

Subbasin : D11

Input Data

Area (ac)	4.65
Peak Rate Factor	484
Weighted Curve Number	86
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.65	-	86
Composite Area & Weighted CN	4.65		86

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	99.23	0	0
Slope (%) :	2.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.24	0	0
Computed Flow Time (min) :	6.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	347.24	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	2.02	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	368	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.77	0	0
Wetted Perimeter (ft) :	4.71	0	0
Velocity (ft/sec) :	4.22	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	10.23		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.24
Peak Runoff (cfs)	7.98
Weighted Curve Number	86
Time of Concentration (days hh:mm:ss)	0 00:10:14

Subbasin : D12

Input Data

Area (ac)	17.87
Peak Rate Factor	484
Weighted Curve Number	88
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	17.87	-	88
Composite Area & Weighted CN	17.87		88

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	46.73	0	0
Slope (%) :	3.4	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	159.79	0	0
Slope (%) :	5.5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	0	0
Computed Flow Time (min) :	0.7	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0.013	0
Flow Length (ft) :	390	556	0
Channel Slope (%) :	0.5	0.5	0
Cross Section Area (ft²) :	4.9	13.59	0
Wetted Perimeter (ft) :	7.9	60	0
Velocity (ft/sec) :	5.89	3.01	0
Computed Flow Time (min) :	1.1	3.08	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.38
Peak Runoff (cfs)	30.91
Weighted Curve Number	88
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : D13

Input Data

Area (ac)	4.88
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.88	-	81
Composite Area & Weighted CN	4.88		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	65	40	0
Slope (%) :	2.6	0.3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	1.06	0.03	0
Computed Flow Time (min) :	1.02	22.76	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.24	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	497	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	5.02	0	0
Total TOC (min)	30.04		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.94
Peak Runoff (cfs)	3.91
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:30:02

Subbasin : D14

Input Data

Area (ac)	2.92
Peak Rate Factor	484
Weighted Curve Number	82
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	2.92	-	82
Composite Area & Weighted CN	2.92		82

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	20	89.49	0
Slope (%) :	1.3	0.9	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.05	0.74	0
Computed Flow Time (min) :	7.27	2.02	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	70	0	0
Slope (%) :	6.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.18	0	0
Computed Flow Time (min) :	0.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	409	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	20	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	4.71	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	11.02		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1
Peak Runoff (cfs)	3.93
Weighted Curve Number	82
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : D15

Input Data

Area (ac)	0.77
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.77	-	87
Composite Area & Weighted CN		0.77		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	160	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.18	0	0
Computed Flow Time (min) :	15.17	0	0
Total TOC (min)	15.17		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.31
Peak Runoff (cfs)	1.25
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:15:10

Subbasin : D16

Input Data

Area (ac)	1.65
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.65	-	87
Composite Area & Weighted CN		1.65		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	113	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.33	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	150	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	300	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.6	0	0
Total TOC (min)	5.16		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.31
Peak Runoff (cfs)	3.43
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:05:10

Subbasin : D17

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	84
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	84
Composite Area & Weighted CN		0.26		84

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.12
Peak Runoff (cfs)	0.46
Weighted Curve Number	84
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D18

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	89
Composite Area & Weighted CN		0.26		89

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.45
Peak Runoff (cfs)	0.61
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D19

Input Data

Area (ac)	1.37
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.37	-	89
Composite Area & Weighted CN		1.37		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	118	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.42	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	88	38	0
Slope (%) :	2.7	0.6	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.65	1.57	0
Computed Flow Time (min) :	0.55	0.4	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	227	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.21	0	0
Total TOC (min)	4.58		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.46
Peak Runoff (cfs)	3.16
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:04:35

Subbasin : D2

Input Data

Area (ac)	7.57
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.57	-	54
Composite Area & Weighted CN		7.57		54

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	17.62	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	314	100	0
Slope (%) :	8	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.56	2.28	0
Computed Flow Time (min) :	1.15	0.73	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0	0
Flow Length (ft) :	348	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	1.73	0	0
Computed Flow Time (min) :	3.36	0	0
Total TOC (min)	22.86		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.07
Peak Runoff (cfs)	0.06
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:22:52

Subbasin : D20

Input Data

Area (ac)	2.11
Peak Rate Factor	0
Weighted Curve Number	94
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.11	-	94
Composite Area & Weighted CN		2.11		94

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	480	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	3.94	0	0
Total TOC (min)	6.06		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.87
Peak Runoff (cfs)	5.88
Weighted Curve Number	94
Time of Concentration (days hh:mm:ss)	0 00:06:04

Subbasin : D21

Input Data

Area (ac)	4.54
Peak Rate Factor	0
Weighted Curve Number	95
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4.54	-	95
Composite Area & Weighted CN		4.54		95

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	481.91	0	0
Slope (%) :	0.9	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	1.93	0	0
Computed Flow Time (min) :	4.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	123.45	0	0
Channel Slope (%) :	2.5	0	0
Cross Section Area (ft²) :	4	0	0
Wetted Perimeter (ft) :	8	0	0
Velocity (ft/sec) :	4.95	0	0
Computed Flow Time (min) :	0.42	0	0
Total TOC (min)	6.69		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.96
Peak Runoff (cfs)	12.86
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:41

Subbasin : D3

Input Data

Area (ac)	4
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4	-	68
Composite Area & Weighted CN		4		68

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0	0.4	0
Flow Length (ft) :	0	100	0
Slope (%) :	0	2	0
2 yr, 24 hr Rainfall (in) :	0	3	0
Velocity (ft/sec) :	0	0.08	0
Computed Flow Time (min) :	0	22.18	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	234	100	0
Slope (%) :	4	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	2.28	0
Computed Flow Time (min) :	1.21	0.73	0
Total TOC (min)	24.12		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.39
Peak Runoff (cfs)	1.11
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:24:07

Subbasin : D4

Input Data

Area (ac)	8.85
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		8.85	-	59
Composite Area & Weighted CN		8.85		59

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	45.52	50	0
Slope (%) :	1.6	3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.81	0.08	0
Computed Flow Time (min) :	0.93	10.83	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	233	0	0
Slope (%) :	1.6	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.04	0	0
Computed Flow Time (min) :	1.9	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0.03
Flow Length (ft) :	842.11	285	208.66
Channel Slope (%) :	1	0.7	0.7
Cross Section Area (ft²) :	10	17.21	17.74
Wetted Perimeter (ft) :	20	34.65	35.7
Velocity (ft/sec) :	3.13	2.61	2.61
Computed Flow Time (min) :	4.49	1.82	1.33
Total TOC (min)	21.31		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.15
Peak Runoff (cfs)	0.41
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:21:19

Subbasin : D5

Input Data

Area (ac)	7.83
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.83	-	67
Composite Area & Weighted CN		7.83		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	101	0	0
Slope (%) :	1.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	22.82	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0
Flow Length (ft) :	310	988	0
Channel Slope (%) :	0.5	2	0
Cross Section Area (ft²) :	1.5	4	0
Wetted Perimeter (ft) :	6	8	0
Velocity (ft/sec) :	1.39	4.42	0
Computed Flow Time (min) :	3.71	3.72	0
Total TOC (min)	30.25		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.36
Peak Runoff (cfs)	1.62
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:30:15

Subbasin : D6

Input Data

Area (ac)	6.77
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		6.77	-	77
Composite Area & Weighted CN		6.77		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	379	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	2.26	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	330	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	3.34	0	0
Total TOC (min)	24.46		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.74
Peak Runoff (cfs)	4.61
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : D8

Input Data

Area (ac)	2.49
Peak Rate Factor	484
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.49	-	80
Composite Area & Weighted CN		2.49		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	120	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	0.72	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	240	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.5	0	0
Wetted Perimeter (ft) :	6	0	0
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.44	0	0
Total TOC (min)	21.01		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.89
Peak Runoff (cfs)	2.3
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:21:01

Subbasin : D9

Input Data

Area (ac)	7.1
Peak Rate Factor	484
Weighted Curve Number	85
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.1	-	85
Composite Area & Weighted CN		7.1		85

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	0.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	33.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	336.83	0	0
Slope (%) :	1.1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.13	0	0
Computed Flow Time (min) :	2.64	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0
Flow Length (ft) :	367.85	422.11	0
Channel Slope (%) :	1	1.5	0
Cross Section Area (ft²) :	6.81	20	0
Wetted Perimeter (ft) :	27.29	80	0
Velocity (ft/sec) :	1.97	5.57	0
Computed Flow Time (min) :	3.11	1.26	0
Total TOC (min)	40.76		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.18
Peak Runoff (cfs)	5.99
Weighted Curve Number	85
Time of Concentration (days hh:mm:ss)	0 00:40:46

Subbasin : F

Input Data

Area (ac)	4.42
Peak Rate Factor	484
Weighted Curve Number	46
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4.42	-	46
Composite Area & Weighted CN		4.42		46

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	13	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.17	0	0
Computed Flow Time (min) :	14.51	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	280	0	0
Channel Slope (%) :	2.7	0	0
Cross Section Area (ft²) :	42	0	0
Wetted Perimeter (ft) :	56	0	0
Velocity (ft/sec) :	6.74	0	0
Computed Flow Time (min) :	0.69	0	0
Total TOC (min)	15.20		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	46
Time of Concentration (days hh:mm:ss)	0 00:15:12

Subbasin : G

Input Data

Area (ac)	12.84
Peak Rate Factor	484
Weighted Curve Number	51
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		12.84	-	51
Composite Area & Weighted CN		12.84		51

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	3.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	23.98	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	388	0	0
Slope (%) :	3.2	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.89	0	0
Computed Flow Time (min) :	2.24	0	0
Total TOC (min)	26.22		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.03
Peak Runoff (cfs)	0.04
Weighted Curve Number	51
Time of Concentration (days hh:mm:ss)	0 00:26:13

Storage Node : N.Basin1

Input Data

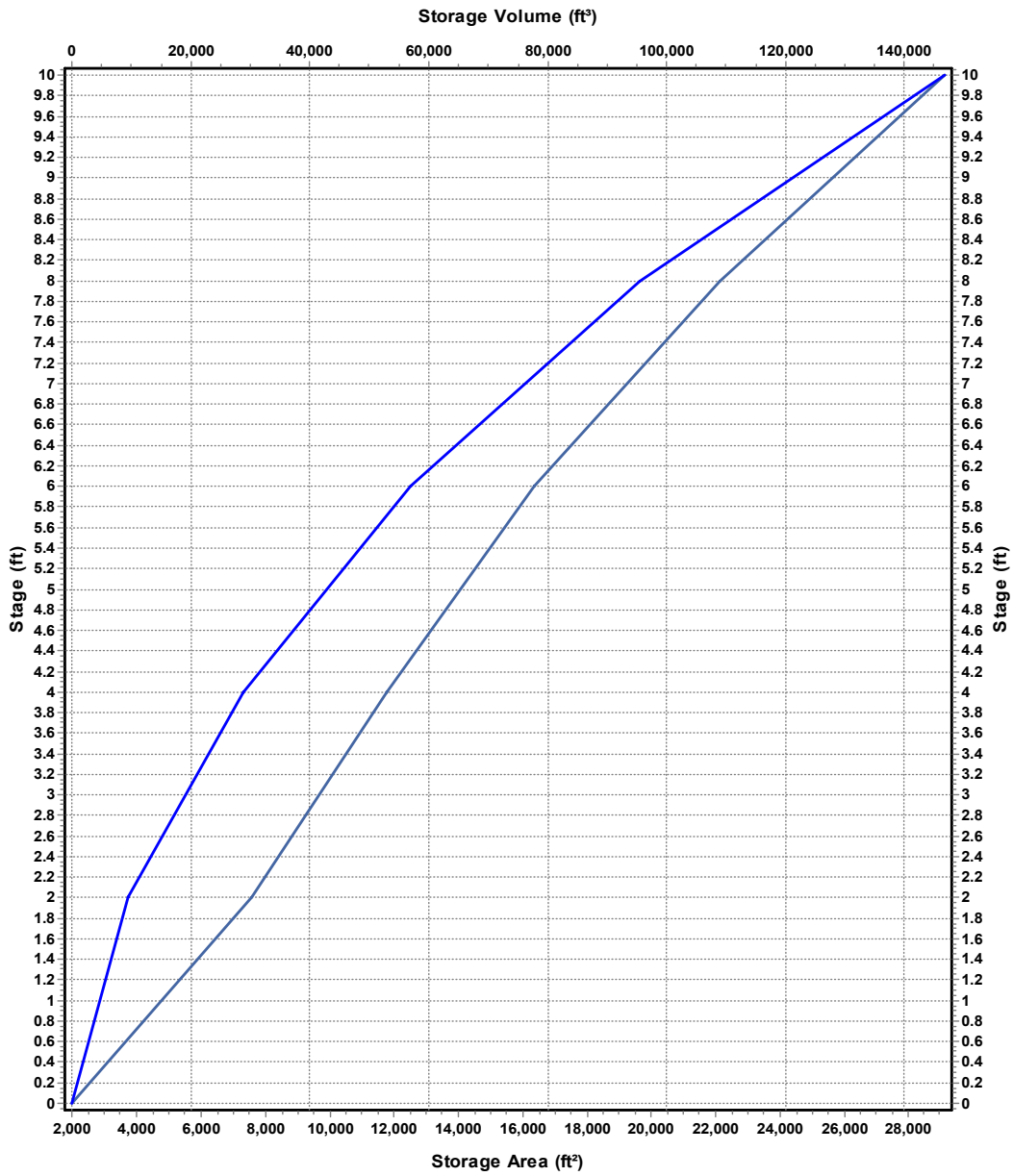
Invert Elevation (ft)	689.00
Max (Rim) Elevation (ft)	699.50
Max (Rim) Offset (ft)	10.50
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-689.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-18

Stage	Storage	Storage
(ft)	Area	Volume
	(ft²)	(ft³)
0	1981	0
2	7562	9543
4	11766	28871
6	16377	57014
8	22122	95513
10	29115	146750

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : N.Basin1 (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	EmergencySpillwayA	Bottom	Rectangular	No		47.80	47.80	697.79	0.63
2	PrimarySpillway	Bottom	Rectangular	No		30.00	18.00	695.82	0.63
3	Underdrain	Side	CIRCULAR	No	3.00			684.28	0.61

Output Summary Results

Peak Inflow (cfs)	8.71
Peak Lateral Inflow (cfs)	2.29
Peak Outflow (cfs)	0.45
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	692.61
Max HGL Depth Attained (ft)	3.61
Average HGL Elevation Attained (ft)	690.13
Average HGL Depth Attained (ft)	1.13
Time of Max HGL Occurrence (days hh:mm)	0 19:34
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Project Description

File Name Post-Development.SPF
Description
22081 Northside Development

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On 00:00:00 0:00:00
End Analysis On 00:00:00 0:00:00
Start Reporting On 00:00:00 0:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-01	Cumulative	inches	Virginia	Frederick	1.00	2.50	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Peak Rate Factor	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)			(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	A2	6.88	484.00	72.00	2.50	0.53	3.64	2.93	0 00:25:19
2	A3	7.03	484.00	73.00	2.50	0.57	3.99	5.63	0 00:05:00
3	A4	33.40	484.00	86.00	2.50	1.24	41.52	62.87	0 00:06:35
4	A5	0.22	484.00	89.00	2.50	1.45	0.32	0.40	0 00:14:38
5	A6	5.99	484.00	70.00	2.50	0.46	2.73	2.34	0 00:20:40
6	B	21.60	484.00	63.00	2.50	0.24	5.27	2.23	0 00:31:18
7	C1	15.73	484.00	60.00	2.50	0.17	2.74	0.99	0 00:21:29
8	C2	5.46	484.00	81.00	2.50	0.94	5.14	7.85	0 00:05:43
9	C3	3.51	0.00	80.00	2.50	0.89	3.12	2.98	0 00:24:28
10	C4	5.48	0.00	81.00	2.50	0.94	5.16	4.92	0 00:24:58
11	C5	3.62	484.00	75.00	2.50	0.65	2.35	2.23	0 00:22:01
12	C6	5.05	484.00	81.00	2.50	0.94	4.76	7.00	0 00:06:54
13	D1	13.01	484.00	67.00	2.50	0.36	4.63	2.90	0 00:26:59
14	D10	63.53	484.00	77.00	2.50	0.74	47.01	19.53	0 01:16:21
15	D11	4.65	484.00	86.00	2.50	1.24	5.78	7.98	0 00:10:13
16	D12	17.87	484.00	88.00	2.50	1.38	24.68	30.91	0 00:14:38
17	D13	4.88	484.00	81.00	2.50	0.94	4.60	3.91	0 00:30:02
18	D14	2.92	484.00	82.00	2.50	1.00	2.91	3.93	0 00:11:01
19	D15	0.77	484.00	87.00	2.50	1.31	1.01	1.25	0 00:15:10
20	D16	1.65	484.00	87.00	2.50	1.31	2.16	3.43	0 00:05:09
21	D17	0.26	484.00	84.00	2.50	1.12	0.29	0.46	0 00:05:00
22	D18	0.26	484.00	89.00	2.50	1.45	0.38	0.61	0 00:05:00
23	D19	1.37	484.00	89.00	2.50	1.46	1.99	3.16	0 00:05:00
24	D2	7.57	484.00	54.00	2.50	0.07	0.51	0.06	0 00:22:51
25	D20	2.11	0.00	94.00	2.50	1.87	3.94	5.88	0 00:06:03
26	D21	4.54	0.00	95.00	2.50	1.96	8.91	12.86	0 00:06:41
27	D3	4.00	484.00	68.00	2.50	0.39	1.55	1.11	0 00:24:07
28	D4	8.85	484.00	59.00	2.50	0.15	1.35	0.41	0 00:21:18
29	D5	7.83	484.00	67.00	2.50	0.36	2.79	1.62	0 00:30:15
30	D6	6.77	484.00	77.00	2.50	0.74	5.01	4.61	0 00:24:27
31	D8	2.49	484.00	80.00	2.50	0.89	2.21	2.30	0 00:21:00
32	D9	7.10	484.00	85.00	2.50	1.18	8.36	5.99	0 00:40:45
33	F1	2.60	484.00	48.00	2.50	0.01	0.03	0.00	0 00:15:12
34	G1	3.00	484.00	47.00	2.50	0.01	0.02	0.00	0 00:05:00

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surchage Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Basin2-Out	Junction	689.58	695.31	0.00	696.00	0.00	0.57	690.61	0.00	4.70	0 00:00	0.00	0.00
2	E103	Junction	714.91	718.00	0.00	0.00	0.00	2.92	715.32	0.00	2.68	0 00:00	0.00	0.00
3	E104	Junction	711.07	715.32	711.07	0.00	0.00	6.86	711.96	0.00	3.36	0 00:00	0.00	0.00
4	E105	Junction	705.99	719.42	705.99	0.00	0.00	6.78	706.70	0.00	12.72	0 00:00	0.00	0.00
5	E106	Junction	718.73	719.98	718.73	719.98	0.00	6.68	719.28	0.00	0.70	0 00:00	0.00	0.00
6	E106A	Junction	684.18	696.94	0.00	0.00	0.00	0.54	684.37	0.00	12.57	0 00:00	0.00	0.00
7	E107	Junction	684.00	699.34	0.00	0.00	0.00	0.54	684.27	0.00	15.07	0 00:00	0.00	0.00
8	E108	Junction	715.39	717.39	715.39	718.00	0.00	8.25	716.52	0.00	0.87	0 00:00	0.00	0.00
9	E109	Junction	714.79	716.00	0.00	0.00	0.00	12.99	715.92	0.00	0.87	0 00:00	0.00	0.00
10	E111	Junction	713.55	718.64	0.00	0.00	0.00	0.41	714.51	0.00	4.13	0 00:00	0.00	0.00
11	E112	Junction	707.58	718.62	707.58	0.00	0.00	0.35	707.75	0.00	10.87	0 00:00	0.00	0.00
12	E116	Junction	709.52	714.00	0.00	0.00	0.00	12.53	710.89	0.00	3.11	0 00:00	0.00	0.00
13	E117	Junction	709.12	713.00	0.00	0.00	0.00	12.30	710.48	0.00	2.52	0 00:00	0.00	0.00
14	E124	Junction	698.61	708.27	698.61	0.00	0.00	12.94	699.66	0.00	8.61	0 00:00	0.00	0.00
15	E125	Junction	692.68	708.84	0.00	0.00	0.00	12.93	708.84	0.00	0.00	0 12:21	0.13	12.00
16	E127	Junction	699.46	704.00	699.46	0.00	0.00	3.85	699.83	0.00	4.17	0 00:00	0.00	0.00
17	E128	Junction	698.50	703.00	698.50	0.00	0.00	28.37	700.62	0.00	2.38	0 00:00	0.00	0.00
18	E142	Junction	691.58	694.00	691.58	0.00	0.00	28.56	692.75	0.00	1.84	0 00:00	0.00	0.00
19	E145-A	Junction	669.37	686.19	0.00	0.00	0.00	95.58	673.19	0.00	13.00	0 00:00	0.00	0.00
20	E159	Junction	680.38	695.00	680.38	6.00	0.00	0.82	690.04	0.00	4.96	0 00:00	0.00	0.00
21	E162	Junction	681.02	690.00	681.02	6.00	0.00	1.10	681.30	0.00	8.70	0 00:00	0.00	0.00
22	E167	Junction	702.90	715.49	0.00	0.00	0.00	7.14	703.68	0.00	11.81	0 00:00	0.00	0.00
23	E169	Junction	698.68	710.00	698.68	0.00	0.00	7.09	699.24	0.00	10.76	0 00:00	0.00	0.00
24	E504	Junction	709.62	714.60	709.62	0.00	12.56	11.82	710.81	0.00	3.79	0 00:00	0.00	0.00
25	Ex_D13	Junction	665.88	675.00	0.00	0.00	0.00	3.84	666.40	0.00	14.48	0 00:00	0.00	0.00
26	JunctionD5	Junction	690.40	695.70	0.00	695.70	0.00	1.60	690.76	0.00	4.94	0 00:00	0.00	0.00
27	Out-A	Outfall	682.47					0.54	682.64					
28	Out-B	Outfall	704.89					2.48	705.05					
29	Out-C	Outfall	690.41					13.44	691.73					
30	Out-D	Outfall	665.41					3.84	665.93					
31	Out-F	Outfall	0.00					0.00	0.00					
32	Out-G	Outfall	0.00					0.00	0.00					
33	Chan-E140-E145	Storage Node	673.58	687.00	673.58		0.00	74.82	676.09				0.00	0.00
34	E110	Storage Node	715.20	718.00	715.20		10000.00	2.95	715.45				0.00	0.00
35	E122-E129	Storage Node	699.00	705.00	699.00		0.00	26.23	701.02				0.00	0.00
36	E123	Storage Node	701.75	704.49	701.75		2059.00	13.22	702.69				0.00	0.00
37	E137	Storage Node	692.09	698.00	692.09		1272.00	66.88	693.97				0.00	0.00
38	E143	Storage Node	688.99	696.00	688.99		0.00	33.82	690.35				0.00	0.00
39	exDA-K-Channel	Storage Node	704.25	708.50	704.25		0.00	21.33	705.71				0.00	0.00
40	InfieldApronIsland	Storage Node	713.50	714.80	713.50		100.00	12.60	714.00				0.00	0.00
41	N.Basin1	Storage Node	687.00	699.50	0.00		0.00	65.87	692.20				0.00	0.00
42	SouthAirportBasin	Storage Node	666.57	682.00	0.00		0.00	85.29	672.28				0.00	0.00
43	SouthGA-Basin1	Storage Node	690.40	696.00	0.00		44584.84	5.94	692.38				0.00	0.00
44	SouthGA-Basin2	Storage Node	690.50	695.70	0.00		22000.00	1.61	691.50				0.00	0.00

Subbasin Hydrology

Subbasin : A2

Input Data

Area (ac)	6.88
Peak Rate Factor	484
Weighted Curve Number	72
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	6.88	-	72
Composite Area & Weighted CN	6.88		72

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

- Tc = Time of Concentration (hr)
- n = Manning's roughness
- Lf = Flow Length (ft)
- P = 2 yr, 24 hr Rainfall (inches)
- Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

- V = 16.1345 * (Sf^0.5) (unpaved surface)
- V = 20.3282 * (Sf^0.5) (paved surface)
- V = 15.0 * (Sf^0.5) (grassed waterway surface)
- V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
- V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
- V = 7.0 * (Sf^0.5) (short grass pasture surface)
- V = 5.0 * (Sf^0.5) (woodland surface)
- V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
- Tc = (Lf / V) / (3600 sec/hr)

Where:

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n

R = Aq / Wp

Tc = (Lf / V) / (3600 sec/hr)

Where :

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- R = Hydraulic Radius (ft)
- Aq = Flow Area (ft²)
- Wp = Wetted Perimeter (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)
- n = Manning's roughness

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	411	0
Slope (%) :	2.1	2.2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	2.39	0
Computed Flow Time (min) :	0.71	2.87	0
Total TOC (min)	25.33		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.53
Peak Runoff (cfs)	2.93
Weighted Curve Number	72
Time of Concentration (days hh:mm:ss)	0 00:25:20

Subbasin : A3

Input Data

Area (ac)	7.03
Peak Rate Factor	484
Weighted Curve Number	73
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	7.03	-	73
Composite Area & Weighted CN	7.03		73

