-Year	0.368
50-Year	0.409
100-Year	0.462
200-Year	0.488

***** Subbasin: SE 33rd St Sidewalk *****

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)
 =====
 2-Year 8.352E-03
 5-Year 1.073E-02
 10-Year 1.196E-02
 25-Year 1.399E-02
 50-Year 1.555E-02
 100-Year 1.754E-02
 200-Year 1.855E-02

***** Link: Infilt Trench 5 ***** Link Inflow Frequency Stats
 Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)
 =====
 2-Year 0.220
 5-Year 0.280
 10-Year 0.315
 25-Year 0.368
 50-Year 0.409
 100-Year 0.462
 200-Year 0.488

***** Link: Infilt Trench 5 ***** Link Outflow 1 Frequency Stats
 Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)
 =====
 2-Year 1.490E-08
 5-Year 2.980E-08
 10-Year 2.980E-08
 25-Year 2.980E-08
 50-Year 2.980E-08
 100-Year 2.980E-08
 200-Year 4.957E-08

***** Link: TDA 9 POC ***** Link Outflow 1
 Frequency Stats
 Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)
 =====
 2-Year 2.142E-08
 5-Year 3.812E-08

10-Year	3.888E-08
25-Year	4.005E-08
50-Year	4.191E-08
100-Year	4.282E-08
200-Year	6.385E-08

***** Link: Infiltration Trenches 5 and 6 ***** Link Inflow Frequency Stats

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

2-Year	8.352E-03
5-Year	1.063E-02
10-Year	1.196E-02
25-Year	1.399E-02
50-Year	1.555E-02
100-Year	1.754E-02
200-Year	1.855E-02

***** Link: Infiltration Trenches 5 and 6 ***** Link Outflow 1 Frequency Stats

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

2-Year	6.519E-09
5-Year	8.321E-09
10-Year	9.073E-09
25-Year	1.024E-08
50-Year	1.211E-08
100-Year	1.301E-08
200-Year	1.427E-08

*****Groundwater Recharge Summary*****

Recharge is computed as input to PerInd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: TDA 9	218.021

Total:	218.021

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: TDA 9	0.000
Subbasin: SE 33rd St Sidewalk	0.000
Link: Infiltration Trench 5	348.893
Link: TDA 9 POC	Not Applicable
Link: Infiltration Trenches 5 and 6	13.249

Total: 362.142

Total Predevelopment Recharge is Less than Post Developed

Average Recharge Per Year, (Number of Years= 158)

Predeveloped: 1.380 ac-ft/year, Post Developed: 2.292 ac-ft/year

*******Water Quality Facility Data *******

-----SCENARIO: PREDEVELOPED

Number of Links: 0

-----SCENARIO: POSTDEVELOPED

Number of Links: 3

***** Link: Infil Trench 5 *****

Infiltration/Filtration Statistics-----

Total Runoff Volume (ac-ft): 348.89

Total Runoff Infiltrated (ac-ft): 348.89, 100.00%

Total Runoff Filtered (ac-ft): 0.00, 0.00%

Percent Treated (Infiltrated+Filtered)/Total Volume: 100.00%

***** Link: Infil Trenches 5 and 6 *****

Infiltration/Filtration Statistics-----

Total Runoff Volume (ac-ft): 13.25

Total Runoff Infiltrated (ac-ft): 13.25, 100.00%

Total Runoff Filtered (ac-ft): 0.00, 0.00%

Percent Treated (Infiltrated+Filtered)/Total Volume: 100.00%

*******Compliance Point Results *******

Scenario Predeveloped Compliance Subbasin: TDA 9

Scenario Postdeveloped Compliance Link: TDA 9 POC

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	1.609E-04	2-Year	2.142E-08
5-Year	1.643E-04	5-Year	3.812E-08
10-Year	1.651E-04	10-Year	3.888E-08
25-Year	3.825E-04	25-Year	4.005E-08
50-Year	7.588E-04	50-Year	4.191E-08
100-Year	1.174E-03	100-Year	4.282E-08
200-Year	2.112E-03	200-Year	6.385E-08

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than 0%):	0.0%	PASS	
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than 0%):	0.0%	PASS	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	0.0%	PASS	
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS	

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

****** LID Duration Performance ******

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	0.0%	PASS
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	0.0%	PASS

MEETS ALL LID DURATION DESIGN CRITERIA: PASS

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.34
Program License Number: 200510005
Run Date: 12/18/2014 2:27 PM

Input File Name: DrainageBasinFlows.fld
Project Name: ELST - S Sammamish Segment A
Analysis Title: Basin flows for Conveyance Sizing
Comments: Drainage basins for TDA1a, TDA 1b, TDA2, TDA3 and Stream #0163 SF, TDA 8

PRECIPITATION INPUT

Computational Time Step (Minutes): 5

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing
Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961040 Puget East 40 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 11

----- Subbasin : U/S Basin to Stream #0163 SF -----

	-----Area(Acres)-----
Till Forest	0.000
Till Pasture	0.000
Till Grass	84.590
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	32.410

Subbasin Total	117.000

----- Subbasin : U/S Basin to TDA 2 -----

	-----Area(Acres) -----
Till Forest	0.000
Till Pasture	0.000
Till Grass	1.300
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.500

Subbasin Total	1.800

----- Subbasin : U/S Basin to TDA 3 -----

	-----Area(Acres) -----
Till Forest	0.000
Till Pasture	0.000
Till Grass	4.270
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	1.630

Subbasin Total	5.900

----- Subbasin : U/S to TDA 1a - Sta 218+95 -----

	-----Area(Acres) -----
Till Forest	0.000
Till Pasture	0.000
Till Grass	11.060
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	4.240

Subbasin Total	15.300

----- Subbasin : TDA 2 - Sta 224+00 -----

	-----Area(Acres) -----
Till Forest	0.466
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000

Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.244

Subbasin Total	0.710

----- Subbasin : TDA 3 - Sta 230+00 -----
-----Area(Acres) -----

Till Forest	0.536
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.197

Subbasin Total	0.733

----- Subbasin : TDA 5 to O163 SF -----
-----Area(Acres) -----

Till Forest	0.135
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.046

Subbasin Total	0.181

----- Subbasin : TDA 8 - Sta 256+35 -----
-----Area(Acres) -----

Till Forest	1.094
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.450

Subbasin Total	1.544

----- Subbasin : U/S Basin to Unnamed #3 -----

	-----Area(Acres) -----
Till Forest	0.000
Till Pasture	0.000
Till Grass	30.370
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	11.630

Subbasin Total	42.000

----- Subbasin : U/S to TDA 1b - Sta 221+55 -----

	-----Area(Acres) -----
Till Forest	0.000
Till Pasture	0.000
Till Grass	11.860
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	4.540

Subbasin Total	16.400

----- Subbasin : TDA 1 - Sta 218+45 -----

	-----Area(Acres) -----
Till Forest	0.426
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.209

Subbasin Total	0.635

-----**SCENARIO: POSTDEVELOPED**

Number of Subbasins: 11

----- Subbasin : U/S Basin to Stream #0163 SF -----

	-----Area(Acres) -----
Till Forest	0.000

Till Pasture	0.000
Till Grass	84.590
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	32.410

Subbasin Total	117.000

----- Subbasin : U/S Basin to TDA 2 -----

-----Area(Acres) -----	
Till Forest	0.000
Till Pasture	0.000
Till Grass	1.300
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.500

Subbasin Total	1.800

----- Subbasin : U/S Basin to TDA 3 -----

-----Area(Acres) -----	
Till Forest	0.000
Till Pasture	0.000
Till Grass	4.270
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	1.630

