RATIONAL METHOD CALCUATIONS

Connection Segment

SUMMARY TABULATION OF COMPUTED FLOWS

BASIN ID DESCRIPTION		Total Basin Area (acres)	Q_5 (CFS)	Q_5 Combined Flow (CFS)	Q_{10} (CFS)	Q_{10} Combined Flow (CFS)	Q_{100} (CFS)	Q_{100} Combined Flow (CFS)
940R	Offsite	1.17	0.79		1.10		2.62	
940L	Offsite	0.82	0.59	1.66	0.82	2.30	1.92	5.40
946R		0.26	0.25		0.34		0.75	
949L		0.78	0.65		0.93		2.28	
949R		0.44	0.50		0.69		1.54	
960L	POND	2.04	1.93	2.64	2.47	3.72	5.18	9.08
961L		1.85	0.65		1.14		3.54	
962L	Offsite	5.90	3.33	15.07	4.56	18.59	10.44	36.86
969L		4.31	0.90		1.28		3.19	
978R		1.92	3.70		4.76		10.42	
979L		1.56	2.98		3.99		8.83	
981L		0.75	1.47		1.98		4.44	
982L	POND	3.28	0.93	11.96	1.21	16.97	2.53	41.37
982R		1.21	0.85		1.17		2.74	
983R		6.22	2.45		3.69		10.26	
990L	Offsite	0.40	0.27		0.41		1.13	
1000L		1.11	1.09		1.41		2.94	
1003L		0.27	0.72		0.86		1.51	
1005L		0.26	0.70		0.83		1.46	
1005R		12.42	5.70		8.84		25.52	
1007L	POND	3.53	2.72	16.84	4.08	24.12	10.66	60.53
1012R		0.38	1.02		1.22		2.14	
1014L		0.55	1.49		1.78		3.13	
1014R		0.51	1.37		1.63		2.88	
1019R	Offsite	0.44	0.50		0.67		1.48	
1019L	Offsite	1.46	1.08		1.52		3.63	
1029R	Offsite	2.76	1.42		2.07		5.33	
1029L	Offsite	0.88	0.77		1.05		2.34	
1033L		0.61	1.58		1.89		3.34	
1037L		1.25	0.92		1.42		4.00	
1037R		1.37	1.89		2.44		5.08	
1039R		0.84	2.10		2.51		4.46	
1039L		0.39	0.94		1.13		2.02	
round about	POND	0.30	1.58	9.01	1.89	11.27	3.34	22.25

			Assigned Impervious Values	
13-034.02 US 550 South Connection	**Date:**	**5/27/2016**	Pavement Area	100%
Hydrological Analysis	**By:**	**WVW**	Gravel Area	13%
Rational Method Calculations			Forest Area	10%
Offsite Basins			Agricutural Area	2%

Existing Basins													**Soil Type:**	**C**
Basin Id	Total Basin Area (SF)	Total Basin Area (acres)	Pavement Area (SF)	Gravel Pavement (SF)	Foreseted Areas (SF)	Agricultural (SF)	Total Impervious Area (SF)	% Impervious	C 2yr	C 5yr	C 10yr	C 25yr	C 50yr	C 100yr
O940R	24,507	0.6			8,244	16,262	1,150	5%	0.07	0.17	0.27	0.39	0.46	0.52
O949R	84,182	1.93	799	7,073	13,420	62,890	4,318	5%	0.08	0.18	0.28	0.39	0.46	0.52
O957R	1,439,756	33.05	12,002	2,273	934,454	491,026	115,564	8%	0.10	0.20	0.29	0.40	0.47	0.53
O961R	1,553,123	35.65	2,546	3,108	1,120,863	426,605	123,569	8%	0.09	0.19	0.29	0.40	0.46	0.52
O968R	319,918	7.34			3,241	316,677	6,658	2%	0.06	0.16	0.26	0.38	0.45	0.51
O969R	3,248,050	74.56	7,700	62,866	365,207	2,812,277	108,639	3%	0.06	0.17	0.27	0.38	0.45	0.51
O980R	5,338,046	122.54	11,160	68,084	1,272,897	3,985,905	227,019	4%	0.07	0.17	0.27	0.39	0.46	0.52
O988R	542404	12.45	31,693			510,711	41,907	8%	0.09	0.19	0.29	0.40	0.46	0.52
O990R	3,304,296	75.86		45,932	420,130	2,838,234	104,749	3%	0.06	0.17	0.27	0.38	0.45	0.51
O1016R	4,105,467	94.25		132,537	3,152,614	820,316	348,898	8%	0.10	0.20	0.29	0.40	0.47	0.53
O1030R	358,408	8.23			358,408		35,841	10%	0.11	0.21	0.30	0.41	0.47	0.53
O1040R	500,380	11.49	196,726		78,697	224,957	209,095	42%	0.29	0.35	0.42	0.50	0.54	0.58
Total Area:		**477.93**												

STANDARD FORM SF-2

TIME OF CONCENTRATION
SUBDIVISION 13-034.01 US 550 South Connection
CALCULATED BY WVW DATE 5/27/2016

SUB-BASIN DATA	INITIAL/OVERLAND TIME (Ti)						TRAVEL TIME (Tt)				Tc CHECK (urbanized basins)		FINAL Tc	REMARKS
DESIGNATION (1)	C 5yr (2)	AREA acres (3)	Ci (4)	LENGTH feet (5)	SLOPE % (6)	Ti min (7)	LENGTH feet (8)	SLOPE % (9)	VEL ft/sec (10)	Tt min (11)	TOT. LENGTH feet (12)	Tc (urban) min (13)	min (14)	
O940R	0.17	0.56	0.17	32	28.13	3.10	814	1.84	0.95	14.27	845.5	14.70	17.38	
O949R	0.18	1.93	0.18	310	2.58	21.26	359	3.48	1.30	4.60	669.1	13.72	25.87	
O957R	0.20	33.05	0.20	500	3.80	23.28	2010	2.74	1.20	27.92	2510.0	23.94	51.19	
O961R	0.19	35.65	0.19	500	3.80	23.43	1891	4.86	0.55	57.31	2391.4	23.29	80.74	
O968R	0.16	7.34	0.16	500	4.40	23.05	570	4.04	1.40	6.79	1070.0	15.94	29.84	
O969R	0.17	74.56	0.17	500	3.80	24.05	3056.5	3.57	1.30	39.19	3556.5	29.76	63.24	
O980R	0.17	122.54	0.17	500	6.80	19.69	4357	3.24	1.25	58.09	4856.8	36.98	77.78	
O988R	0.19	12.45	0.19	500	2.90	25.64	777	3.54	1.30	9.96	1277.1	17.09	35.60	
O990R	0.17	75.86	0.17	500	5.20	21.66	4739	3.25	1.25	63.19	5239.0	39.11	84.85	
O1016R	0.20	94.25	0.20	500	6.80	19.18	3886	6.95	0.68	95.24	4385.8	34.37	114.41	
O1030R	0.21	8.23	0.21	500	7.80	18.08	670	20.89	1.10	10.16	1170.3	16.50	28.23	down steep cut slope
O1040R	0.35	11.49	0.35	500	21.40	10.83	378.36	21.01	1.10	5.73	878.4	14.88	16.56	down steep cut slope

Impervious Values derived from *CDOT Drainage Design Manual* Page 7-14

Ti = Equation from *CDOT Drainage Design Manual* Section 7.3.3 Time of Concentration $Ti = \frac{1.8(1.1-C)D^{0.5}}{S^{0.33}}$

VEL = Determined from *CDOT Drainage Design Manual* Figure 7.2 Velocities for Estimation of Time of Concentration

Tt = Equation from *CDOT Drainage Design Manual* Section 7.3.3 Time of Concentration $Tt = \frac{L}{60 \cdot V}$

Tc = Equation from *CDOT Drainage Design Manual* Section 7.3.3 Time of Concentration $Tc = \frac{L}{180} + 10$

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 2-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
	O940R	0.56	0.07	17.4	0.04	1.33	0.05							
	O949R	1.93	0.08	25.9	0.15	1.07	0.16	17.4	0.2	1.33	0.26			Basin O949R + O940R
	O957R	33.05	0.10	51.2	3.24	0.69	2.23							
	O961R	35.65	0.09	80.7	3.28	0.60	1.97							
	O968R	7.34	0.06	29.8	0.41	0.93	0.38							
	O969R	74.56	0.06	63.2	4.77	0.60	2.86	63.2	5.2	0.60	3.11			Basin O968R + O969R
	O980R	122.54	0.07	77.8	8.82	0.60	5.29							
	O988R	12.45	0.09	35.6	1.15	0.85	0.97							
	O990R	75.86	0.06	84.9	4.85	0.60	2.91	35.6	6.0	0.85	5.10			Basin O988R + O990R through stock pond (DETENTION)
	O1016R	94.25	0.10	114.4	9.24	0.60	5.54							
	O1030R	8.23	0.11	28.2	0.91	0.97	0.87							
	O1040R	11.49	0.29	16.6	3.29	1.37	4.49							

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 5-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
	O940R	0.56	0.17	17.4	0.10	1.92	0.19							
	O949R	1.93	0.18	25.9	0.35	1.60	0.56	17.4	0.4	1.60	0.71			Basin O949R + O940R
	O957R	33.05	0.20	51.2	6.54	1.05	6.87							
	O961R	35.65	0.19	80.7	6.85	0.90	6.16							
	O968R	7.34	0.16	29.8	1.19	1.44	1.71							
	O969R	74.56	0.17	63.2	12.53	0.90	11.27	63.2	13.7	0.90	12.35			Basin O968R + O969R
	O980R	122.54	0.17	77.8	21.32	0.90	19.19							
	O988R	12.45	0.19	35.6	2.39	1.32	3.15							
	O990R	75.86	0.17	84.9	12.74	0.90	11.47	35.6	15.1	0.90	13.62			Basin O988R + O990R through stock pond (DETENTION)
	O1016R	94.25	0.20	114.4	18.66	0.90	16.80							
	O1030R	8.23	0.21	28.2	1.73	1.48	2.56							
	O1040R	11.49	0.35	16.6	4.07	1.96	7.97							

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 10-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
	O940R	0.56	0.27	17.4	0.15	2.21	0.34							
	O949R	1.93	0.28	25.9	0.54	1.83	0.99	17.4	0.7	1.83	1.27			Basin O949R + O940R
	O957R	33.05	0.29	51.2	9.65	1.18	11.39							
	O961R	35.65	0.29	80.7	10.27	1.00	10.27							
	O968R	7.34	0.26	29.8	1.92	1.65	3.17							
	O969R	74.56	0.27	63.2	19.98	1.00	19.98	63.2	21.9	1.00	21.91			Basin O968R + O969R
	O980R	122.54	0.27	77.8	33.58	1.00	33.58							
	O988R	12.45	0.29	35.6	3.59	1.50	5.38							
	O990R	75.86	0.27	84.9	20.33	1.00	20.33	35.6	23.9	1.00	23.92			Basin O988R + O990R through stock pond (DETENTION)
	O1016R	94.25	0.29	114.4	27.52	1.00	27.52							
	O1030R	8.23	0.30	28.2	2.47	1.69	4.18							
	O1040R	11.49	0.42	16.6	4.87	2.25	10.97							