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.93	0	0
Computed Flow Time (min) :	1.8	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	110	54.19	0
Slope (%) :	3.3	1.7	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.93	2.65	0
Computed Flow Time (min) :	0.63	0.34	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	452.63	0	0
Channel Slope (%) :	0.8	0	0
Cross Section Area (ft²) :	43.83	0	0
Wetted Perimeter (ft) :	61.35	0	0
Velocity (ft/sec) :	3.55	0	0
Computed Flow Time (min) :	2.12	0	0
Total TOC (min)	4.89		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.57
Peak Runoff (cfs)	5.63
Weighted Curve Number	73
Time of Concentration (days hh:mm:ss)	0 00:04:53

Subbasin : A4

Input Data

Area (ac)	33.4
Peak Rate Factor	484
Weighted Curve Number	86
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	33.4	-	86
Composite Area & Weighted CN	33.4		86

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.01	0	0
Flow Length (ft) :	71	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	1.58	0	0
Computed Flow Time (min) :	0.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	3318	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	7.07	0	0
Wetted Perimeter (ft) :	9.42	0	0
Velocity (ft/sec) :	9.47	0	0
Computed Flow Time (min) :	5.84	0	0
Total TOC (min)	6.59		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.24
Peak Runoff (cfs)	62.87
Weighted Curve Number	86
Time of Concentration (days hh:mm:ss)	0 00:06:35

Subbasin : A5

Input Data

Area (ac)	0.22
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.22	-	89
Composite Area & Weighted CN	0.22		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	72	47	0
Slope (%) :	3.4	2.2	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.09	0.93	0
Computed Flow Time (min) :	13.79	0.84	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.45
Peak Runoff (cfs)	0.4
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : A6

Input Data

Area (ac)	5.99
Peak Rate Factor	484
Weighted Curve Number	70
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.99	-	70
Composite Area & Weighted CN	5.99		70

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.8	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	19.39	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	220	70	0
Slope (%) :	4	23.3	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	7.79	0
Computed Flow Time (min) :	1.14	0.15	0
Total TOC (min)	20.67		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.46
Peak Runoff (cfs)	2.34
Weighted Curve Number	70
Time of Concentration (days hh:mm:ss)	0 00:20:40

Subbasin : B

Input Data

Area (ac)	21.6
Peak Rate Factor	484
Weighted Curve Number	63
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	20.67	-	63
Composite Area & Weighted CN	20.67		63

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	1.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	26.01	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	2.69	0	0
Slope (%) :	2	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0	0
Computed Flow Time (min) :	0.02	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.03
Flow Length (ft) :	858	505	518
Channel Slope (%) :	1	3.3	2.6
Cross Section Area (ft²) :	42	7.07	42
Wetted Perimeter (ft) :	56	9.42	56
Velocity (ft/sec) :	4.1	17.2	6.61
Computed Flow Time (min) :	3.49	0.49	1.31
Total TOC (min)	31.31		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.24
Peak Runoff (cfs)	2.23
Weighted Curve Number	63
Time of Concentration (days hh:mm:ss)	0 00:31:19

Subbasin : C1

Input Data

Area (ac)	15.73
Peak Rate Factor	484
Weighted Curve Number	60
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	15.72	-	60
Composite Area & Weighted CN	15.72		60

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	65.55	54.45	0
Slope (%) :	1.5	0.7	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.06	0.6	0
Computed Flow Time (min) :	17.75	1.5	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	251	0	0
Slope (%) :	2.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.65	0	0
Computed Flow Time (min) :	1.58	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	613.56	0	0
Channel Slope (%) :	4.2	0	0
Cross Section Area (ft²) :	74.65	0	0
Wetted Perimeter (ft) :	39.92	0	0
Velocity (ft/sec) :	15.45	0	0
Computed Flow Time (min) :	0.66	0	0
Total TOC (min)	21.49		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.17
Peak Runoff (cfs)	0.99
Weighted Curve Number	60
Time of Concentration (days hh:mm:ss)	0 00:21:29

Subbasin : C2

Input Data

Area (ac)	5.46
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.46	-	81
Composite Area & Weighted CN	5.46		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	126	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.97	0	0
Computed Flow Time (min) :	2.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	49	105	0
Slope (%) :	3.3	2.4	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.93	2.5	0
Computed Flow Time (min) :	0.28	0.7	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	543.81	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	23.19	0	0
Wetted Perimeter (ft) :	35.98	0	0
Velocity (ft/sec) :	3.52	0	0
Computed Flow Time (min) :	2.58	0	0
Total TOC (min)	5.72		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.94
Peak Runoff (cfs)	7.85
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:05:43

Subbasin : C3

Input Data

Area (ac)	3.51
Peak Rate Factor	0
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.51	-	80
Composite Area & Weighted CN	3.51		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	40	60	0
Slope (%) :	1.4	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.15	0.06	0
Computed Flow Time (min) :	4.38	17	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	172	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	363.59	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	1.87	0	0
Total TOC (min)	24.47		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.89
Peak Runoff (cfs)	2.98
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : C4

Input Data

Area (ac)	5.48
Peak Rate Factor	0
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.48	-	81
Composite Area & Weighted CN	5.48		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	67.8	32.2	0
Slope (%) :	0.5	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.11	0.05	0
Computed Flow Time (min) :	10.07	10.33	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174.24	0	0
Slope (%) :	1.4	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.91	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	592.19	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	3.05	0	0
Total TOC (min)	24.97		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.94
Peak Runoff (cfs)	4.92
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:24:58

Subbasin : C5

Input Data

Area (ac)	3.62
Peak Rate Factor	484
Weighted Curve Number	75
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.62	-	75
Composite Area & Weighted CN	3.62		75

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	20.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	93	100	0
Slope (%) :	5.5	2.5	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	2.55	0
Computed Flow Time (min) :	0.41	0.65	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	170	0	0
Channel Slope (%) :	1.2	0	0
Cross Section Area (ft²) :	22.39	0	0
Wetted Perimeter (ft) :	33.33	0	0
Velocity (ft/sec) :	4.17	0	0
Computed Flow Time (min) :	0.68	0	0
Total TOC (min)	22.03		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.65
Peak Runoff (cfs)	2.23
Weighted Curve Number	75
Time of Concentration (days hh:mm:ss)	0 00:22:02

Subbasin : C6

Input Data

Area (ac)	5.05
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.44	-	81
Composite Area & Weighted CN	3.44		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.85	0	0
Computed Flow Time (min) :	1.97	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	262	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.03
Flow Length (ft) :	118	88.82	277.62
Channel Slope (%) :	0.4	2	1.5
Cross Section Area (ft²) :	22.39	0.79	11.07
Wetted Perimeter (ft) :	33.33	3.14	61
Velocity (ft/sec) :	2.41	6.46	1.95
Computed Flow Time (min) :	0.82	0.23	2.37
Total TOC (min)	6.91		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.94
Peak Runoff (cfs)	7
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:06:55

Subbasin : D1

Input Data

Area (ac)	13.01
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	13.01	-	67
Composite Area & Weighted CN	13.01		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.35	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	641	0
Slope (%) :	2.2	1.9	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.39	2.22	0
Computed Flow Time (min) :	0.7	4.81	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.01	0	0
Flow Length (ft) :	187	0	0
Channel Slope (%) :	1.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	23.91	0	0
Computed Flow Time (min) :	0.13	0	0
Total TOC (min)	26.99		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.36
Peak Runoff (cfs)	2.9
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:26:59

Subbasin : D10

Input Data

Area (ac)	63.53
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	63.53	-	77
Composite Area & Weighted CN	63.53		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	62	40	0
Slope (%) :	0.9	1.8	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.69	0.06	0
Computed Flow Time (min) :	1.51	11.11	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	180	154	0
Slope (%) :	1.5	0.8	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.98	1.44	0
Computed Flow Time (min) :	1.52	1.78	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0.03	0
Flow Length (ft) :	2181	646	0
Channel Slope (%) :	0.3	0.8	0
Cross Section Area (ft²) :	47.3	34	0
Wetted Perimeter (ft) :	94.68	68	0
Velocity (ft/sec) :	0.64	2.8	0
Computed Flow Time (min) :	56.6	3.85	0
Total TOC (min)	76.36		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.74
Peak Runoff (cfs)	19.53
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 01:16:22

Subbasin : D11

Input Data

Area (ac)	4.65
Peak Rate Factor	484
Weighted Curve Number	86
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.65	-	86
Composite Area & Weighted CN	4.65		86

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	99.23	0	0
Slope (%) :	2.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.24	0	0
Computed Flow Time (min) :	6.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	347.24	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	2.02	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	368	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.77	0	0
Wetted Perimeter (ft) :	4.71	0	0
Velocity (ft/sec) :	4.22	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	10.23		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.24
Peak Runoff (cfs)	7.98
Weighted Curve Number	86
Time of Concentration (days hh:mm:ss)	0 00:10:14

Subbasin : D12

Input Data

Area (ac)	17.87
Peak Rate Factor	484
Weighted Curve Number	88
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	17.87	-	88
Composite Area & Weighted CN	17.87		88

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	46.73	0	0
Slope (%) :	3.4	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	159.79	0	0
Slope (%) :	5.5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	0	0
Computed Flow Time (min) :	0.7	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0.013	0
Flow Length (ft) :	390	556	0
Channel Slope (%) :	0.5	0.5	0
Cross Section Area (ft²) :	4.9	13.59	0
Wetted Perimeter (ft) :	7.9	60	0
Velocity (ft/sec) :	5.89	3.01	0
Computed Flow Time (min) :	1.1	3.08	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.38
Peak Runoff (cfs)	30.91
Weighted Curve Number	88
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : D13

Input Data

Area (ac)	4.88
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.88	-	81
Composite Area & Weighted CN	4.88		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	65	40	0
Slope (%) :	2.6	0.3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	1.06	0.03	0
Computed Flow Time (min) :	1.02	22.76	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.24	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	497	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	5.02	0	0
Total TOC (min)	30.04		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.94
Peak Runoff (cfs)	3.91
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:30:02

Subbasin : D14

Input Data

Area (ac)	2.92
Peak Rate Factor	484
Weighted Curve Number	82
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	2.92	-	82
Composite Area & Weighted CN	2.92		82

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	20	89.49	0
Slope (%) :	1.3	0.9	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.05	0.74	0
Computed Flow Time (min) :	7.27	2.02	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	70	0	0
Slope (%) :	6.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.18	0	0
Computed Flow Time (min) :	0.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	409	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	20	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	4.71	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	11.02		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1
Peak Runoff (cfs)	3.93
Weighted Curve Number	82
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : D15

Input Data

Area (ac)	0.77
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.77	-	87
Composite Area & Weighted CN		0.77		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	160	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.18	0	0
Computed Flow Time (min) :	15.17	0	0
Total TOC (min)	15.17		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.31
Peak Runoff (cfs)	1.25
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:15:10

Subbasin : D16

Input Data

Area (ac)	1.65
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.65	-	87
Composite Area & Weighted CN		1.65		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	113	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.33	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	150	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	300	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.6	0	0
Total TOC (min)	5.16		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.31
Peak Runoff (cfs)	3.43
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:05:10

Subbasin : D17

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	84
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	84
Composite Area & Weighted CN		0.26		84

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.12
Peak Runoff (cfs)	0.46
Weighted Curve Number	84
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D18

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	89
Composite Area & Weighted CN		0.26		89

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.45
Peak Runoff (cfs)	0.61
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D19

Input Data

Area (ac)	1.37
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.37	-	89
Composite Area & Weighted CN		1.37		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	118	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.42	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	88	38	0
Slope (%) :	2.7	0.6	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.65	1.57	0
Computed Flow Time (min) :	0.55	0.4	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	227	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.21	0	0
Total TOC (min)	4.58		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.46
Peak Runoff (cfs)	3.16
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:04:35

Subbasin : D2

Input Data

Area (ac)	7.57
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.57	-	54
Composite Area & Weighted CN		7.57		54

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	17.62	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	314	100	0
Slope (%) :	8	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.56	2.28	0
Computed Flow Time (min) :	1.15	0.73	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0	0
Flow Length (ft) :	348	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	1.73	0	0
Computed Flow Time (min) :	3.36	0	0
Total TOC (min)	22.86		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.07
Peak Runoff (cfs)	0.06
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:22:52

Subbasin : D20

Input Data

Area (ac)	2.11
Peak Rate Factor	0
Weighted Curve Number	94
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.11	-	94
Composite Area & Weighted CN		2.11		94

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	480	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	3.94	0	0
Total TOC (min)	6.06		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.87
Peak Runoff (cfs)	5.88
Weighted Curve Number	94
Time of Concentration (days hh:mm:ss)	0 00:06:04

Subbasin : D21

Input Data

Area (ac)	4.54
Peak Rate Factor	0
Weighted Curve Number	95
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4.54	-	95
Composite Area & Weighted CN		4.54		95

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	481.91	0	0
Slope (%) :	0.9	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	1.93	0	0
Computed Flow Time (min) :	4.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	123.45	0	0
Channel Slope (%) :	2.5	0	0
Cross Section Area (ft²) :	4	0	0
Wetted Perimeter (ft) :	8	0	0
Velocity (ft/sec) :	4.95	0	0
Computed Flow Time (min) :	0.42	0	0
Total TOC (min)	6.69		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.96
Peak Runoff (cfs)	12.86
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:41

Subbasin : D3

Input Data

Area (ac)	4
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4	-	68
Composite Area & Weighted CN		4		68

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0	0.4	0
Flow Length (ft) :	0	100	0
Slope (%) :	0	2	0
2 yr, 24 hr Rainfall (in) :	0	3	0
Velocity (ft/sec) :	0	0.08	0
Computed Flow Time (min) :	0	22.18	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	234	100	0
Slope (%) :	4	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	2.28	0
Computed Flow Time (min) :	1.21	0.73	0
Total TOC (min)	24.12		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.39
Peak Runoff (cfs)	1.11
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:24:07

Subbasin : D4

Input Data

Area (ac)	8.85
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		8.85	-	59
Composite Area & Weighted CN		8.85		59

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	45.52	50	0
Slope (%) :	1.6	3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.81	0.08	0
Computed Flow Time (min) :	0.93	10.83	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	233	0	0
Slope (%) :	1.6	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.04	0	0
Computed Flow Time (min) :	1.9	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0.03
Flow Length (ft) :	842.11	285	208.66
Channel Slope (%) :	1	0.7	0.7
Cross Section Area (ft²) :	10	17.21	17.74
Wetted Perimeter (ft) :	20	34.65	35.7
Velocity (ft/sec) :	3.13	2.61	2.61
Computed Flow Time (min) :	4.49	1.82	1.33
Total TOC (min)	21.31		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.15
Peak Runoff (cfs)	0.41
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:21:19

Subbasin : D5

Input Data

Area (ac)	7.83
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.83	-	67
Composite Area & Weighted CN		7.83		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	101	0	0
Slope (%) :	1.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	22.82	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0
Flow Length (ft) :	310	988	0
Channel Slope (%) :	0.5	2	0
Cross Section Area (ft²) :	1.5	4	0
Wetted Perimeter (ft) :	6	8	0
Velocity (ft/sec) :	1.39	4.42	0
Computed Flow Time (min) :	3.71	3.72	0
Total TOC (min)	30.25		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.36
Peak Runoff (cfs)	1.62
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:30:15

Subbasin : D6

Input Data

Area (ac)	6.77
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		6.77	-	77
Composite Area & Weighted CN		6.77		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	379	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	2.26	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	330	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	3.34	0	0
Total TOC (min)	24.46		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.74
Peak Runoff (cfs)	4.61
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : D8

Input Data

Area (ac)	2.49
Peak Rate Factor	484
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.49	-	80
Composite Area & Weighted CN		2.49		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	120	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	0.72	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	240	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.5	0	0
Wetted Perimeter (ft) :	6	0	0
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.44	0	0
Total TOC (min)	21.01		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.89
Peak Runoff (cfs)	2.3
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:21:01

Subbasin : D9

Input Data

Area (ac)	7.1
Peak Rate Factor	484
Weighted Curve Number	85
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.1	-	85
Composite Area & Weighted CN		7.1		85

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	0.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	33.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	336.83	0	0
Slope (%) :	1.1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.13	0	0
Computed Flow Time (min) :	2.64	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0
Flow Length (ft) :	367.85	422.11	0
Channel Slope (%) :	1	1.5	0
Cross Section Area (ft²) :	6.81	20	0
Wetted Perimeter (ft) :	27.29	80	0
Velocity (ft/sec) :	1.97	5.57	0
Computed Flow Time (min) :	3.11	1.26	0
Total TOC (min)	40.76		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	1.18
Peak Runoff (cfs)	5.99
Weighted Curve Number	85
Time of Concentration (days hh:mm:ss)	0 00:40:46

Subbasin : F1

Input Data

Area (ac)	2.6
Peak Rate Factor	484
Weighted Curve Number	48
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.6	-	48
Composite Area & Weighted CN		2.6		48

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	13	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.17	0	0
Computed Flow Time (min) :	14.51	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	280	0	0
Channel Slope (%) :	2.7	0	0
Cross Section Area (ft²) :	42	0	0
Wetted Perimeter (ft) :	56	0	0
Velocity (ft/sec) :	6.74	0	0
Computed Flow Time (min) :	0.69	0	0
Total TOC (min)	15.20		

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.01
Peak Runoff (cfs)	0
Weighted Curve Number	48
Time of Concentration (days hh:mm:ss)	0 00:15:12

Subbasin : G1

Input Data

Area (ac)	3
Peak Rate Factor	484
Weighted Curve Number	47
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		3	-	47
Composite Area & Weighted CN		3		47

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	2.5
Total Runoff (in)	0.01
Peak Runoff (cfs)	0
Weighted Curve Number	47
Time of Concentration (days hh:mm:ss)	0 00:05:00

Storage Node : N.Basin1

Input Data

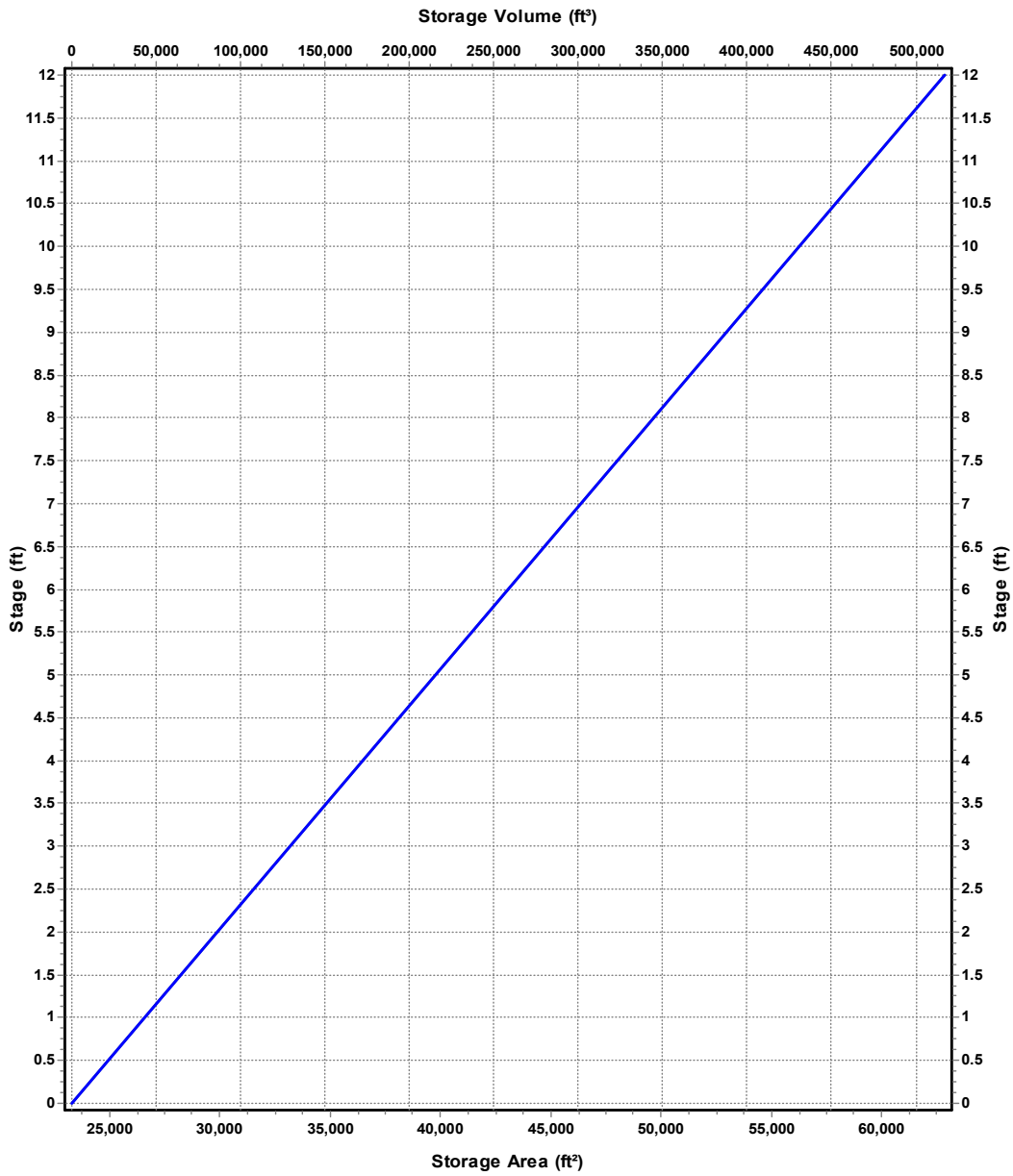
Invert Elevation (ft)	687.00
Max (Rim) Elevation (ft)	699.50
Max (Rim) Offset (ft)	12.50
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-687.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-18

Stage	Storage Area	Storage Volume
(ft)	(ft²)	(ft³)
0	23305	0
12	62866.42	517028.52

Storage Area Volume Curves



Storage Area Storage Volume

Storage Node : N.Basin1 (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	EmergencySpillwayA	Bottom	Rectangular	No		47.80	47.80	697.79	0.63
2	PrimarySpillway	Bottom	Rectangular	No		30.00	18.00	695.82	0.63
3	Underdrain	Side	CIRCULAR	No	3.00			684.28	0.61

Output Summary Results

Peak Inflow (cfs)	65.87
Peak Lateral Inflow (cfs)	60.76
Peak Outflow (cfs)	0.54
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	692.2
Max HGL Depth Attained (ft)	5.2
Average HGL Elevation Attained (ft)	690.49
Average HGL Depth Attained (ft)	3.49
Time of Max HGL Occurrence (days hh:mm)	1 00:11
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Project Description

File Name Pre-Development.SPF
Description
22081 Northside Development

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On 00:00:00 0:00:00
End Analysis On 00:00:00 0:00:00
Start Reporting On 00:00:00 0:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-02	Cumulative	inches	Virginia	Frederick	2.00	3.00	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Peak Rate	Weighted	Total	Total	Total	Peak	Time of
			Factor	Curve	Rainfall	Runoff	Runoff	Runoff	Concentration
		(ac)		Number	(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	A2	6.88	484.00	72.00	3.00	0.81	5.56	4.89	0 00:25:19
2	A3	7.03	484.00	73.00	3.00	0.86	6.02	9.02	0 00:05:00
3	A4	11.62	484.00	56.00	3.00	0.22	2.56	0.89	0 00:26:18
4	A5	0.22	484.00	89.00	3.00	1.90	0.42	0.51	0 00:14:38
5	A6	5.99	484.00	70.00	3.00	0.71	4.28	4.09	0 00:20:40
6	B	31.82	484.00	59.00	3.00	0.30	9.64	4.38	0 00:29:17
7	C1	15.73	484.00	60.00	3.00	0.33	5.24	3.17	0 00:21:29
8	C2	5.46	484.00	81.00	3.00	1.31	7.17	11.09	0 00:05:43
9	C3	3.51	0.00	80.00	3.00	1.25	4.39	4.28	0 00:24:28
10	C4	5.48	0.00	81.00	3.00	1.31	7.20	6.98	0 00:24:58
11	C5	3.62	484.00	75.00	3.00	0.96	3.48	3.46	0 00:22:01
12	C6	5.05	484.00	81.00	3.00	1.31	6.63	9.89	0 00:06:54
13	D1	13.01	484.00	67.00	3.00	0.59	7.61	5.66	0 00:26:59
14	D10	63.53	484.00	77.00	3.00	1.07	68.04	29.62	0 01:16:21
15	D11	4.65	484.00	86.00	3.00	1.66	7.73	10.66	0 00:10:13
16	D12	17.87	484.00	88.00	3.00	1.82	32.49	40.49	0 00:14:38
17	D13	4.88	484.00	81.00	3.00	1.31	6.41	5.56	0 00:30:02
18	D14	2.92	484.00	82.00	3.00	1.38	4.03	5.46	0 00:11:01
19	D15	0.77	484.00	87.00	3.00	1.74	1.34	1.65	0 00:15:10
20	D16	1.65	484.00	87.00	3.00	1.74	2.87	4.53	0 00:05:09
21	D17	0.26	484.00	84.00	3.00	1.52	0.39	0.63	0 00:05:00
22	D18	0.26	484.00	89.00	3.00	1.90	0.49	0.79	0 00:05:00
23	D19	1.37	484.00	89.00	3.00	1.90	2.60	4.10	0 00:05:00
24	D2	7.57	484.00	54.00	3.00	0.17	1.29	0.34	0 00:22:51
25	D20	2.11	0.00	94.00	3.00	2.35	4.96	7.30	0 00:06:03
26	D21	4.54	0.00	95.00	3.00	2.45	11.12	15.85	0 00:06:41
27	D3	4.00	484.00	68.00	3.00	0.63	2.51	2.07	0 00:24:07
28	D4	8.85	484.00	59.00	3.00	0.30	2.68	1.50	0 00:21:18
29	D5	7.83	484.00	67.00	3.00	0.59	4.58	3.15	0 00:30:15
30	D6	6.77	484.00	77.00	3.00	1.07	7.25	6.93	0 00:24:27
31	D8	2.49	484.00	80.00	3.00	1.25	3.11	3.31	0 00:21:00
32	D9	7.10	484.00	85.00	3.00	1.59	11.27	8.14	0 00:40:45
33	F	4.42	484.00	46.00	3.00	0.03	0.15	0.02	0 00:15:12
34	G	12.84	484.00	51.00	3.00	0.11	1.40	0.20	0 00:26:13