Subbasin Total	5.900

----- Subbasin : U/S to TDA 1a - Sta 218+95 -----

-----Area(Acres) -----	
Till Forest	0.000
Till Pasture	0.000
Till Grass	11.060
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000

Impervious	4.240

Subbasin Total	15.300

----- Subbasin : TDA 2 - Sta 224+00 -----

	-----Area(Acres) -----
Till Forest	0.466
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.244

Subbasin Total	0.710

----- Subbasin : TDA 3 - Sta 230+00 -----

	-----Area(Acres) -----
Till Forest	0.536
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.197

Subbasin Total	0.733

----- Subbasin : TDA 5 to O163 SF -----

	-----Area(Acres) -----
Till Forest	0.135
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.046

Subbasin Total	0.181

----- Subbasin : TDA 8 - Sta 256+35 -----

	-----Area(Acres) -----
Till Forest	1.094

Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.450

Subbasin Total	1.544

----- Subbasin : U/S Basin to Unnamed #3 -----

	-----Area(Acres) -----
Till Forest	0.000
Till Pasture	0.000
Till Grass	30.370
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	11.630

Subbasin Total	42.000

----- Subbasin : U/S to TDA 1b - Sta 221+55 -----

	-----Area(Acres) -----
Till Forest	0.000
Till Pasture	0.000
Till Grass	11.860
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	4.540

Subbasin Total	16.400

----- Subbasin : TDA 1 - Sta 218+45 -----

	-----Area(Acres) -----
Till Forest	0.426
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000

Impervious	0.209

Subbasin Total	0.635

***** LINK DATA *****

-----SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: New Copy Lnk1
Link Type: Copy
Downstream Link: None

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: New Copy Lnk1
Link Type: Copy
Downstream Link: None

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED
Number of Subbasins: 11
Number of Links: 1

***** Subbasin: U/S Basin to Stream #0163 SF *****

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)

=====	
2-Year	23.302
5-Year	35.915
10-Year	46.920
25-Year	62.195
50-Year	93.135
100-Year	111.838
200-Year	113.130

***** Subbasin: U/S Basin to TDA 2 *****

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)

=====	
2-Year	0.359
5-Year	0.553
10-Year	0.723
25-Year	0.957
50-Year	1.434
100-Year	1.722
200-Year	1.742

******* Subbasin: U/S Basin to TDA 3 *******

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	1.174
5-Year	1.810
10-Year	2.364
25-Year	3.135
50-Year	4.694
100-Year	5.636
200-Year	5.701

******* Subbasin: U/S to TDA 1a - Sta 218+95 *******

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	3.048
5-Year	4.697
10-Year	6.137
25-Year	8.134
50-Year	12.180
100-Year	14.627
200-Year	14.795

******* Subbasin: TDA 2 - Sta 224+00 *******

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	0.119
5-Year	0.157
10-Year	0.192
25-Year	0.235
50-Year	0.336
100-Year	0.382
200-Year	0.398

******* Subbasin: TDA 3 - Sta 230+00 *******

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	9.753E-02
5-Year	0.129
10-Year	0.156
25-Year	0.199
50-Year	0.272
100-Year	0.327
200-Year	0.344

******* Subbasin: TDA 5 to O163 SF *******

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	2.307E-02
5-Year	3.017E-02
10-Year	3.640E-02
25-Year	4.706E-02
50-Year	6.347E-02
100-Year	7.634E-02
200-Year	8.210E-02

******* Subbasin: TDA 8 - Sta 256+35 *******

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	0.221
5-Year	0.292
10-Year	0.355
25-Year	0.443
50-Year	0.621
100-Year	0.746
200-Year	0.763

******* Subbasin: U/S Basin to Unnamed #3 *******

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	8.364
5-Year	12.891
10-Year	16.841
25-Year	22.325
50-Year	33.431
100-Year	40.143

200-Year 40.607

***** Subbasin: U/S to TDA 1b - Sta 221+55 *****

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)
=====

2-Year	3.266
5-Year	5.033
10-Year	6.575
25-Year	8.717
50-Year	13.053
100-Year	15.674
200-Year	15.855

***** Subbasin: TDA 1 - Sta 218+45 *****

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)
=====

2-Year	0.102
5-Year	0.135
10-Year	0.165
25-Year	0.202
50-Year	0.288
100-Year	0.335
200-Year	0.344

***** Link: New Copy Lnk1 ***** Link Inflow Frequency Stats

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)
=====

2-Year	39.956
5-Year	61.580
10-Year	80.486
25-Year	106.543
50-Year	159.597
100-Year	191.546
200-Year	193.584

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 11
Number of Links: 1

***** Subbasin: U/S Basin to Stream #0163 SF *****

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)

=====	
2-Year	23.302
5-Year	35.915
10-Year	46.920
25-Year	62.195
50-Year	93.135
100-Year	111.838
200-Year	113.130

******* Subbasin: U/S Basin to TDA 2 *******

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)

=====	
2-Year	0.359
5-Year	0.553
10-Year	0.723
25-Year	0.957
50-Year	1.434
100-Year	1.722
200-Year	1.742

******* Subbasin: U/S Basin to TDA 3 *******

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)

=====	
2-Year	1.174
5-Year	1.810
10-Year	2.364
25-Year	3.135
50-Year	4.694
100-Year	5.636
200-Year	5.701

******* Subbasin: U/S to TDA 1a - Sta 218+95 *******

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)

=====	
2-Year	3.048
5-Year	4.697
10-Year	6.137
25-Year	8.134
50-Year	12.180
100-Year	14.627
200-Year	14.795

***** Subbasin: TDA 2 - Sta 224+00 *****

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)
=====

2-Year	0.119
5-Year	0.157
10-Year	0.192
25-Year	0.235
50-Year	0.336
100-Year	0.382
200-Year	0.398

***** Subbasin: TDA 3 - Sta 230+00 *****

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)
=====

2-Year	9.753E-02
5-Year	0.129
10-Year	0.156
25-Year	0.199
50-Year	0.272
100-Year	0.327
200-Year	0.344

***** Subbasin: TDA 5 to O163 SF *****

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)
=====

2-Year	2.307E-02
5-Year	3.017E-02
10-Year	3.640E-02
25-Year	4.706E-02
50-Year	6.347E-02
100-Year	7.634E-02
200-Year	8.210E-02

***** Subbasin: TDA 8 - Sta 256+35 *****

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs) Flood Peak (cfs)
=====

2-Year	0.221
5-Year	0.292
10-Year	0.355
25-Year	0.443

50-Year	0.621
100-Year	0.746
200-Year	0.763

***** Subbasin: U/S Basin to Unnamed #3 *****

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	8.364
5-Year	12.891
10-Year	16.841
25-Year	22.325
50-Year	33.431
100-Year	40.143
200-Year	40.607

***** Subbasin: U/S to TDA 1b - Sta 221+55 *****

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	3.266
5-Year	5.033
10-Year	6.575
25-Year	8.717
50-Year	13.053
100-Year	15.674
200-Year	15.855

***** Subbasin: TDA 1 - Sta 218+45 *****

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
2-Year	0.102
5-Year	0.135
10-Year	0.165
25-Year	0.202
50-Year	0.288
100-Year	0.335
200-Year	0.344

***** Link: New Copy Lnk1 ***** Link Inflow Frequency Stats

Flood Frequency Data(cfs)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
 Tr (yrs) Flood Peak (cfs)

=====	
-------	--

2-Year	39.956
5-Year	61.580
10-Year	80.486
25-Year	106.543
50-Year	159.597
100-Year	191.546
200-Year	193.584