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 25-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
	O940R	0.56	0.39	17.4	0.22	2.78	0.60							
	O949R	1.93	0.39	25.9	0.75	2.30	1.73	17.4	1.0	2.30	2.23			Basin O949R + O940R
	O957R	33.05	0.40	51.2	13.29	1.51	20.06							
	O961R	35.65	0.40	80.7	14.19	1.30	18.45							
	O968R	7.34	0.38	29.8	2.78	2.06	5.72							
	O969R	74.56	0.38	63.2	28.48	1.30	37.03	63.2	31.3	1.30	40.64			Basin O968R + O969R
	O980R	122.54	0.39	77.8	47.30	1.30	61.49							
	O988R	12.45	0.40	35.6	4.96	1.88	9.33							
	O990R	75.86	0.38	84.9	28.98	1.30	37.67	35.6	33.9	1.30	44.11			Basin O988R + O990R through stock pond (DETENTION)
	O1016R	94.25	0.40	114.4	37.89	1.30	49.25							
	O1030R	8.23	0.41	28.2	3.37	2.12	7.15							
	O1040R	11.49	0.50	16.6	5.77	2.84	16.38							

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 50-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
	O940R	0.56	0.46	17.4	0.26	3.25	0.83							
	O949R	1.93	0.46	25.9	0.89	2.67	2.37	17.4	1.1	2.67	3.05			Basin O949R + O940R
	O957R	33.05	0.47	51.2	15.40	1.74	26.80							
	O961R	35.65	0.46	80.7	16.54	1.50	24.82							
	O968R	7.34	0.45	29.8	3.29	2.37	7.81							
	O969R	74.56	0.45	63.2	33.70	1.50	50.56	63.2	37.0	1.50	55.49			Basin O968R + O969R
	O980R	122.54	0.46	77.8	55.88	1.50	83.82							
	O988R	12.45	0.46	35.6	5.78	2.17	12.52							
	O990R	75.86	0.45	84.9	34.29	1.50	51.43	35.6	40.1	1.50	60.10			Basin O988R + O990R through stock pond (DETENTION)
	O1016R	94.25	0.47	114.4	43.92	1.50	65.88							
	O1030R	8.23	0.47	28.2	3.87	2.45	9.46							
	O1040R	11.49	0.54	16.6	6.23	3.33	20.71							

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 100-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
	O940R	0.56	0.52	17.4	0.29	3.74	1.1							
	O949R	1.93	0.52	25.9	1.00	3.10	3.1	25.9	1.3	3.10	4.02			Basin O949R + O940R
	O957R	33.05	0.53	51.2	17.39	2.00	34.8							
	O961R	35.65	0.52	80.7	18.68	1.70	31.8							
	O968R	7.34	0.51	29.8	3.73	2.78	10.4							
	O969R	74.56	0.51	63.2	38.18	1.70	64.9	63.2	41.9	1.70	71.24			Basin O968R + O969R
	O980R	122.54	0.52	77.8	63.23	1.70	107.5							
	O988R	12.45	0.52	35.6	6.52	2.53	16.5							
	O990R	75.86	0.51	84.9	38.84	1.70	66.0	84.9	45.4	1.70	77.12			Basin O988R + O990R through stock pond (DETENTION)
	O1016R	94.25	0.53	114.4	49.57	1.70	84.3							
	O1030R	8.23	0.53	28.2	4.36	2.86	12.5							
	O1040R	11.49	0.58	16.6	6.69	3.82	25.5							

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

MULLER ENGINEERING COMPANY, INC

13-034.01 US 550 South Connection **Date:** **5/27/2016**

Hydrological Analysis **By:** **WVW**

Rational Method Calculations

Onsite Basins

Assigned Impervious Values	
Pavement Area	100%
Grass Area	2%
Forest Area	10%
Gravel Area	13%
Terraced Area	100%

Existing Basins																**Soil Type:**	**C**
Basin Id	Total Basin Area (SF)	Total Basin Area (Acres)	Pavement Area (SF)	Foreseted Areas (SF)	Grass Areas (SF)	Gravel Areas (SF)	Terraced Areass (SF)	Total Impervious Area (SF)	Total Impervious Area (Acres)	% Impervious	C 2yr	C 5yr	C 10yr	C 25yr	C 50yr	C 100yr
940R	50,956	1.17	18,644		32,313			19,290	0.44	38%	0.26	0.34	0.41	0.49	0.53	0.57
940L	35,776	0.82	14,158		21,617			14,590	0.33	41%	0.28	0.35	0.42	0.50	0.54	0.58
946R	11,330	0.26	5,345		5,985			5,465	0.13	48%	0.33	0.39	0.45	0.52	0.56	0.60
949L	34,012	0.78	11,265		22,747			11,720	0.27	34%	0.24	0.32	0.40	0.48	0.53	0.57
949R	19,201	0.44	8,734		10,467			8,943	0.21	47%	0.32	0.38	0.44	0.51	0.55	0.59
960L	88,666	2.04	53,204		35,462			53,913	1.24	61%	0.41	0.46	0.51	0.57	0.60	0.63
961L	80,630	1.85	3,611		77,018			5,151	0.12	6%	0.09	0.19	0.28	0.39	0.46	0.52
962L	257,086	5.90	109,127		147,959			112,086	2.57	44%	0.30	0.36	0.43	0.51	0.55	0.59
969L	187,635	4.31	101,778		85,857			103,495	2.38	55%	0.37	0.43	0.48	0.55	0.58	0.62
978R	83,561	1.92	38,960		44,601			39,852	0.91	48%	0.32	0.38	0.45	0.52	0.56	0.59
979L	68,115	1.56	21,031		47,084			21,972	0.50	32%	0.23	0.31	0.39	0.47	0.52	0.57
981L	32,496	0.75	19,415		13,081			19,676	0.45	61%	0.41	0.46	0.51	0.57	0.60	0.63
982L	142,838	3.28	72,188		70,650			73,601	1.69	52%	0.35	0.41	0.46	0.53	0.57	0.60
982R	52,677	1.21	20,857		31,821			21,493	0.49	41%	0.28	0.35	0.42	0.50	0.54	0.58
983R	271,100	6.22	46,923		224,177			51,406	1.18	19%	0.16	0.25	0.33	0.44	0.50	0.55
990L	17,472	0.40	3,367		14,105			3,649	0.08	21%	0.17	0.26	0.34	0.44	0.50	0.55
1000L	48,256	1.11	29,116		19,140			29,498	0.68	61%	0.42	0.47	0.52	0.57	0.60	0.63
1003L	11,813	0.27	11,805		9			11,805	0.27	100%	0.87	0.88	0.90	0.93	0.94	0.95
1005L	11,252	0.26	11,252		0			11,252	0.26	100%	0.89	0.90	0.92	0.94	0.95	0.96
1005R	540,954	12.42	70,564		470,390			79,972	1.84	15%	0.13	0.23	0.32	0.43	0.49	0.54
1007L	153,601	3.53	37,963		115,639			40,275	0.92	26%	0.20	0.28	0.36	0.46	0.51	0.56
1012R	16,453	0.38	16,453		0			16,453	0.38	100%	0.89	0.90	0.92	0.94	0.95	0.96
1014L	24,084	0.55	24,084		0			24,084	0.55	100%	0.89	0.90	0.92	0.94	0.95	0.96
1014R	22,115	0.51	22,115		0			22,115	0.51	100%	0.89	0.90	0.92	0.94	0.95	0.96
1019R	19,036	0.44	9,396		9,640			9,589	0.22	50%	0.34	0.40	0.46	0.53	0.57	0.60
1019L	63,802	1.46	23,248		40,554			24,059	0.55	38%	0.26	0.34	0.41	0.49	0.53	0.57
1029R	120,021	2.76	32,910		87,111			34,652	0.80	29%	0.21	0.29	0.37	0.47	0.52	0.57
1029L	38,150	0.88	18,330		19,820			18,726	0.43	49%	0.33	0.39	0.46	0.53	0.57	0.60
1033L	26,484	0.61	26,149		335			26,156	0.60	99%	0.85	0.87	0.89	0.91	0.92	0.93
1037L	54,524	1.25	8,311		46,213			9,236	0.21	17%	0.15	0.24	0.32	0.43	0.49	0.54
1037R	59,547	1.37	35,750		23,797			36,226	0.83	61%	0.41	0.46	0.51	0.57	0.60	0.63
1039R	36,434	0.84	35,166		1,268			35,191	0.81	97%	0.82	0.84	0.86	0.88	0.89	0.90
1039L	16,984	0.39	16,069		915			16,088	0.37	95%	0.79	0.81	0.83	0.86	0.87	0.88
round abo	13,068	0.30	0		13,068			261	0.01	2%	0.06	0.16	0.26	0.38	0.45	0.51
Total Area:		**62.22**														

STANDARD FORM SF-2

TIME OF CONCENTRATION
SUBDIVISION 13-034.01 US 550 South Connection
CALCULATED BY WVW DATE 5/27/2016

SUB-BASIN DATA	INITIAL/OVERLAND TIME (Ti)						TRAVEL TIME (Tt)				Tc CHECK (urbanized basins)		FINAL Tc	REMARKS
DESIGNATION	C 5yr	AREA acres	Ci	LENGTH feet	SLOPE %	Ti min	LENGTH feet	SLOPE %	VEL ft/sec	Tt min	TOT. LENGTH feet	Tc (urban) min	min	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
940R	0.34	1.17	0.34	162	7.4	8.95	817	1.8	2.00	6.80	978.3	15.44	15.76	
940L	0.35	0.82	0.35	70	2.9	7.98	802	1.9	2.05	6.52	872.1	14.85	14.50	
946R	0.39	0.26	0.39	61	4.9	5.87	240	0.6	1.20	3.34	301.2	11.67	9.21	
949L	0.32	0.78	0.32	67	4.5	6.97	169	2.7	2.50	1.13	236.8	11.32	8.10	
949R	0.38	0.44	0.38	48	6.2	0.00	224	1.1	1.70	2.19	272.0	11.51	5.00	
960L	0.46	2.04	0.46	53	2.8	5.93	1029	1.7	2.00	8.58	1082.0	16.01	14.50	
961L	0.19	1.85	0.19	117	3.0	12.36	786	2.0	2.10	6.24	902.9	15.02	18.60	
962L	0.36	5.90	0.36	221	5.4	0.00	1681	0.4	1.05	26.68	1901.7	20.57	26.68	
969L	0.43	4.31	0.43	69	4.3	6.17	977	0.6	1.20	13.57	1046.7	15.82	19.75	
978R	0.38	1.92	0.38	37	2.0	6.28	1463	2.9	2.60	9.38	1500.6	18.34	15.66	
979L	0.31	1.56	0.31	36	9.7	4.00	924	1.7	2.00	7.70	959.9	15.33	11.70	
981L	0.46	0.75	0.46	169	3.0	10.41	646	1.9	2.10	5.13	814.9	14.53	15.54	
982L	0.41	3.28	0.41	18	22.3	1.88	715	2.0	2.10	5.68	733.3	14.07	7.56	
982R	0.35	1.21	0.35	16	24.5	1.88	1218	1.0	1.50	13.54	1234.8	16.86	15.42	
983R	0.25	6.22	0.25	171	6.4	10.73	2526	3.3	2.60	16.19	2696.4	24.98	26.92	
990L	0.26	0.40	0.26	41	2.4	7.22	216	2.8	2.50	1.44	257.6	11.43	8.66	
1000L	0.47	1.11	0.47	59	8.5	4.29	736	0.9	1.40	8.76	794.8	14.42	13.06	
1003L	0.88	0.27	0.88	50	4.8	1.62	219	1.7	2.60	1.41	268.9	11.49	5.00	
1005L	0.90	0.26	0.90	40	6.0	1.26	246	0.9	1.90	2.16	286.1	11.59	5.00	
1005R	0.23	12.42	0.23	48	9.2	5.17	1197	1.4	1.80	11.09	1245.3	16.92	16.26	
1007L	0.28	3.53	0.28	87	5.5	0.00	705	1.1	1.60	7.35	792.2	14.40	7.35	
1012R	0.90	0.38	0.90	53	3.5	1.72	370	2.0	2.80	2.20	422.8	12.35	5.00	
1014L	0.90	0.55	0.90	45	3.3	1.62	506	1.1	2.10	4.02	551.5	13.06	5.64	
1014R	0.90	0.51	0.90	42	2.4	1.73	506	1.7	2.60	3.25	547.8	13.04	5.00	
1019R	0.40	0.44	0.40	41	100.1	1.75	270	0.5	1.05	4.28	311.3	11.73	6.03	
1019L	0.34	1.46	0.34	54	30.5	3.24	627.1	0.6	1.10	9.50	681.3	13.79	12.74	
1029R	0.29	2.76	0.29	170	2.0	15.06	646.8	1.2	1.60	6.74	816.9	14.54	21.79	
1029L	0.39	0.88	0.39	51	1.9	7.30	376.5	1.2	1.60	3.92	427.9	12.38	11.22	
1033L	0.87	0.61	0.87	52	3.3	0.00	571.8	2.4	3.00	3.18	623.3	13.46	5.00	
1037L	0.24	1.25	0.24	15	16.4	0.00	628.1	2.9	2.60	4.03	643.4	13.57	5.00	
1037R	0.46	1.37	0.46	52	3.4	0.00	766.0	3.5	2.80	4.56	818.4	14.55	5.00	
1039R	0.84	0.84	0.84	79	1.5	0.00	285.9	1.7	2.60	1.83	365.1	12.03	5.00	
1039L	0.81	0.39	0.81	64	3.8	0.00	331.7	3.2	3.50	1.58	395.6	12.20	5.00	
round about	0.16	0.30	0.16	5	0.5	0.00	82.0	0.5	1.10	1.24	87.0	10.48	5.00	