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)		(ft)	(days hh:mm)	(ac-in)	(min)
1	Basin2-Out	Junction	689.58	695.31	0.00	696.00	0.00	1.14	690.69	0.00	4.62	0 00:00	0.00	0.00
2	E103	Junction	714.91	718.00	0.00	0.00	0.00	4.88	715.44	0.00	2.56	0 00:00	0.00	0.00
3	E104	Junction	711.07	715.32	711.07	0.00	0.00	11.12	712.08	0.00	3.24	0 00:00	0.00	0.00
4	E105	Junction	705.99	719.42	705.99	0.00	0.00	11.17	706.90	0.00	12.52	0 00:00	0.00	0.00
5	E106	Junction	718.73	719.98	718.73	719.98	0.00	9.31	719.35	0.00	0.63	0 00:00	0.00	0.00
6	E106A	Junction	684.18	696.94	0.00	0.00	0.00	0.55	684.37	0.00	12.57	0 00:00	0.00	0.00
7	E107	Junction	684.00	699.34	0.00	0.00	0.00	0.55	684.27	0.00	15.07	0 00:00	0.00	0.00
8	E108	Junction	715.39	717.39	715.39	718.00	0.00	11.90	716.84	0.00	0.55	0 00:00	0.00	0.00
9	E109	Junction	714.79	716.00	0.00	0.00	0.00	18.81	716.24	0.00	0.55	0 00:00	0.00	0.00
10	E111	Junction	713.55	718.64	0.00	0.00	0.00	1.37	714.69	0.00	3.95	0 00:00	0.00	0.00
11	E112	Junction	707.58	718.62	707.58	0.00	0.00	1.15	707.89	0.00	10.73	0 00:00	0.00	0.00
12	E116	Junction	709.52	714.00	0.00	0.00	0.00	18.59	711.26	0.00	2.74	0 00:00	0.00	0.00
13	E117	Junction	709.12	713.00	0.00	0.00	0.00	18.27	710.84	0.00	2.16	0 00:00	0.00	0.00
14	E124	Junction	698.61	708.27	698.61	0.00	0.00	19.00	708.27	0.00	0.00	0 12:21	0.78	22.00
15	E125	Junction	692.68	708.84	0.00	0.00	0.00	16.36	708.84	0.00	0.00	0 12:12	1.70	34.00
16	E127	Junction	699.46	704.00	699.46	0.00	0.00	5.51	699.91	0.00	4.09	0 00:00	0.00	0.00
17	E128	Junction	698.50	703.00	698.50	0.00	0.00	36.50	700.79	0.00	2.21	0 00:00	0.00	0.00
18	E142	Junction	691.58	694.00	691.58	0.00	0.00	36.43	692.91	0.00	1.68	0 00:00	0.00	0.00
19	E145-A	Junction	669.37	686.19	0.00	0.00	0.00	128.83	686.19	0.00	0.00	0 12:16	1.54	11.00
20	E159	Junction	680.38	695.00	680.38	6.00	0.00	1.92	690.12	0.00	4.88	0 00:00	0.00	0.00
21	E162	Junction	681.02	690.00	681.02	6.00	0.00	2.07	681.40	0.00	8.60	0 00:00	0.00	0.00
22	E167	Junction	702.90	715.49	0.00	0.00	0.00	11.58	703.83	0.00	11.66	0 00:00	0.00	0.00
23	E169	Junction	698.68	710.00	698.68	0.00	0.00	11.53	699.40	0.00	10.60	0 00:00	0.00	0.00
24	E504	Junction	709.62	714.60	709.62	0.00	12.56	14.51	710.96	0.00	3.64	0 00:00	0.00	0.00
25	Ex_D13	Junction	665.88	675.00	0.00	0.00	0.00	4.41	666.43	0.00	14.45	0 00:00	0.00	0.00
26	JunctionD5	Junction	690.40	695.70	0.00	695.70	0.00	1.77	690.78	0.00	4.92	0 00:00	0.00	0.00
27	Out-A	Outfall	682.47					0.55	682.63					
28	Out-B	Outfall	704.89					5.02	705.18					
29	Out-C	Outfall	690.41					14.98	691.91					
30	Out-D	Outfall	665.41					4.41	665.96					
31	Out-F	Outfall	705.00					0.02	705.00					
32	Out-G	Outfall	712.00					0.20	712.00					
33	Chan-E140-E145	Storage Node	673.58	687.00	673.58		0.00	101.08	676.50				0.00	0.00
34	E110	Storage Node	715.20	718.00	715.20		10000.00	4.23	715.63				0.00	0.00
35	E122-E129	Storage Node	699.00	705.00	699.00		0.00	33.29	701.29				0.00	0.00
36	E123	Storage Node	701.75	704.49	701.75		2059.00	20.04	703.07				0.00	0.00
37	E137	Storage Node	692.09	698.00	692.09		1272.00	87.51	694.29				0.00	0.00
38	E143	Storage Node	688.99	696.00	688.99		0.00	44.23	690.57				0.00	0.00
39	exDA-K-Channel	Storage Node	704.25	708.50	704.25		0.00	26.68	705.92				0.00	0.00
40	InfieldApronIsland	Storage Node	713.50	714.80	713.50		100.00	15.54	714.07				0.00	0.00
41	N.Basin1	Storage Node	689.00	699.50	0.00		0.00	14.61	694.20				0.00	0.00
42	SouthAirportBasin	Storage Node	666.57	682.00	0.00		0.00	111.31	673.98				0.00	0.00
43	SouthGA-Basin1	Storage Node	690.40	696.00	0.00		44584.84	8.05	692.76				0.00	0.00
44	SouthGA-Basin2	Storage Node	690.50	695.70	0.00		22000.00	3.15	691.81				0.00	0.00

Subbasin Hydrology

Subbasin : A2

Input Data

Area (ac)	6.88
Peak Rate Factor	484
Weighted Curve Number	72
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	6.88	-	72
Composite Area & Weighted CN	6.88		72

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

- Tc = Time of Concentration (hr)
- n = Manning's roughness
- Lf = Flow Length (ft)
- P = 2 yr, 24 hr Rainfall (inches)
- Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

- V = 16.1345 * (Sf^0.5) (unpaved surface)
- V = 20.3282 * (Sf^0.5) (paved surface)
- V = 15.0 * (Sf^0.5) (grassed waterway surface)
- V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
- V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
- V = 7.0 * (Sf^0.5) (short grass pasture surface)
- V = 5.0 * (Sf^0.5) (woodland surface)
- V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
- Tc = (Lf / V) / (3600 sec/hr)

Where:

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n

R = Aq / Wp

Tc = (Lf / V) / (3600 sec/hr)

Where :

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- R = Hydraulic Radius (ft)
- Aq = Flow Area (ft²)
- Wp = Wetted Perimeter (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)
- n = Manning's roughness

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	411	0
Slope (%) :	2.1	2.2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	2.39	0
Computed Flow Time (min) :	0.71	2.87	0
Total TOC (min) 25.33			

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.81
Peak Runoff (cfs)	4.89
Weighted Curve Number	72
Time of Concentration (days hh:mm:ss)	0 00:25:20

Subbasin : A3

Input Data

Area (ac)	7.03
Peak Rate Factor	484
Weighted Curve Number	73
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	7.03	-	73
Composite Area & Weighted CN	7.03		73

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.93	0	0
Computed Flow Time (min) :	1.8	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	110	54.19	0
Slope (%) :	3.3	1.7	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.93	2.65	0
Computed Flow Time (min) :	0.63	0.34	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	452.63	0	0
Channel Slope (%) :	0.8	0	0
Cross Section Area (ft²) :	43.83	0	0
Wetted Perimeter (ft) :	61.35	0	0
Velocity (ft/sec) :	3.55	0	0
Computed Flow Time (min) :	2.12	0	0
Total TOC (min)	4.89		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.86
Peak Runoff (cfs)	9.02
Weighted Curve Number	73
Time of Concentration (days hh:mm:ss)	0 00:04:53

Subbasin : A4

Input Data

Area (ac)	11.62
Peak Rate Factor	484
Weighted Curve Number	56
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	11.62	-	56
Composite Area & Weighted CN	11.62		56

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	105	0	0
Slope (%) :	2.4	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.44	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	394	0	0
Slope (%) :	1.8	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.16	0	0
Computed Flow Time (min) :	3.04	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.013
Flow Length (ft) :	257	196	175
Channel Slope (%) :	1.3	0.57	1.13
Cross Section Area (ft²) :	26.06	7.07	7.07
Wetted Perimeter (ft) :	43.83	9.42	9.42
Velocity (ft/sec) :	4	7.15	10.06
Computed Flow Time (min) :	1.07	0.46	0.29
Total TOC (min)	26.30		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.22
Peak Runoff (cfs)	0.89
Weighted Curve Number	56
Time of Concentration (days hh:mm:ss)	0 00:26:18

Subbasin : A5

Input Data

Area (ac)	0.22
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.22	-	89
Composite Area & Weighted CN	0.22		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	72	47	0
Slope (%) :	3.4	2.2	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.09	0.93	0
Computed Flow Time (min) :	13.79	0.84	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.9
Peak Runoff (cfs)	0.51
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : A6

Input Data

Area (ac)	5.99
Peak Rate Factor	484
Weighted Curve Number	70
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.99	-	70
Composite Area & Weighted CN	5.99		70

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.8	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	19.39	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	220	70	0
Slope (%) :	4	23.3	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	7.79	0
Computed Flow Time (min) :	1.14	0.15	0
Total TOC (min)	20.67		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.71
Peak Runoff (cfs)	4.09
Weighted Curve Number	70
Time of Concentration (days hh:mm:ss)	0 00:20:40

Subbasin : B

Input Data

Area (ac)	31.82
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	13.78	-	59
Composite Area & Weighted CN	13.78		59

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	22.64	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	203	0
Slope (%) :	1.4	0.5	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.91	1.14	0
Computed Flow Time (min) :	0.87	2.97	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	858	0	0
Channel Slope (%) :	1.6	0	0
Cross Section Area (ft²) :	19.1	0	0
Wetted Perimeter (ft) :	26.17	0	0
Velocity (ft/sec) :	5.09	0	0
Computed Flow Time (min) :	2.81	0	0
Total TOC (min)	29.29		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.3
Peak Runoff (cfs)	4.38
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:29:17

Subbasin : C1

Input Data

Area (ac)	15.73
Peak Rate Factor	484
Weighted Curve Number	60
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	15.72	-	60
Composite Area & Weighted CN	15.72		60

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	65.55	54.45	0
Slope (%) :	1.5	0.7	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.06	0.6	0
Computed Flow Time (min) :	17.75	1.5	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	251	0	0
Slope (%) :	2.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.65	0	0
Computed Flow Time (min) :	1.58	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	613.56	0	0
Channel Slope (%) :	4.2	0	0
Cross Section Area (ft²) :	74.65	0	0
Wetted Perimeter (ft) :	39.92	0	0
Velocity (ft/sec) :	15.45	0	0
Computed Flow Time (min) :	0.66	0	0
Total TOC (min)	21.49		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.33
Peak Runoff (cfs)	3.17
Weighted Curve Number	60
Time of Concentration (days hh:mm:ss)	0 00:21:29

Subbasin : C2

Input Data

Area (ac)	5.46
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.46	-	81
Composite Area & Weighted CN	5.46		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	126	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.97	0	0
Computed Flow Time (min) :	2.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	49	105	0
Slope (%) :	3.3	2.4	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.93	2.5	0
Computed Flow Time (min) :	0.28	0.7	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	543.81	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	23.19	0	0
Wetted Perimeter (ft) :	35.98	0	0
Velocity (ft/sec) :	3.52	0	0
Computed Flow Time (min) :	2.58	0	0
Total TOC (min)	5.72		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.31
Peak Runoff (cfs)	11.09
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:05:43

Subbasin : C3

Input Data

Area (ac)	3.51
Peak Rate Factor	0
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.51	-	80
Composite Area & Weighted CN	3.51		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	40	60	0
Slope (%) :	1.4	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.15	0.06	0
Computed Flow Time (min) :	4.38	17	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	172	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	363.59	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	1.87	0	0
Total TOC (min)	24.47		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.25
Peak Runoff (cfs)	4.28
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : C4

Input Data

Area (ac)	5.48
Peak Rate Factor	0
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.48	-	81
Composite Area & Weighted CN	5.48		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	67.8	32.2	0
Slope (%) :	0.5	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.11	0.05	0
Computed Flow Time (min) :	10.07	10.33	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174.24	0	0
Slope (%) :	1.4	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.91	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	592.19	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	3.05	0	0
Total TOC (min)	24.97		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.31
Peak Runoff (cfs)	6.98
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:24:58

Subbasin : C5

Input Data

Area (ac)	3.62
Peak Rate Factor	484
Weighted Curve Number	75
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.62	-	75
Composite Area & Weighted CN	3.62		75

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	20.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	93	100	0
Slope (%) :	5.5	2.5	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	2.55	0
Computed Flow Time (min) :	0.41	0.65	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	170	0	0
Channel Slope (%) :	1.2	0	0
Cross Section Area (ft²) :	22.39	0	0
Wetted Perimeter (ft) :	33.33	0	0
Velocity (ft/sec) :	4.17	0	0
Computed Flow Time (min) :	0.68	0	0
Total TOC (min)	22.03		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.96
Peak Runoff (cfs)	3.46
Weighted Curve Number	75
Time of Concentration (days hh:mm:ss)	0 00:22:02

Subbasin : C6

Input Data

Area (ac)	5.05
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.44	-	81
Composite Area & Weighted CN	3.44		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.85	0	0
Computed Flow Time (min) :	1.97	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	262	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.03
Flow Length (ft) :	118	88.82	277.62
Channel Slope (%) :	0.4	2	1.5
Cross Section Area (ft²) :	22.39	0.79	11.07
Wetted Perimeter (ft) :	33.33	3.14	61
Velocity (ft/sec) :	2.41	6.46	1.95
Computed Flow Time (min) :	0.82	0.23	2.37
Total TOC (min)	6.91		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.31
Peak Runoff (cfs)	9.89
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:06:55

Subbasin : D1

Input Data

Area (ac)	13.01
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	13.01	-	67
Composite Area & Weighted CN	13.01		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.35	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	641	0
Slope (%) :	2.2	1.9	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.39	2.22	0
Computed Flow Time (min) :	0.7	4.81	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.01	0	0
Flow Length (ft) :	187	0	0
Channel Slope (%) :	1.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	23.91	0	0
Computed Flow Time (min) :	0.13	0	0
Total TOC (min)	26.99		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.59
Peak Runoff (cfs)	5.66
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:26:59

Subbasin : D10

Input Data

Area (ac)	63.53
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	63.53	-	77
Composite Area & Weighted CN	63.53		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	62	40	0
Slope (%) :	0.9	1.8	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.69	0.06	0
Computed Flow Time (min) :	1.51	11.11	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	180	154	0
Slope (%) :	1.5	0.8	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.98	1.44	0
Computed Flow Time (min) :	1.52	1.78	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0.03	0
Flow Length (ft) :	2181	646	0
Channel Slope (%) :	0.3	0.8	0
Cross Section Area (ft²) :	47.3	34	0
Wetted Perimeter (ft) :	94.68	68	0
Velocity (ft/sec) :	0.64	2.8	0
Computed Flow Time (min) :	56.6	3.85	0
Total TOC (min)	76.36		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.07
Peak Runoff (cfs)	29.62
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 01:16:22

Subbasin : D11

Input Data

Area (ac)	4.65
Peak Rate Factor	484
Weighted Curve Number	86
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.65	-	86
Composite Area & Weighted CN	4.65		86

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	99.23	0	0
Slope (%) :	2.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.24	0	0
Computed Flow Time (min) :	6.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	347.24	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	2.02	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	368	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.77	0	0
Wetted Perimeter (ft) :	4.71	0	0
Velocity (ft/sec) :	4.22	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	10.23		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.66
Peak Runoff (cfs)	10.66
Weighted Curve Number	86
Time of Concentration (days hh:mm:ss)	0 00:10:14

Subbasin : D12

Input Data

Area (ac)	17.87
Peak Rate Factor	484
Weighted Curve Number	88
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	17.87	-	88
Composite Area & Weighted CN	17.87		88

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	46.73	0	0
Slope (%) :	3.4	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	159.79	0	0
Slope (%) :	5.5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	0	0
Computed Flow Time (min) :	0.7	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0.013	0
Flow Length (ft) :	390	556	0
Channel Slope (%) :	0.5	0.5	0
Cross Section Area (ft²) :	4.9	13.59	0
Wetted Perimeter (ft) :	7.9	60	0
Velocity (ft/sec) :	5.89	3.01	0
Computed Flow Time (min) :	1.1	3.08	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.82
Peak Runoff (cfs)	40.49
Weighted Curve Number	88
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : D13

Input Data

Area (ac)	4.88
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.88	-	81
Composite Area & Weighted CN	4.88		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	65	40	0
Slope (%) :	2.6	0.3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	1.06	0.03	0
Computed Flow Time (min) :	1.02	22.76	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.24	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	497	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	5.02	0	0
Total TOC (min)	30.04		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.31
Peak Runoff (cfs)	5.56
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:30:02

Subbasin : D14

Input Data

Area (ac)	2.92
Peak Rate Factor	484
Weighted Curve Number	82
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	2.92	-	82
Composite Area & Weighted CN	2.92		82

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	20	89.49	0
Slope (%) :	1.3	0.9	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.05	0.74	0
Computed Flow Time (min) :	7.27	2.02	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	70	0	0
Slope (%) :	6.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.18	0	0
Computed Flow Time (min) :	0.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	409	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	20	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	4.71	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	11.02		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.38
Peak Runoff (cfs)	5.46
Weighted Curve Number	82
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : D15

Input Data

Area (ac)	0.77
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.77	-	87
Composite Area & Weighted CN		0.77		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	160	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.18	0	0
Computed Flow Time (min) :	15.17	0	0
Total TOC (min)	15.17		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.74
Peak Runoff (cfs)	1.65
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:15:10

Subbasin : D16

Input Data

Area (ac)	1.65
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.65	-	87
Composite Area & Weighted CN		1.65		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	113	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.33	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	150	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	300	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.6	0	0
Total TOC (min)	5.16		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.74
Peak Runoff (cfs)	4.53
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:05:10

Subbasin : D17

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	84
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	84
Composite Area & Weighted CN		0.26		84

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.52
Peak Runoff (cfs)	0.63
Weighted Curve Number	84
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D18

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	89
Composite Area & Weighted CN		0.26		89

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.9
Peak Runoff (cfs)	0.79
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D19

Input Data

Area (ac)	1.37
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.37	-	89
Composite Area & Weighted CN		1.37		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	118	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.42	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	88	38	0
Slope (%) :	2.7	0.6	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.65	1.57	0
Computed Flow Time (min) :	0.55	0.4	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	227	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.21	0	0
Total TOC (min)	4.58		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.9
Peak Runoff (cfs)	4.1
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:04:35

Subbasin : D2

Input Data

Area (ac)	7.57
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.57	-	54
Composite Area & Weighted CN		7.57		54

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	17.62	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	314	100	0
Slope (%) :	8	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.56	2.28	0
Computed Flow Time (min) :	1.15	0.73	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0	0
Flow Length (ft) :	348	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	1.73	0	0
Computed Flow Time (min) :	3.36	0	0
Total TOC (min)	22.86		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.17
Peak Runoff (cfs)	0.34
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:22:52

Subbasin : D20

Input Data

Area (ac)	2.11
Peak Rate Factor	0
Weighted Curve Number	94
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.11	-	94
Composite Area & Weighted CN		2.11		94

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	480	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	3.94	0	0
Total TOC (min)	6.06		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	2.35
Peak Runoff (cfs)	7.3
Weighted Curve Number	94
Time of Concentration (days hh:mm:ss)	0 00:06:04

Subbasin : D21

Input Data

Area (ac)	4.54
Peak Rate Factor	0
Weighted Curve Number	95
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4.54	-	95
Composite Area & Weighted CN		4.54		95

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	481.91	0	0
Slope (%) :	0.9	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	1.93	0	0
Computed Flow Time (min) :	4.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	123.45	0	0
Channel Slope (%) :	2.5	0	0
Cross Section Area (ft²) :	4	0	0
Wetted Perimeter (ft) :	8	0	0
Velocity (ft/sec) :	4.95	0	0
Computed Flow Time (min) :	0.42	0	0
Total TOC (min)	6.69		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	2.45
Peak Runoff (cfs)	15.85
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:41

Subbasin : D3

Input Data

Area (ac)	4
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4	-	68
Composite Area & Weighted CN		4		68

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0	0.4	0
Flow Length (ft) :	0	100	0
Slope (%) :	0	2	0
2 yr, 24 hr Rainfall (in) :	0	3	0
Velocity (ft/sec) :	0	0.08	0
Computed Flow Time (min) :	0	22.18	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	234	100	0
Slope (%) :	4	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	2.28	0
Computed Flow Time (min) :	1.21	0.73	0
Total TOC (min)	24.12		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.63
Peak Runoff (cfs)	2.07
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:24:07

Subbasin : D4

Input Data

Area (ac)	8.85
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		8.85	-	59
Composite Area & Weighted CN		8.85		59

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	45.52	50	0
Slope (%) :	1.6	3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.81	0.08	0
Computed Flow Time (min) :	0.93	10.83	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	233	0	0
Slope (%) :	1.6	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.04	0	0
Computed Flow Time (min) :	1.9	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0.03
Flow Length (ft) :	842.11	285	208.66
Channel Slope (%) :	1	0.7	0.7
Cross Section Area (ft²) :	10	17.21	17.74
Wetted Perimeter (ft) :	20	34.65	35.7
Velocity (ft/sec) :	3.13	2.61	2.61
Computed Flow Time (min) :	4.49	1.82	1.33
Total TOC (min)	21.31		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.3
Peak Runoff (cfs)	1.5
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:21:19

Subbasin : D5

Input Data

Area (ac)	7.83
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.83	-	67
Composite Area & Weighted CN		7.83		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	101	0	0
Slope (%) :	1.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	22.82	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0
Flow Length (ft) :	310	988	0
Channel Slope (%) :	0.5	2	0
Cross Section Area (ft²) :	1.5	4	0
Wetted Perimeter (ft) :	6	8	0
Velocity (ft/sec) :	1.39	4.42	0
Computed Flow Time (min) :	3.71	3.72	0
Total TOC (min)	30.25		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.59
Peak Runoff (cfs)	3.15
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:30:15

Subbasin : D6

Input Data

Area (ac)	6.77
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		6.77	-	77
Composite Area & Weighted CN		6.77		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	379	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	2.26	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	330	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	3.34	0	0
Total TOC (min)	24.46		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.07
Peak Runoff (cfs)	6.93
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : D8

Input Data

Area (ac)	2.49
Peak Rate Factor	484
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.49	-	80
Composite Area & Weighted CN		2.49		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	120	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	0.72	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	240	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.5	0	0
Wetted Perimeter (ft) :	6	0	0
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.44	0	0
Total TOC (min)	21.01		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.25
Peak Runoff (cfs)	3.31
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:21:01

Subbasin : D9

Input Data

Area (ac)	7.1
Peak Rate Factor	484
Weighted Curve Number	85
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.1	-	85
Composite Area & Weighted CN		7.1		85

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	0.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	33.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	336.83	0	0
Slope (%) :	1.1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.13	0	0
Computed Flow Time (min) :	2.64	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0
Flow Length (ft) :	367.85	422.11	0
Channel Slope (%) :	1	1.5	0
Cross Section Area (ft²) :	6.81	20	0
Wetted Perimeter (ft) :	27.29	80	0
Velocity (ft/sec) :	1.97	5.57	0
Computed Flow Time (min) :	3.11	1.26	0
Total TOC (min)	40.76		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.59
Peak Runoff (cfs)	8.14
Weighted Curve Number	85
Time of Concentration (days hh:mm:ss)	0 00:40:46

Subbasin : F

Input Data

Area (ac)	4.42
Peak Rate Factor	484
Weighted Curve Number	46
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4.42	-	46
Composite Area & Weighted CN		4.42		46

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	13	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.17	0	0
Computed Flow Time (min) :	14.51	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	280	0	0
Channel Slope (%) :	2.7	0	0
Cross Section Area (ft²) :	42	0	0
Wetted Perimeter (ft) :	56	0	0
Velocity (ft/sec) :	6.74	0	0
Computed Flow Time (min) :	0.69	0	0
Total TOC (min)	15.20		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.03
Peak Runoff (cfs)	0.02
Weighted Curve Number	46
Time of Concentration (days hh:mm:ss)	0 00:15:12