*****Groundwater Recharge Summary*****

Recharge is computed as input to PerInd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: U/S Basin to Stream	10330.600
Subbasin: U/S Basin to TDA 2	158.763
Subbasin: U/S Basin to TDA 3	521.476
Subbasin: U/S to TDA 1a - Sta	1350.709
Subbasin: TDA 2 - Sta 224+00	80.200
Subbasin: TDA 3 - Sta 230+00	92.247
Subbasin: TDA 5 to O163 SF	23.234
Subbasin: TDA 8 - Sta 256+35	188.281
Subbasin: U/S Basin to Unnamed	3708.955
Subbasin: U/S to TDA 1b - Sta	1448.410
Subbasin: TDA 1 - Sta 218+45	73.316
Link: New Copy Lnk1	Not Applicable

Total:	17976.200

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: U/S Basin to Stream	10330.600
Subbasin: U/S Basin to TDA 2	158.763
Subbasin: U/S Basin to TDA 3	521.476
Subbasin: U/S to TDA 1a - Sta	1350.709
Subbasin: TDA 2 - Sta 224+00	80.200
Subbasin: TDA 3 - Sta 230+00	92.247
Subbasin: TDA 5 to O163 SF	23.234
Subbasin: TDA 8 - Sta 256+35	188.281
Subbasin: U/S Basin to Unnamed	3708.955
Subbasin: U/S to TDA 1b - Sta	1448.410
Subbasin: TDA 1 - Sta 218+45	73.316
Link: New Copy Lnk1	Not Applicable

Total:	17976.200

**Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)**

Predeveloped: 113.773 ac-ft/year, Post Developed: 113.773 ac-ft/year

*****Water Quality Facility Data*****

-----SCENARIO: PREDEVELOPED

Number of Links: 1

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

*****Compliance Point Results *****

Scenario Predeveloped Compliance Link: New Copy Lnk1
Scenario Postdeveloped Compliance Link: New Copy Lnk1

*** Point of Compliance Flow Frequency Data ***

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)

2-Year	39.956	2-Year	39.956
5-Year	61.580	5-Year	61.580
10-Year	80.486	10-Year	80.486
25-Year	106.543	25-Year	106.543
50-Year	159.597	50-Year	159.597
100-Year	191.546	100-Year	191.546
200-Year	193.584	200-Year	193.584

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

Drainage Basin areas delineated and calculated ArcGIS10.

File Created by: CAB 12/18/2014

Land Use Residential Zoning from City of Sammamish GIS data.

The Zoning map displayed R 1-4 and R-4 throughout the delineated basins.

The below table describes the land use area and how the effective impervious area was calculated.

To be consistent with the Sammamish Basin Plan that Parametrix completed for the City in 2010, R-1=L and R-4=H.

To be conservative, use LU Code H to comply with R-4, since the designation R 1-4 can either be L or H. Therefore, effective impervious are will be 23.1% of the total area.

LU Code			% of Total	Effective	% Effective
	Name	Density	Impervious	Percentage	Impervious
RF	Rural Forest	<1 Unit/ac	10	40	4
RG	Rural Grass	<1 Unit/ac	10	40	4
L	Low Density Residen	1-3 Unit/ac	20	50	10
H	Medium Density Resi	3-9 Units/ac	42	66	27.7
MF	Multi-Family	Multi-Family	60	80	48
C	Commercial/Industria	Commercial	90	95	85.5

Drainage Basin		MGSFloodV4 land use input					
Area (AC)		Land Type	TDA 1a	TDA 1b	TDA 2	TDA 3	Stream 0163S
TDA 1a	15.3	Till Grass	11.06	11.86	1.30	4.27	84.59
TDA 1b	16.4	Impervious	4.24	4.54	0.50	1.63	32.41
TDA 2	1.8	Total Area	15.30	16.40	1.80	5.90	117.00
TDA 3	5.9						42.00
Stream 0163S	117	MGSFloodV4 5 Min Timestep					
Stream 0163N	28.2	Flow Rate	TDA 1a	TDA 1b	TDA 2	TDA 3	Stream 0163S
TDA 8 Unnamed 3	42	Q _{2YR}	3.05	3.27	0.36	1.17	23.30
		Q _{10YR}	6.14	6.58	0.72	2.36	46.92
		Q _{25YR}	8.13	8.72	0.96	3.14	62.20
		Q _{100YR}	14.63	15.67	1.72	5.64	111.84
							40.14

Offsite Drainage Basin Areas delineated in figure named **Figure 1-3 Drainage Basins, Subbasins and Site Characteristics**

TDA 1

Impervious area measured by station and trail width calculation below

Begin STA	End STA	length	width	area (SF)	area (ACRE)
217+00	222+50	550	16	8,800	0.202

Pervious area measured in CAD.Area from east edge of KC R/W to east gravel shoulder edge of proposed trail.

File location: U:\Bell\Projects\Clients\1521-King Cnty\554-1521-075-ELST\99Svc\cADD\Phase 20\Task 03\Engr\Craig

File name: SD-SSammA_cab-working Layer name: AreaMeasure

Area 18,560 SF
0.426 ACRE

MGSFlood Entries	
Cover	Areas (ac)
Till Forest	0.426
Impervious	0.202
Total	0.628

MGSFloodV4 5 Min Timestep					
Flow Rate	TDA 1	TDA 2	TDA 3	TDA 5	TDA 8
Q _{2YR}	1.933	0.119	0.098	0.023	0.221
Q _{25YR}	3.949	0.235	0.199	0.047	0.443
Q _{100YR}	6.349	0.382	0.327	0.076	0.746

TDA 2

Impervious area measured by station and trail width calculation below

Begin STA	End STA	length	width	area (SF)	area (ACRE)
222+50	229+15	665	16	10,640	0.244

Pervious area measured in CAD.Area from east edge of KC R/W to east gravel shoulder edge of proposed trail.

File location: U:\Bell\Projects\Clients\1521-King Cnty\554-1521-075-ELST\99Svc\cADD\Phase 20\Task 03\Engr\Craig

File name: SD-SSammA_cab-working Layer name: AreaMeasure

Area 20,308 SF
0.466 ACRE

MGSFlood Entries	
Cover	Areas (ac)
Till Forest	0.466
Impervious	0.244
Total	0.710

TDA 3

Impervious area measured by station and trail width calculation below

Begin STA	End STA	length	width	area (SF)	area (ACRE)
229+15	234+50	535	16	8,560	0.197

Pervious area measured in CAD.Area from east edge of KC R/W to east gravel shoulder edge of proposed trail.

File location: U:\Bell\Projects\Clients\1521-King Cnty\554-1521-075-ELST\99Svc\cADD\Phase 20\Task 03\Engr\Craig

File name: SD-SSammA_cab-working Layer name: AreaMeasure

Area 23,361 SF
0.536 ACRE

MGSFlood Entries	
Cover	Areas (ac)
Till Forest	0.536
Impervious	0.197
Total	0.733

TDA 5 only area that flows to Stream 0163 South Fork

Impervious area measured by station and trail width calculation below

Begin STA	End STA	length	width	area (SF)	area (ACRE)
239+00	240+25	125	16	2,000	0.046

Pervious area measured in CAD.Area from edge of parkway pavement to east gravel shoulder edge of proposed trail.