Impervious Values derived from *CDOT Drainage Design Manual* Page 7-14

Ti = Equation from *CDOT Drainage Design Manual* Section 7.3.3 Time of Concentration $Ti = \frac{.8(1.1-C)D^{0.5}}{S^{0.33}}$

VEL = Determined from *CDOT Drainage Design Manual* Figure 7.2 Velocities for Estimation of Time of Concentration

Tt = Equation from *CDOT Drainage Design Manual* Section 7.3.3 Time of Concentration $Tt = \frac{L}{60 \cdot V}$

Tc = Equation from *CDOT Drainage Design Manual* Section 7.3.3 Time of Concentration $Tc = \frac{L}{180} + 10$

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 2-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
OFF	940R	1.17	0.26	15.8	0.31	1.40	0.43							
OFF	940L	0.82	0.28	14.5	0.23	1.44	0.33	14.5	0.6	1.44	0.93			940L + 946R + 949L + 949R
	946R	0.26	0.33	9.2	0.09	1.68	0.14	9.2	0.22	1.68	0.38			946R + 949R
	949L	0.78	0.24	8.1	0.19	1.76	0.34							
	949R	0.44	0.32	5.0	0.14	2.00	0.28							
POND	960L	2.04	0.41	14.5	0.83	1.44	1.20	18.6	0.99	1.44	1.43			960L + 961L
	961L	1.85	0.09	18.6	0.16	1.30	0.21							
OFF	962L	5.90	0.30	26.7	1.76	1.03	1.82	63.2	9.15	1.03	9.46			O968R + O969R + 962L + 969L + 978R
	969L	4.31	0.37	19.7	1.59	1.27	2.02							
	978R	1.92	0.32	15.7	0.62	1.40	0.86							
	979L	1.56	0.23	11.7	0.36	1.56	0.57							
	981L	0.75	0.41	15.5	0.31	1.40	0.43							
POND	982L	3.28	0.35	7.6	1.13	1.84	2.09	26.9	3.13	1.84	5.75			979l + 981L + 982L + 982R +983R
	982R	1.21	0.28	15.4	0.34	1.40	0.47							
	983R	6.22	0.16	26.9	0.98	1.03	1.02							
OFF	990L	0.40	0.17	8.7	0.07	1.76	0.12							
	1000L	1.11	0.42	13.1	0.46	1.48	0.69							
	1003L	0.27	0.87	5.0	0.24	2.00	0.47							
	1005L	0.26	0.89	5.0	0.23	2.00	0.46							
	1005R	12.42	0.13	16.3	1.66	1.37	2.27	16.3	2.00	1.37	2.73			1005R + 1012R
POND	1007L	3.53	0.20	7.3	0.72	1.84	1.32	16.3	4.59	1.84	8.45			1000L+1003L+1005L+1005R+1007L+1012R+1014L+1014R
	1012R	0.38	0.89	5.0	0.34	2.00	0.67							
	1014L	0.55	0.89	5.6	0.49	2.00	0.98	5.6	0.94	2.00	1.89			1014R + 1014L
	1014R	0.51	0.89	5.0	0.45	2.00	0.90							
OFF	1019R	0.44	0.34	6.0	0.15	1.92	0.29							
OFF	1019L	1.46	0.26	12.7	0.38	1.52	0.58							
OFF	1029R	2.76	0.21	21.8	0.58	1.20	0.70							
OFF	1029L	0.88	0.33	11.2	0.29	1.56	0.46							
	1033L	0.61	0.85	5.0	0.52	2.00	1.04							
	1037L	1.25	0.15	5.0	0.18	2.00	0.37	5.0	0.70	2.00	1.40			1033L + 1037L
	1037R	1.37	0.41	5.0	0.56	2.00	1.12							
	1039R	0.84	0.82	5.0	0.68	2.00	1.37							
	1039L	0.39	0.79	5.0	0.31	2.00	0.61							
POND	round about	0.30	0.06	5.0	0.02	2.00	0.03	5.0	2.27	2.00	4.54			1033L+1037L+1037R+1039R+1039L+ROUNDABOUT

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 5-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
OFF	940R	1.17	0.34	15.8	0.40	2.00	0.79							
OFF	940L	0.82	0.35	14.5	0.29	2.06	0.59	14.5	0.8	2.06	1.66			940L + 946R + 949L + 949R
	946R	0.26	0.39	9.2	0.10	2.44	0.25	9.2	0.27	2.44	0.65			946R + 949R
	949L	0.78	0.32	8.1	0.25	2.58	0.65							
	949R	0.44	0.38	5.0	0.17	3.00	0.50							
POND	960L	2.04	0.46	14.5	0.94	2.06	1.93	18.6	1.28	2.06	2.64			960L + 961L
	961L	1.85	0.19	18.6	0.34	1.88	0.65							
OFF	962L	5.90	0.36	26.7	2.14	1.56	3.33	63.2	9.66	1.56	15.07			O968R + O969R + 962L + 969L + 978R
	969L	1.56	0.31	19.7	0.49	1.84	0.90							
	978R	4.31	0.43	15.7	1.85	2.00	3.70							
	979L	3.28	0.41	11.7	1.33	2.24	2.98							
	981L	1.92	0.38	15.5	0.73	2.00	1.47							
POND	982L	0.75	0.46	7.6	0.34	2.72	0.93	26.9	4.40	2.72	11.96			979l + 981L + 982L + 982R +983R
	982R	1.21	0.35	15.4	0.42	2.00	0.85							
	983R	6.22	0.25	26.9	1.57	1.56	2.45							
OFF	990L	0.40	0.26	8.7	0.10	2.58	0.27							
	1000L	1.11	0.47	13.1	0.52	2.12	1.09							
	1003L	0.27	0.88	5.0	0.24	3.00	0.72							
	1005L	0.26	0.90	5.0	0.23	3.00	0.70							
	1005R	12.42	0.23	16.3	2.91	1.96	5.70	16.3	3.25	1.96	6.36			1005R + 1012R
POND	1007L	3.53	0.28	7.3	1.00	2.72	2.72	16.3	6.19	2.72	16.84			1000L+1003L+1005L+1005R+1007L+1012R+1014L+1014R
	1012R	0.38	0.90	5.0	0.34	3.00	1.02							
	1014L	0.55	0.90	5.6	0.50	3.00	1.49	5.6	0.95	3.00	2.86			1014R + 1014L
	1014R	0.51	0.90	5.0	0.46	3.00	1.37							
OFF	1019R	0.44	0.40	6.0	0.17	2.86	0.50							
OFF	1019L	1.46	0.34	12.7	0.50	2.18	1.08							
OFF	1029R	2.76	0.29	21.8	0.80	1.76	1.42							
OFF	1029L	0.88	0.39	11.2	0.35	2.24	0.77							
	1033L	0.61	0.87	5.0	0.53	3.00	1.58							
	1037L	1.25	0.24	5.0	0.31	3.00	0.92	5.0	0.83	3.00	2.50			1033L + 1037L
	1037R	1.37	0.46	5.0	0.63	3.00	1.89							
	1039R	0.84	0.84	5.0	0.70	3.00	2.10							
	1039L	0.39	0.81	5.0	0.31	3.00	0.94							
POND	round about	0.61	0.87	5.0	0.53	3.00	1.58	5.0	3.00	3.00	9.01			1033L+1037L+1037R+1039R+1039L+ROUNDABOUT