Subbasin : G

Input Data

Area (ac)	12.84
Peak Rate Factor	484
Weighted Curve Number	51
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		12.84	-	51
Composite Area & Weighted CN		12.84		51

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	3.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	23.98	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	388	0	0
Slope (%) :	3.2	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.89	0	0
Computed Flow Time (min) :	2.24	0	0
Total TOC (min)	26.22		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.11
Peak Runoff (cfs)	0.2
Weighted Curve Number	51
Time of Concentration (days hh:mm:ss)	0 00:26:13

Storage Node : N.Basin1

Input Data

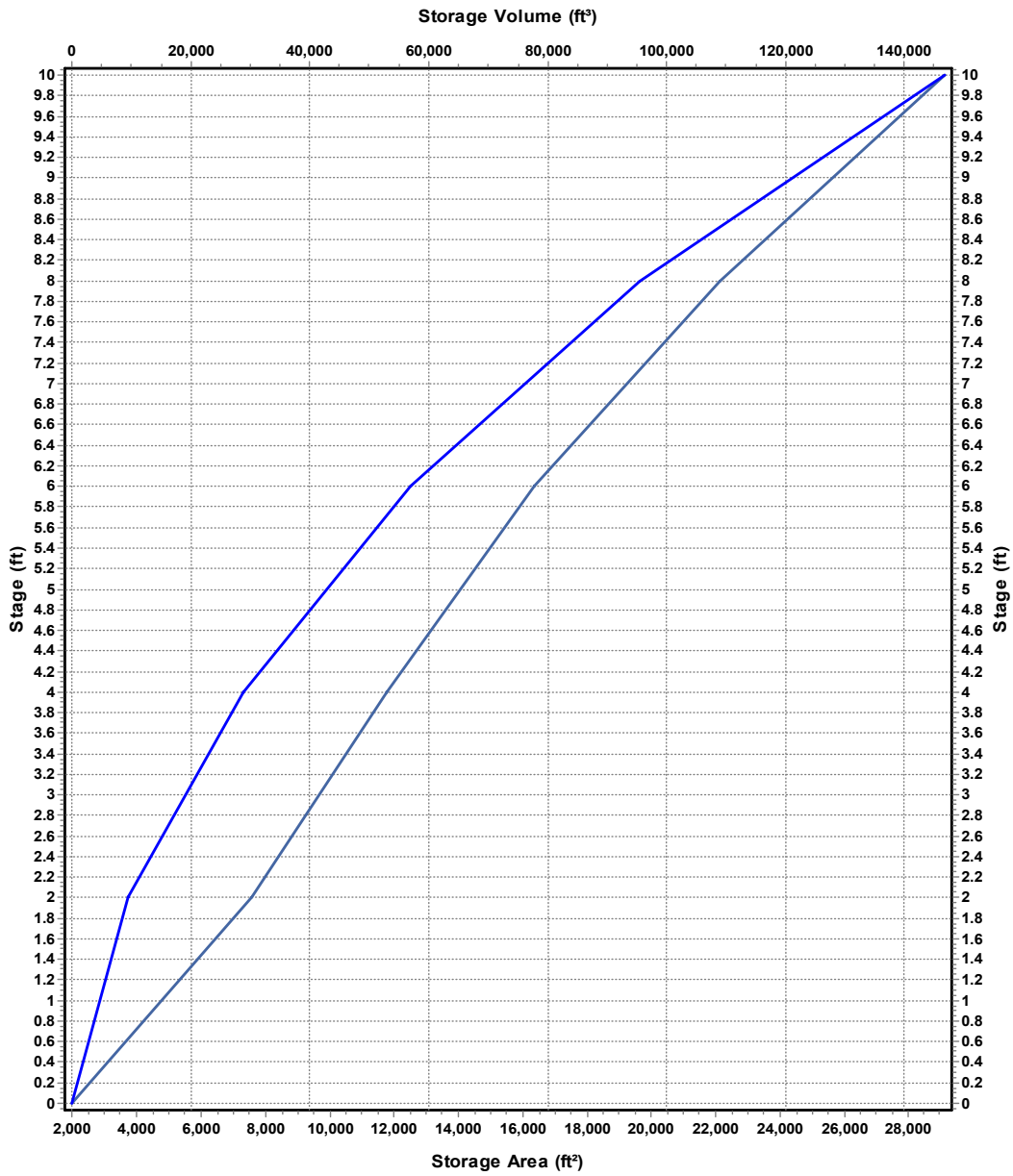
Invert Elevation (ft)	689.00
Max (Rim) Elevation (ft)	699.50
Max (Rim) Offset (ft)	10.50
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-689.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-18

Stage	Storage Area	Storage Volume
(ft)	(ft²)	(ft³)
0	1981	0
2	7562	9543
4	11766	28871
6	16377	57014
8	22122	95513
10	29115	146750

Storage Area Volume Curves



Storage Area Storage Volume

Storage Node : N.Basin1 (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	EmergencySpillwayA	Bottom	Rectangular	No		47.80	47.80	697.79	0.63
2	PrimarySpillway	Bottom	Rectangular	No		30.00	18.00	695.82	0.63
3	Underdrain	Side	CIRCULAR	No	3.00			684.28	0.61

Output Summary Results

Peak Inflow (cfs)	14.61
Peak Lateral Inflow (cfs)	3.91
Peak Outflow (cfs)	0.55
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	694.2
Max HGL Depth Attained (ft)	5.2
Average HGL Elevation Attained (ft)	691.11
Average HGL Depth Attained (ft)	2.11
Time of Max HGL Occurrence (days hh:mm)	0 22:10
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Project Description

File Name Post-Development.SPF
Description
22081 Northside Development

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On 00:00:00 0:00:00
End Analysis On 00:00:00 0:00:00
Start Reporting On 00:00:00 0:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-02	Cumulative	inches	Virginia	Frederick	2.00	3.00	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Peak Rate Factor	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)			(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	A2	6.88	484.00	72.00	3.00	0.81	5.56	4.89	0 00:25:19
2	A3	7.03	484.00	73.00	3.00	0.86	6.02	9.02	0 00:05:00
3	A4	33.40	484.00	86.00	3.00	1.66	55.51	84.08	0 00:06:35
4	A5	0.22	484.00	89.00	3.00	1.90	0.42	0.51	0 00:14:38
5	A6	5.99	484.00	70.00	3.00	0.71	4.28	4.09	0 00:20:40
6	B	21.60	484.00	63.00	3.00	0.43	9.35	5.33	0 00:31:18
7	C1	15.73	484.00	60.00	3.00	0.33	5.24	3.17	0 00:21:29
8	C2	5.46	484.00	81.00	3.00	1.31	7.17	11.09	0 00:05:43
9	C3	3.51	0.00	80.00	3.00	1.25	4.39	4.28	0 00:24:28
10	C4	5.48	0.00	81.00	3.00	1.31	7.20	6.98	0 00:24:58
11	C5	3.62	484.00	75.00	3.00	0.96	3.48	3.46	0 00:22:01
12	C6	5.05	484.00	81.00	3.00	1.31	6.63	9.89	0 00:06:54
13	D1	13.01	484.00	67.00	3.00	0.59	7.61	5.66	0 00:26:59
14	D10	63.53	484.00	77.00	3.00	1.07	68.04	29.62	0 01:16:21
15	D11	4.65	484.00	86.00	3.00	1.66	7.73	10.66	0 00:10:13
16	D12	17.87	484.00	88.00	3.00	1.82	32.49	40.49	0 00:14:38
17	D13	4.88	484.00	81.00	3.00	1.31	6.41	5.56	0 00:30:02
18	D14	2.92	484.00	82.00	3.00	1.38	4.03	5.46	0 00:11:01
19	D15	0.77	484.00	87.00	3.00	1.74	1.34	1.65	0 00:15:10
20	D16	1.65	484.00	87.00	3.00	1.74	2.87	4.53	0 00:05:09
21	D17	0.26	484.00	84.00	3.00	1.52	0.39	0.63	0 00:05:00
22	D18	0.26	484.00	89.00	3.00	1.90	0.49	0.79	0 00:05:00
23	D19	1.37	484.00	89.00	3.00	1.90	2.60	4.10	0 00:05:00
24	D2	7.57	484.00	54.00	3.00	0.17	1.29	0.34	0 00:22:51
25	D20	2.11	0.00	94.00	3.00	2.35	4.96	7.30	0 00:06:03
26	D21	4.54	0.00	95.00	3.00	2.45	11.12	15.85	0 00:06:41
27	D3	4.00	484.00	68.00	3.00	0.63	2.51	2.07	0 00:24:07
28	D4	8.85	484.00	59.00	3.00	0.30	2.68	1.50	0 00:21:18
29	D5	7.83	484.00	67.00	3.00	0.59	4.58	3.15	0 00:30:15
30	D6	6.77	484.00	77.00	3.00	1.07	7.25	6.93	0 00:24:27
31	D8	2.49	484.00	80.00	3.00	1.25	3.11	3.31	0 00:21:00
32	D9	7.10	484.00	85.00	3.00	1.59	11.27	8.14	0 00:40:45
33	F1	2.60	484.00	48.00	3.00	0.06	0.15	0.02	0 00:15:12
34	G1	3.00	484.00	47.00	3.00	0.05	0.14	0.01	0 00:05:00

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)		(ft)	(days hh:mm)	(ac-in)	(min)
1	Basin2-Out	Junction	689.58	695.31	0.00	696.00	0.00	1.14	690.69	0.00	4.62	0 00:00	0.00	0.00
2	E103	Junction	714.91	718.00	0.00	0.00	0.00	4.88	715.44	0.00	2.56	0 00:00	0.00	0.00
3	E104	Junction	711.07	715.32	711.07	0.00	0.00	11.12	712.08	0.00	3.24	0 00:00	0.00	0.00
4	E105	Junction	705.99	719.42	705.99	0.00	0.00	11.05	706.90	0.00	12.52	0 00:00	0.00	0.00
5	E106	Junction	718.73	719.98	718.73	719.98	0.00	9.31	719.35	0.00	0.63	0 00:00	0.00	0.00
6	E106A	Junction	684.18	696.94	0.00	0.00	0.00	0.62	684.39	0.00	12.55	0 00:00	0.00	0.00
7	E107	Junction	684.00	699.34	0.00	0.00	0.00	0.62	684.29	0.00	15.05	0 00:00	0.00	0.00
8	E108	Junction	715.39	717.39	715.39	718.00	0.00	11.90	716.84	0.00	0.55	0 00:00	0.00	0.00
9	E109	Junction	714.79	716.00	0.00	0.00	0.00	18.81	716.24	0.00	0.55	0 00:00	0.00	0.00
10	E111	Junction	713.55	718.64	0.00	0.00	0.00	1.37	714.69	0.00	3.95	0 00:00	0.00	0.00
11	E112	Junction	707.58	718.62	707.58	0.00	0.00	1.15	707.89	0.00	10.73	0 00:00	0.00	0.00
12	E116	Junction	709.52	714.00	0.00	0.00	0.00	18.59	711.26	0.00	2.74	0 00:00	0.00	0.00
13	E117	Junction	709.12	713.00	0.00	0.00	0.00	18.27	710.84	0.00	2.16	0 00:00	0.00	0.00
14	E124	Junction	698.61	708.27	698.61	0.00	0.00	19.00	708.27	0.00	0.00	0 12:21	0.78	22.00
15	E125	Junction	692.68	708.84	0.00	0.00	0.00	16.36	708.84	0.00	0.00	0 12:12	1.70	34.00
16	E127	Junction	699.46	704.00	699.46	0.00	0.00	5.51	699.91	0.00	4.09	0 00:00	0.00	0.00
17	E128	Junction	698.50	703.00	698.50	0.00	0.00	36.50	700.79	0.00	2.21	0 00:00	0.00	0.00
18	E142	Junction	691.58	694.00	691.58	0.00	0.00	36.43	692.91	0.00	1.68	0 00:00	0.00	0.00
19	E145-A	Junction	669.37	686.19	0.00	0.00	0.00	128.83	686.19	0.00	0.00	0 12:16	1.54	11.00
20	E159	Junction	680.38	695.00	680.38	6.00	0.00	1.92	690.12	0.00	4.88	0 00:00	0.00	0.00
21	E162	Junction	681.02	690.00	681.02	6.00	0.00	2.07	681.40	0.00	8.60	0 00:00	0.00	0.00
22	E167	Junction	702.90	715.49	0.00	0.00	0.00	11.50	703.83	0.00	11.66	0 00:00	0.00	0.00
23	E169	Junction	698.68	710.00	698.68	0.00	0.00	11.44	699.39	0.00	10.61	0 00:00	0.00	0.00
24	E504	Junction	709.62	714.60	709.62	0.00	12.56	14.51	710.96	0.00	3.64	0 00:00	0.00	0.00
25	Ex_D13	Junction	665.88	675.00	0.00	0.00	0.00	4.41	666.43	0.00	14.45	0 00:00	0.00	0.00
26	JunctionD5	Junction	690.40	695.70	0.00	695.70	0.00	1.77	690.78	0.00	4.92	0 00:00	0.00	0.00
27	Out-A	Outfall	682.47					0.62	682.65					
28	Out-B	Outfall	704.89					6.00	705.18					
29	Out-C	Outfall	690.41					14.98	691.91					
30	Out-D	Outfall	665.41					4.41	665.96					
31	Out-F	Outfall	0.00					0.02	0.00					
32	Out-G	Outfall	0.00					0.01	0.00					
33	Chan-E140-E145	Storage Node	673.58	687.00	673.58		0.00	101.08	676.50				0.00	0.00
34	E110	Storage Node	715.20	718.00	715.20		10000.00	4.23	715.63				0.00	0.00
35	E122-E129	Storage Node	699.00	705.00	699.00		0.00	33.29	701.29				0.00	0.00
36	E123	Storage Node	701.75	704.49	701.75		2059.00	20.04	703.07				0.00	0.00
37	E137	Storage Node	692.09	698.00	692.09		1272.00	87.51	694.29				0.00	0.00
38	E143	Storage Node	688.99	696.00	688.99		0.00	44.23	690.57				0.00	0.00
39	exDA-K-Channel	Storage Node	704.25	708.50	704.25		0.00	26.68	705.92				0.00	0.00
40	InfieldApronIsland	Storage Node	713.50	714.80	713.50		100.00	15.54	714.07				0.00	0.00
41	N.Basin1	Storage Node	687.00	699.50	0.00		0.00	91.08	693.76				0.00	0.00
42	SouthAirportBasin	Storage Node	666.57	682.00	0.00		0.00	111.31	673.98				0.00	0.00
43	SouthGA-Basin1	Storage Node	690.40	696.00	0.00		44584.84	8.05	692.76				0.00	0.00
44	SouthGA-Basin2	Storage Node	690.50	695.70	0.00		22000.00	3.15	691.81				0.00	0.00

Subbasin Hydrology

Subbasin : A2

Input Data

Area (ac)	6.88
Peak Rate Factor	484
Weighted Curve Number	72
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	6.88	-	72
Composite Area & Weighted CN	6.88		72

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

- Tc = Time of Concentration (hr)
- n = Manning's roughness
- Lf = Flow Length (ft)
- P = 2 yr, 24 hr Rainfall (inches)
- Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

- V = 16.1345 * (Sf^0.5) (unpaved surface)
- V = 20.3282 * (Sf^0.5) (paved surface)
- V = 15.0 * (Sf^0.5) (grassed waterway surface)
- V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
- V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
- V = 7.0 * (Sf^0.5) (short grass pasture surface)
- V = 5.0 * (Sf^0.5) (woodland surface)
- V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
- Tc = (Lf / V) / (3600 sec/hr)

Where:

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n

R = Aq / Wp

Tc = (Lf / V) / (3600 sec/hr)

Where :

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- R = Hydraulic Radius (ft)
- Aq = Flow Area (ft²)
- Wp = Wetted Perimeter (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)
- n = Manning's roughness

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	411	0
Slope (%) :	2.1	2.2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	2.39	0
Computed Flow Time (min) :	0.71	2.87	0
Total TOC (min) 25.33			

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.81
Peak Runoff (cfs)	4.89
Weighted Curve Number	72
Time of Concentration (days hh:mm:ss)	0 00:25:20

Subbasin : A3

Input Data

Area (ac)	7.03
Peak Rate Factor	484
Weighted Curve Number	73
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	7.03	-	73
Composite Area & Weighted CN	7.03		73

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.93	0	0
Computed Flow Time (min) :	1.8	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	110	54.19	0
Slope (%) :	3.3	1.7	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.93	2.65	0
Computed Flow Time (min) :	0.63	0.34	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	452.63	0	0
Channel Slope (%) :	0.8	0	0
Cross Section Area (ft²) :	43.83	0	0
Wetted Perimeter (ft) :	61.35	0	0
Velocity (ft/sec) :	3.55	0	0
Computed Flow Time (min) :	2.12	0	0
Total TOC (min)	4.89		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.86
Peak Runoff (cfs)	9.02
Weighted Curve Number	73
Time of Concentration (days hh:mm:ss)	0 00:04:53

Subbasin : A4

Input Data

Area (ac)	33.4
Peak Rate Factor	484
Weighted Curve Number	86
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	33.4	-	86
Composite Area & Weighted CN	33.4		86

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.01	0	0
Flow Length (ft) :	71	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	1.58	0	0
Computed Flow Time (min) :	0.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	3318	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	7.07	0	0
Wetted Perimeter (ft) :	9.42	0	0
Velocity (ft/sec) :	9.47	0	0
Computed Flow Time (min) :	5.84	0	0
Total TOC (min)	6.59		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.66
Peak Runoff (cfs)	84.08
Weighted Curve Number	86
Time of Concentration (days hh:mm:ss)	0 00:06:35

Subbasin : A5

Input Data

Area (ac)	0.22
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.22	-	89
Composite Area & Weighted CN	0.22		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	72	47	0
Slope (%) :	3.4	2.2	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.09	0.93	0
Computed Flow Time (min) :	13.79	0.84	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.9
Peak Runoff (cfs)	0.51
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : A6

Input Data

Area (ac)	5.99
Peak Rate Factor	484
Weighted Curve Number	70
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.99	-	70
Composite Area & Weighted CN	5.99		70

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.8	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	19.39	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	220	70	0
Slope (%) :	4	23.3	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	7.79	0
Computed Flow Time (min) :	1.14	0.15	0
Total TOC (min)	20.67		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.71
Peak Runoff (cfs)	4.09
Weighted Curve Number	70
Time of Concentration (days hh:mm:ss)	0 00:20:40

Subbasin : B

Input Data

Area (ac)	21.6
Peak Rate Factor	484
Weighted Curve Number	63
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	20.67	-	63
Composite Area & Weighted CN	20.67		63

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	1.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	26.01	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	2.69	0	0
Slope (%) :	2	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0	0
Computed Flow Time (min) :	0.02	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.03
Flow Length (ft) :	858	505	518
Channel Slope (%) :	1	3.3	2.6
Cross Section Area (ft²) :	42	7.07	42
Wetted Perimeter (ft) :	56	9.42	56
Velocity (ft/sec) :	4.1	17.2	6.61
Computed Flow Time (min) :	3.49	0.49	1.31
Total TOC (min)	31.31		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.43
Peak Runoff (cfs)	5.33
Weighted Curve Number	63
Time of Concentration (days hh:mm:ss)	0 00:31:19

Subbasin : C1

Input Data

Area (ac)	15.73
Peak Rate Factor	484
Weighted Curve Number	60
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	15.72	-	60
Composite Area & Weighted CN	15.72		60

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	65.55	54.45	0
Slope (%) :	1.5	0.7	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.06	0.6	0
Computed Flow Time (min) :	17.75	1.5	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	251	0	0
Slope (%) :	2.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.65	0	0
Computed Flow Time (min) :	1.58	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	613.56	0	0
Channel Slope (%) :	4.2	0	0
Cross Section Area (ft²) :	74.65	0	0
Wetted Perimeter (ft) :	39.92	0	0
Velocity (ft/sec) :	15.45	0	0
Computed Flow Time (min) :	0.66	0	0
Total TOC (min)	21.49		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.33
Peak Runoff (cfs)	3.17
Weighted Curve Number	60
Time of Concentration (days hh:mm:ss)	0 00:21:29

Subbasin : C2

Input Data

Area (ac)	5.46
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.46	-	81
Composite Area & Weighted CN	5.46		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	126	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.97	0	0
Computed Flow Time (min) :	2.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	49	105	0
Slope (%) :	3.3	2.4	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.93	2.5	0
Computed Flow Time (min) :	0.28	0.7	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	543.81	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	23.19	0	0
Wetted Perimeter (ft) :	35.98	0	0
Velocity (ft/sec) :	3.52	0	0
Computed Flow Time (min) :	2.58	0	0
Total TOC (min)	5.72		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.31
Peak Runoff (cfs)	11.09
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:05:43

Subbasin : C3

Input Data

Area (ac)	3.51
Peak Rate Factor	0
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.51	-	80
Composite Area & Weighted CN	3.51		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	40	60	0
Slope (%) :	1.4	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.15	0.06	0
Computed Flow Time (min) :	4.38	17	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	172	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	363.59	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	1.87	0	0
Total TOC (min)	24.47		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.25
Peak Runoff (cfs)	4.28
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : C4

Input Data

Area (ac)	5.48
Peak Rate Factor	0
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.48	-	81
Composite Area & Weighted CN	5.48		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	67.8	32.2	0
Slope (%) :	0.5	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.11	0.05	0
Computed Flow Time (min) :	10.07	10.33	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174.24	0	0
Slope (%) :	1.4	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.91	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	592.19	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	3.05	0	0
Total TOC (min)	24.97		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.31
Peak Runoff (cfs)	6.98
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:24:58

Subbasin : C5

Input Data

Area (ac)	3.62
Peak Rate Factor	484
Weighted Curve Number	75
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.62	-	75
Composite Area & Weighted CN	3.62		75

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	20.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	93	100	0
Slope (%) :	5.5	2.5	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	2.55	0
Computed Flow Time (min) :	0.41	0.65	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	170	0	0
Channel Slope (%) :	1.2	0	0
Cross Section Area (ft²) :	22.39	0	0
Wetted Perimeter (ft) :	33.33	0	0
Velocity (ft/sec) :	4.17	0	0
Computed Flow Time (min) :	0.68	0	0
Total TOC (min)	22.03		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.96
Peak Runoff (cfs)	3.46
Weighted Curve Number	75
Time of Concentration (days hh:mm:ss)	0 00:22:02

Subbasin : C6

Input Data

Area (ac)	5.05
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.44	-	81
Composite Area & Weighted CN	3.44		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.85	0	0
Computed Flow Time (min) :	1.97	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	262	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.03
Flow Length (ft) :	118	88.82	277.62
Channel Slope (%) :	0.4	2	1.5
Cross Section Area (ft²) :	22.39	0.79	11.07
Wetted Perimeter (ft) :	33.33	3.14	61
Velocity (ft/sec) :	2.41	6.46	1.95
Computed Flow Time (min) :	0.82	0.23	2.37
Total TOC (min)	6.91		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.31
Peak Runoff (cfs)	9.89
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:06:55

Subbasin : D1

Input Data

Area (ac)	13.01
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	13.01	-	67
Composite Area & Weighted CN	13.01		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.35	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	641	0
Slope (%) :	2.2	1.9	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.39	2.22	0
Computed Flow Time (min) :	0.7	4.81	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.01	0	0
Flow Length (ft) :	187	0	0
Channel Slope (%) :	1.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	23.91	0	0
Computed Flow Time (min) :	0.13	0	0
Total TOC (min)	26.99		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.59
Peak Runoff (cfs)	5.66
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:26:59

Subbasin : D10

Input Data

Area (ac)	63.53
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	63.53	-	77
Composite Area & Weighted CN	63.53		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	62	40	0
Slope (%) :	0.9	1.8	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.69	0.06	0
Computed Flow Time (min) :	1.51	11.11	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	180	154	0
Slope (%) :	1.5	0.8	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.98	1.44	0
Computed Flow Time (min) :	1.52	1.78	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0.03	0
Flow Length (ft) :	2181	646	0
Channel Slope (%) :	0.3	0.8	0
Cross Section Area (ft²) :	47.3	34	0
Wetted Perimeter (ft) :	94.68	68	0
Velocity (ft/sec) :	0.64	2.8	0
Computed Flow Time (min) :	56.6	3.85	0
Total TOC (min)	76.36		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.07
Peak Runoff (cfs)	29.62
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 01:16:22

Subbasin : D11

Input Data

Area (ac)	4.65
Peak Rate Factor	484
Weighted Curve Number	86
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.65	-	86
Composite Area & Weighted CN	4.65		86

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	99.23	0	0
Slope (%) :	2.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.24	0	0
Computed Flow Time (min) :	6.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	347.24	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	2.02	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	368	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.77	0	0
Wetted Perimeter (ft) :	4.71	0	0
Velocity (ft/sec) :	4.22	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	10.23		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.66
Peak Runoff (cfs)	10.66
Weighted Curve Number	86
Time of Concentration (days hh:mm:ss)	0 00:10:14

Subbasin : D12

Input Data

Area (ac)	17.87
Peak Rate Factor	484
Weighted Curve Number	88
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	17.87	-	88
Composite Area & Weighted CN	17.87		88