File location: U:\Bell\Projects\Clients\1521-King Cnty\554-1521-075-ELST\99Svc\cADD\Phase 20\Task 03\Engr\Craig

File name: SD-SSammA_cab-working Layer name: AreaMeasure

Area 5,881 SF
0.135 ACRE

MGSFlood Entries	
Cover	Areas (ac)
Till Forest	0.135
Impervious	0.046
Total	0.181

TDA 8

Impervious area measured by station and trail width calculation below

Begin STA	End STA	length	width	area (SF)	area (ACRE)
249+25	261+50	1225	16	19,600	0.450

Pervious area measured in CAD.Area from edge of parkway pavement to east gravel shoulder edge of proposed trail.

File location: U:\Bell\Projects\Clients\1521-King Cnty\554-1521-075-ELST\99Svc\cADD\Phase 20\Task 03\Engr\Craig

File name: SD-SSammA_cab-working Layer name: AreaMeasure

Area 47,654 SF
1.094 ACRE

MGSFlood Entries	
Cover	Areas (ac)
Till Forest	1.094
Impervious	0.450
Total	1.544

Offsite Basin Flows

MGSFloodV4 5 Min Timestep						
Flow Rate	TDA 1a	TDA 1b	TDA 2	TDA 3	Stream 0163S	TDA 8 Unnamed 3
Q2YR	3.048	3.266	0.359	1.174	23.302	8.364
Q10YR	6.137	6.575	0.723	2.364	46.92	16.841
Q25YR	8.134	8.717	0.957	3.135	62.195	22.325
Q100YR	14.627	15.674	1.722	5.636	111.838	40.143

ROW/TDA Basin Flows

MGSFloodV4 5 Min Timestep					
Flow Rate	TDA 1	TDA 2	TDA 3	TDA 5	TDA 8
Q2YR	0.102	0.119	0.098	0.023	0.221
Q10YR	0.165	0.192	0.156	0.036	0.355
Q25YR	0.202	0.235	0.199	0.047	0.443
Q100YR	0.335	0.382	0.327	0.076	0.746

Total Contributing Flow to a Trail cross-culvert or downstream private drainage system

	TDA 1	TDA 2	TDA 3	TDA 8 Unnamed 3
Culvert Station	218+45	224+00	229+90	256+35
Q2YR	6.416	0.478	1.272	8.585
Q10YR	12.877	0.915	2.520	17.196
Q25YR	17.053	1.192	3.334	22.768
Q100YR	30.636	2.104	5.963	40.889

Use Q25YR as the design storm flow rate when evaluating conveyance and culvert capacity.

Worksheet for STA 218+45 Trail Culvert Exist - Qfull

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.03390	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	45.12	ft³/s

Results

Discharge	45.12	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	1.97	ft
Percent Full	100.0	%
Critical Slope	0.03073	ft/ft
Velocity	14.36	ft/s
Velocity Head	3.21	ft
Specific Energy	5.21	ft
Froude Number	0.00	
Maximum Discharge	48.54	ft³/s
Discharge Full	45.12	ft³/s
Slope Full	0.03390	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for STA 218+45 Trail Culvert Exist - Qfull

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.97	ft
Channel Slope	0.03390	ft/ft
Critical Slope	0.03073	ft/ft

Worksheet for STA 218+45 Exist D/S - Qfull

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.04250	ft/ft
Normal Depth	1.33	ft
Diameter	1.33	ft
Discharge	17.02	ft ³ /s

Results

Discharge	17.02	ft ³ /s
Normal Depth	1.33	ft
Flow Area	1.39	ft ²
Wetted Perimeter	4.18	ft
Hydraulic Radius	0.33	ft
Top Width	0.00	ft
Critical Depth	1.31	ft
Percent Full	100.0	%
Critical Slope	0.03880	ft/ft
Velocity	12.25	ft/s
Velocity Head	2.33	ft
Specific Energy	3.66	ft
Froude Number	0.00	
Maximum Discharge	18.31	ft ³ /s
Discharge Full	17.02	ft ³ /s
Slope Full	0.04250	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for STA 218+45 Exist D/S - Qfull

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.33	ft
Critical Depth	1.31	ft
Channel Slope	0.04250	ft/ft
Critical Slope	0.03880	ft/ft

Worksheet for STA 218+45 Exist D/S channel - Q25

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.04250 ft/ft
Discharge 17.05 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00	2.00
0+05	1.00
0+07	0.00
0+09	0.00
0+11	1.00
0+16	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.00)	(0+16, 2.00)	0.040

Options

Current Roughness weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth 0.88 ft
Elevation Range 0.00 to 2.00 ft
Flow Area 3.29 ft²
Wetted Perimeter 5.92 ft
Hydraulic Radius 0.56 ft
Top Width 5.51 ft
Normal Depth 0.88 ft

Worksheet for STA 218+45 Exist D/S channel - Q25

Results

Critical Depth	0.96	ft
Critical Slope	0.02984	ft/ft
Velocity	5.18	ft/s
Velocity Head	0.42	ft
Specific Energy	1.29	ft
Froude Number	1.18	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.88	ft
Critical Depth	0.96	ft
Channel Slope	0.04250	ft/ft
Critical Slope	0.02984	ft/ft

Worksheet for STA 218+45 Exist D/S channel - Q100

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.04250 ft/ft
Discharge 30.64 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00	2.00
0+05	1.00
0+07	0.00
0+09	0.00
0+11	1.00
0+16	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.00)	(0+16, 2.00)	0.040

Options

Current Roughness weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth 1.20 ft
Elevation Range 0.00 to 2.00 ft
Flow Area 5.42 ft²
Wetted Perimeter 8.53 ft
Hydraulic Radius 0.63 ft
Top Width 8.02 ft
Normal Depth 1.20 ft

Worksheet for STA 218+45 Exist D/S channel - Q100

Results

Critical Depth	1.32	ft
Critical Slope	0.02831	ft/ft
Velocity	5.66	ft/s
Velocity Head	0.50	ft
Specific Energy	1.70	ft
Froude Number	1.21	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.20	ft
Critical Depth	1.32	ft
Channel Slope	0.04250	ft/ft
Critical Slope	0.02831	ft/ft

STORM SEWER DESIGN (English Units)

This spreadsheet accomplishes a storm sewer design using the rational method. Enter the data in the non-shaded areas only. Please use one spreadsheet per stormsewer run.

Project Name:	ELST - S Sammamish Segment A
---------------	------------------------------

Designed By: C. Buitrago
Project Office: N/A

m =	6.89	n =	0.539	Design Storm Event =	25-yr MRI	Pavement thickness (ft) =	0.5	Pipe Thickness (inches) =	2
-----	------	-----	-------	----------------------	-----------	---------------------------	-----	---------------------------	---

[illegible]

See WSDOT Hydraulic Manual 6-5 for explanation of columns. <http://www.wsdot.wa.gov/eesc/design/hydraulics/>

Notes:	Column 12 represents inflow from a storm sewer line, branch, an offsite source that flows into the trunk line being analyzed. The conservative assumption is that the flow enters the storm sewer run at the upstream end of the run being analyzed.
--------	--

For pipe cover calculation, Pipe cover = (Ground or Rim Elevation - Pipe invert elevation) - (pavement thickness) - (top of pipe thickness) - (pipe diameter). The pipe thickness is based on the pipe diameter per WSDOT Manual Concrete for Shallow Pipe Cover Installations Fill Height Table 8-11.2. Please specify the largest pipe thickness of the storm sewer run being analyzed.

The spreadsheet will only calculate one storm sewer line at a time. Please copy the "Blank Template" and use this for calculating new storm sewer lines. If analyzing complicated stormsewer system with multiple lateral lines to the trunk line, it is recommended that Stormshed be used to model the conveyance system. Please contact your region Hydraulic Contact.