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 10-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
OFF	940R	1.17	0.41	15.8	0.48	2.30	1.10							
OFF	940L	0.82	0.42	14.5	0.34	2.38	0.82	14.5	1.0	2.38	2.30			940L + 946R + 949L + 949R
	946R	0.26	0.45	9.2	0.12	2.86	0.34	9.2	0.31	2.86	0.90			946R + 949R
	949L	0.78	0.40	8.1	0.31	3.02	0.93							
	949R	0.44	0.44	5.0	0.20	3.50	0.69							
POND	960L	2.04	0.51	14.5	1.04	2.38	2.47	18.6	1.56	2.38	3.72			960L + 961L
	961L	1.85	0.28	18.6	0.53	2.16	1.14							
OFF	962L	5.90	0.43	26.7	2.55	1.79	4.56	63.2	10.41	1.79	18.59			O968R + O969R + 962L + 969L + 978R
	969L	1.56	0.39	19.7	0.61	2.11	1.28							
	978R	4.31	0.48	15.7	2.07	2.30	4.76							
	979L	3.28	0.46	11.7	1.52	2.62	3.99							
	981L	1.92	0.45	15.5	0.86	2.30	1.98							
POND	982L	0.75	0.51	7.6	0.38	3.18	1.21	26.9	5.34	3.18	16.97			979l + 981L + 982L + 982R +983R
	982R	1.21	0.42	15.4	0.51	2.30	1.17							
	983R	6.22	0.33	26.9	2.07	1.79	3.69							
OFF	990L	0.40	0.34	8.7	0.14	3.02	0.41							
	1000L	1.11	0.52	13.1	0.57	2.46	1.41							
	1003L	0.27	0.90	5.0	0.25	3.50	0.86							
	1005L	0.26	0.92	5.0	0.24	3.50	0.83							
	1005R	12.42	0.32	16.3	3.92	2.25	8.84	16.3	4.27	2.25	9.63			1005R + 1012R
POND	1007L	3.53	0.36	7.3	1.28	3.18	4.08	16.3	7.59	3.18	24.12			1000L+1003L+1005L+1005R+1007L+1012R+1014L+1014R
	1012R	0.38	0.92	5.0	0.35	3.50	1.22							
	1014L	0.55	0.92	5.6	0.51	3.50	1.78	5.6	0.98	3.50	3.42			1014R + 1014L
	1014R	0.51	0.92	5.0	0.47	3.50	1.63							
OFF	1019R	0.44	0.46	6.0	0.20	3.34	0.67							
OFF	1019L	1.46	0.41	12.7	0.60	2.54	1.52							
OFF	1029R	2.76	0.37	21.8	1.02	2.02	2.07							
OFF	1029L	0.88	0.46	11.2	0.40	2.62	1.05							
	1033L	0.61	0.89	5.0	0.54	3.50	1.89							
	1037L	1.25	0.32	5.0	0.41	3.50	1.42	5.0	0.95	3.50	3.31			1033L + 1037L
	1037R	1.37	0.51	5.0	0.70	3.50	2.44							
	1039R	0.84	0.86	5.0	0.72	3.50	2.51							
	1039L	0.39	0.83	5.0	0.32	3.50	1.13							
POND	round about	0.61	0.89	5.0	0.54	3.50	1.89	5.0	3.22	3.50	11.27			1033L+1037L+1037R+1039R+1039L+ROUNDABOUT

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 25-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
OFF	940R	1.17	0.49	15.8	0.57	2.90	1.66							
OFF	940L	0.82	0.50	14.5	0.41	3.00	1.23	14.5	1.1	3.00	3.44			940L + 946R + 949L + 949R
	946R	0.26	0.52	9.2	0.14	3.60	0.49	9.2	0.36	3.60	1.30			946R + 949R
	949L	0.78	0.48	8.1	0.37	3.80	1.42							
	949R	0.44	0.51	5.0	0.23	4.40	1.00							
POND	960L	2.04	0.57	14.5	1.16	3.00	3.48	18.6	1.89	3.00	5.67			960L + 961L
	961L	1.85	0.39	18.6	0.73	2.72	1.98							
OFF	962L	5.90	0.51	26.7	2.99	2.24	6.69	63.2	11.28	2.24	25.27			O968R + O969R + 962L + 969L + 978R
	969L	1.56	0.47	19.7	0.74	2.66	1.97							
	978R	4.31	0.55	15.7	2.37	2.90	6.87							
	979L	3.28	0.53	11.7	1.75	3.30	5.78							
	981L	1.92	0.52	15.5	0.99	2.90	2.88							
POND	982L	0.75	0.57	7.6	0.43	4.00	1.70	26.9	6.49	4.00	25.95			979l + 981L + 982L + 982R +983R
	982R	1.21	0.50	15.4	0.60	2.90	1.75							
	983R	6.22	0.44	26.9	2.71	2.24	6.08							
OFF	990L	0.40	0.44	8.7	0.18	3.80	0.67							
	1000L	1.11	0.57	13.1	0.64	3.10	1.97							
	1003L	0.27	0.93	5.0	0.25	4.40	1.10							
	1005L	0.26	0.94	5.0	0.24	4.40	1.07							
	1005R	12.42	0.43	16.3	5.29	2.84	15.02	16.3	5.65	2.84	16.03			1005R + 1012R
POND	1007L	3.53	0.46	7.3	1.63	4.00	6.52	16.3	9.40	4.00	37.60			1000L+1003L+1005L+1005R+1007L+1012R+1014L+1014R
	1012R	0.38	0.94	5.0	0.36	4.40	1.56							
	1014L	0.55	0.94	5.6	0.52	4.40	2.29	5.6	1.00	4.40	4.39			1014R + 1014L
	1014R	0.51	0.94	5.0	0.48	4.40	2.10							
OFF	1019R	0.44	0.53	6.0	0.23	4.20	0.97							
OFF	1019L	1.46	0.49	12.7	0.71	3.20	2.29							
OFF	1029R	2.76	0.47	21.8	1.28	2.54	3.26							
OFF	1029L	0.88	0.53	11.2	0.46	3.30	1.52							
	1033L	0.61	0.91	5.0	0.55	4.40	2.44							
	1037L	1.25	0.43	5.0	0.54	4.40	2.38	5.0	1.10	4.40	4.82			1033L + 1037L
	1037R	1.37	0.57	5.0	0.78	4.40	3.43							
	1039R	0.84	0.88	5.0	0.74	4.40	3.25							
	1039L	0.39	0.86	5.0	0.33	4.40	1.47							
POND	round about	0.61	0.91	5.0	0.55	4.40	2.44	5.0	3.50	4.40	15.41			1033L+1037L+1037R+1039R+1039L+ROUNDABOUT

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection
DESIGN STORM: 50-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
OFF	940R	1.17	0.53	15.8	0.62	3.40	2.12							
OFF	940L	0.82	0.54	14.5	0.44	3.52	1.56	14.5	1.2	3.52	4.39			940L + 946R + 949L + 949R
	946R	0.26	0.56	9.2	0.15	4.24	0.62	9.2	0.39	4.24	1.66			946R + 949R
	949L	0.78	0.53	8.1	0.41	4.48	1.85							
	949R	0.44	0.55	5.0	0.24	5.20	1.27							
POND	960L	2.04	0.60	14.5	1.22	3.52	4.30	18.6	2.08	3.52	7.31			960L + 961L
	961L	1.85	0.46	18.6	0.86	3.18	2.72							
OFF	962L	5.90	0.55	26.7	3.22	2.59	8.36	63.2	11.72	2.59	30.40			O968R + O969R + 962L + 969L + 978R
	969L	1.56	0.52	19.7	0.82	3.11	2.55							
	978R	4.31	0.58	15.7	2.50	3.40	8.49							
	979L	3.28	0.57	11.7	1.88	3.88	7.28							
	981L	1.92	0.56	15.5	1.07	3.40	3.64							
POND	982L	0.75	0.60	7.6	0.45	4.72	2.11	26.9	7.13	4.72	33.67			979l + 981L + 982L + 982R +983R
	982R	1.21	0.54	15.4	0.65	3.40	2.22							
	983R	6.22	0.50	26.9	3.09	2.59	8.01							
OFF	990L	0.40	0.50	8.7	0.20	4.48	0.90							
	1000L	1.11	0.60	13.1	0.67	3.64	2.44							
	1003L	0.27	0.94	5.0	0.25	5.20	1.32							
	1005L	0.26	0.95	5.0	0.25	5.20	1.28							
	1005R	12.42	0.49	16.3	6.04	3.33	20.08	16.3	6.39	3.33	21.27			1005R + 1012R
POND	1007L	3.53	0.51	7.3	1.81	4.72	8.52	16.3	10.38	4.72	48.97			1000L+1003L+1005L+1005R+1007L+1012R+1014L+1014R
	1012R	0.38	0.95	5.0	0.36	5.20	1.87							
	1014L	0.55	0.95	5.6	0.53	5.20	2.73	5.6	1.01	5.20	5.24			1014R + 1014L
	1014R	0.51	0.95	5.0	0.48	5.20	2.51							
OFF	1019R	0.44	0.57	6.0	0.25	4.96	1.24							
OFF	1019L	1.46	0.53	12.7	0.78	3.76	2.94							
OFF	1029R	2.76	0.52	21.8	1.42	2.96	4.21							
OFF	1029L	0.88	0.57	11.2	0.50	3.88	1.92							
	1033L	0.61	0.92	5.0	0.56	5.20	2.91							
	1037L	1.25	0.49	5.0	0.62	5.20	3.20	5.0	1.18	5.20	6.12			1033L + 1037L
	1037R	1.37	0.60	5.0	0.82	5.20	4.27							
	1039R	0.84	0.89	5.0	0.75	5.20	3.89							
	1039L	0.39	0.87	5.0	0.34	5.20	1.76							
POND	round about	0.61	0.92	5.0	0.56	5.20	2.91	5.0	3.64	5.20	18.95			1033L+1037L+1037R+1039R+1039L+ROUNDABOUT

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

STANDARD FORM SF-3

CALCULATED BY: WVW
DATE: 5/27/2016

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

JOB #: 13-034.01
PROJECT: US 550 South Connection .
DESIGN STORM: 100-YEAR

DESIGN	DIRECT RUNOFF							TOTAL RUNOFF				TRAVEL TIME		REMARKS
	AREA DESIGN.	AREA (Ac)	COEFF C	Tc (min)	C*A (Ac)	I	Q (CFS)	Tc (min)	Sum C*A (Ac)	I (In/Hr)	Q (CFS)	I (in/Hr)	Q tot	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(22)	(23)	(13)
OFF	940R	1.17	0.57	15.8	0.67	3.90	2.62							
OFF	940L	0.82	0.58	14.5	0.48	4.04	1.92	14.5	1.3	4.04	5.40			940L + 946R + 949L + 949R
	946R	0.26	0.60	9.2	0.16	4.86	0.75	9.2	0.42	4.86	2.02			946R + 949R
	949L	0.78	0.57	8.1	0.45	5.12	2.28							
	949R	0.44	0.59	5.0	0.26	5.90	1.54							
POND	960L	2.04	0.63	14.5	1.28	4.04	5.18	18.6	2.25	4.04	9.08			960L + 961L
	961L	1.85	0.52	18.6	0.97	3.66	3.54							
OFF	962L	5.90	0.59	26.7	3.46	3.02	10.44	63.2	12.20	3.02	36.86			O968R + O969R + 962L + 969L + 978R
	969L	1.56	0.57	19.7	0.89	3.58	3.19							
	978R	4.31	0.62	15.7	2.67	3.90	10.42							
	979L	3.28	0.60	11.7	1.98	4.46	8.83							
	981L	1.92	0.59	15.5	1.14	3.90	4.44							
POND	982L	0.75	0.63	7.6	0.47	5.38	2.53	26.9	7.69	5.38	41.37			979l + 981L + 982L + 982R +983R
	982R	1.21	0.58	15.4	0.70	3.90	2.74							
	983R	6.22	0.55	26.9	3.40	3.02	10.26							
OFF	990L	0.40	0.55	8.7	0.22	5.12	1.13							
	1000L	1.11	0.63	13.1	0.70	4.18	2.94							
	1003L	0.27	0.95	5.0	0.26	5.90	1.51							
	1005L	0.26	0.96	5.0	0.25	5.90	1.46							
	1005R	12.42	0.54	16.3	6.68	3.82	25.52	16.3	7.04	3.82	26.91			1005R + 1012R
POND	1007L	3.53	0.56	7.3	1.98	5.38	10.66	16.3	11.25	5.38	60.53			1000L+1003L+1005L+1005R+1007L+1012R+1014L+1014R
	1012R	0.38	0.96	5.0	0.36	5.90	2.14							
	1014L	0.55	0.96	5.6	0.53	5.90	3.13	5.6	1.02	5.90	6.01			1014R + 1014L
	1014R	0.51	0.96	5.0	0.49	5.90	2.88							
OFF	1019R	0.44	0.60	6.0	0.26	5.64	1.48							
OFF	1019L	1.46	0.57	12.7	0.84	4.32	3.63							
OFF	1029R	2.76	0.57	21.8	1.56	3.42	5.33							
OFF	1029L	0.88	0.60	11.2	0.52	4.46	2.34							
	1033L	0.61	0.93	5.0	0.57	5.90	3.34							
	1037L	1.25	0.54	5.0	0.68	5.90	4.00	5.0	1.25	5.90	7.35			1033L + 1037L
	1037R	1.37	0.63	5.0	0.86	5.90	5.08							
	1039R	0.84	0.90	5.0	0.76	5.90	4.46							
	1039L	0.39	0.88	5.0	0.34	5.90	2.02							
POND	round about	0.61	0.93	5.0	0.57	5.90	3.34	5.0	3.77	5.90	22.25			1033L+1037L+1037R+1039R+1039L+ROUNDABOUT