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	46.73	0	0
Slope (%) :	3.4	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	159.79	0	0
Slope (%) :	5.5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	0	0
Computed Flow Time (min) :	0.7	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0.013	0
Flow Length (ft) :	390	556	0
Channel Slope (%) :	0.5	0.5	0
Cross Section Area (ft²) :	4.9	13.59	0
Wetted Perimeter (ft) :	7.9	60	0
Velocity (ft/sec) :	5.89	3.01	0
Computed Flow Time (min) :	1.1	3.08	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.82
Peak Runoff (cfs)	40.49
Weighted Curve Number	88
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : D13

Input Data

Area (ac)	4.88
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.88	-	81
Composite Area & Weighted CN	4.88		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	65	40	0
Slope (%) :	2.6	0.3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	1.06	0.03	0
Computed Flow Time (min) :	1.02	22.76	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.24	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	497	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	5.02	0	0
Total TOC (min)	30.04		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.31
Peak Runoff (cfs)	5.56
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:30:02

Subbasin : D14

Input Data

Area (ac)	2.92
Peak Rate Factor	484
Weighted Curve Number	82
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	2.92	-	82
Composite Area & Weighted CN	2.92		82

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	20	89.49	0
Slope (%) :	1.3	0.9	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.05	0.74	0
Computed Flow Time (min) :	7.27	2.02	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	70	0	0
Slope (%) :	6.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.18	0	0
Computed Flow Time (min) :	0.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	409	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	20	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	4.71	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	11.02		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.38
Peak Runoff (cfs)	5.46
Weighted Curve Number	82
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : D15

Input Data

Area (ac)	0.77
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.77	-	87
Composite Area & Weighted CN		0.77		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	160	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.18	0	0
Computed Flow Time (min) :	15.17	0	0
Total TOC (min)	15.17		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.74
Peak Runoff (cfs)	1.65
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:15:10

Subbasin : D16

Input Data

Area (ac)	1.65
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.65	-	87
Composite Area & Weighted CN		1.65		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	113	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.33	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	150	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	300	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.6	0	0
Total TOC (min)	5.16		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.74
Peak Runoff (cfs)	4.53
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:05:10

Subbasin : D17

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	84
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	84
Composite Area & Weighted CN		0.26		84

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.52
Peak Runoff (cfs)	0.63
Weighted Curve Number	84
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D18

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	89
Composite Area & Weighted CN		0.26		89

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.9
Peak Runoff (cfs)	0.79
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D19

Input Data

Area (ac)	1.37
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.37	-	89
Composite Area & Weighted CN		1.37		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	118	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.42	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	88	38	0
Slope (%) :	2.7	0.6	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.65	1.57	0
Computed Flow Time (min) :	0.55	0.4	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	227	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.21	0	0
Total TOC (min)	4.58		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.9
Peak Runoff (cfs)	4.1
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:04:35

Subbasin : D2

Input Data

Area (ac)	7.57
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.57	-	54
Composite Area & Weighted CN		7.57		54

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	17.62	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	314	100	0
Slope (%) :	8	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.56	2.28	0
Computed Flow Time (min) :	1.15	0.73	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0	0
Flow Length (ft) :	348	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	1.73	0	0
Computed Flow Time (min) :	3.36	0	0
Total TOC (min)	22.86		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.17
Peak Runoff (cfs)	0.34
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:22:52

Subbasin : D20

Input Data

Area (ac)	2.11
Peak Rate Factor	0
Weighted Curve Number	94
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.11	-	94
Composite Area & Weighted CN		2.11		94

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	480	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	3.94	0	0
Total TOC (min)	6.06		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	2.35
Peak Runoff (cfs)	7.3
Weighted Curve Number	94
Time of Concentration (days hh:mm:ss)	0 00:06:04

Subbasin : D21

Input Data

Area (ac)	4.54
Peak Rate Factor	0
Weighted Curve Number	95
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4.54	-	95
Composite Area & Weighted CN		4.54		95

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	481.91	0	0
Slope (%) :	0.9	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	1.93	0	0
Computed Flow Time (min) :	4.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	123.45	0	0
Channel Slope (%) :	2.5	0	0
Cross Section Area (ft²) :	4	0	0
Wetted Perimeter (ft) :	8	0	0
Velocity (ft/sec) :	4.95	0	0
Computed Flow Time (min) :	0.42	0	0
Total TOC (min)	6.69		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	2.45
Peak Runoff (cfs)	15.85
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:41

Subbasin : D3

Input Data

Area (ac)	4
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4	-	68
Composite Area & Weighted CN		4		68

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0	0.4	0
Flow Length (ft) :	0	100	0
Slope (%) :	0	2	0
2 yr, 24 hr Rainfall (in) :	0	3	0
Velocity (ft/sec) :	0	0.08	0
Computed Flow Time (min) :	0	22.18	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	234	100	0
Slope (%) :	4	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	2.28	0
Computed Flow Time (min) :	1.21	0.73	0
Total TOC (min)	24.12		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.63
Peak Runoff (cfs)	2.07
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:24:07

Subbasin : D4

Input Data

Area (ac)	8.85
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		8.85	-	59
Composite Area & Weighted CN		8.85		59

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	45.52	50	0
Slope (%) :	1.6	3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.81	0.08	0
Computed Flow Time (min) :	0.93	10.83	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	233	0	0
Slope (%) :	1.6	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.04	0	0
Computed Flow Time (min) :	1.9	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0.03
Flow Length (ft) :	842.11	285	208.66
Channel Slope (%) :	1	0.7	0.7
Cross Section Area (ft²) :	10	17.21	17.74
Wetted Perimeter (ft) :	20	34.65	35.7
Velocity (ft/sec) :	3.13	2.61	2.61
Computed Flow Time (min) :	4.49	1.82	1.33
Total TOC (min)	21.31		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.3
Peak Runoff (cfs)	1.5
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:21:19

Subbasin : D5

Input Data

Area (ac)	7.83
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.83	-	67
Composite Area & Weighted CN		7.83		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	101	0	0
Slope (%) :	1.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	22.82	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0
Flow Length (ft) :	310	988	0
Channel Slope (%) :	0.5	2	0
Cross Section Area (ft²) :	1.5	4	0
Wetted Perimeter (ft) :	6	8	0
Velocity (ft/sec) :	1.39	4.42	0
Computed Flow Time (min) :	3.71	3.72	0
Total TOC (min)	30.25		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.59
Peak Runoff (cfs)	3.15
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:30:15

Subbasin : D6

Input Data

Area (ac)	6.77
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		6.77	-	77
Composite Area & Weighted CN		6.77		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	379	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	2.26	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	330	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	3.34	0	0
Total TOC (min)	24.46		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.07
Peak Runoff (cfs)	6.93
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : D8

Input Data

Area (ac)	2.49
Peak Rate Factor	484
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.49	-	80
Composite Area & Weighted CN		2.49		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	120	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	0.72	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	240	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.5	0	0
Wetted Perimeter (ft) :	6	0	0
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.44	0	0
Total TOC (min)	21.01		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.25
Peak Runoff (cfs)	3.31
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:21:01

Subbasin : D9

Input Data

Area (ac)	7.1
Peak Rate Factor	484
Weighted Curve Number	85
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.1	-	85
Composite Area & Weighted CN		7.1		85

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	0.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	33.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	336.83	0	0
Slope (%) :	1.1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.13	0	0
Computed Flow Time (min) :	2.64	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0
Flow Length (ft) :	367.85	422.11	0
Channel Slope (%) :	1	1.5	0
Cross Section Area (ft²) :	6.81	20	0
Wetted Perimeter (ft) :	27.29	80	0
Velocity (ft/sec) :	1.97	5.57	0
Computed Flow Time (min) :	3.11	1.26	0
Total TOC (min)	40.76		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	1.59
Peak Runoff (cfs)	8.14
Weighted Curve Number	85
Time of Concentration (days hh:mm:ss)	0 00:40:46

Subbasin : F1

Input Data

Area (ac)	2.6
Peak Rate Factor	484
Weighted Curve Number	48
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.6	-	48
Composite Area & Weighted CN		2.6		48

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	13	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.17	0	0
Computed Flow Time (min) :	14.51	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	280	0	0
Channel Slope (%) :	2.7	0	0
Cross Section Area (ft²) :	42	0	0
Wetted Perimeter (ft) :	56	0	0
Velocity (ft/sec) :	6.74	0	0
Computed Flow Time (min) :	0.69	0	0
Total TOC (min)	15.20		

Subbasin Runoff Results

Total Rainfall (in)	3
Total Runoff (in)	0.06
Peak Runoff (cfs)	0.02
Weighted Curve Number	48
Time of Concentration (days hh:mm:ss)	0 00:15:12

Storage Node : N.Basin1

Input Data

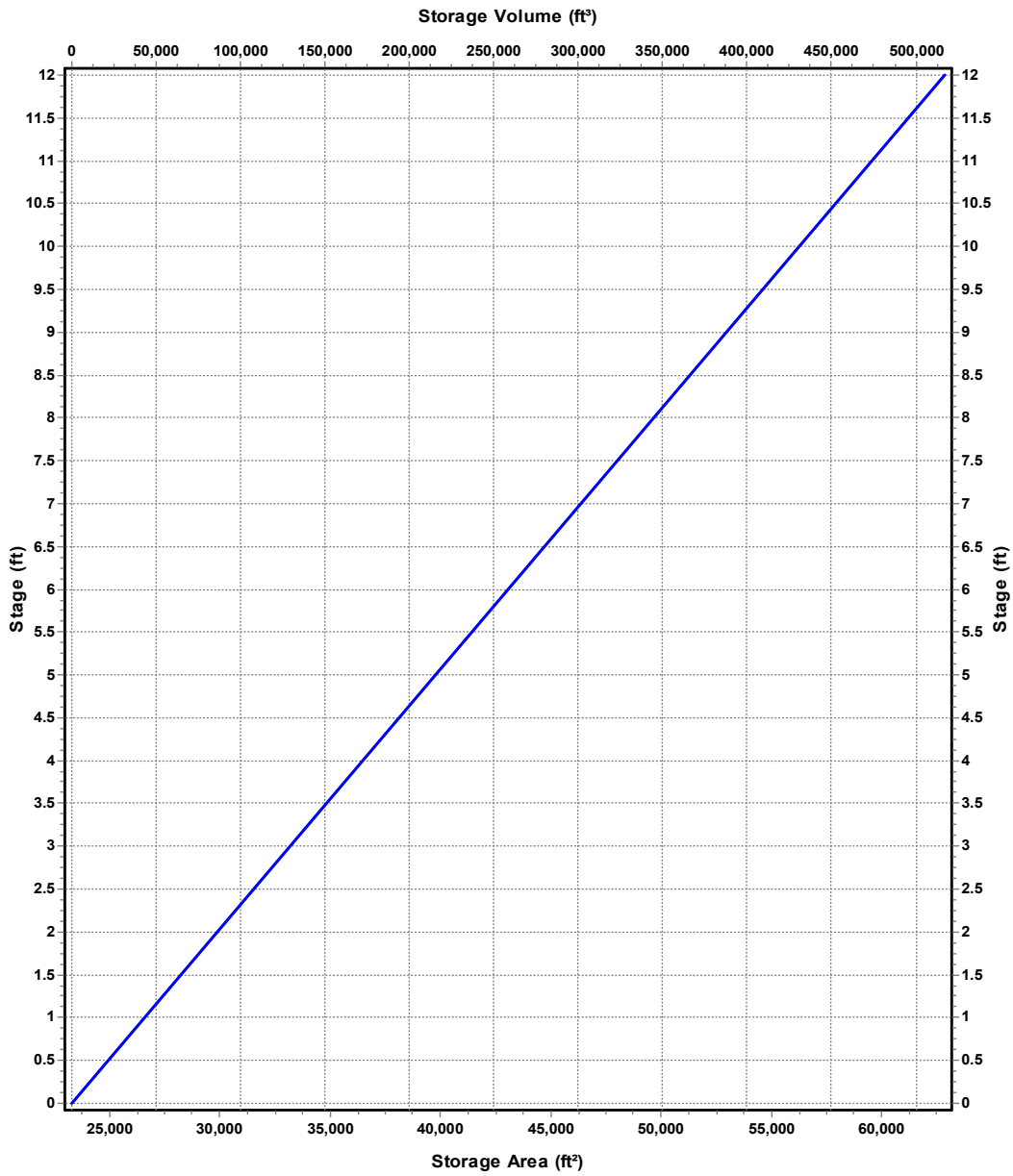
Invert Elevation (ft)	687.00
Max (Rim) Elevation (ft)	699.50
Max (Rim) Offset (ft)	12.50
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-687.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-18

Stage	Storage Area	Storage Volume
(ft)	(ft²)	(ft³)
0	23305	0
12	62866.42	517028.52

Storage Area Volume Curves



Storage Area Storage Volume

Storage Node : N.Basin1 (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	EmergencySpillwayA	Bottom	Rectangular	No		47.80	47.80	697.79	0.63
2	PrimarySpillway	Bottom	Rectangular	No		30.00	18.00	695.82	0.63
3	Underdrain	Side	CIRCULAR	No	3.00			684.28	0.61

Output Summary Results

Peak Inflow (cfs)	91.08
Peak Lateral Inflow (cfs)	82.32
Peak Outflow (cfs)	0.62
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	693.76
Max HGL Depth Attained (ft)	6.76
Average HGL Elevation Attained (ft)	691.75
Average HGL Depth Attained (ft)	4.75
Time of Max HGL Occurrence (days hh:mm)	1 00:12
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Project Description

File Name Pre-Development.SPF
Description
22081 Northside Development

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On 00:00:00 0:00:00
End Analysis On 00:00:00 0:00:00
Start Reporting On 00:00:00 0:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-10	Cumulative	inches	Virginia	Frederick	10.00	4.90	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Peak Rate	Weighted	Total	Total	Total	Peak	Time of
			Factor	Curve	Rainfall	Runoff	Runoff	Runoff	Concentration
		(ac)		Number	(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	A2	6.88	484.00	72.00	4.90	2.12	14.59	14.01	0 00:25:19
2	A3	7.03	484.00	73.00	4.90	2.20	15.48	24.52	0 00:05:00
3	A4	11.62	484.00	56.00	4.90	0.99	11.50	8.88	0 00:26:18
4	A5	0.22	484.00	89.00	4.90	3.68	0.81	0.97	0 00:14:38
5	A6	5.99	484.00	70.00	4.90	1.96	11.75	12.54	0 00:20:40
6	B	31.82	484.00	59.00	4.90	1.18	37.48	28.89	0 00:29:17
7	C1	15.73	484.00	60.00	4.90	1.24	19.55	18.65	0 00:21:29
8	C2	5.46	484.00	81.00	4.90	2.90	15.82	24.52	0 00:05:43
9	C3	3.51	0.00	80.00	4.90	2.81	9.85	9.77	0 00:24:28
10	C4	5.48	0.00	81.00	4.90	2.90	15.88	15.56	0 00:24:58
11	C5	3.62	484.00	75.00	4.90	2.37	8.57	8.99	0 00:22:01
12	C6	5.05	484.00	81.00	4.90	2.90	14.63	21.90	0 00:06:54
13	D1	13.01	484.00	67.00	4.90	1.73	22.56	20.30	0 00:26:59
14	D10	63.53	484.00	77.00	4.90	2.54	161.37	74.50	0 01:16:21
15	D11	4.65	484.00	86.00	4.90	3.37	15.69	21.24	0 00:10:13
16	D12	17.87	484.00	88.00	4.90	3.57	63.87	77.85	0 00:14:38
17	D13	4.88	484.00	81.00	4.90	2.90	14.14	12.50	0 00:30:02
18	D14	2.92	484.00	82.00	4.90	2.99	8.73	11.76	0 00:11:01
19	D15	0.77	484.00	87.00	4.90	3.47	2.67	3.23	0 00:15:10
20	D16	1.65	484.00	87.00	4.90	3.47	5.73	8.86	0 00:05:09
21	D17	0.26	484.00	84.00	4.90	3.18	0.83	1.31	0 00:05:00
22	D18	0.26	484.00	89.00	4.90	3.68	0.96	1.48	0 00:05:00
23	D19	1.37	484.00	89.00	4.90	3.68	5.04	7.72	0 00:05:00
24	D2	7.57	484.00	54.00	4.90	0.87	6.60	5.26	0 00:22:51
25	D20	2.11	0.00	94.00	4.90	4.21	8.88	12.65	0 00:06:03
26	D21	4.54	0.00	95.00	4.90	4.32	19.61	27.08	0 00:06:41
27	D3	4.00	484.00	68.00	4.90	1.81	7.24	7.01	0 00:24:07
28	D4	8.85	484.00	59.00	4.90	1.18	10.43	9.83	0 00:21:18
29	D5	7.83	484.00	67.00	4.90	1.73	13.58	11.37	0 00:30:15
30	D6	6.77	484.00	77.00	4.90	2.54	17.20	17.08	0 00:24:27
31	D8	2.49	484.00	80.00	4.90	2.81	6.99	7.51	0 00:21:00
32	D9	7.10	484.00	85.00	4.90	3.28	23.26	16.87	0 00:40:45
33	F	4.42	484.00	46.00	4.90	0.46	2.02	1.29	0 00:15:12
34	G	12.84	484.00	51.00	4.90	0.71	9.05	5.82	0 00:26:13

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)		(ft)	(days hh:mm)	(ac-in)	(min)
1	Basin2-Out	Junction	689.58	695.31	0.00	696.00	0.00	2.61	690.84	0.00	4.47	0 00:00	0.00	0.00
2	E103	Junction	714.91	718.00	0.00	0.00	0.00	13.94	715.84	0.00	2.16	0 00:00	0.00	0.00
3	E104	Junction	711.07	715.32	711.07	0.00	0.00	30.48	712.72	0.00	2.60	0 00:00	0.00	0.00
4	E105	Junction	705.99	719.42	705.99	0.00	0.00	34.79	707.65	0.00	11.77	0 00:00	0.00	0.00
5	E106	Junction	718.73	719.98	718.73	719.98	0.00	21.09	719.58	0.00	0.40	0 00:00	0.00	0.00
6	E106A	Junction	684.18	696.94	0.00	0.00	0.00	13.37	685.11	0.00	11.83	0 00:00	0.00	0.00
7	E107	Junction	684.00	699.34	0.00	0.00	0.00	13.37	685.01	0.00	14.33	0 00:00	0.00	0.00
8	E108	Junction	715.39	717.39	715.39	718.00	0.00	27.31	717.39	0.00	0.00	0 12:05	2.74	21.00
9	E109	Junction	714.79	716.00	0.00	0.00	0.00	44.84	716.79	0.00	0.00	0 00:00	0.00	0.00
10	E111	Junction	713.55	718.64	0.00	0.00	0.00	4.50	715.08	0.00	3.56	0 00:00	0.00	0.00
11	E112	Junction	707.58	718.62	707.58	0.00	0.00	3.87	708.15	0.00	10.47	0 00:00	0.00	0.00
12	E116	Junction	709.52	714.00	0.00	0.00	0.00	39.91	714.00	0.00	0.00	0 12:15	1.36	16.00
13	E117	Junction	709.12	713.00	0.00	0.00	0.00	31.01	712.12	0.00	0.88	0 00:00	0.00	0.00
14	E124	Junction	698.61	708.27	698.61	0.00	0.00	19.22	708.27	0.00	0.00	0 11:58	3.29	85.00
15	E125	Junction	692.68	708.84	0.00	0.00	0.00	16.22	708.84	0.00	0.00	0 11:56	5.25	88.00
16	E127	Junction	699.46	704.00	699.46	0.00	0.00	24.61	700.41	0.00	3.59	0 00:00	0.00	0.00
17	E128	Junction	698.50	703.00	698.50	0.00	0.00	66.14	701.24	0.00	1.76	0 00:00	0.00	0.00
18	E142	Junction	691.58	694.00	691.58	0.00	0.00	48.22	693.15	0.00	1.44	0 00:00	0.00	0.00
19	E145-A	Junction	669.37	686.19	0.00	0.00	0.00	233.56	686.19	0.00	0.00	0 12:41	44.50	64.00
20	E159	Junction	680.38	695.00	680.38	6.00	0.00	11.05	690.27	0.00	4.73	0 00:00	0.00	0.00
21	E162	Junction	681.02	690.00	681.02	6.00	0.00	6.89	681.72	0.00	8.28	0 00:00	0.00	0.00
22	E167	Junction	702.90	715.49	0.00	0.00	0.00	35.63	704.38	0.00	11.11	0 00:00	0.00	0.00
23	E169	Junction	698.68	710.00	698.68	0.00	0.00	35.58	699.94	0.00	10.06	0 00:00	0.00	0.00
24	E504	Junction	709.62	714.60	709.62	0.00	12.56	24.52	711.56	0.00	3.04	0 00:00	0.00	0.00
25	Ex_D13	Junction	665.88	675.00	0.00	0.00	0.00	62.36	668.07	0.00	12.81	0 00:00	0.00	0.00
26	JunctionD5	Junction	690.40	695.70	0.00	695.70	0.00	2.85	690.88	0.00	4.82	0 00:00	0.00	0.00
27	Out-A	Outfall	682.47					13.37	683.21					
28	Out-B	Outfall	704.89					30.79	705.43					
29	Out-C	Outfall	690.41					29.82	691.91					
30	Out-D	Outfall	665.41					62.34	667.60					
31	Out-F	Outfall	705.00					1.22	705.00					
32	Out-G	Outfall	712.00					5.70	712.00					
33	Chan-E140-E145	Storage Node	673.58	687.00	673.58		0.00	185.24	677.54				0.00	0.00
34	E110	Storage Node	715.20	718.00	715.20		10000.00	9.54	716.02				0.00	0.00
35	E122-E129	Storage Node	699.00	705.00	699.00		0.00	58.64	703.36				0.00	0.00
36	E123	Storage Node	701.75	704.49	701.75		2059.00	40.60	706.23				0.03	44.00
37	E137	Storage Node	692.09	698.00	692.09		1272.00	155.09	695.65				0.00	0.00
38	E143	Storage Node	688.99	696.00	688.99		0.00	64.29	690.95				0.00	0.00
39	exDA-K-Channel	Storage Node	704.25	708.50	704.25		0.00	44.48	706.66				0.00	0.00
40	InfieldApronIsland	Storage Node	713.50	714.80	713.50		100.00	26.61	714.29				0.00	0.00
41	N.Basin1	Storage Node	689.00	699.50	0.00		0.00	46.05	696.43				0.00	0.00
42	SouthAirportBasin	Storage Node	666.57	682.00	0.00		0.00	128.15	675.14				0.00	0.00
43	SouthGA-Basin1	Storage Node	690.40	696.00	0.00		44584.84	16.71	693.81				0.00	0.00
44	SouthGA-Basin2	Storage Node	690.50	695.70	0.00		22000.00	11.17	693.23				0.00	0.00

Subbasin Hydrology

Subbasin : A2

Input Data

Area (ac)	6.88
Peak Rate Factor	484
Weighted Curve Number	72
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	6.88	-	72
Composite Area & Weighted CN	6.88		72

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

- Tc = Time of Concentration (hr)
- n = Manning's roughness
- Lf = Flow Length (ft)
- P = 2 yr, 24 hr Rainfall (inches)
- Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

- V = 16.1345 * (Sf^0.5) (unpaved surface)
- V = 20.3282 * (Sf^0.5) (paved surface)
- V = 15.0 * (Sf^0.5) (grassed waterway surface)
- V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
- V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
- V = 7.0 * (Sf^0.5) (short grass pasture surface)
- V = 5.0 * (Sf^0.5) (woodland surface)
- V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
- Tc = (Lf / V) / (3600 sec/hr)

Where:

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n

R = Aq / Wp

Tc = (Lf / V) / (3600 sec/hr)

Where :

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- R = Hydraulic Radius (ft)
- Aq = Flow Area (ft²)
- Wp = Wetted Perimeter (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)
- n = Manning's roughness

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	411	0
Slope (%) :	2.1	2.2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	2.39	0
Computed Flow Time (min) :	0.71	2.87	0
Total TOC (min) 25.33			

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.12
Peak Runoff (cfs)	14.01
Weighted Curve Number	72
Time of Concentration (days hh:mm:ss)	0 00:25:20

Subbasin : A3

Input Data

Area (ac)	7.03
Peak Rate Factor	484
Weighted Curve Number	73
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	7.03	-	73
Composite Area & Weighted CN	7.03		73

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.93	0	0
Computed Flow Time (min) :	1.8	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	110	54.19	0
Slope (%) :	3.3	1.7	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.93	2.65	0
Computed Flow Time (min) :	0.63	0.34	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	452.63	0	0
Channel Slope (%) :	0.8	0	0
Cross Section Area (ft²) :	43.83	0	0
Wetted Perimeter (ft) :	61.35	0	0
Velocity (ft/sec) :	3.55	0	0
Computed Flow Time (min) :	2.12	0	0
Total TOC (min)	4.89		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.2
Peak Runoff (cfs)	24.52
Weighted Curve Number	73
Time of Concentration (days hh:mm:ss)	0 00:04:53

Subbasin : A4

Input Data

Area (ac)	11.62
Peak Rate Factor	484
Weighted Curve Number	56
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	11.62	-	56
Composite Area & Weighted CN	11.62		56

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	105	0	0
Slope (%) :	2.4	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.44	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	394	0	0
Slope (%) :	1.8	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.16	0	0
Computed Flow Time (min) :	3.04	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.013
Flow Length (ft) :	257	196	175
Channel Slope (%) :	1.3	0.57	1.13
Cross Section Area (ft²) :	26.06	7.07	7.07
Wetted Perimeter (ft) :	43.83	9.42	9.42
Velocity (ft/sec) :	4	7.15	10.06
Computed Flow Time (min) :	1.07	0.46	0.29
Total TOC (min)	26.30		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	0.99
Peak Runoff (cfs)	8.88
Weighted Curve Number	56
Time of Concentration (days hh:mm:ss)	0 00:26:18