WARNING: START YOUR STORMSEWER RUN ON ROW 12. DO NOT SKIP ANY ROWS IN BETWEEN. USE ONE SHEET PER STORMSEWER RUN

Please report any problems to the WSDOT HQ Hydraulics Office.

STORM SEWER DESIGN (English Units)

This spreadsheet accomplishes a storm sewer design using the rational method. Enter the data in the non-shaded areas only. Please use one spreadsheet per stormsewer run.

Project Name:	ELST - S Sammamish Segment A
---------------	------------------------------

Designed By: C. Buitrago

Project Office: N/A

m = 6.89

n = 0.539

Design Storm Event = 25-yr MRI

Pavement thickness (ft) = 0.5

Pipe Thickness (inches) = 2

[illegible]

See WSDOT Hydraulic Manual 6-5 for explanation of columns. <http://www.wsdot.wa.gov/eesc/design/hydraulics/>

Notes:	Column 12 represents inflow from a storm sewer line, branch, an offsite source that flows into the trunk line being analyzed. The conservative assumption is that the flow enters the storm sewer run at the upstream end of the run being analyzed.
--------	---

For pipe cover calculation, Pipe cover = (Ground or Rim Elevation - Pipe invert elevation) - (pavement thickness) - (top of pipe thickness) - (pipe diameter). The pipe thickness is based on the pipe diameter per WSDOT Manual Concrete for Shallow Pipe Cover Installations Fill Height Table 8-11.2. Please specify the largest pipe thickness of the storm sewer run being analyzed.

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WARNING: START YOUR STORMSEWER RUN ON ROW 12. DO NOT SKIP ANY ROWS IN BETWEEN. USE ONE SHEET PER STORMSEWER RUN

Please report any problems to the WSDOT HQ Hydraulics Office.

STORM SEWER DESIGN (English Units)

This spreadsheet accomplishes a storm sewer design using the rational method. Enter the data in the non-shaded areas only. Please use one spreadsheet per stormsewer run.

Project Name:	ELST - S Sammamish Segment A
---------------	------------------------------

Designed By:	C. Buitrago
Project Office:	N/A

m = 6.89

n = 0.539

Design Storm Event = 25-yr MRI

Pavement thickness (ft) = 0.5

Pipe Thickness (inches) = 2

[illegible]

See WSDOT Hydraulic Manual 6-5 for explanation of columns. <http://www.wsdot.wa.gov/eesc/design/hydraulics/>

Notes:	Column 12 represents inflow from a storm sewer line, branch, an offsite source that flows into the trunk line being analyzed. The conservative assumption is that the flow enters the storm sewer run at the upstream end of the run being analyzed.
--------	---

For pipe cover calculation, Pipe cover = (Ground or Rim Elevation - Pipe invert elevation) - (pavement thickness) - (top of pipe thickness) - (pipe diameter). The pipe thickness is based on the pipe diameter per WSDOT Manual Concrete for Shallow Pipe Cover Installations Fill Height Table 8-11.2. Please specify the largest pipe thickness of the storm sewer run being analyzed.

The spreadsheet will only calculate one storm sewer line at a time. Please copy the "Blank Template" and use this for calculating new storm sewer lines. If analyzing complicated stormsewer system with multiple lateral lines to the trunk line, it is recommended that Stormshed be used to model the conveyance system. Please contact your region Hydraulic Contact.

WARNING: START YOUR STORMSEWER RUN ON ROW 12. DO NOT SKIP ANY ROWS IN BETWEEN. USE ONE SHEET PER STORMSEWER RUN

Please report any problems to the WSDOT HQ Hydraulics Office.

STORM SEWER DESIGN (English Units)

This spreadsheet accomplishes a storm sewer design using the rational method. Enter the data in the non-shaded areas only. Please use one spreadsheet per stormsewer run.

Project Name:	ELST - S Sammamish Segment A
---------------	------------------------------

Designed By: C. Buitrago

Project Office: N/A

m = 6.89

n = 0.539

Design Storm Event = 25-yr MRI

Pavement thickness (ft) = 0.5

Pipe Thickness (inches) =

[illegible]

See WSDOT Hydraulic Manual 6-5 for explanation of columns. <http://www.wsdot.wa.gov/eesc/design/hydraulics/>

Notes:	Column 12 represents inflow from a storm sewer line, branch, an offsite source that flows into the trunk line being analyzed. The conservative assumption is that the flow enters the storm sewer run at the upstream end of the run being analyzed.
--------	--

For pipe cover calculation, Pipe cover = (Ground or Rim Elevation - Pipe invert elevation) - (pavement thickness) - (top of pipe thickness) - (pipe diameter). The pipe thickness is based on the pipe diameter per WSDOT Manual Concrete for Shallow Pipe Cover Installations Fill Height Table 8-11.2. Please specify the largest pipe thickness of the storm sewer run being analyzed.

The spreadsheet will only calculate one storm sewer line at a time. Please copy the "Blank Template" and use this for calculating new storm sewer lines. If analyzing complicated stormsewer system with multiple lateral lines to the trunk line, it is recommended that Stormshed be used to model the conveyance system. Please contact your region Hydraulic Contact.

WARNING: START YOUR STORMSEWER RUN ON ROW 12. DO NOT SKIP ANY ROWS IN BETWEEN. USE ONE SHEET PER STORMSEWER RUN

Please report any problems to the WSDOT HQ Hydraulics Office.

BACKWATER COMPUTER PROGRAM FOR PIPES
Pipe data from file:ELST224.bwp

Surcharge condition at intermediate junctions
Tailwater Elevation:32.5 feet
Discharge Range:0.1 to 2. Step of 0.1 [cfs]
Overflow Elevation:38.44 feet
Weir:NONE
Upstream Velocity:3. feet/sec

PIPE NO. 1: 56 LF - 4"CP @ 5.25% OUTLET: 32.50 INLET: 35.44
INTYP: 5
JUNC NO. 1: OVERFLOW-EL: 38.00 BEND: 69 DEG DIA/WIDTH: 1.0 Q-
RATIO: 0.00

Q(CFS)	HW(FT)	HW ELEV.	* N-FAC	DC	DN	TW	DO	DE	HWO
0.10	0.25	35.69	* 0.012	0.18	0.11	0.00	0.11	0.18	*****
0.20	0.41	35.85	* 0.012	0.26	0.16	0.00	0.16	0.26	*****
0.30	0.65	36.09	* 0.012	0.30	0.20	0.00	0.20	0.30	*****
0.40	0.99	36.43	* 0.012	0.33	0.24	0.00	0.24	0.33	*****
0.50	1.43	36.87	* 0.012	0.33	0.30	0.00	0.30	0.33	*****
***** OVERFLOW ENCOUNTERED AT 0.60 CFS DISCHARGE *****									
***** OVERFLOW CONDITIONS CALCULATED ASSUMING SURCHARGE CONDITIONS *****									
0.60	3.11	38.55	* 0.012	0.33	0.33	0.00	0.33	2.14	3.11
0.70	5.17	40.61	* 0.012	0.33	0.33	0.00	0.33	3.85	5.17
0.80	7.55	42.99	* 0.012	0.33	0.33	0.00	0.33	5.83	7.55
0.90	10.25	45.69	* 0.012	0.33	0.33	0.00	0.33	8.07	10.25
1.00	13.26	48.70	* 0.012	0.33	0.33	0.00	0.33	10.57	13.26
1.10	16.59	52.03	* 0.012	0.33	0.33	0.00	0.33	13.34	16.59
1.20	20.24	55.68	* 0.012	0.33	0.33	0.00	0.33	16.37	20.24
1.30	24.21	59.65	* 0.012	0.33	0.33	0.00	0.33	19.66	24.21
1.40	28.50	63.94	* 0.012	0.33	0.33	0.00	0.33	23.22	28.50