I = Intensity Values are from the *City of Durango Rainfall Intensity Curves*

Q = CIA = (7) * (8)

RATIONAL METHOD CALCULATIONS

302 North Segment

US 550 DB
Proposed On-Site Basin Calculations - Rational Method
Muller Engineering Company, Inc.
CDOT Project Number: 22420
Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5

BY: EGK
DATE: 6/22/2018
CHECKED BY: ACF
DATE: 7/11/2018

Land Use Types	Percent Impervious
STREETS: PAVED	100
LAWNS, CLAYEY SOIL	2

PERCENT IMPERVIOUS VALUES

BASIN ID	STATION	TOTAL AREA		STREETS: PAVED		LAWNS, CLAYEY SOIL		WEIGHTED PERCENT IMPERVIOUS	WEIGHTED PERCENT PERVIOUS
		(sq ft)	(acre)	(sq ft)	% of Basin [2]	(sq ft)	% of Basin [2]		
P797L	797+00	112,553	2.58	44329	39	68224	61	41	59
P797R	797+00	188,880	4.34	79989	42	108891	58	44	56
P798R	798+00	78,497	1.80	0	0	78497	100	2	98
P810L	810+00	25,725	0.59	11390	44	14335	56	45	55
P813L	813+00	40,074	0.92	18311	46	21763	54	47	53
P815R	815+00	37,415	0.86	18397	49	19018	51	50	50
P818R	818+00	92,718	2.13	29710	32	63008	68	33	67
P818L	818+00	52,801	1.21	22550	43	30251	57	44	56
P819R	819+00	19,387	0.45	0	0	19387	100	2	98
P824L	824+00	29,870	0.69	12601	42	17269	58	43	57
P824R	824+00	90,054	2.07	39076	43	50978	57	45	55
P827L	827+00	56,763	1.30	20,123	35	36640	65	37	63
P825R	825+00	62,042	1.42	14005	23	48037	77	24	76
P833L	833+00	24,155	0.55	1898	8	22257	92	10	90
P833R	833+00	28,065	0.64	15505	55	12560	45	56	44
P835R	835+00	104,543	2.40	45957	44	58586	56	45	55
P837L	837+00	81,174	1.86	0	0	81174	100	2	98
P837R	837+00	145,247	3.33	82201	57	63046	43	57	43
P849R	849+00	31,966	0.73	16793	53	15173	47	53	47
P850L	850+00	165,612	3.80	6982	4	158630	96	6	94
P851R	851+00	28,251	0.65	15184	54	13067	46	55	45
P853L	853+00	89,511	2.05	29611	33	59900	67	34	66
P852L	852+00	106,135	2.44	30876	29	75259	71	31	69
P856R	856+00	32,247	0.74	16856	52	15391	48	53	47
P859L	859+00	354,351	8.13	25296	7	329055	93	9	91
P859R	859+00	57,252	1.31	31769	55	25483	45	56	44
P865L	865+00	242,620	5.57	16790	7	225830	93	9	91
P876L	876+00	13,111	0.30	446	3	12665	97	5	95
P867R	867+00	119,973	2.75	68067	57	51906	43	58	42
P877L	877+00	182,074	4.18	93753	51	88321	49	52	48
P881L	881+00	18,940	0.43	0	0	18940	100	2	98
P883R	883+00	60,994	1.40	32398	53	28596	47	54	46
P885L	885+00	37,528	0.86	968	3	36560	97	5	95
P888L	888+00	47,426	1.09	660	1	46766	99	3	97
P902L	902+00	366,836	8.42	32939	9	333897	91	11	89
P905R	905+00	22,987	0.53	0	0	22987	100	2	98
P902R	902+00	163,074	3.74	68188	42	94886	58	43	57
P909R	909+00	107,585	2.47	38871	36	68714	64	37	63
P911L	911+00	634,577	14.57	189139	30	445438	70	31	69
P914R	914+00	160,341	3.68	40914	26	119427	74	27	73
P928L	928+00	111,916	2.57	63105	56	48811	44	57	43
P931R	931+00	42,997	0.99	0	0	42997	100	2	98

US 550 DB
Proposed On-Site Basin Calculations - Rational Method
Muller Engineering Company, Inc.
CDOT Project Number: 22420
Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5

BY: EGK
DATE: 6/22/2018
CHECKED BY: ACF
DATE: 7/11/2018

RUNOFF COEFFIECIENTS FOR 2, 5, 10, AND 100 YEAR STORM EVENTS

BASIN ID	STATION	NRCS HYDROLOGIC SOIL GROUP[1]										C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
		SOIL GROUP (%)[1]			SOIL GROUP C/D (CLAYEY SOIL)												
		A	B	C/D	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}	%						
P797L	797+00	0	0	100	0.30	0.37	0.43	0.55	0.59	0.65	100	0.30	0.37	0.43	0.55	0.59	0.65
P797R	797+00	0	0	100	0.33	0.39	0.45	0.56	0.61	0.66	100	0.33	0.39	0.45	0.56	0.61	0.66
P798R	798+00	0	0	100	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49
P810L	810+00	0	0	100	0.34	0.41	0.47	0.57	0.62	0.67	100	0.34	0.41	0.47	0.57	0.62	0.67
P813L	813+00	0	0	100	0.35	0.42	0.48	0.58	0.62	0.68	100	0.35	0.42	0.48	0.58	0.62	0.68
P815R	815+00	0	0	100	0.38	0.45	0.50	0.60	0.64	0.69	100	0.38	0.45	0.50	0.60	0.64	0.69
P818R	818+00	0	0	100	0.24	0.31	0.38	0.51	0.56	0.62	100	0.24	0.31	0.38	0.51	0.56	0.62
P818L	818+00	0	0	100	0.33	0.39	0.46	0.56	0.61	0.66	100	0.33	0.39	0.46	0.56	0.61	0.66
P819R	819+00	0	0	100	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49
P824L	824+00	0	0	100	0.32	0.39	0.45	0.56	0.61	0.66	100	0.32	0.39	0.45	0.56	0.61	0.66
P824R	824+00	0	0	100	0.33	0.40	0.46	0.57	0.61	0.67	100	0.33	0.40	0.46	0.57	0.61	0.67
P827L	827+00	0	0	100	0.27	0.34	0.40	0.52	0.57	0.63	100	0.27	0.34	0.40	0.52	0.57	0.63
P825R	825+00	0	0	100	0.17	0.23	0.31	0.45	0.51	0.58	100	0.17	0.23	0.31	0.45	0.51	0.58
P833L	833+00	0	0	100	0.06	0.11	0.20	0.37	0.44	0.52	100	0.06	0.11	0.20	0.37	0.44	0.52
P833R	833+00	0	0	100	0.43	0.50	0.55	0.63	0.67	0.71	100	0.43	0.50	0.55	0.63	0.67	0.71
P835R	835+00	0	0	100	0.34	0.40	0.47	0.57	0.61	0.67	100	0.34	0.40	0.47	0.57	0.61	0.67
P837L	837+00	0	0	100	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49
P837R	837+00	0	0	100	0.45	0.51	0.56	0.64	0.67	0.72	100	0.45	0.51	0.56	0.64	0.67	0.72
P849R	849+00	0	0	100	0.41	0.47	0.53	0.62	0.66	0.70	100	0.41	0.47	0.53	0.62	0.66	0.70
P850L	850+00	0	0	100	0.04	0.09	0.18	0.35	0.42	0.51	100	0.04	0.09	0.18	0.35	0.42	0.51
P851R	851+00	0	0	100	0.42	0.48	0.54	0.63	0.66	0.71	100	0.42	0.48	0.54	0.63	0.66	0.71
P853L	853+00	0	0	100	0.25	0.32	0.39	0.51	0.56	0.63	100	0.25	0.32	0.39	0.51	0.56	0.63
P852L	852+00	0	0	100	0.22	0.29	0.36	0.49	0.54	0.61	100	0.22	0.29	0.36	0.49	0.54	0.61
P856R	856+00	0	0	100	0.41	0.47	0.53	0.62	0.65	0.70	100	0.41	0.47	0.53	0.62	0.65	0.70
P859L	859+00	0	0	100	0.06	0.11	0.20	0.37	0.44	0.52	100	0.06	0.11	0.20	0.37	0.44	0.52
P859R	859+00	0	0	100	0.44	0.50	0.55	0.63	0.67	0.72	100	0.44	0.50	0.55	0.63	0.67	0.72
P865L	865+00	0	0	100	0.05	0.11	0.20	0.37	0.44	0.52	100	0.05	0.11	0.20	0.37	0.44	0.52
P876L	876+00	0	0	100	0.03	0.08	0.17	0.35	0.42	0.51	100	0.03	0.08	0.17	0.35	0.42	0.51
P867R	867+00	0	0	100	0.45	0.51	0.56	0.64	0.68	0.72	100	0.45	0.51	0.56	0.64	0.68	0.72
P877L	877+00	0	0	100	0.40	0.47	0.52	0.61	0.65	0.70	100	0.40	0.47	0.52	0.61	0.65	0.70
P881L	881+00	0	0	100	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49
P883R	883+00	0	0	100	0.42	0.48	0.53	0.62	0.66	0.71	100	0.42	0.48	0.53	0.62	0.66	0.71
P885L	885+00	0	0	100	0.03	0.07	0.17	0.34	0.42	0.50	100	0.03	0.07	0.17	0.34	0.42	0.50
P888L	888+00	0	0	100	0.02	0.06	0.16	0.34	0.41	0.50	100	0.02	0.06	0.16	0.34	0.41	0.50
P902L	902+00	0	0	100	0.07	0.12	0.21	0.38	0.45	0.53	100	0.07	0.12	0.21	0.38	0.45	0.53
P905R	905+00	0	0	100	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49
P902R	902+00	0	0	100	0.32	0.39	0.45	0.56	0.60	0.66	100	0.32	0.39	0.45	0.56	0.60	0.66
P909R	909+00	0	0	100	0.28	0.34	0.41	0.53	0.58	0.64	100	0.28	0.34	0.41	0.53	0.58	0.64
P911L	911+00	0	0	100	0.22	0.29	0.36	0.49	0.55	0.61	100	0.22	0.29	0.36	0.49	0.55	0.61
P914R	914+00	0	0	100	0.19	0.26	0.33	0.47	0.53	0.59	100	0.19	0.26	0.33	0.47	0.53	0.59
P928L	928+00	0	0	100	0.44	0.50	0.56	0.64	0.67	0.72	100	0.44	0.50	0.56	0.64	0.67	0.72
P931R	931+00	0	0	100	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49

US 550 DB

Proposed On-Site Basin Calculations - Rational Method

Muller Engineering Company, Inc.