Subbasin : A5

Input Data

Area (ac)	0.22
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.22	-	89
Composite Area & Weighted CN	0.22		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	72	47	0
Slope (%) :	3.4	2.2	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.09	0.93	0
Computed Flow Time (min) :	13.79	0.84	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.68
Peak Runoff (cfs)	0.97
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : A6

Input Data

Area (ac)	5.99
Peak Rate Factor	484
Weighted Curve Number	70
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.99	-	70
Composite Area & Weighted CN	5.99		70

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.8	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	19.39	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	220	70	0
Slope (%) :	4	23.3	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	7.79	0
Computed Flow Time (min) :	1.14	0.15	0
Total TOC (min)	20.67		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.96
Peak Runoff (cfs)	12.54
Weighted Curve Number	70
Time of Concentration (days hh:mm:ss)	0 00:20:40

Subbasin : B

Input Data

Area (ac)	31.82
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	13.78	-	59
Composite Area & Weighted CN	13.78		59

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	22.64	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	203	0
Slope (%) :	1.4	0.5	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.91	1.14	0
Computed Flow Time (min) :	0.87	2.97	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	858	0	0
Channel Slope (%) :	1.6	0	0
Cross Section Area (ft²) :	19.1	0	0
Wetted Perimeter (ft) :	26.17	0	0
Velocity (ft/sec) :	5.09	0	0
Computed Flow Time (min) :	2.81	0	0
Total TOC (min)	29.29		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.18
Peak Runoff (cfs)	28.89
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:29:17

Subbasin : C1

Input Data

Area (ac)	15.73
Peak Rate Factor	484
Weighted Curve Number	60
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	15.72	-	60
Composite Area & Weighted CN	15.72		60

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	65.55	54.45	0
Slope (%) :	1.5	0.7	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.06	0.6	0
Computed Flow Time (min) :	17.75	1.5	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	251	0	0
Slope (%) :	2.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.65	0	0
Computed Flow Time (min) :	1.58	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	613.56	0	0
Channel Slope (%) :	4.2	0	0
Cross Section Area (ft²) :	74.65	0	0
Wetted Perimeter (ft) :	39.92	0	0
Velocity (ft/sec) :	15.45	0	0
Computed Flow Time (min) :	0.66	0	0
Total TOC (min)	21.49		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.24
Peak Runoff (cfs)	18.65
Weighted Curve Number	60
Time of Concentration (days hh:mm:ss)	0 00:21:29

Subbasin : C2

Input Data

Area (ac)	5.46
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.46	-	81
Composite Area & Weighted CN	5.46		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	126	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.97	0	0
Computed Flow Time (min) :	2.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	49	105	0
Slope (%) :	3.3	2.4	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.93	2.5	0
Computed Flow Time (min) :	0.28	0.7	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	543.81	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	23.19	0	0
Wetted Perimeter (ft) :	35.98	0	0
Velocity (ft/sec) :	3.52	0	0
Computed Flow Time (min) :	2.58	0	0
Total TOC (min)	5.72		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.9
Peak Runoff (cfs)	24.52
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:05:43

Subbasin : C3

Input Data

Area (ac)	3.51
Peak Rate Factor	0
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.51	-	80
Composite Area & Weighted CN	3.51		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	40	60	0
Slope (%) :	1.4	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.15	0.06	0
Computed Flow Time (min) :	4.38	17	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	172	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	363.59	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	1.87	0	0
Total TOC (min)	24.47		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.81
Peak Runoff (cfs)	9.77
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : C4

Input Data

Area (ac)	5.48
Peak Rate Factor	0
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.48	-	81
Composite Area & Weighted CN	5.48		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	67.8	32.2	0
Slope (%) :	0.5	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.11	0.05	0
Computed Flow Time (min) :	10.07	10.33	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174.24	0	0
Slope (%) :	1.4	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.91	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	592.19	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	3.05	0	0
Total TOC (min)	24.97		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.9
Peak Runoff (cfs)	15.56
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:24:58

Subbasin : C5

Input Data

Area (ac)	3.62
Peak Rate Factor	484
Weighted Curve Number	75
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.62	-	75
Composite Area & Weighted CN	3.62		75

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	20.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	93	100	0
Slope (%) :	5.5	2.5	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	2.55	0
Computed Flow Time (min) :	0.41	0.65	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	170	0	0
Channel Slope (%) :	1.2	0	0
Cross Section Area (ft²) :	22.39	0	0
Wetted Perimeter (ft) :	33.33	0	0
Velocity (ft/sec) :	4.17	0	0
Computed Flow Time (min) :	0.68	0	0
Total TOC (min)	22.03		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.37
Peak Runoff (cfs)	8.99
Weighted Curve Number	75
Time of Concentration (days hh:mm:ss)	0 00:22:02

Subbasin : C6

Input Data

Area (ac)	5.05
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.44	-	81
Composite Area & Weighted CN	3.44		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.85	0	0
Computed Flow Time (min) :	1.97	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	262	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.03
Flow Length (ft) :	118	88.82	277.62
Channel Slope (%) :	0.4	2	1.5
Cross Section Area (ft²) :	22.39	0.79	11.07
Wetted Perimeter (ft) :	33.33	3.14	61
Velocity (ft/sec) :	2.41	6.46	1.95
Computed Flow Time (min) :	0.82	0.23	2.37
Total TOC (min)	6.91		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.9
Peak Runoff (cfs)	21.9
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:06:55

Subbasin : D1

Input Data

Area (ac)	13.01
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	13.01	-	67
Composite Area & Weighted CN	13.01		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.35	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	641	0
Slope (%) :	2.2	1.9	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.39	2.22	0
Computed Flow Time (min) :	0.7	4.81	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.01	0	0
Flow Length (ft) :	187	0	0
Channel Slope (%) :	1.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	23.91	0	0
Computed Flow Time (min) :	0.13	0	0
Total TOC (min)	26.99		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.73
Peak Runoff (cfs)	20.3
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:26:59

Subbasin : D10

Input Data

Area (ac)	63.53
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	63.53	-	77
Composite Area & Weighted CN	63.53		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	62	40	0
Slope (%) :	0.9	1.8	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.69	0.06	0
Computed Flow Time (min) :	1.51	11.11	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	180	154	0
Slope (%) :	1.5	0.8	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.98	1.44	0
Computed Flow Time (min) :	1.52	1.78	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0.03	0
Flow Length (ft) :	2181	646	0
Channel Slope (%) :	0.3	0.8	0
Cross Section Area (ft²) :	47.3	34	0
Wetted Perimeter (ft) :	94.68	68	0
Velocity (ft/sec) :	0.64	2.8	0
Computed Flow Time (min) :	56.6	3.85	0
Total TOC (min)	76.36		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.54
Peak Runoff (cfs)	74.5
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 01:16:22

Subbasin : D11

Input Data

Area (ac)	4.65
Peak Rate Factor	484
Weighted Curve Number	86
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.65	-	86
Composite Area & Weighted CN	4.65		86

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	99.23	0	0
Slope (%) :	2.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.24	0	0
Computed Flow Time (min) :	6.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	347.24	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	2.02	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	368	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.77	0	0
Wetted Perimeter (ft) :	4.71	0	0
Velocity (ft/sec) :	4.22	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	10.23		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.37
Peak Runoff (cfs)	21.24
Weighted Curve Number	86
Time of Concentration (days hh:mm:ss)	0 00:10:14

Subbasin : D12

Input Data

Area (ac)	17.87
Peak Rate Factor	484
Weighted Curve Number	88
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	17.87	-	88
Composite Area & Weighted CN	17.87		88

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	46.73	0	0
Slope (%) :	3.4	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	159.79	0	0
Slope (%) :	5.5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	0	0
Computed Flow Time (min) :	0.7	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0.013	0
Flow Length (ft) :	390	556	0
Channel Slope (%) :	0.5	0.5	0
Cross Section Area (ft²) :	4.9	13.59	0
Wetted Perimeter (ft) :	7.9	60	0
Velocity (ft/sec) :	5.89	3.01	0
Computed Flow Time (min) :	1.1	3.08	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.57
Peak Runoff (cfs)	77.85
Weighted Curve Number	88
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : D13

Input Data

Area (ac)	4.88
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.88	-	81
Composite Area & Weighted CN	4.88		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	65	40	0
Slope (%) :	2.6	0.3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	1.06	0.03	0
Computed Flow Time (min) :	1.02	22.76	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.24	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	497	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	5.02	0	0
Total TOC (min)	30.04		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.9
Peak Runoff (cfs)	12.5
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:30:02

Subbasin : D14

Input Data

Area (ac)	2.92
Peak Rate Factor	484
Weighted Curve Number	82
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	2.92	-	82
Composite Area & Weighted CN	2.92		82

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	20	89.49	0
Slope (%) :	1.3	0.9	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.05	0.74	0
Computed Flow Time (min) :	7.27	2.02	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	70	0	0
Slope (%) :	6.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.18	0	0
Computed Flow Time (min) :	0.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	409	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	20	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	4.71	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	11.02		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.99
Peak Runoff (cfs)	11.76
Weighted Curve Number	82
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : D15

Input Data

Area (ac)	0.77
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.77	-	87
Composite Area & Weighted CN		0.77		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	160	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.18	0	0
Computed Flow Time (min) :	15.17	0	0
Total TOC (min)	15.17		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.47
Peak Runoff (cfs)	3.23
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:15:10

Subbasin : D16

Input Data

Area (ac)	1.65
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.65	-	87
Composite Area & Weighted CN		1.65		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	113	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.33	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	150	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	300	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.6	0	0
Total TOC (min)	5.16		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.47
Peak Runoff (cfs)	8.86
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:05:10

Subbasin : D17

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	84
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	84
Composite Area & Weighted CN		0.26		84

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.18
Peak Runoff (cfs)	1.31
Weighted Curve Number	84
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D18

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	89
Composite Area & Weighted CN		0.26		89

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.68
Peak Runoff (cfs)	1.48
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D19

Input Data

Area (ac)	1.37
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.37	-	89
Composite Area & Weighted CN		1.37		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	118	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.42	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	88	38	0
Slope (%) :	2.7	0.6	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.65	1.57	0
Computed Flow Time (min) :	0.55	0.4	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	227	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.21	0	0
Total TOC (min)	4.58		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.68
Peak Runoff (cfs)	7.72
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:04:35

Subbasin : D2

Input Data

Area (ac)	7.57
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.57	-	54
Composite Area & Weighted CN		7.57		54

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	17.62	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	314	100	0
Slope (%) :	8	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.56	2.28	0
Computed Flow Time (min) :	1.15	0.73	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0	0
Flow Length (ft) :	348	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	1.73	0	0
Computed Flow Time (min) :	3.36	0	0
Total TOC (min)	22.86		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	0.87
Peak Runoff (cfs)	5.26
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:22:52

Subbasin : D20

Input Data

Area (ac)	2.11
Peak Rate Factor	0
Weighted Curve Number	94
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.11	-	94
Composite Area & Weighted CN		2.11		94

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	480	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	3.94	0	0
Total TOC (min)	6.06		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	4.21
Peak Runoff (cfs)	12.65
Weighted Curve Number	94
Time of Concentration (days hh:mm:ss)	0 00:06:04

Subbasin : D21

Input Data

Area (ac)	4.54
Peak Rate Factor	0
Weighted Curve Number	95
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4.54	-	95
Composite Area & Weighted CN		4.54		95

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	481.91	0	0
Slope (%) :	0.9	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	1.93	0	0
Computed Flow Time (min) :	4.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	123.45	0	0
Channel Slope (%) :	2.5	0	0
Cross Section Area (ft²) :	4	0	0
Wetted Perimeter (ft) :	8	0	0
Velocity (ft/sec) :	4.95	0	0
Computed Flow Time (min) :	0.42	0	0
Total TOC (min)	6.69		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	4.32
Peak Runoff (cfs)	27.08
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:41

Subbasin : D3

Input Data

Area (ac)	4
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4	-	68
Composite Area & Weighted CN		4		68

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0	0.4	0
Flow Length (ft) :	0	100	0
Slope (%) :	0	2	0
2 yr, 24 hr Rainfall (in) :	0	3	0
Velocity (ft/sec) :	0	0.08	0
Computed Flow Time (min) :	0	22.18	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	234	100	0
Slope (%) :	4	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	2.28	0
Computed Flow Time (min) :	1.21	0.73	0
Total TOC (min)	24.12		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.81
Peak Runoff (cfs)	7.01
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:24:07

Subbasin : D4

Input Data

Area (ac)	8.85
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		8.85	-	59
Composite Area & Weighted CN		8.85		59

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	45.52	50	0
Slope (%) :	1.6	3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.81	0.08	0
Computed Flow Time (min) :	0.93	10.83	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	233	0	0
Slope (%) :	1.6	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.04	0	0
Computed Flow Time (min) :	1.9	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0.03
Flow Length (ft) :	842.11	285	208.66
Channel Slope (%) :	1	0.7	0.7
Cross Section Area (ft²) :	10	17.21	17.74
Wetted Perimeter (ft) :	20	34.65	35.7
Velocity (ft/sec) :	3.13	2.61	2.61
Computed Flow Time (min) :	4.49	1.82	1.33
Total TOC (min)	21.31		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.18
Peak Runoff (cfs)	9.83
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:21:19

Subbasin : D5

Input Data

Area (ac)	7.83
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.83	-	67
Composite Area & Weighted CN		7.83		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	101	0	0
Slope (%) :	1.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	22.82	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0
Flow Length (ft) :	310	988	0
Channel Slope (%) :	0.5	2	0
Cross Section Area (ft²) :	1.5	4	0
Wetted Perimeter (ft) :	6	8	0
Velocity (ft/sec) :	1.39	4.42	0
Computed Flow Time (min) :	3.71	3.72	0
Total TOC (min)	30.25		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.73
Peak Runoff (cfs)	11.37
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:30:15

Subbasin : D6

Input Data

Area (ac)	6.77
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		6.77	-	77
Composite Area & Weighted CN		6.77		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	379	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	2.26	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	330	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	3.34	0	0
Total TOC (min)	24.46		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.54
Peak Runoff (cfs)	17.08
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : D8

Input Data

Area (ac)	2.49
Peak Rate Factor	484
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.49	-	80
Composite Area & Weighted CN		2.49		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	120	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	0.72	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	240	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.5	0	0
Wetted Perimeter (ft) :	6	0	0
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.44	0	0
Total TOC (min)	21.01		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.81
Peak Runoff (cfs)	7.51
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:21:01

Subbasin : D9

Input Data

Area (ac)	7.1
Peak Rate Factor	484
Weighted Curve Number	85
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.1	-	85
Composite Area & Weighted CN		7.1		85

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	0.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	33.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	336.83	0	0
Slope (%) :	1.1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.13	0	0
Computed Flow Time (min) :	2.64	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0
Flow Length (ft) :	367.85	422.11	0
Channel Slope (%) :	1	1.5	0
Cross Section Area (ft²) :	6.81	20	0
Wetted Perimeter (ft) :	27.29	80	0
Velocity (ft/sec) :	1.97	5.57	0
Computed Flow Time (min) :	3.11	1.26	0
Total TOC (min)	40.76		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.28
Peak Runoff (cfs)	16.87
Weighted Curve Number	85
Time of Concentration (days hh:mm:ss)	0 00:40:46

Subbasin : F

Input Data

Area (ac)	4.42
Peak Rate Factor	484
Weighted Curve Number	46
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4.42	-	46
Composite Area & Weighted CN		4.42		46

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	13	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.17	0	0
Computed Flow Time (min) :	14.51	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	280	0	0
Channel Slope (%) :	2.7	0	0
Cross Section Area (ft²) :	42	0	0
Wetted Perimeter (ft) :	56	0	0
Velocity (ft/sec) :	6.74	0	0
Computed Flow Time (min) :	0.69	0	0
Total TOC (min)	15.20		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	0.46
Peak Runoff (cfs)	1.29
Weighted Curve Number	46
Time of Concentration (days hh:mm:ss)	0 00:15:12

Subbasin : G

Input Data

Area (ac)	12.84
Peak Rate Factor	484
Weighted Curve Number	51
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		12.84	-	51
Composite Area & Weighted CN		12.84		51

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	3.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	23.98	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	388	0	0
Slope (%) :	3.2	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.89	0	0
Computed Flow Time (min) :	2.24	0	0
Total TOC (min)	26.22		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	0.71
Peak Runoff (cfs)	5.82
Weighted Curve Number	51
Time of Concentration (days hh:mm:ss)	0 00:26:13

Storage Node : N.Basin1

Input Data

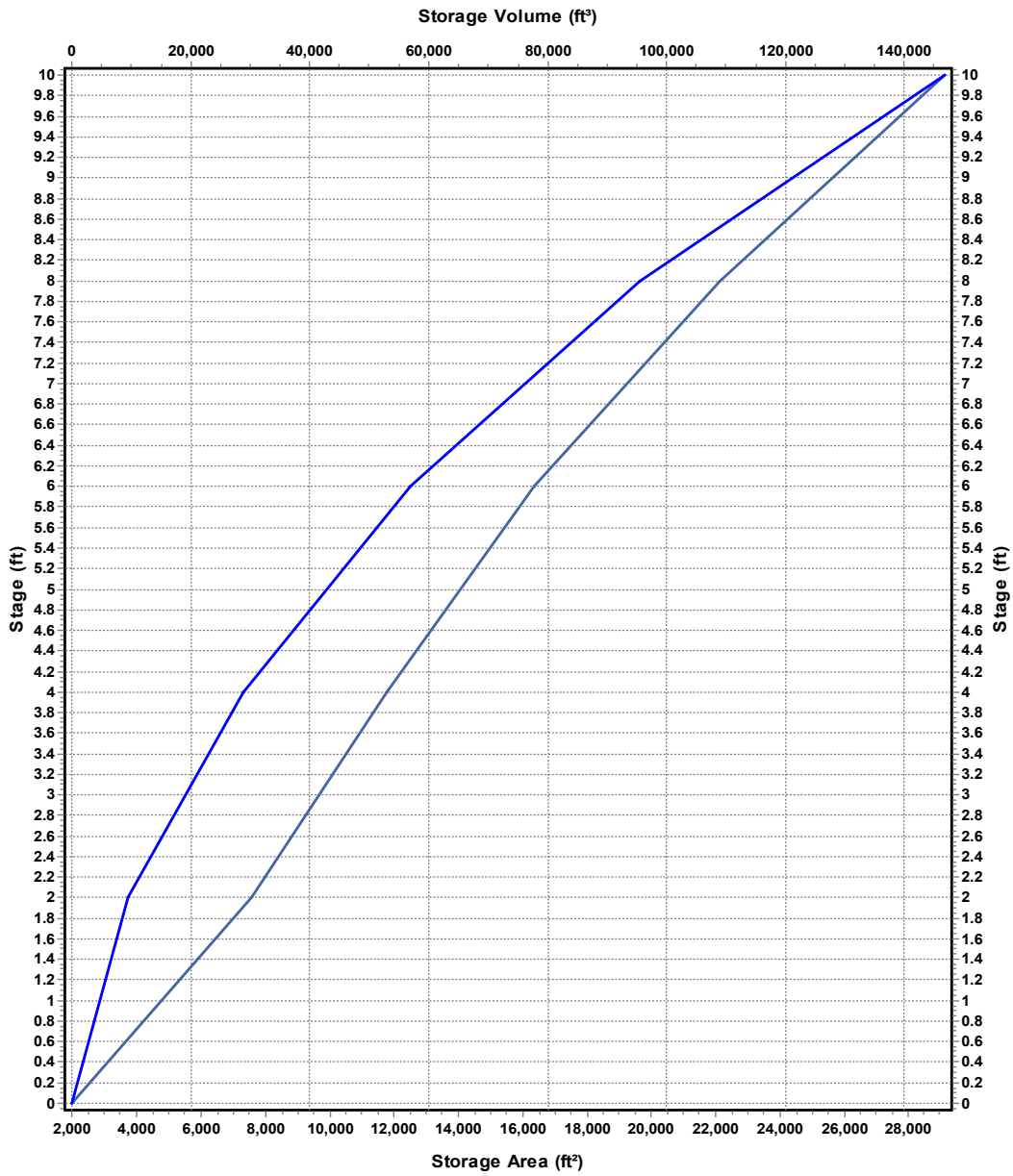
Invert Elevation (ft)	689.00
Max (Rim) Elevation (ft)	699.50
Max (Rim) Offset (ft)	10.50
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-689.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-18

Stage	Storage Area	Storage Volume
(ft)	(ft²)	(ft³)
0	1981	0
2	7562	9543
4	11766	28871
6	16377	57014
8	22122	95513
10	29115	146750

Storage Area Volume Curves



Storage Area Storage Volume

Storage Node : N.Basin1 (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	EmergencySpillwayA	Bottom	Rectangular	No		47.80	47.80	697.79	0.63
2	PrimarySpillway	Bottom	Rectangular	No		30.00	18.00	695.82	0.63
3	Underdrain	Side	CIRCULAR	No	3.00			684.28	0.61

Output Summary Results

Peak Inflow (cfs)	46.05
Peak Lateral Inflow (cfs)	12.37
Peak Outflow (cfs)	13.37
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	696.43
Max HGL Depth Attained (ft)	7.43
Average HGL Elevation Attained (ft)	692.59
Average HGL Depth Attained (ft)	3.59
Time of Max HGL Occurrence (days hh:mm)	0 12:40
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Project Description

File Name Post-Development.SPF
Description
22081 Northside Development

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On 00:00:00 0:00:00
End Analysis On 00:00:00 0:00:00
Start Reporting On 00:00:00 0:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-10	Cumulative	inches	Virginia	Frederick	10.00	4.90	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Peak Rate Factor	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)			(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	A2	6.88	484.00	72.00	4.90	2.12	14.59	14.01	0 00:25:19
2	A3	7.03	484.00	73.00	4.90	2.20	15.48	24.52	0 00:05:00
3	A4	33.40	484.00	86.00	4.90	3.37	112.69	167.72	0 00:06:35
4	A5	0.22	484.00	89.00	4.90	3.68	0.81	0.97	0 00:14:38
5	A6	5.99	484.00	70.00	4.90	1.96	11.75	12.54	0 00:20:40
6	B	21.60	484.00	63.00	4.90	1.45	31.23	24.53	0 00:31:18
7	C1	15.73	484.00	60.00	4.90	1.24	19.55	18.65	0 00:21:29
8	C2	5.46	484.00	81.00	4.90	2.90	15.82	24.52	0 00:05:43
9	C3	3.51	0.00	80.00	4.90	2.81	9.85	9.77	0 00:24:28
10	C4	5.48	0.00	81.00	4.90	2.90	15.88	15.56	0 00:24:58
11	C5	3.62	484.00	75.00	4.90	2.37	8.57	8.99	0 00:22:01
12	C6	5.05	484.00	81.00	4.90	2.90	14.63	21.90	0 00:06:54
13	D1	13.01	484.00	67.00	4.90	1.73	22.56	20.30	0 00:26:59
14	D10	63.53	484.00	77.00	4.90	2.54	161.37	74.50	0 01:16:21
15	D11	4.65	484.00	86.00	4.90	3.37	15.69	21.24	0 00:10:13
16	D12	17.87	484.00	88.00	4.90	3.57	63.87	77.85	0 00:14:38
17	D13	4.88	484.00	81.00	4.90	2.90	14.14	12.50	0 00:30:02
18	D14	2.92	484.00	82.00	4.90	2.99	8.73	11.76	0 00:11:01
19	D15	0.77	484.00	87.00	4.90	3.47	2.67	3.23	0 00:15:10
20	D16	1.65	484.00	87.00	4.90	3.47	5.73	8.86	0 00:05:09
21	D17	0.26	484.00	84.00	4.90	3.18	0.83	1.31	0 00:05:00
22	D18	0.26	484.00	89.00	4.90	3.68	0.96	1.48	0 00:05:00
23	D19	1.37	484.00	89.00	4.90	3.68	5.04	7.72	0 00:05:00
24	D2	7.57	484.00	54.00	4.90	0.87	6.60	5.26	0 00:22:51
25	D20	2.11	0.00	94.00	4.90	4.21	8.88	12.65	0 00:06:03
26	D21	4.54	0.00	95.00	4.90	4.32	19.61	27.08	0 00:06:41
27	D3	4.00	484.00	68.00	4.90	1.81	7.24	7.01	0 00:24:07
28	D4	8.85	484.00	59.00	4.90	1.18	10.43	9.83	0 00:21:18
29	D5	7.83	484.00	67.00	4.90	1.73	13.58	11.37	0 00:30:15
30	D6	6.77	484.00	77.00	4.90	2.54	17.20	17.08	0 00:24:27
31	D8	2.49	484.00	80.00	4.90	2.81	6.99	7.51	0 00:21:00
32	D9	7.10	484.00	85.00	4.90	3.28	23.26	16.87	0 00:40:45
33	F1	2.60	484.00	48.00	4.90	0.55	1.43	1.09	0 00:15:12
34	G1	3.00	484.00	47.00	4.90	0.50	1.51	1.70	0 00:05:00