Q(CFS)	HW(FT)	HW ELEV.	* N-FAC	DC	DN	TW	DO	DE	HWO
***** *****									
0.10 0.11	0.18	37.62	* 0.012	0.18	0.11	0.25	0.25	0.18	*****
0.20 0.28	0.28	37.72	* 0.012	0.26	0.16	0.41	0.41	0.26	*****
0.30 0.55	0.55	37.99	* 0.012	0.30	0.20	0.65	0.65	0.30	*****
0.40 0.91	0.91	38.35	* 0.012	0.33	0.24	0.99	0.99	0.50	0.85
***** OVERFLOW ENCOUNTERED AT 0.50 CFS DISCHARGE *****									
0.50 1.38	2.41	39.85	* 0.012	0.33	0.33	1.43	1.43	1.78	2.41
0.60 1.96	5.46	42.90	* 0.012	0.33	0.33	3.11	3.11	4.49	5.46
0.70 2.64	9.14	46.58	* 0.012	0.33	0.33	5.17	5.17	7.78	9.14
0.80 3.42	13.39	50.83	* 0.012	0.33	0.33	7.55	7.55	11.57	13.39
0.90 4.31	18.21	55.65	* 0.012	0.33	0.33	10.25	10.25	15.87	18.21
1.00 5.30	23.59	61.03	* 0.012	0.33	0.33	13.26	13.26	20.67	23.59
1.10 6.40	29.55	66.99	* 0.012	0.33	0.33	16.59	16.59	25.98	29.55
1.20 7.60	36.07	73.51	* 0.012	0.33	0.33	20.24	20.24	31.80	36.07
1.30 8.91	43.15	80.59	* 0.012	0.33	0.33	24.21	24.21	38.12	43.15
1.40 10.32	50.80	88.24	* 0.012	0.33	0.33	28.50	28.50	44.94	50.80
1.50 11.83	59.02	96.46	* 0.012	0.33	0.33	33.10	33.10	52.27	59.02

13.45	1.60	67.81	105.25	*	0.012	0.33	0.33	38.02	38.02	60.11	67.81
15.18	1.70	77.16	114.60	*	0.012	0.33	0.33	43.25	43.25	68.45	77.16
17.01	1.80	87.08	124.52	*	0.012	0.33	0.33	48.81	48.81	77.30	87.08
18.94	1.90	97.57	135.01	*	0.012	0.33	0.33	54.68	54.68	86.65	97.57
20.98	2.00	108.62	146.06	*	0.012	0.33	0.33	60.87	60.87	96.51	*****

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200510005
Run Date: 12/03/2014 6:29 PM

Input File Name: TDA2-VaultFC_BW.fld
Project Name: ELST - S Sammamish Segment A
Analysis Title: Basin flows for Concrete Detention Vault
Comments: Drainage basins for TDA2

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Timeseries Selected
Climatic Region Number: 13

Full Period of Record Available used for Routing

Precipitation Station : 96004005 Puget East 40 in_5min 10/01/1939-10/01/2097

Evaporation Station : 961040 Puget East 40 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1

HSPF Parameter Region Name : USGS Default

***** Default HSPF Parameters Used (Not Modified by User) *****

***** WATERSHED DEFINITION *****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 2

----- Subbasin : U/S Basin to TDA 2 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	1.384
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.416

Subbasin Total 1.800

----- Subbasin : TDA 2 - Sta 224+00 -----

-----Area(Acres) -----

Till Forest	0.710
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.000

Subbasin Total 0.710

-----**SCENARIO: POSTDEVELOPED**

Number of Subbasins: 2

----- Subbasin : U/S Basin to TDA 2 -----

-----Area(Acres) -----

Till Forest	0.000
Till Pasture	0.000
Till Grass	1.384
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.416

Subbasin Total 1.800

----- Subbasin : TDA 2 - Sta 224+00 -----

-----Area(Acres) -----

Till Forest	0.466
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User	0.000
Impervious	0.244

Subbasin Total 0.710

***** **LINK DATA** *****

-----SCENARIO: PREDEVELOPED

Number of Links: 1

Link Name: New Copy Lnk1

Link Type: Copy

Downstream Link: None

***** LINK DATA *****

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

Link Name: Detention Vault

Link Type: Structure

Downstream Link: None

Prismatic Pond Option Used

Pond Floor Elevation (ft) : 38.50
Riser Crest Elevation (ft) : 42.82
Max Pond Elevation (ft) : 43.79
Storage Depth (ft) : 4.32
Pond Bottom Length (ft) : 72.0
Pond Bottom Width (ft) : 10.0
Pond Side Slopes (ft/ft) : L1= 0.00 L2= 0.00 W1= 0.00 W2= 0.00
Bottom Area (sq-ft) : 720.
Area at Riser Crest El (sq-ft) : 720.
(acres) : 0.017
Volume at Riser Crest (cu-ft) : 3,110.
(ac-ft) : 0.071
Area at Max Elevation (sq-ft) : 720.
(acres) : 0.017
Vol at Max Elevation (cu-ft) : 3,881.
(ac-ft) : 0.089

Massmann Infiltration Option Used

Hydraulic Conductivity (in/hr) : 0.00
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry

Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.020
Riser Crest Elevation : 42.82 ft

Hydraulic Structure Geometry

Number of Devices: 2

--- Device Number 1 ---

Device Type : Circular Orifice with Backwater
Control Elevation (ft) : 36.50
Diameter (in) : 1.50
Orientation : Horizontal

Tailwater Rating Table

Stage (ft)	Discharge (cfs)
38.63	0.100
38.69	0.200
38.73	0.300
38.77	0.400
40.23	0.500
43.37	0.600
47.17	0.700

--- Device Number 2 ---

Device Type : Vertical Rectangular Orifice
Control Elevation (ft) : 39.17
Length (in) : 0.25
Height (in) : 43.78
Orientation : Vertical
Elbow : No

*****FLOOD FREQUENCY AND DURATION STATISTICS*****

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 2
Number of Links: 1

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 2
Number of Links: 1

***** Link: Detention Vault

***** Link WSEL

Stats

WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	39.511
1.11-Year	39.656
1.25-Year	39.902
2.00-Year	40.283
3.33-Year	40.716
5-Year	41.011
10-Year	41.399
25-Year	41.686
50-Year	42.463
100-Year	42.696

*****Groundwater Recharge Summary*****

Recharge is computed as input to PerInd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: U/S Basin to TDA 2	170.122
Subbasin: TDA 2 - Sta 224+00	123.105
Link: New Copy Lnk1	Not Applicable

Total:	293.226

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)

Subbasin: U/S Basin to TDA 2	170.122
Subbasin: TDA 2 - Sta 224+00	80.798
Link: Detention Vault	0.000

Total:	250.920

**Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)**

Predeveloped: 1.856 ac-ft/year, Post Developed: 1.588 ac-ft/year

*****Water Quality Facility Data*****

-----SCENARIO: PREDEVELOPED

Number of Links: 1

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

***** Link: Detention Vault

Basic Wet Pond Volume (91% Exceedance): 5166. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 7750. cu-ft

Infiltration/Filtration Statistics-----
Total Runoff Volume (ac-ft): 610.08
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Percent Treated (Infiltrated+Filtered)/Total Volume: 0.00%