CDOT Project Number: 22420

Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5

Originator: EGK

Date: 6/22/2018

Checker: ACF

Date: 7/11/2018

INTENSITY VALUES	
Storm Event	One-Hour Point Rainfall Values (P1)
2-Year	0.60
5-Year	0.88
10-Year	1.13
25-Year	1.51
50-Year	1.83
100-Year	2.17

[1] I = (28.5 x P1) / (10 +Tc)^0.786 , Eq. (RA-3) (USDCM), NOAA Atlas 14, Volume 8, Version 2 for Durango CO

US 550 DB
Proposed On-Site Basin Calculations - Rational Method
Muller Engineering Company, Inc.
CDOT Project Number: 22420
Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5

Originator: EGK
Date: 6/22/2018
Checker: ACF
Date: 7/11/2018

STANDARD FORM SF-2
TIME OF CONCENTRATION

SUB-BASIN DATA				INITIAL/OVERLAND TIME (Ti)						TRAVEL TIME (Tt)									TOTAL	Tc CHECK (Urbanized Basins)			FINAL Tc
BASIN ID	STATION	COMP. C_5	AREA (acre)	ELEV. START (ft)	ELEV. END (ft)	INIT. C_5[3]	LENGTH (ft)	SLOPE (Si)%	Ti (Min)[1.4]	LENGTH (ft)	ELEV. START (ft)	ELEV. END (ft)	DELTA ELEV. (ft)	LONG. SLOPE (ft/ft)	Conveyance Coefficient Type	Conveyance Coefficient K	VEL. (fps)	Tt (Min)[2]	Ti+Tt (Min.)	First Design Point-Yes (Y) or No (N)	LENGTH. (ft)	Maximum Tc = (L/180) + 10	10 minute min[5] (minutes)
P797L	797+00	0.37	2.58	6601.50	6594.00	0.90	114	6.6	2.1	658.0	6594.00	6591.00	3.0	0.0046	GW	15	1.0	10.8	12.9	N	N/A	N/A	12.9
P797R	797+00	0.39	4.34	6604.25	6597.00	0.90	98	7.4	1.8	1666.6	6597.00	6587.00	10.0	0.0060	GW	15	1.2	23.9	25.7	N	N/A	N/A	25.7
P798R	798+00	0.05	1.80	6605.50	6603.00	0.08	18	13.9	3.2	2006	6603.00	6593.00	10.0	0.0050	GW	15	1.1	31.6	34.8	N	N/A	N/A	34.8
P810L	810+00	0.41	0.59	6603.50	6598.00	0.90	92	6.0	1.9	241.0	6598.00	6596.00	2.0	0.0083	GW	15	1.4	2.9	4.8	N	N/A	N/A	10.0
P813L	813+00	0.42	0.92	6606.00	6603.00	0.90	72	4.2	1.9	408.0	6603.00	6600.00	3.0	0.0074	GW	15	1.3	5.3	7.2	N	N/A	N/A	10.0
P815R	815+00	0.45	0.86	6606.00	6604.00	0.90	130	1.5	3.6	164.0	6604.00	6601.50	2.5	0.0152	SP	7	0.9	3.2	6.7	N	N/A	N/A	10.0
P818R	818+00	0.31	2.13	6617.00	6608.00	0.08	190	4.7	15.1	470.0	6608.00	6603.00	5.0	0.0106	GW	15	1.5	5.1	20.1	N	N/A	N/A	20.1
P818L	818+00	0.39	1.21	6613.00	6610.00	0.90	118	2.5	2.9	508.0	6610.00	6603.00	7.0	0.0138	GW	15	1.8	4.8	7.7	N	N/A	N/A	10.0
P819R	819+00	0.05	0.45	6611.00	6609.00	0.08	14	14.3	2.8	497.0	6609.00	6604.00	5.0	0.0101	GW	15	1.5	5.5	8.3	N	N/A	N/A	10.0
P824L	824+00	0.39	0.69	6619.00	6617.00	0.90	87	2.3	2.5	285	6617.00	6610.00	7.0	0.0246	GW	15	2.4	2.0	4.6	N	N/A	N/A	10.0
P824R	824+00	0.40	2.07	6624.00	6623.00	0.90	63	1.6	2.4	1046	6623.00	6609.00	14.0	0.0134	GW	15	1.7	10.0	12.5	N	N/A	N/A	12.5
P827L	827+00	0.34	1.30	6624.00	6620.00	0.90	94	4.3	2.2	450	6620.00	6616.00	4.0	0.0089	GW	15	1.4	5.3	7.5	N	N/A	N/A	10.0
P825R	825+00	0.23	1.42	6629.00	6625.00	0.90	197	2.0	4.0	1093.0	6625.00	6610.00	15.0	0.0137	GW	15	1.8	10.4	14.4	N	N/A	N/A	14.4
P833L	833+00	0.11	0.55	6630.00	6627.00	0.90	197	1.5	4.4	366.0	6627.00	6621.00	6.0	0.0164	GW	15	1.9	3.2	7.6	N	N/A	N/A	10.0
P833R	833+00	0.50	0.64	6629.00	6625.00	0.90	25	16.0	0.7	211.0	6625.00	6621.00	4.0	0.0190	GW	15	2.1	1.7	2.4	N	N/A	N/A	10.0
P835R	835+00	0.40	2.40	6633.00	6628.00	0.90	61	8.2	1.4	1110.0	6628.00	6621.00	7.0	0.0063	GW	15	1.2	15.5	16.9	N	N/A	N/A	16.9
P837L	837+00	0.05	1.86	6635.00	6632.00	0.90	46	6.5	1.3	1101.0	6632.00	6627.00	5.0	0.0045	GW	15	1.0	18.2	19.5	N	N/A	N/A	19.5
P837R	837+00	0.51	3.33	6640.00	6637.00	0.90	76	3.9	2.0	1,634	6637.00	6627.00	10.0	0.0061	GW	15	1.2	23.2	25.2	N	N/A	N/A	25.2
P849R	849+00	0.47	0.73	6637.00	6632.00	0.90	74	6.8	1.6	128	6632.00	6627.00	5.0	0.0391	GW	15	3.0	0.7	2.4	N	N/A	N/A	10.0
P850L	850+00	0.09	3.80	6637.00	6636.50	0.08	35	1.4	9.6	540	6636.50	6631.00	5.5	0.0102	SP	7	0.7	12.7	22.4	N	N/A	N/A	22.4
P851R	851+00	0.48	0.65	6640.00	6639.00	0.90	61	1.6	2.4	342	6639.00	6633.00	6.0	0.0175	GW	15	2.0	2.9	5.3	N	N/A	N/A	10.0
P853L	853+00	0.32	2.05	6645.00	6641.00	0.08	183	2.2	19.1	591	6641.00	6634.00	7.0	0.0118	GW	15	1.6	6.0	25.2	N	N/A	N/A	25.2
P852L	852+00	0.29	2.44	6665.00	6661.50	0.90	85	4.1	2.1	2,153	6661.50	6637.50	24.0	0.0111	GW	15	1.6	22.7	24.7	N	N/A	N/A	24.7
P856R	856+00	0.47	0.74	6645.00	6642.00	0.90	129	2.3	3.1	368	6642.00	6639.00	3.0	0.0082	GW	15	1.4	4.5	7.6	N	N/A	N/A	10.0
P859L	859+00	0.11	8.13	6664.00	6648.00	0.08	500	3.2	27.9	622	6648.00	6642.00	6.0	0.0096	GW	15	1.5	7.0	34.9	N	N/A	N/A	34.9
P859R	859+00	0.50	1.31	6649.00	6646.00	0.90	75	4.0	2.0	776	6646.00	6642.00	4.0	0.0052	GW	15	1.1	12.0	14.0	N	N/A	N/A	14.0
P865L	865+00	0.11	5.57	6665.00	6648.50	0.08	387	4.3	22.3	390	6648.50	6645.00	3.5	0.0090	GW	15	1.4	4.6	26.8	N	N/A	N/A	26.8
P876L	876+00	0.08	0.30	6670.50	6668.50	0.08	16	12.5	3.2	345	6668.50	6663.00	5.5	0.0159	GW	15	1.9	3.0	6.2	N	N/A	N/A	10.0
P867R	867+00	0.51	2.75	6673.00	6664.00	0.90	178	5.1	2.8	1334	6664.00	6645.00	19.0	0.0142	GW	15	1.8	12.4	15.2	N	N/A	N/A	15.2
P877L	877+00	0.47	4.18	6686.00	6685.00	0.90	51	2.0	2.1	2223	6685.00	6663.00	22.0	0.0099	GW	15	1.5	24.8	26.9	N	N/A	N/A	26.9
P881L	881+00	0.05	0.43	6672.00	6670.00	0.90	25	8.0	0.9	338.0	6670.00	6659.00	11.0	0.0325	GW	15	2.7	2.1	3.0	N	N/A	N/A	10.0
P883R	883+00	0.48	1.40	6681.00	6677.00	0.90	63	6.3	1.5	850	6677.00	6670.00	7.0	0.0082	GW	15	1.4	10.4	12.0	N	N/A	N/A	12.0
P885L	885+00	0.07	0.86	6678.00	6677.00	0.90	51	2.0	2.1	404.0	6677.00	6670.00	7.0	0.0173	GW	15	2.0	3.4	5.5	N	N/A	N/A	10.0
P888L	888+00	0.06	1.09	6686.00	6680.00	0.90	35	17.1	0.8	693.0	6680.00	6678.00	2.0	0.0029	GW	15	0.8	14.3	15.2	N	N/A	N/A	15.2
P902L	902+00	0.12	8.42	6696.00	6683.50	0.08	500	2.5	30.2	603.0	6683.50	6670.00	13.5	0.0224	GW	15	2.2	4.5	34.7	N	N/A	N/A	34.7
P905R	905+00	0.05	0.53	6686.00	6685.00	0.08	12	8.3	3.1	708.0	6685.00	6681.00	4.0	0.0056	GW	15	1.1	10.5	13.6	N	N/A	N/A	13.6
P902R	902+00	0.39	3.74	6685.50	6668.00	0.90	113	15.5	1.5	1	6668.00	6667.80	0.2	0.2000	GW	15	6.7	0.0	1.5	N	N/A	N/A	10.0
P909R	909+00	0.34	2.47	6689.00	6686.00	0.08	18	16.7	3.0	1,835	6686.00	6677.00	9.0	0.0049	GW	15	1.1	29.1	32.2	N	N/A	N/A	32.2
P911L	911+00	0.29	14.57	6726.00	6723.00	0.90	78	3.8	2.0	3714	6723.00	6672.00	51.0	0.0137	GW	15	1.8	35.2	37.2	N	N/A	N/A	37.2
P914R	914+00	0.26	3.68	6689.00	6684.00	0.90	67	7.5	1.5	1195	6684.00	6667.50	16.5	0.0138	GW	15	1.8	11.3	12.8	N	N/A	N/A	12.8
P928L	928+00	0.50	2.57	6726.00	6725.00	0.08	26	3.8	6.0	2072	6725.00	6686.00	39.0	0.0188	GW	15	2.1	16.8	22.8	N	N/A	N/A	22.8
P931R	931+00	0.05	0.99	6695.00	6693.00	0.90	16	12.5	0.6	558	6693.00	6680.00	13.0	0.0233	GW	15	2.3	4.1	4.7	N	N/A	N/A	10.0