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)		(ft)	(days hh:mm)	(ac-in)	(min)
1	Basin2-Out	Junction	689.58	695.31	0.00	696.00	0.00	2.61	690.84	0.00	4.47	0 00:00	0.00	0.00
2	E103	Junction	714.91	718.00	0.00	0.00	0.00	13.94	715.84	0.00	2.16	0 00:00	0.00	0.00
3	E104	Junction	711.07	715.32	711.07	0.00	0.00	30.48	712.72	0.00	2.60	0 00:00	0.00	0.00
4	E105	Junction	705.99	719.42	705.99	0.00	0.00	30.48	707.65	0.00	11.77	0 00:00	0.00	0.00
5	E106	Junction	718.73	719.98	718.73	719.98	0.00	21.09	719.58	0.00	0.40	0 00:00	0.00	0.00
6	E106A	Junction	684.18	696.94	0.00	0.00	0.00	11.17	685.03	0.00	11.91	0 00:00	0.00	0.00
7	E107	Junction	684.00	699.34	0.00	0.00	0.00	11.17	684.93	0.00	14.41	0 00:00	0.00	0.00
8	E108	Junction	715.39	717.39	715.39	718.00	0.00	27.31	717.39	0.00	0.00	0 12:05	2.74	21.00
9	E109	Junction	714.79	716.00	0.00	0.00	0.00	44.84	716.79	0.00	0.00	0 00:00	0.00	0.00
10	E111	Junction	713.55	718.64	0.00	0.00	0.00	4.50	715.08	0.00	3.56	0 00:00	0.00	0.00
11	E112	Junction	707.58	718.62	707.58	0.00	0.00	3.87	708.15	0.00	10.47	0 00:00	0.00	0.00
12	E116	Junction	709.52	714.00	0.00	0.00	0.00	39.91	714.00	0.00	0.00	0 12:15	1.36	16.00
13	E117	Junction	709.12	713.00	0.00	0.00	0.00	31.01	712.12	0.00	0.88	0 00:00	0.00	0.00
14	E124	Junction	698.61	708.27	698.61	0.00	0.00	19.22	708.27	0.00	0.00	0 11:58	3.29	85.00
15	E125	Junction	692.68	708.84	0.00	0.00	0.00	16.22	708.84	0.00	0.00	0 11:56	5.25	88.00
16	E127	Junction	699.46	704.00	699.46	0.00	0.00	24.61	700.41	0.00	3.59	0 00:00	0.00	0.00
17	E128	Junction	698.50	703.00	698.50	0.00	0.00	66.14	701.24	0.00	1.76	0 00:00	0.00	0.00
18	E142	Junction	691.58	694.00	691.58	0.00	0.00	48.22	693.15	0.00	1.44	0 00:00	0.00	0.00
19	E145-A	Junction	669.37	686.19	0.00	0.00	0.00	233.56	686.19	0.00	0.00	0 12:41	44.50	64.00
20	E159	Junction	680.38	695.00	680.38	6.00	0.00	11.05	690.27	0.00	4.73	0 00:00	0.00	0.00
21	E162	Junction	681.02	690.00	681.02	6.00	0.00	6.89	681.72	0.00	8.28	0 00:00	0.00	0.00
22	E167	Junction	702.90	715.49	0.00	0.00	0.00	31.37	704.30	0.00	11.19	0 00:00	0.00	0.00
23	E169	Junction	698.68	710.00	698.68	0.00	0.00	31.31	699.86	0.00	10.14	0 00:00	0.00	0.00
24	E504	Junction	709.62	714.60	709.62	0.00	12.56	24.52	711.56	0.00	3.04	0 00:00	0.00	0.00
25	Ex_D13	Junction	665.88	675.00	0.00	0.00	0.00	62.36	668.07	0.00	12.81	0 00:00	0.00	0.00
26	JunctionD5	Junction	690.40	695.70	0.00	695.70	0.00	2.85	690.88	0.00	4.82	0 00:00	0.00	0.00
27	Out-A	Outfall	682.47					11.17	683.18					
28	Out-B	Outfall	704.89					26.75	705.43					
29	Out-C	Outfall	690.41					29.82	691.91					
30	Out-D	Outfall	665.41					62.34	667.60					
31	Out-F	Outfall	0.00					1.07	0.00					
32	Out-G	Outfall	0.00					1.61	0.00					
33	Chan-E140-E145	Storage Node	673.58	687.00	673.58		0.00	185.24	677.54				0.00	0.00
34	E110	Storage Node	715.20	718.00	715.20		10000.00	9.54	716.02				0.00	0.00
35	E122-E129	Storage Node	699.00	705.00	699.00		0.00	58.64	703.36				0.00	0.00
36	E123	Storage Node	701.75	704.49	701.75		2059.00	40.60	706.23				0.03	44.00
37	E137	Storage Node	692.09	698.00	692.09		1272.00	155.09	695.65				0.00	0.00
38	E143	Storage Node	688.99	696.00	688.99		0.00	64.29	690.95				0.00	0.00
39	exDA-K-Channel	Storage Node	704.25	708.50	704.25		0.00	44.48	706.66				0.00	0.00
40	InfieldApronIsland	Storage Node	713.50	714.80	713.50		100.00	26.61	714.29				0.00	0.00
41	N.Basin1	Storage Node	687.00	699.50	0.00		0.00	196.39	696.36				0.00	0.00
42	SouthAirportBasin	Storage Node	666.57	682.00	0.00		0.00	128.15	675.14				0.00	0.00
43	SouthGA-Basin1	Storage Node	690.40	696.00	0.00		44584.84	16.71	693.81				0.00	0.00
44	SouthGA-Basin2	Storage Node	690.50	695.70	0.00		22000.00	11.17	693.23				0.00	0.00

Subbasin Hydrology

Subbasin : A2

Input Data

Area (ac)	6.88
Peak Rate Factor	484
Weighted Curve Number	72
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	6.88	-	72
Composite Area & Weighted CN	6.88		72

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

- Tc = Time of Concentration (hr)
- n = Manning's roughness
- Lf = Flow Length (ft)
- P = 2 yr, 24 hr Rainfall (inches)
- Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

- V = 16.1345 * (Sf^0.5) (unpaved surface)
- V = 20.3282 * (Sf^0.5) (paved surface)
- V = 15.0 * (Sf^0.5) (grassed waterway surface)
- V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
- V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
- V = 7.0 * (Sf^0.5) (short grass pasture surface)
- V = 5.0 * (Sf^0.5) (woodland surface)
- V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
- Tc = (Lf / V) / (3600 sec/hr)

Where:

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n

R = Aq / Wp

Tc = (Lf / V) / (3600 sec/hr)

Where :

- Tc = Time of Concentration (hr)
- Lf = Flow Length (ft)
- R = Hydraulic Radius (ft)
- Aq = Flow Area (ft²)
- Wp = Wetted Perimeter (ft)
- V = Velocity (ft/sec)
- Sf = Slope (ft/ft)
- n = Manning's roughness

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	411	0
Slope (%) :	2.1	2.2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	2.39	0
Computed Flow Time (min) :	0.71	2.87	0
Total TOC (min) 25.33			

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.12
Peak Runoff (cfs)	14.01
Weighted Curve Number	72
Time of Concentration (days hh:mm:ss)	0 00:25:20

Subbasin : A3

Input Data

Area (ac)	7.03
Peak Rate Factor	484
Weighted Curve Number	73
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	7.03	-	73
Composite Area & Weighted CN	7.03		73

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.93	0	0
Computed Flow Time (min) :	1.8	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	110	54.19	0
Slope (%) :	3.3	1.7	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.93	2.65	0
Computed Flow Time (min) :	0.63	0.34	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	452.63	0	0
Channel Slope (%) :	0.8	0	0
Cross Section Area (ft²) :	43.83	0	0
Wetted Perimeter (ft) :	61.35	0	0
Velocity (ft/sec) :	3.55	0	0
Computed Flow Time (min) :	2.12	0	0
Total TOC (min)	4.89		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.2
Peak Runoff (cfs)	24.52
Weighted Curve Number	73
Time of Concentration (days hh:mm:ss)	0 00:04:53

Subbasin : A4

Input Data

Area (ac)	33.4
Peak Rate Factor	484
Weighted Curve Number	86
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	33.4	-	86
Composite Area & Weighted CN	33.4		86

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.01	0	0
Flow Length (ft) :	71	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	1.58	0	0
Computed Flow Time (min) :	0.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	3318	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	7.07	0	0
Wetted Perimeter (ft) :	9.42	0	0
Velocity (ft/sec) :	9.47	0	0
Computed Flow Time (min) :	5.84	0	0
Total TOC (min)	6.59		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.37
Peak Runoff (cfs)	167.72
Weighted Curve Number	86
Time of Concentration (days hh:mm:ss)	0 00:06:35

Subbasin : A5

Input Data

Area (ac)	0.22
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.22	-	89
Composite Area & Weighted CN	0.22		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	72	47	0
Slope (%) :	3.4	2.2	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.09	0.93	0
Computed Flow Time (min) :	13.79	0.84	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.68
Peak Runoff (cfs)	0.97
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : A6

Input Data

Area (ac)	5.99
Peak Rate Factor	484
Weighted Curve Number	70
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.99	-	70
Composite Area & Weighted CN	5.99		70

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.8	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	19.39	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	220	70	0
Slope (%) :	4	23.3	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	7.79	0
Computed Flow Time (min) :	1.14	0.15	0
Total TOC (min)	20.67		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.96
Peak Runoff (cfs)	12.54
Weighted Curve Number	70
Time of Concentration (days hh:mm:ss)	0 00:20:40

Subbasin : B

Input Data

Area (ac)	21.6
Peak Rate Factor	484
Weighted Curve Number	63
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	20.67	-	63
Composite Area & Weighted CN	20.67		63

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	1.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	26.01	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	2.69	0	0
Slope (%) :	2	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0	0
Computed Flow Time (min) :	0.02	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.03
Flow Length (ft) :	858	505	518
Channel Slope (%) :	1	3.3	2.6
Cross Section Area (ft²) :	42	7.07	42
Wetted Perimeter (ft) :	56	9.42	56
Velocity (ft/sec) :	4.1	17.2	6.61
Computed Flow Time (min) :	3.49	0.49	1.31
Total TOC (min)	31.31		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.45
Peak Runoff (cfs)	24.53
Weighted Curve Number	63
Time of Concentration (days hh:mm:ss)	0 00:31:19

Subbasin : C1

Input Data

Area (ac)	15.73
Peak Rate Factor	484
Weighted Curve Number	60
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	15.72	-	60
Composite Area & Weighted CN	15.72		60

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	65.55	54.45	0
Slope (%) :	1.5	0.7	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.06	0.6	0
Computed Flow Time (min) :	17.75	1.5	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	251	0	0
Slope (%) :	2.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.65	0	0
Computed Flow Time (min) :	1.58	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	613.56	0	0
Channel Slope (%) :	4.2	0	0
Cross Section Area (ft²) :	74.65	0	0
Wetted Perimeter (ft) :	39.92	0	0
Velocity (ft/sec) :	15.45	0	0
Computed Flow Time (min) :	0.66	0	0
Total TOC (min)	21.49		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.24
Peak Runoff (cfs)	18.65
Weighted Curve Number	60
Time of Concentration (days hh:mm:ss)	0 00:21:29

Subbasin : C2

Input Data

Area (ac)	5.46
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.46	-	81
Composite Area & Weighted CN	5.46		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	126	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.97	0	0
Computed Flow Time (min) :	2.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	49	105	0
Slope (%) :	3.3	2.4	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.93	2.5	0
Computed Flow Time (min) :	0.28	0.7	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	543.81	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	23.19	0	0
Wetted Perimeter (ft) :	35.98	0	0
Velocity (ft/sec) :	3.52	0	0
Computed Flow Time (min) :	2.58	0	0
Total TOC (min)	5.72		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.9
Peak Runoff (cfs)	24.52
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:05:43

Subbasin : C3

Input Data

Area (ac)	3.51
Peak Rate Factor	0
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.51	-	80
Composite Area & Weighted CN	3.51		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	40	60	0
Slope (%) :	1.4	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.15	0.06	0
Computed Flow Time (min) :	4.38	17	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	172	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	363.59	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	1.87	0	0
Total TOC (min)	24.47		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.81
Peak Runoff (cfs)	9.77
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : C4

Input Data

Area (ac)	5.48
Peak Rate Factor	0
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.48	-	81
Composite Area & Weighted CN	5.48		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0.4	0
Flow Length (ft) :	67.8	32.2	0
Slope (%) :	0.5	1.4	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.11	0.05	0
Computed Flow Time (min) :	10.07	10.33	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174.24	0	0
Slope (%) :	1.4	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.91	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	592.19	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	26.22	0	0
Wetted Perimeter (ft) :	38.1	0	0
Velocity (ft/sec) :	3.24	0	0
Computed Flow Time (min) :	3.05	0	0
Total TOC (min)	24.97		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.9
Peak Runoff (cfs)	15.56
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:24:58

Subbasin : C5

Input Data

Area (ac)	3.62
Peak Rate Factor	484
Weighted Curve Number	75
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.62	-	75
Composite Area & Weighted CN	3.62		75

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.5	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	20.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	93	100	0
Slope (%) :	5.5	2.5	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	2.55	0
Computed Flow Time (min) :	0.41	0.65	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	170	0	0
Channel Slope (%) :	1.2	0	0
Cross Section Area (ft²) :	22.39	0	0
Wetted Perimeter (ft) :	33.33	0	0
Velocity (ft/sec) :	4.17	0	0
Computed Flow Time (min) :	0.68	0	0
Total TOC (min)	22.03		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.37
Peak Runoff (cfs)	8.99
Weighted Curve Number	75
Time of Concentration (days hh:mm:ss)	0 00:22:02

Subbasin : C6

Input Data

Area (ac)	5.05
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	3.44	-	81
Composite Area & Weighted CN	3.44		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.85	0	0
Computed Flow Time (min) :	1.97	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	262	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	1.52	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0.03
Flow Length (ft) :	118	88.82	277.62
Channel Slope (%) :	0.4	2	1.5
Cross Section Area (ft²) :	22.39	0.79	11.07
Wetted Perimeter (ft) :	33.33	3.14	61
Velocity (ft/sec) :	2.41	6.46	1.95
Computed Flow Time (min) :	0.82	0.23	2.37
Total TOC (min)	6.91		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.9
Peak Runoff (cfs)	21.9
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:06:55

Subbasin : D1

Input Data

Area (ac)	13.01
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	13.01	-	67
Composite Area & Weighted CN	13.01		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2.2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	21.35	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	100	641	0
Slope (%) :	2.2	1.9	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.39	2.22	0
Computed Flow Time (min) :	0.7	4.81	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.01	0	0
Flow Length (ft) :	187	0	0
Channel Slope (%) :	1.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	23.91	0	0
Computed Flow Time (min) :	0.13	0	0
Total TOC (min)	26.99		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.73
Peak Runoff (cfs)	20.3
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:26:59

Subbasin : D10

Input Data

Area (ac)	63.53
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	63.53	-	77
Composite Area & Weighted CN	63.53		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	62	40	0
Slope (%) :	0.9	1.8	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.69	0.06	0
Computed Flow Time (min) :	1.51	11.11	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	180	154	0
Slope (%) :	1.5	0.8	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.98	1.44	0
Computed Flow Time (min) :	1.52	1.78	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0.03	0
Flow Length (ft) :	2181	646	0
Channel Slope (%) :	0.3	0.8	0
Cross Section Area (ft²) :	47.3	34	0
Wetted Perimeter (ft) :	94.68	68	0
Velocity (ft/sec) :	0.64	2.8	0
Computed Flow Time (min) :	56.6	3.85	0
Total TOC (min)	76.36		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.54
Peak Runoff (cfs)	74.5
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 01:16:22

Subbasin : D11

Input Data

Area (ac)	4.65
Peak Rate Factor	484
Weighted Curve Number	86
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.65	-	86
Composite Area & Weighted CN	4.65		86

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	99.23	0	0
Slope (%) :	2.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.24	0	0
Computed Flow Time (min) :	6.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	347.24	0	0
Slope (%) :	2	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0	0
Computed Flow Time (min) :	2.02	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	368	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.77	0	0
Wetted Perimeter (ft) :	4.71	0	0
Velocity (ft/sec) :	4.22	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	10.23		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.37
Peak Runoff (cfs)	21.24
Weighted Curve Number	86
Time of Concentration (days hh:mm:ss)	0 00:10:14

Subbasin : D12

Input Data

Area (ac)	17.87
Peak Rate Factor	484
Weighted Curve Number	88
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	17.87	-	88
Composite Area & Weighted CN	17.87		88

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	46.73	0	0
Slope (%) :	3.4	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.76	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	159.79	0	0
Slope (%) :	5.5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.78	0	0
Computed Flow Time (min) :	0.7	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.013	0.013	0
Flow Length (ft) :	390	556	0
Channel Slope (%) :	0.5	0.5	0
Cross Section Area (ft²) :	4.9	13.59	0
Wetted Perimeter (ft) :	7.9	60	0
Velocity (ft/sec) :	5.89	3.01	0
Computed Flow Time (min) :	1.1	3.08	0
Total TOC (min)	14.64		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.57
Peak Runoff (cfs)	77.85
Weighted Curve Number	88
Time of Concentration (days hh:mm:ss)	0 00:14:38

Subbasin : D13

Input Data

Area (ac)	4.88
Peak Rate Factor	484
Weighted Curve Number	81
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.88	-	81
Composite Area & Weighted CN	4.88		81

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	65	40	0
Slope (%) :	2.6	0.3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	1.06	0.03	0
Computed Flow Time (min) :	1.02	22.76	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	174	0	0
Slope (%) :	2.1	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.34	0	0
Computed Flow Time (min) :	1.24	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	497	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	5.02	0	0
Total TOC (min)	30.04		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.9
Peak Runoff (cfs)	12.5
Weighted Curve Number	81
Time of Concentration (days hh:mm:ss)	0 00:30:02

Subbasin : D14

Input Data

Area (ac)	2.92
Peak Rate Factor	484
Weighted Curve Number	82
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	2.92	-	82
Composite Area & Weighted CN	2.92		82

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.015	0
Flow Length (ft) :	20	89.49	0
Slope (%) :	1.3	0.9	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.05	0.74	0
Computed Flow Time (min) :	7.27	2.02	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	70	0	0
Slope (%) :	6.7	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.18	0	0
Computed Flow Time (min) :	0.28	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	409	0	0
Channel Slope (%) :	0.9	0	0
Cross Section Area (ft²) :	20	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	4.71	0	0
Computed Flow Time (min) :	1.45	0	0
Total TOC (min)	11.02		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.99
Peak Runoff (cfs)	11.76
Weighted Curve Number	82
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : D15

Input Data

Area (ac)	0.77
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.77	-	87
Composite Area & Weighted CN		0.77		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.11	0	0
Flow Length (ft) :	160	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.18	0	0
Computed Flow Time (min) :	15.17	0	0
Total TOC (min)	15.17		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.47
Peak Runoff (cfs)	3.23
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:15:10

Subbasin : D16

Input Data

Area (ac)	1.65
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.65	-	87
Composite Area & Weighted CN		1.65		87

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	113	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.33	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	150	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	1.23	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	300	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.6	0	0
Total TOC (min)	5.16		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.47
Peak Runoff (cfs)	8.86
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:05:10

Subbasin : D17

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	84
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	84
Composite Area & Weighted CN		0.26		84

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.18
Peak Runoff (cfs)	1.31
Weighted Curve Number	84
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D18

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		0.26	-	89
Composite Area & Weighted CN		0.26		89

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.68
Peak Runoff (cfs)	1.48
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : D19

Input Data

Area (ac)	1.37
Peak Rate Factor	484
Weighted Curve Number	89
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		1.37	-	89
Composite Area & Weighted CN		1.37		89

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	118	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.81	0	0
Computed Flow Time (min) :	2.42	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	88	38	0
Slope (%) :	2.7	0.6	0
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	2.65	1.57	0
Computed Flow Time (min) :	0.55	0.4	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	227	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft²) :	10	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	3.13	0	0
Computed Flow Time (min) :	1.21	0	0
Total TOC (min)	4.58		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.68
Peak Runoff (cfs)	7.72
Weighted Curve Number	89
Time of Concentration (days hh:mm:ss)	0 00:04:35

Subbasin : D2

Input Data

Area (ac)	7.57
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.57	-	54
Composite Area & Weighted CN		7.57		54

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	17.62	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	314	100	0
Slope (%) :	8	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.56	2.28	0
Computed Flow Time (min) :	1.15	0.73	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.08	0	0
Flow Length (ft) :	348	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	30	0	0
Wetted Perimeter (ft) :	20	0	0
Velocity (ft/sec) :	1.73	0	0
Computed Flow Time (min) :	3.36	0	0
Total TOC (min)	22.86		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	0.87
Peak Runoff (cfs)	5.26
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:22:52

Subbasin : D20

Input Data

Area (ac)	2.11
Peak Rate Factor	0
Weighted Curve Number	94
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.11	-	94
Composite Area & Weighted CN		2.11		94

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	480	0	0
Slope (%) :	1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.03	0	0
Computed Flow Time (min) :	3.94	0	0
Total TOC (min)	6.06		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	4.21
Peak Runoff (cfs)	12.65
Weighted Curve Number	94
Time of Concentration (days hh:mm:ss)	0 00:06:04

Subbasin : D21

Input Data

Area (ac)	4.54
Peak Rate Factor	0
Weighted Curve Number	95
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4.54	-	95
Composite Area & Weighted CN		4.54		95

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	1	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	2.12	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	481.91	0	0
Slope (%) :	0.9	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	1.93	0	0
Computed Flow Time (min) :	4.16	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	123.45	0	0
Channel Slope (%) :	2.5	0	0
Cross Section Area (ft²) :	4	0	0
Wetted Perimeter (ft) :	8	0	0
Velocity (ft/sec) :	4.95	0	0
Computed Flow Time (min) :	0.42	0	0
Total TOC (min)	6.69		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	4.32
Peak Runoff (cfs)	27.08
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:41

Subbasin : D3

Input Data

Area (ac)	4
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		4	-	68
Composite Area & Weighted CN		4		68

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0	0.4	0
Flow Length (ft) :	0	100	0
Slope (%) :	0	2	0
2 yr, 24 hr Rainfall (in) :	0	3	0
Velocity (ft/sec) :	0	0.08	0
Computed Flow Time (min) :	0	22.18	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	234	100	0
Slope (%) :	4	2	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	2.28	0
Computed Flow Time (min) :	1.21	0.73	0
Total TOC (min)	24.12		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.81
Peak Runoff (cfs)	7.01
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:24:07

Subbasin : D4

Input Data

Area (ac)	8.85
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		8.85	-	59
Composite Area & Weighted CN		8.85		59

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.015	0.4	0
Flow Length (ft) :	45.52	50	0
Slope (%) :	1.6	3	0
2 yr, 24 hr Rainfall (in) :	3	3	0
Velocity (ft/sec) :	0.81	0.08	0
Computed Flow Time (min) :	0.93	10.83	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	233	0	0
Slope (%) :	1.6	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.04	0	0
Computed Flow Time (min) :	1.9	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0.03
Flow Length (ft) :	842.11	285	208.66
Channel Slope (%) :	1	0.7	0.7
Cross Section Area (ft²) :	10	17.21	17.74
Wetted Perimeter (ft) :	20	34.65	35.7
Velocity (ft/sec) :	3.13	2.61	2.61
Computed Flow Time (min) :	4.49	1.82	1.33
Total TOC (min)	21.31		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.18
Peak Runoff (cfs)	9.83
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:21:19

Subbasin : D5

Input Data

Area (ac)	7.83
Peak Rate Factor	484
Weighted Curve Number	67
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.83	-	67
Composite Area & Weighted CN		7.83		67

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	101	0	0
Slope (%) :	1.9	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	22.82	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.03	0
Flow Length (ft) :	310	988	0
Channel Slope (%) :	0.5	2	0
Cross Section Area (ft²) :	1.5	4	0
Wetted Perimeter (ft) :	6	8	0
Velocity (ft/sec) :	1.39	4.42	0
Computed Flow Time (min) :	3.71	3.72	0
Total TOC (min)	30.25		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	1.73
Peak Runoff (cfs)	11.37
Weighted Curve Number	67
Time of Concentration (days hh:mm:ss)	0 00:30:15

Subbasin : D6

Input Data

Area (ac)	6.77
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		6.77	-	77
Composite Area & Weighted CN		6.77		77

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	379	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	2.26	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	330	0	0
Channel Slope (%) :	0.7	0	0
Cross Section Area (ft²) :	6	0	0
Wetted Perimeter (ft) :	24	0	0
Velocity (ft/sec) :	1.65	0	0
Computed Flow Time (min) :	3.34	0	0
Total TOC (min)	24.46		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.54
Peak Runoff (cfs)	17.08
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:24:28

Subbasin : D8

Input Data

Area (ac)	2.49
Peak Rate Factor	484
Weighted Curve Number	80
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.49	-	80
Composite Area & Weighted CN		2.49		80

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	18.86	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	120	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	0.72	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.015	0	0
Flow Length (ft) :	240	0	0
Channel Slope (%) :	0.5	0	0
Cross Section Area (ft²) :	1.5	0	0
Wetted Perimeter (ft) :	6	0	0
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.44	0	0
Total TOC (min)	21.01		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	2.81
Peak Runoff (cfs)	7.51
Weighted Curve Number	80
Time of Concentration (days hh:mm:ss)	0 00:21:01