*****Compliance Point Results*****

Scenario Predeveloped Compliance Link: New Copy Lnk1
Scenario Postdeveloped Compliance Link: Detention Vault

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.198	2-Year	0.142
5-Year	0.283	5-Year	0.231
10-Year	0.369	10-Year	0.285
25-Year	0.508	25-Year	0.332
50-Year	0.576	50-Year	0.445
100-Year	0.628	100-Year	0.487
200-Year	0.805	200-Year	0.840

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

**** Flow Duration Performance ****

Excursion at Predeveloped 50%Q2 (Must be Less Than 0%):	-6.6%	PASS	
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than 0%):	-1.3%	PASS	
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	-17.5%	PASS	
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS	

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

BACKWATER COMPUTER PROGRAM FOR PIPES

Pipe data from file:DetVault224.bwp

Surcharge condition at intermediate junctions

Tailwater Elevation:32.5 feet

Discharge Range:0.05 to 0.5 Step of 0.05 [cfs]

Overflow Elevation:43.8 feet

Weir:NONE

Upstream Velocity:3. feet/sec

PIPE NO. 1: 56 LF - 4"CP @ 5.25% OUTLET: 32.50 INLET: 35.44

INTYP: 5

JUNC NO. 1: OVERFLOW-EL: 38.00 BEND: 69 DEG DIA/WIDTH: 1.0 Q-

RATIO: 0.00

Q(CFS)	HW(FT)	HW ELEV.	* N-FAC	DC	DN	TW	DO	DE	HWO
0.05	0.16	35.60	* 0.012	0.13	0.08	0.00	0.08	0.13	*****
0.10	0.25	35.69	* 0.012	0.18	0.11	0.00	0.11	0.18	*****
0.15	0.33	35.77	* 0.012	0.22	0.13	0.00	0.13	0.22	*****
0.20	0.41	35.85	* 0.012	0.26	0.16	0.00	0.16	0.26	*****
0.25	0.52	35.96	* 0.012	0.28	0.18	0.00	0.18	0.28	*****
0.30	0.65	36.09	* 0.012	0.30	0.20	0.00	0.20	0.30	*****
0.35	0.81	36.25	* 0.012	0.32	0.22	0.00	0.22	0.32	*****
0.40	0.99	36.43	* 0.012	0.33	0.24	0.00	0.24	0.33	*****
0.45	1.20	36.64	* 0.012	0.33	0.27	0.00	0.27	0.33	*****
0.50	1.43	36.87	* 0.012	0.33	0.30	0.00	0.30	0.33	*****

PIPE NO. 2: 40 LF - 4"CP @ 5.00% OUTLET: 35.44 INLET: 37.44

INTYP: 5

JUNC NO. 2: OVERFLOW-EL: 38.44 BEND: 56 DEG DIA/WIDTH: 1.8 Q-

RATIO: 0.00

Q(CFS)	HW(FT)	HW ELEV.	* N-FAC	DC	DN	TW	DO	DE	HWO
0.05	0.16	37.60	* 0.012	0.13	0.08	0.16	0.16	0.13	*****

```
***** OVERFLOW ENCOUNTERED AT      0.40 CFS DISCHARGE
*****
***** OVERFLOW CONDITIONS CALCULATED ASSUMING SURCHARGE CONDITIONS
*****
    0.40    1.02    38.46 * 0.012  0.33  0.24  0.99  0.99  0.50  0.96
1.02
    0.45    1.69    39.13 * 0.012  0.33  0.27  1.20  1.20  1.10  1.69
1.24
    0.50    2.50    39.94 * 0.012  0.33  0.33  1.43  1.43  1.78  2.50
1.48
```

Q (CFS)	HW (FT)	HW ELEV.	* N-FAC	DC	DN	TW	DO	DE	HWO
0.05	0.14	37.86	* 0.012	0.11	0.09	0.16	0.16	0.11	*****
0.10	0.21	37.93	* 0.012	0.16	0.12	0.25	0.25	0.16	*****
0.15	0.27	37.99	* 0.012	0.20	0.15	0.33	0.33	0.20	*****
0.20	0.32	38.04	* 0.012	0.23	0.17	0.41	0.41	0.23	*****
0.25	0.36	38.08	* 0.012	0.26	0.19	0.53	0.53	0.26	*****
0.30	0.49	38.21	* 0.012	0.28	0.21	0.67	0.67	0.42	0.49
0.35	0.68	38.40	* 0.012	0.31	0.23	0.83	0.83	0.60	0.68
0.40	0.90	38.62	* 0.012	0.33	0.24	1.02	1.02	0.80	0.90
0.45	1.61	39.33	* 0.012	0.35	0.26	1.69	1.69	1.48	1.61
0.50	2.47	40.19	* 0.012	0.37	0.28	2.50	2.50	2.32	2.47

Q(CFS)	HW(FT)	HW ELEV.	* N-FAC	DC	DN	TW	DO	DE	HWO
***** *****									
0.05 0.12	0.12	38.47	* 0.012	0.10	0.09	0.14	0.14	0.10	*****
0.10 0.17	0.17	38.52	* 0.012	0.13	0.12	0.21	0.21	0.13	*****
0.15 0.21	0.21	38.56	* 0.012	0.16	0.15	0.27	0.27	0.16	*****
0.20 0.24	0.24	38.59	* 0.012	0.19	0.17	0.32	0.32	0.19	*****
0.25 0.28	0.28	38.63	* 0.012	0.21	0.19	0.36	0.36	0.21	*****
0.30 0.30	0.30	38.65	* 0.012	0.23	0.21	0.49	0.49	0.23	*****
0.35 0.33	0.33	38.68	* 0.012	0.25	0.22	0.68	0.68	0.25	*****
0.40 0.36	0.40	38.75	* 0.012	0.27	0.24	0.90	0.90	0.32	0.40
0.45 0.38	1.01	39.36	* 0.012	0.28	0.25	1.61	1.61	1.00	1.01
0.50 0.40	1.87	40.22	* 0.012	0.30	0.27	2.47	2.47	1.86	1.87

Q (CFS)	HW (FT)	HW ELEV.	* N-FAC	DC	DN	TW	DO	DE	HWO
0.05	0.10	38.60	* 0.012	0.10	0.10	0.10	0.10	0.10	-0.01
0.10	0.13	38.63	* 0.012	0.13	0.13	0.15	0.15	0.13	0.05
0.15	0.16	38.66	* 0.012	0.16	0.16	0.19	0.19	0.16	0.10
0.20	0.19	38.69	* 0.012	0.19	0.19	0.22	0.22	0.19	0.14
0.25	0.21	38.71	* 0.012	0.21	0.21	0.26	0.26	0.21	0.17
0.30	0.23	38.73	* 0.012	0.23	0.23	0.28	0.28	0.23	0.20
0.35	0.25	38.75	* 0.012	0.25	0.24	0.31	0.31	0.25	*****

[illegible]

STORM SEWER DESIGN (English Units)

This spreadsheet accomplishes a storm sewer design using the rational method. Enter the data in the non-shaded areas only. Please use one spreadsheet per stormsewer run.