US 550 DB
Proposed On-Site Basin Calculations - Rational Method
Muller Engineering Company, Inc.
CDOT Project Number: 22420
Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5

Originator: EGK
Date: 6/22/2018
Checker: ACF
Date: 7/11/2018

RATIONAL FLOWS

BASIN ID	STATION	AREA (acre)	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}	I_2 (in/hr)	I_5 (in/hr)	I_{10} (in/hr)	I_{25} (in/hr)	I_{50} (in/hr)	I_{100} (in/hr)	Q_2 (cfs)	Q_5 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)
P797L	797+00	2.58	0.30	0.37	0.43	0.55	0.59	0.65	1.46	2.13	2.75	3.68	4.45	5.28	1.1	2.0	3.1	5.2	6.8	8.9
P797R	797+00	4.34	0.33	0.39	0.45	0.56	0.61	0.66	1.03	1.50	1.94	2.59	3.14	3.72	1.5	2.6	3.8	6.3	8.2	10.7
P798R	798+00	1.80	0.01	0.05	0.15	0.33	0.40	0.49	0.86	1.26	1.62	2.17	2.63	3.11	0.0	0.1	0.4	1.3	1.9	2.8
P810L	810+00	0.59	0.34	0.41	0.47	0.57	0.62	0.67	1.63	2.37	3.06	4.09	4.95	5.87	0.3	0.6	0.8	1.4	1.8	2.3
P813L	813+00	0.92	0.35	0.42	0.48	0.58	0.62	0.68	1.63	2.37	3.06	4.09	4.95	5.87	0.5	0.9	1.3	2.2	2.8	3.6
P815R	815+00	0.86	0.38	0.45	0.50	0.60	0.64	0.69	1.63	2.37	3.06	4.09	4.95	5.87	0.5	0.9	1.3	2.1	2.7	3.5
P818R	818+00	2.13	0.24	0.31	0.38	0.51	0.56	0.62	1.18	1.72	2.22	2.96	3.59	4.25	0.6	1.1	1.8	3.2	4.3	5.6
P818L	818+00	1.21	0.33	0.39	0.46	0.56	0.61	0.66	1.63	2.37	3.06	4.09	4.95	5.87	0.6	1.1	1.7	2.8	3.6	4.7
P819R	819+00	0.45	0.01	0.05	0.15	0.33	0.40	0.49	1.63	2.37	3.06	4.09	4.95	5.87	0.0	0.1	0.2	0.6	0.9	1.3
P824L	824+00	0.69	0.32	0.39	0.45	0.56	0.61	0.66	1.63	2.37	3.06	4.09	4.95	5.87	0.4	0.6	0.9	1.6	2.1	2.7
P824R	824+00	2.07	0.33	0.40	0.46	0.57	0.61	0.67	1.48	2.16	2.79	3.72	4.51	5.35	1.0	1.8	2.7	4.4	5.7	7.4
P827L	827+00	1.30	0.27	0.34	0.40	0.52	0.57	0.63	1.63	2.37	3.06	4.09	4.95	5.87	0.6	1.0	1.6	2.8	3.7	4.9
P825R	825+00	1.42	0.17	0.23	0.31	0.45	0.51	0.58	1.39	2.03	2.62	3.50	4.24	5.03	0.3	0.7	1.2	2.3	3.1	4.2
P833L	833+00	0.55	0.06	0.11	0.20	0.37	0.44	0.52	1.63	2.37	3.06	4.09	4.95	5.87	0.1	0.2	0.3	0.8	1.2	1.7
P833R	833+00	0.64	0.43	0.50	0.55	0.63	0.67	0.71	1.63	2.37	3.06	4.09	4.95	5.87	0.5	0.8	1.1	1.7	2.1	2.7
P835R	835+00	2.40	0.34	0.40	0.47	0.57	0.61	0.67	1.29	1.88	2.42	3.23	3.92	4.65	1.0	1.8	2.7	4.4	5.8	7.5
P837L	837+00	1.86	0.01	0.05	0.15	0.33	0.40	0.49	1.20	1.75	2.25	3.01	3.65	4.33	0.0	0.2	0.6	1.9	2.7	4.0
P837R	837+00	3.33	0.45	0.51	0.56	0.64	0.67	0.72	1.04	1.52	1.96	2.62	3.18	3.77	1.5	2.6	3.6	5.6	7.1	9.0
P849R	849+00	0.73	0.41	0.47	0.53	0.62	0.66	0.70	1.63	2.37	3.06	4.09	4.95	5.87	0.5	0.8	1.2	1.9	2.4	3.0
P850L	850+00	3.80	0.04	0.09	0.18	0.35	0.42	0.51	1.11	1.62	2.09	2.80	3.39	4.02	0.2	0.5	1.4	3.8	5.5	7.8
P851R	851+00	0.65	0.42	0.48	0.54	0.63	0.66	0.71	1.63	2.37	3.06	4.09	4.95	5.87	0.4	0.7	1.1	1.7	2.1	2.7
P853L	853+00	2.05	0.25	0.32	0.39	0.51	0.56	0.63	1.04	1.52	1.96	2.62	3.18	3.77	0.5	1.0	1.6	2.8	3.7	4.8
P852L	852+00	2.44	0.22	0.29	0.36	0.49	0.54	0.61	1.05	1.54	1.98	2.65	3.21	3.80	0.6	1.1	1.7	3.2	4.2	5.6
P856R	856+00	0.74	0.41	0.47	0.53	0.62	0.65	0.70	1.63	2.37	3.06	4.09	4.95	5.87	0.5	0.8	1.2	1.9	2.4	3.1
P859L	859+00	8.13	0.06	0.11	0.20	0.37	0.44	0.52	0.86	1.26	1.62	2.16	2.62	3.11	0.4	1.1	2.6	6.5	9.3	13.2
P859R	859+00	1.31	0.44	0.50	0.55	0.63	0.67	0.72	1.41	2.06	2.65	3.54	4.29	5.09	0.8	1.3	1.9	3.0	3.8	4.8
P865L	865+00	5.57	0.05	0.11	0.20	0.37	0.44	0.52	1.01	1.47	1.89	2.53	3.06	3.63	0.3	0.9	2.1	5.2	7.4	10.5
P876L	876+00	0.30	0.03	0.08	0.17	0.35	0.42	0.51	1.63	2.37	3.06	4.09	4.95	5.87	0.0	0.1	0.2	0.4	0.6	0.9
P867R	867+00	2.75	0.45	0.51	0.56	0.64	0.68	0.72	1.36	1.98	2.55	3.40	4.13	4.89	1.7	2.8	3.9	6.0	7.7	9.7
P877L	877+00	4.18	0.40	0.47	0.52	0.61	0.65	0.70	1.01	1.46	1.89	2.53	3.06	3.63	1.7	2.8	4.1	6.5	8.3	10.6
P881L	881+00	0.43	0.01	0.05	0.15	0.33	0.40	0.49	1.63	2.37	3.06	4.09	4.95	5.87	0.0	0.1	0.2	0.6	0.9	1.3
P883R	883+00	1.40	0.42	0.48	0.53	0.62	0.66	0.71	1.51	2.20	2.84	3.80	4.60	5.46	0.9	1.5	2.1	3.3	4.2	5.4
P885L	885+00	0.86	0.03	0.07	0.17	0.34	0.42	0.50	1.63	2.37	3.06	4.09	4.95	5.87	0.0	0.1	0.4	1.2	1.8	2.5
P888L	888+00	1.09	0.02	0.06	0.16	0.34	0.41	0.50	1.36	1.98	2.55	3.41	4.13	4.90	0.0	0.1	0.4	1.3	1.8	2.7
P902L	902+00	8.42	0.07	0.12	0.21	0.38	0.45	0.53	0.86	1.26	1.62	2.17	2.63	3.12	0.5	1.3	2.9	6.9	9.9	13.9
P905R	905+00	0.53	0.01	0.05	0.15	0.33	0.40	0.49	1.43	2.08	2.68	3.59	4.35	5.15	0.0	0.1	0.2	0.6	0.9	1.3
P902R	902+00	3.74	0.32	0.39	0.45	0.56	0.60	0.66	1.63	2.37	3.06	4.09	4.95	5.87	2.0	3.4	5.2	8.6	11.2	14.5
P909R	909+00	2.47	0.28	0.34	0.41	0.53	0.58	0.64	0.90	1.32	1.70	2.27	2.75	3.27	0.6	1.1	1.7	3.0	3.9	5.1
P911L	911+00	14.57	0.22	0.29	0.36	0.49	0.55	0.61	0.83	1.21	1.56	2.08	2.52	2.99	2.7	5.1	8.2	15.0	20.0	26.6
P914R	914+00	3.68	0.19	0.26	0.33	0.47	0.53	0.59	1.47	2.14	2.76	3.68	4.47	5.29	1.0	2.0	3.4	6.4	8.6	11.6
P928L	928+00	2.57	0.44	0.50	0.56	0.64	0.67	0.72	1.10	1.61	2.07	2.77	3.36	3.98	1.3	2.1	3.0	4.6	5.8	7.4
P931R	931+00	0.99	0.01	0.05	0.15	0.33	0.40	0.49	1.63	2.37	3.06	4.09	4.95	5.87	0.0	0.1	0.4	1.3	2.0	2.9

US 550 DB
Existing On-Site Basin Calculations - Rational Method
Muller Engineering Company, Inc.
CDOT Project Number: 22420
Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5

BY: EGK
DATE: 6/22/2018
CHECKED BY: ACF
DATE: 7/11/2018

Land Use Types	Percent Impervious
STREETS: PAVED	100
STREETS: GRAVEL (PACKED)	40
UNDEVELOPED AREAS: GREENBELTS, AGRICULTURAL	2
LAWNS, CLAYEY SOIL	2

PERCENT IMPERVIOUS VALUES

BASIN ID	STATION	TOTAL AREA		STREETS: PAVED		STREETS: GRAVEL (PACKED)		UNDEVELOPED AREAS: GREENBELTS, AGRICULTURAL		LAWNS, CLAYEY SOIL		WEIGHTED PERCENT IMPERVIOUS	WEIGHTED PERCENT PERVIOUS
		(sq ft)	(acre)	(sq ft)	% of Basin [2]	(sq ft)	% of Basin [2]	(sq ft)	% of Basin [2]	(sq ft)	% of Basin [2]		
O827L	828+00	1,060,627	24.35	0	0	0	0	0	0	1,060,627	100	2	98
O824R	824+00	497,218	11.41	0	0	0	0	0	0	497,218	100	2	98
O819L	819+00	3,342,070	76.72	0	0	0	0	0	0	3,342,070	100	2	98
O853L	853+00	654,439	15.02	0	0	0	0	0	0	654,439	100	2	98
O850L	850+00	165,611	3.80	0	0	0	0	0	0	165,611	100	2	98

US 550 DB

Existing On-Site Basin Calculations - Rational Method — Originator: EGK

Muller Engineering Company, Inc. — Date: 6/22/2018

CDOT Project Number: 22420 — Checker: ACF

Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5 — Date: 7/11/2018

INTENSITY VALUES	
Storm Event	One-Hour Point Rainfall Values (P1)
2-Year	0.60
5-Year	0.88
10-Year	1.13
25-Year	1.51
50-Year	1.83
100-Year	2.17