Project Name: ELST - S Sammamish Segment A

Designed By:	Enter Here
Project Office:	Enter Here

m =	6.89	n =	0.539	Design Storm Event =	25-yr MRI	Pavement thickness (ft) =	0.5	Pipe Thickness (inches) =	2
-----	------	-----	-------	----------------------	-----------	---------------------------	-----	---------------------------	---

[illegible]

See WSDOT Hydraulic Manual 6-5 for explanation of columns. <http://www.wsdot.wa.gov/eesc/design/hydraulics/>

Notes:	Column 12 represents inflow from a storm sewer line, branch, an offsite source that flows into the trunk line being analyzed. The conservative assumption is that the flow enters the storm sewer run at the upstream end of the run being analyzed.
--------	--

For pipe cover calculation, Pipe cover = (Ground or Rim Elevation - Pipe invert elevation) - (pavement thickness) - (top of pipe thickness) - (pipe diameter). The pipe thickness is based on the pipe diameter per WSDOT Manual Concrete for Shallow Pipe Cover Installations Fill Height Table 8-11.2. Please specify the largest pipe thickness of the storm sewer run being analyzed.

The spreadsheet will only calculate one storm sewer line at a time. Please copy the "Blank Template" and use this for calculating new storm sewer lines. If analyzing complicated stormsewer system with multiple lateral lines to the trunk line, it is recommended that Stormshd be used to model the conveyance system. Please contact your region Hydraulic Contact.

WARNING: START YOUR STORMSEWER RUN ON ROW 12. DO NOT SKIP ANY ROWS IN BETWEEN. USE ONE SHEET PER STORMSEWER RUN

Please report any problems to the WSDOT HQ Hydraulics Office.

STORM SEWER DESIGN (English Units)

This spreadsheet accomplishes a storm sewer design using the rational method. Enter the data in the non-shaded areas only. Please use one spreadsheet per stormsewer run.

Project Name: ELST - S Sammamish Segment A

Designed By: C. Buitrago
Project Office: Enter Here

m =	6.89	n =	0.539	Design Storm Event =	25-yr MRI	Pavement thickness (ft) =	0.5	Pipe Thickness (inches) =	2
-----	------	-----	-------	----------------------	-----------	---------------------------	-----	---------------------------	---

[illegible]

See WSDOT Hydraulic Manual 6-5 for explanation of columns. <http://www.wsdot.wa.gov/eesc/design/hydraulics/>

Notes:	Column 12 represents inflow from a storm sewer line, branch, an offsite source that flows into the trunk line being analyzed. The conservative assumption is that the flow enters the storm sewer run at the upstream end of the run being analyzed.
--------	--

For pipe cover calculation, $\text{Pipe cover} = (\text{Ground or Rim Elevation} - \text{Pipe invert elevation}) - (\text{pavement thickness}) - (\text{top of pipe thickness}) - (\text{pipe diameter})$. The pipe thickness is based on the pipe diameter per WSDOT Manual Concrete for Shallow Pipe Cover Installations Fill Height Table 8-11.2. Please specify the largest pipe thickness of the storm sewer run being analyzed.

The spreadsheet will only calculate one storm sewer line at a time. Please copy the "Blank Template" and use this for calculating new storm sewer lines. If analyzing complicated stormsewer system with multiple lateral lines to the trunk line, it is recommended that Stormshed be used to model the conveyance system. Please contact your region Hydraulic Contact.

WARNING: START YOUR STORMSEWER RUN ON ROW 12. DO NOT SKIP ANY ROWS IN BETWEEN. USE ONE SHEET PER STORMSEWER RUN

Please report any problems to the WSDOT HQ Hydraulics Office.

Pipe data from file:ELST230.bwp

Upstream Velocity:3. feet/sec

RATIO: 0.00

RATIO: 0.00

Q (CFS)	HW (FT)	HW ELEV.	* N-FAC	DC	DN	TW	DO	DE	HWO
3.00	0.94	39.14	* 0.012	0.66	0.50	1.20	1.20	0.66	*****
3.50	1.04	39.24	* 0.012	0.72	0.55	1.41	1.41	0.72	*****
4.00	1.13	39.33	* 0.012	0.77	0.59	1.64	1.64	0.77	*****
4.50	1.32	39.52	* 0.012	0.82	0.63	1.91	1.91	0.91	1.32

1.32

INTYP: 5

HWI

INTYP: 4

HWI

Worksheet for STA 256+35 Exist - Q25

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.15850	ft/ft
Diameter	1.50	ft
Discharge	22.66	ft³/s

Results

Normal Depth	0.79	ft
Flow Area	0.94	ft²
Wetted Perimeter	2.43	ft
Hydraulic Radius	0.39	ft
Top Width	1.50	ft
Critical Depth	1.48	ft
Percent Full	52.4	%
Critical Slope	0.04240	ft/ft
Velocity	24.14	ft/s
Velocity Head	9.06	ft
Specific Energy	9.84	ft
Froude Number	5.38	
Maximum Discharge	44.98	ft³/s
Discharge Full	41.82	ft³/s
Slope Full	0.04654	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	52.45	%
Downstream Velocity	Infinity	ft/s

Worksheet for STA 256+35 Exist - Q25

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.79	ft
Critical Depth	1.48	ft
Channel Slope	0.15850	ft/ft
Critical Slope	0.04240	ft/ft

Worksheet for STA 256+35 Exist - Q100

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.15850	ft/ft
Diameter	1.50	ft
Discharge	39.88	ft³/s

Results

Normal Depth	1.17	ft
Flow Area	1.48	ft²
Wetted Perimeter	3.25	ft
Hydraulic Radius	0.46	ft
Top Width	1.24	ft
Critical Depth	1.50	ft
Percent Full	78.1	%
Critical Slope	0.13983	ft/ft
Velocity	26.94	ft/s
Velocity Head	11.28	ft
Specific Energy	12.45	ft
Froude Number	4.35	
Maximum Discharge	44.98	ft³/s
Discharge Full	41.82	ft³/s
Slope Full	0.14415	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	78.09	%
Downstream Velocity	Infinity	ft/s

Worksheet for STA 256+35 Exist - Q100

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.17	ft
Critical Depth	1.50	ft
Channel Slope	0.15850	ft/ft
Critical Slope	0.13983	ft/ft

STORM SEWER DESIGN (English Units)

This spreadsheet accomplishes a storm sewer design using the rational method. Enter the data in the non-shaded areas only. Please use one spreadsheet per stormsewer run.

Project Name:	ELST - S Sammamish Segment A
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Designed By: C. Buitrago

Project Office: N/A

m = 6.89

n = 0.539

Design Storm Event = 25-yr MRI

Pavement thickness (ft) = 0.5

Pipe Thickness (inches) = 2

[illegible]

See WSDOT Hydraulic Manual 6-5 for explanation of columns. <http://www.wsdot.wa.gov/eesc/design/hydraulics/>

Notes:	Column 12 represents inflow from a storm sewer line, branch, an offsite source that flows into the trunk line being analyzed. The conservative assumption is that the flow enters the storm sewer run at the upstream end of the run being analyzed.
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For pipe cover calculation, Pipe cover = (Ground or Rim Elevation - Pipe invert elevation) - (pavement thickness) - (top of pipe thickness) - (pipe diameter). The pipe thickness is based on the pipe diameter per WSDOT Manual Concrete for Shallow Pipe Cover Installations Fill Height Table 8-11.2. Please specify the largest pipe thickness of the storm sewer run being analyzed.

The spreadsheet will only calculate one storm sewer line at a time. Please copy the "Blank Template" and use this for calculating new storm sewer lines. If analyzing complicated stormsewer system with multiple lateral lines to the trunk line, it is recommended that Stormshed be used to model the conveyance system. Please contact your region Hydraulic Contact.

WARNING: START YOUR STORMSEWER RUN ON ROW 12. DO NOT SKIP ANY ROWS IN BETWEEN. USE ONE SHEET PER STORMSEWER RUN

Please report any problems to the WSDOT HQ Hydraulics Office.