[1] I = (28.5 x P1) / (10 +Tc)^0.786 , Eq. (RA-3) (USDCM), NOAA Atlas 14, Volume 8, Version 2 for Broomfield, CO

US 550 DB
Existing On-Site Basin Calculations - Rational Method
Muller Engineering Company, Inc.
CDOT Project Number: 22420
Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5

BY: EGK
DATE: 6/22/2018
CHECKED BY: ACF
DATE: 7/11/2018

RUNOFF COEFFIECIENTS FOR 2, 5, 10, AND 100 YEAR STORM EVENTS

BASIN ID	STATION	NRCS HYDROLOGIC SOIL GROUP[1]																							C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
		SOIL GROUP (%)[1]			SOIL GROUP A (LAWNS, SANDY SOIL)							SOIL GROUP B (LAWNS, SANDY/CLAYEY SOIL)							SOIL GROUP C/D (CLAYEY SOIL)												
		A	B	C/D	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}	%	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}	%	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}	%						
O827L	828+00	0.0	0.0	100.0							0							0	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49
O824R	824+00	0.0	0.0	100.0							0							0	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49
O819L	819+00	0.0	0.0	100.0							0							0	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49
O853L	853+00	0.0	0.0	100.0							0							0	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49
O850L	850+00	0.0	0.0	100.0							0							0	0.01	0.05	0.15	0.33	0.40	0.49	100	0.01	0.05	0.15	0.33	0.40	0.49

US 550 DB
Existing On-Site Basin Calculations - Rational Method
Muller Engineering Company, Inc.
CDOT Project Number: 22420
Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5

Originator: EGK
Date: 6/22/2018
Checker: ACF
Date: 7/11/2018

STANDARD FORM SF-2
TIME OF CONCENTRATION

SUB-BASIN DATA				INITIAL/OVERLAND TIME (Ti)						TRAVEL TIME (Tt)										TOTAL	Tc CHECK (Urbanized Basins)			FINAL Tc
BASIN ID	STATION	COMP. C_5	AREA (acre)	ELEV. START (ft)	ELEV. END (ft)	INIT. C_5[3]	LENGTH (ft)	SLOPE (Si)%	Ti (Min)[1]	LENGTH (ft)	ELEV. START (ft)	ELEV. END (ft)	DELTA ELEV. (ft)	LONG. SLOPE (ft/ft)	Conveyance Coefficient Type	Conveyance Coefficient K	VEL. (fps)	Tt (Min)[2]	Ti+Tt (Min.)	First Design Point-Yes (Y) or No (N)	LENGTH. (ft)	Maximum Tc = (L/180) + 10	10 minute min (minutes)
O827L	828+00	0.05	24.35	6648.00	6642.00	0.08	332	1.8	27.5	3332	6642.00	6620.00	22.0	0.0066	SP	7	0.6	97.6	125.1	n	N/A	N/A	125.1
O824R	824+00	0.05	11.41	6628.00	6623.00	0.08	250	2.0	23.0	1425	6623.00	6611.00	12.0	0.0084	SP	7	0.6	37.0	60.0	n	N/A	N/A	60.0
O819L	819+00	0.05	76.72	6680.00	6660.00	0.08	500	4.0	25.9	4870	6660.00	6603.00	57.0	0.0117	SP	7	0.8	107.2	133.0	n	N/A	N/A	133.0
O853L	853+00	0.05	0.56	6663.00	6652.00	0.08	500	2.2	31.6	1136	6652.00	6632.00	20.0	0.0176	SP	7	0.9	20.4	52.0	n	N/A	N/A	52.0
O850L	850+00	0.05	1.93	6637.00	6634.00	0.08	213	1.4	23.9	346	6634.00	6611.00	23.0	0.0665	SP	7	1.8	3.2	27.1	n	N/A	N/A	27.1

US 550 DB
Existing On-Site Basin Calculations - Rational Method
Muller Engineering Company, Inc.
CDOT Project Number: 22420
Muller Project Number: 18-018.01 US 550 S Connection D-B - CDOT R-5

Originator: EGK
Date: 6/22/2018
Checker: ACF
Date: 7/11/2018

RATIONAL FLOWS																				
BASIN ID	STATION	AREA (acre)	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}	I_2 (in/hr)	I_5 (in/hr)	I_{10} (in/hr)	I_{25} (in/hr)	I_{50} (in/hr)	I_{100} (in/hr)	Q_2 (cfs)	Q_5 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)
O827L	828+00	24.35	0.01	0.05	0.15	0.33	0.40	0.49	0.36	0.53	0.68	0.91	1.10	1.31	0.1	0.7	2.4	7.3	10.8	15.7
O824R	824+00	11.41	0.01	0.05	0.15	0.33	0.40	0.49	0.61	0.89	1.14	1.53	1.85	2.19	0.1	0.5	1.9	5.8	8.5	12.3
O819L	819+00	76.72	0.01	0.05	0.15	0.33	0.40	0.49	0.35	0.51	0.65	0.87	1.05	1.25	0.3	2.0	7.3	22.0	32.6	47.2
O853L	853+00	15.02	0.01	0.05	0.15	0.33	0.40	0.49	0.67	0.98	1.26	1.68	2.04	2.41	0.1	0.8	2.8	8.3	12.3	17.9
O850L	850+00	3.80	0.01	0.05	0.15	0.33	0.40	0.49	1.00	1.46	1.88	2.51	3.05	3.61	0.0	0.3	1.0	3.2	4.7	6.8

SOILS REPORT

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (550)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

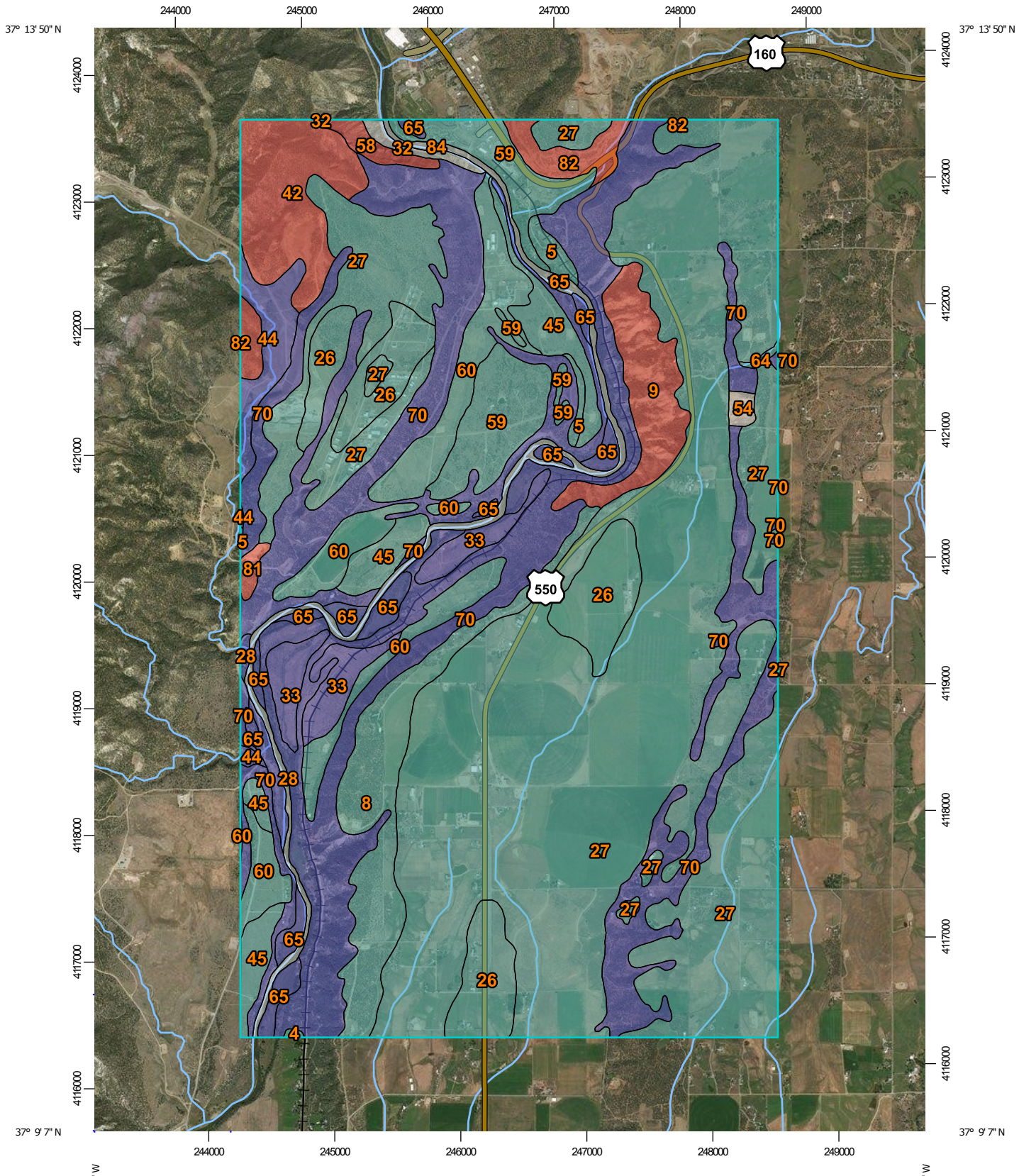
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group (550)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: La Plata County Area, Colorado
Survey Area Data: Version 15, Oct 10, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 2, 2009—Feb 19, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group (550)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
4	Arboles silty clay loam, 0 to 3 percent slopes	C	2.2	0.0%
5	Arboles clay, 3 to 12 percent slopes	C	33.4	0.4%
8	Baca variant loam, 3 to 12 percent slopes	C	301.7	3.9%
9	Badland	D	177.1	2.3%
26	Falfa clay loam, 1 to 3 percent slopes	C	376.0	4.9%
27	Falfa clay loam, 3 to 8 percent slopes	C	3,343.2	43.7%
28	Fluvaquents, sandy, frequently flooded	B	30.0	0.4%
32	Haploborolls-Rubble land complex, 10 to 60 percent slopes		20.0	0.3%
33	Harlan cobbly loam, moist, 1 to 3 percent slopes	B	154.7	2.0%
42	Lazear-Rock outcrop complex, 12 to 65 percent slopes	D	240.3	3.1%
44	Mikim loam, 3 to 12 percent slopes	B	96.6	1.3%
45	Nehar stony sandy loam	C	186.5	2.4%
54	Pits, gravel		13.4	0.2%
58	Rock outcrop	D	31.1	0.4%
59	Sedillo gravelly loam, 0 to 3 percent slopes	C	274.2	3.6%
60	Shalona loam	C	379.2	5.0%
64	Simpatico loam	C	4.2	0.1%
65	Sycle fine sandy loam	B	127.8	1.7%
70	Ustic Torriorthents-Ustollic Haplargids complex, 12 to 60	B	1,635.3	21.4%
81	Zyme clay loam, 3 to 25 percent slopes	D	14.1	0.2%
82	Zyme-Rock outcrop complex, 12 to 65 percent slopes	D	87.2	1.1%
84	Water		130.0	1.7%
Totals for Area of Interest			**7,658.2**	**100.0%**