Subbasin : D9

Input Data

Area (ac)	7.1
Peak Rate Factor	484
Weighted Curve Number	85
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		7.1	-	85
Composite Area & Weighted CN		7.1		85

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	100	0	0
Slope (%) :	0.7	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	33.75	0	0
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	336.83	0	0
Slope (%) :	1.1	0	0
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.13	0	0
Computed Flow Time (min) :	2.64	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0.013	0
Flow Length (ft) :	367.85	422.11	0
Channel Slope (%) :	1	1.5	0
Cross Section Area (ft²) :	6.81	20	0
Wetted Perimeter (ft) :	27.29	80	0
Velocity (ft/sec) :	1.97	5.57	0
Computed Flow Time (min) :	3.11	1.26	0
Total TOC (min)	40.76		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	3.28
Peak Runoff (cfs)	16.87
Weighted Curve Number	85
Time of Concentration (days hh:mm:ss)	0 00:40:46

Subbasin : F1

Input Data

Area (ac)	2.6
Peak Rate Factor	484
Weighted Curve Number	48
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		2.6	-	48
Composite Area & Weighted CN		2.6		48

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	150	0	0
Slope (%) :	13	0	0
2 yr, 24 hr Rainfall (in) :	3	0	0
Velocity (ft/sec) :	0.17	0	0
Computed Flow Time (min) :	14.51	0	0
	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	0.03	0	0
Flow Length (ft) :	280	0	0
Channel Slope (%) :	2.7	0	0
Cross Section Area (ft²) :	42	0	0
Wetted Perimeter (ft) :	56	0	0
Velocity (ft/sec) :	6.74	0	0
Computed Flow Time (min) :	0.69	0	0
Total TOC (min)	15.20		

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	0.55
Peak Runoff (cfs)	1.09
Weighted Curve Number	48
Time of Concentration (days hh:mm:ss)	0 00:15:12

Subbasin : G1

Input Data

Area (ac)	3
Peak Rate Factor	484
Weighted Curve Number	47
Rain Gage ID	Rain Gage-01

Composite Curve Number

	32	Area	Soil	Curve
Soil/Surface Description		(acres)	Group	Number
-		3	-	47
Composite Area & Weighted CN		3		47

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	4.9
Total Runoff (in)	0.5
Peak Runoff (cfs)	1.7
Weighted Curve Number	47
Time of Concentration (days hh:mm:ss)	0 00:05:00

Storage Node : N.Basin1

Input Data

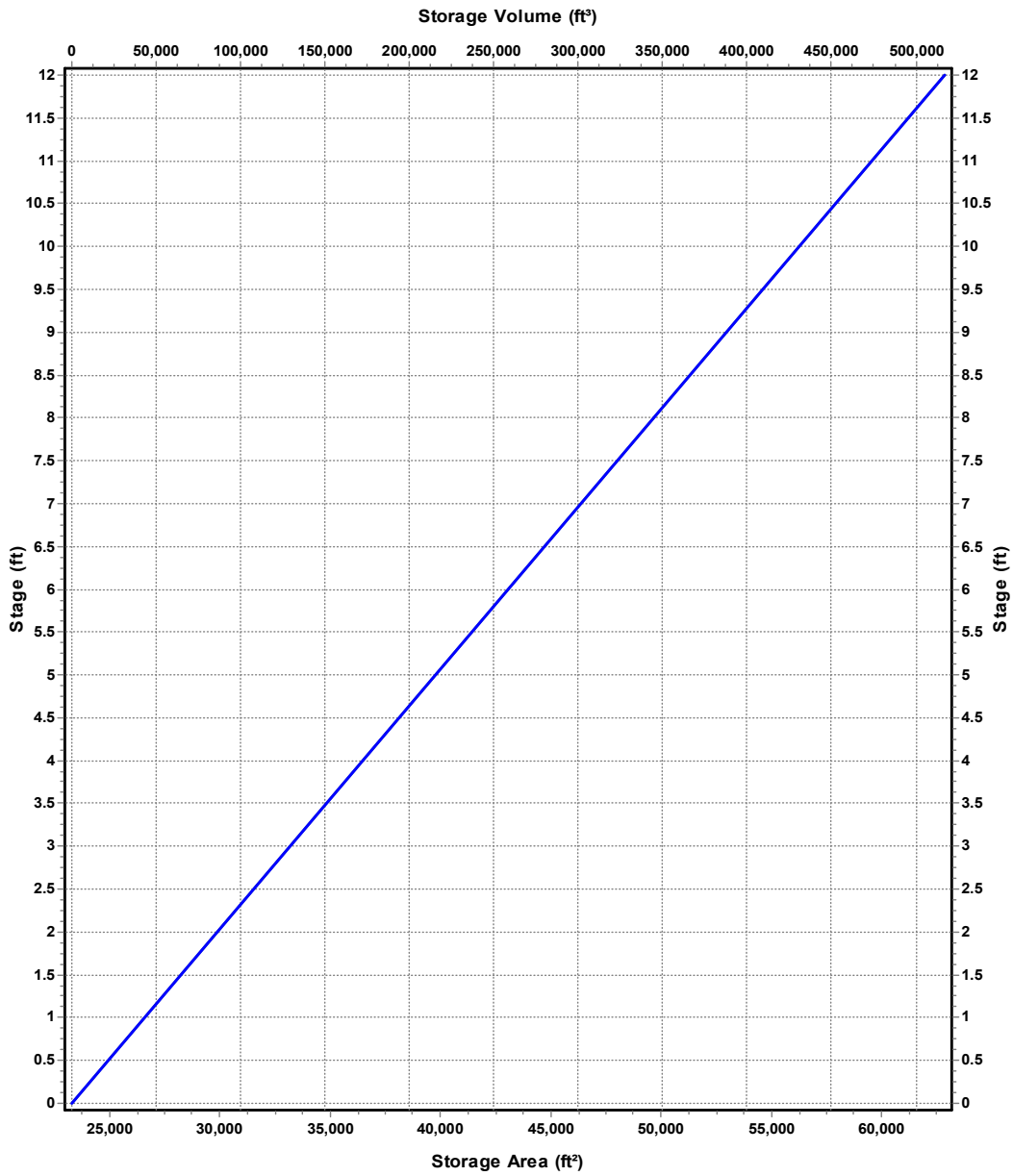
Invert Elevation (ft)	687.00
Max (Rim) Elevation (ft)	699.50
Max (Rim) Offset (ft)	12.50
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-687.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-18

Stage	Storage Area	Storage Volume
(ft)	(ft²)	(ft³)
0	23305	0
12	62866.42	517028.52

Storage Area Volume Curves



Storage Area Storage Volume

Storage Node : N.Basin1 (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	EmergencySpillwayA	Bottom	Rectangular	No		47.80	47.80	697.79	0.63
2	PrimarySpillway	Bottom	Rectangular	No		30.00	18.00	695.82	0.63
3	Underdrain	Side	CIRCULAR	No	3.00			684.28	0.61

Output Summary Results

Peak Inflow (cfs)	196.39
Peak Lateral Inflow (cfs)	169.59
Peak Outflow (cfs)	11.17
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	696.36
Max HGL Depth Attained (ft)	9.36
Average HGL Elevation Attained (ft)	693.73
Average HGL Depth Attained (ft)	6.73
Time of Max HGL Occurrence (days hh:mm)	0 13:34
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet - Version 4.1

BMP Design Specifications List: 2024 Stds & Specs

Site Summary

Project Title: Northside Development-Preliminary Engineering
Date: 03/19/2024

Site Land Cover Summary

	A soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest (acres)	0.01	0.00	0.00	0.00	0.01	0
Mixed Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	9.70	2.49	0.00	0.54	12.73	33
Impervious Cover (acres)	11.74	9.19	5.32	0.09	26.34	67
					39.08	100

Site Tv and Land Cover Nutrient Loads

Site Rv	0.69
Treatment Volume (ft ³)	2
TP Load (lb/yr)	29.67
TN Load (lb/yr)	400.12

Total TP Load Reduction Required (lb/yr)	0.00

Site Compliance Summary

Total Runoff Volume Reduction (ft ³)	0
Total TP Load Reduction Achieved (lb/yr)	0.00
Total TN Load Reduction Achieved (lb/yr)	0.00
Remaining Post Development TP Load (lb/yr)	29.67
Remaining TP Load Reduction (lb/yr) Required	19.51

Appendix C - Engineer's Opinion of Probable Construction Costs



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ENGINEER'S OPINION OF PROBABLE COST (EOPC)

EOPC LEVEL	DATE
Preliminary Engineering	Mar-24

AIP Project No. 3-51-0059-045-2023
Delta Project No. 22081

Northside Development

AIRPORT NAME	AIRPORT LOCATION
Winchester Regional Airport	Frederick County, VA

Item No.	Description	Unit	Quantity	Unit Price (US\$)	Total Amount (US\$)
1	PARKING LOT	SY	25,000	\$250.00	\$6,250,000.00
2	TAXIWAY/APRON	SY	35,000	\$200.00	\$7,000,000.00
3	AIRCRAFT MANUFACTURING FACILITY	SF	600,000	\$500.00	\$300,000,000.00
4	FUEL FARM SITE WORK	LS	1	\$2,000,000.00	\$2,000,000.00
5	FUEL FARM TANKS	LS	1	\$1,500,000.00	\$1,500,000.00
TOTAL AMOUNT					\$316,750,000.00

*This Engineers Opinion of Probable Cost (EOPC) is based on **preliminary exhibits** prepared by Delta Airport Consultants March, 2024. All quantities are approximations which are subject to change based on preparation of final design plans and/or any regulatory agency reviews.*

*This EOPC is based in **2024** dollars and reflects available cost information for construction in the general location of this project.*

This EOPC is based on our experience and qualifications as engineers and shall be deemed to represent our opinion and judgment. This estimate cannot and does not guarantee that proposals, bids, or actual costs will be the same as or within any specific percentage of this estimate of probable construction cost.

Inherent in soils, foundations, groundwater, and other geotechnical explorations, actual conditions may vary significantly from assumed conditions. Due to these inherent uncertainties, changes or unanticipated conditions may arise during construction activities at the project site, subsequent to the initial assumptions, that may impact the project scope and cost. Therefore, this estimate, with respect to potential construction costs, shall not be deemed a guaranteed maximum price or cost of the project.

Assumptions:

- The fuel farm is based on AvGas and Jet-A tanks
- The unit price for the building is based on manufacturing building costs accounting for specialty manufacturing
- The parking lot and apron costs are based off similar projects at OKV and other airports
- Items not included:
- Specific line items and quantities

Appendix D – BMP Discussion

BMP Discussion

The phosphorous load of new development sites are not allowed to exceed 0.41 pounds per acre per year (lb/ac/yr). The Virginia Runoff Reduction Method (VRRM) is used to calculate the amount of phosphorous new impervious area introduces. The site development can be approached in two ways: as one large development project or broken into two development sites (only if construction is phased). If the development site is analyzed in one site plan, the New Development VRRM will be used. If the project is broken into two site plans, the first one is assumed to be analyzed using New Development VRRM and the second one is assumed to use the Redevelopment VRRM. For the purpose of this PER, the second option will divide the development site into the apron as phase one and the building and parking lot as phase two. Table 1 below summarizes the results of the two analysis options. Although the second option has smaller individual require load reductions, the total required load reduction is much greater: 19.51 vs 28.07 pounds per year (lb/yr).

Table 1: VRRM Analysis

	Everything	Apron (Phase 1)	Building/Parking (Phase 2)
Impervious	26.34	7.93	18.41 (new)
TP Load Reduction (lb/yr)	19.51	14.46	13.61
Treatment Volume (ft ³)	98,500	46,320	98,500

Assumptions:

- All of drainage areas A4, G, and F (oppose to LOD) used in analysis
- Area B was excluded because no new impervious was added
- Apron project includes site work for building/parking lot (i.e. same drainage areas as completing everything at once)
- Everything and Apron analyzed as New Development
- Bldg/parking as Redevelopment

It is recommended that a single site plan be done for the Northwest Development Site. In addition to requiring a lower load reduction, it also allows the Best Management Practices (BMPs) to be sized correctly and built to accommodate the whole site. The Virginia Stormwater Management Handbook provides guidance on several different BMPs that can be used to address the required load reduction. Airports are limited in the types of BMPs that can be used to those that do not attract animals.

Table 2: Recommended BMPs

	Impervious Cover Credit Area (Acres)	Runoff Reduction Credit (%)	Phosphorus Removed by Practice (lb)
Vegetated Roof #1	7.5	45	2.9
Vegetated Roof #2	7.5	60	3.86
Permeable Pavement #1	3	45	1.51
Permeable Pavement #2	3	75	2.09
Infiltration #1	20	50	10.73
Infiltration #2	20	90	15.87

Assumptions:

- Only half the building roof is available for BMP use
- Two thirds of the parking lot is available for BMP use

There are different levels of treatment for BMPs. The higher levels have a higher runoff reduction credit but they require an enhanced design to achieve the runoff reduction. The Virginia Code requires that sites over ten acres and/or that require more than 10 lb/ac/yr of load reduction meet at least 75% of the reduction on site (9VAC25-870-69 B.3). For the Northwest Development Site, on site BMPs must treat 14.63 lb/ac/yr. A level 2 infiltration trench would be able to be sized to meet all on site reduction if enough of the impervious runoff was directed to it. The site is set up to have all the water run to the west through pipes into an existing basin. This set up allows a large portion of the impervious runoff to be directed to an underground infiltration trench. Figure 1 below depicts what this would look like.

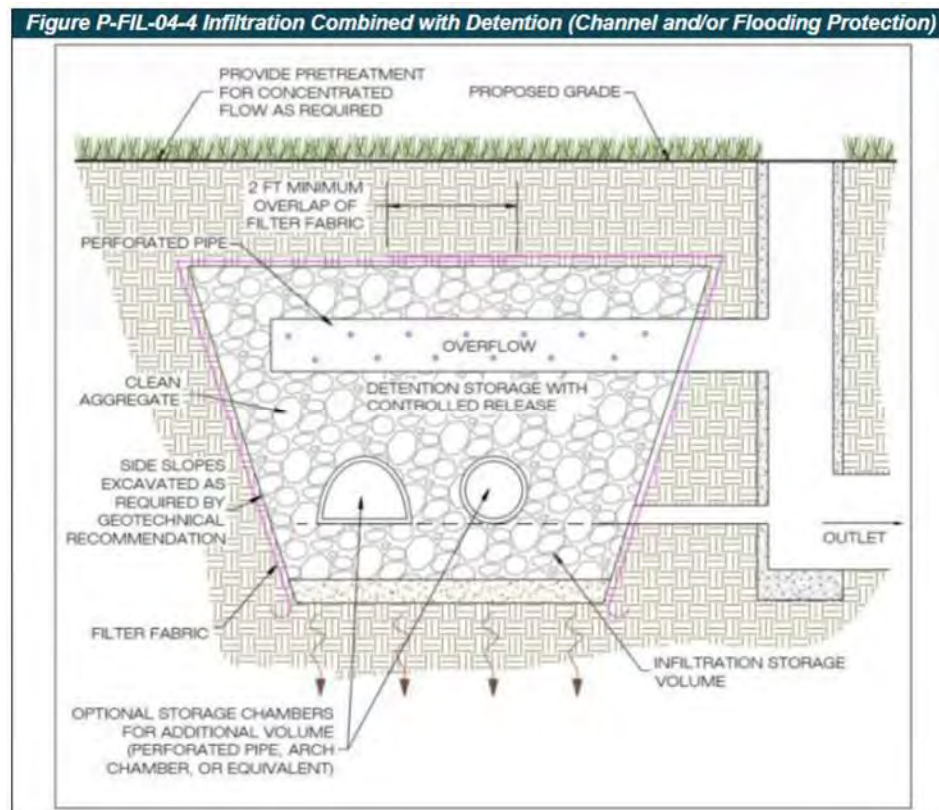


Figure 1: Underground Infiltration (Source: VDEQ Stormwater Management Handbook)

It should be noted that the maximum contributing drainage area (CDA) to an individual infiltration trench is 2 acres. Since the site needs to treat about 25 acres of impervious runoff, an exception to the max CDA or a series of trenches would need to be designed with flow splitters. Table P-FIL-04-2 Feasibility Criteria, Table P-FIL-04-3 Infiltration Offset Guidance, and Table P-FIL-04-8 Level 1 and Level 2 Infiltration Design Guidelines in the Virginia Stormwater Management Handbook summarizes site and BMP requirements. One of the more critical components is that a minimum infiltration rate of 0.5 inch per hour is required. The proposed location of the BMP is a Hydraulic Soil Group A soil. A and B soils typically meet this criterion. For a level 2 infiltration trench an infiltration rate of 1 in/hour is required. This will need to be field verified and included in the Geotech request for proposal for final design.

The depth and therefore size of the infiltration trench is dependent on the infiltration rate. About 1.38 acres Northeast of the existing partial parallel taxiway is reserved for an infiltration BMP (see Figure 2). In addition to the depth, since there is a limited amount of space and depth, perforated pipe will need

to be installed as storage chambers for additional volume (see Figure 1). Table 3 below shows how the infiltration rate effects the size of the BMP and the load reduction that is achieved.

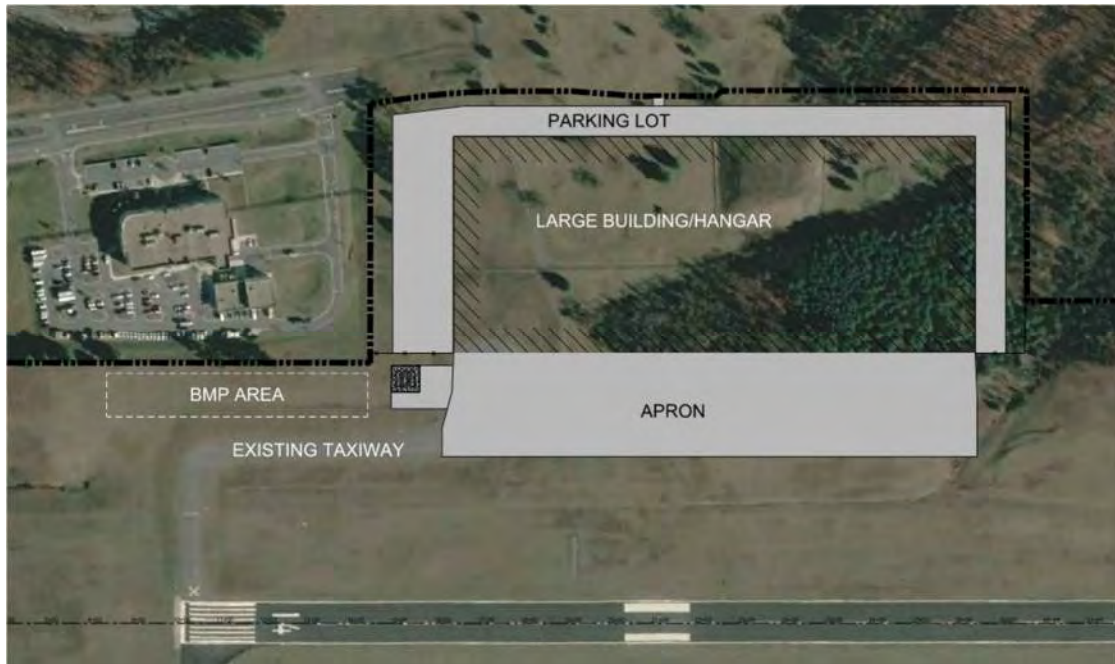


Figure 2: BMP Location

Table 3: Infiltration Sizing

Level	Infiltration Rate (in/hr)	Depth (ft)	Impervious Cover Credit Area (acres)	Total BMP Treatment Volume (ft ³)	BMP Surface Area (acres)	Phosphorous Removed
1	0.5	2.5	20	20	1.35	10.73
2	1.0	5	20	20	0.90	15.87

Assumptions:

- Each infiltration BMP handles 2 acres of runoff
- 10 feet between infiltration BMPs

The following figures depict how the BMP could look depending on if multiple smaller infiltration trenches () or one large infiltration trench () would be acceptable.

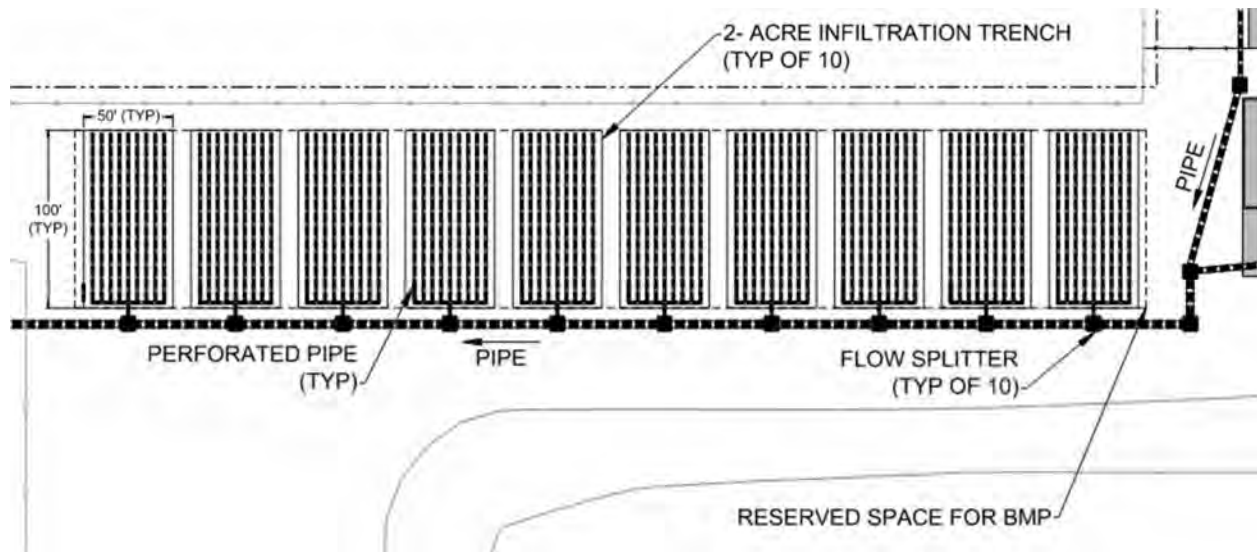


Figure 3: Multiple Infiltration BMPs

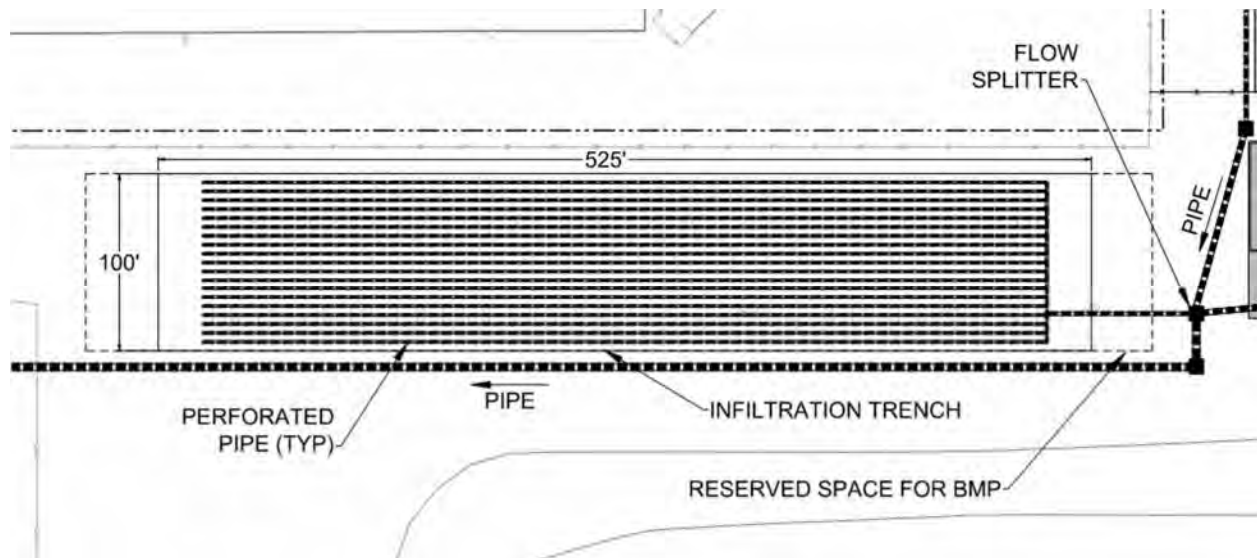


Figure 4: Single Large Infiltration BMP

Attachment G

Winchester Regional Airport Northside Development Project Environmental Assessment

Final Air Quality and Climate Analysis Technical Report

HMMH Report No. 23-0015A
January 2025

Prepared for:

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Appendices

- Appendix A. Air Emissions Spreadsheet Calculations**
Appendix B. Delta’s Forecast and Assumptions, FAA Approval Letter

1. Introduction

Harris Miller Miller & Hanson Inc. (HMMH) is assisting Delta Airport Consultants, Inc. on the Environmental Assessment (EA) for the proposed construction of a new hangar building with associated parking, fuel storage, and apron footage at Winchester Regional Airport (OKV) in Frederick County, Virginia.

This technical report provides detailed information for the National Environmental Policy Act (NEPA) air quality and climate analysis of the EA including the methodology and assumptions for the construction and demolition activity along with additional aircraft operations for two Proposed Action Alternatives.

The air quality analysis includes comparison of the criteria pollutant emissions from the construction and demolition activities and additional aircraft operations and general access and parking for the Proposed Action Alternatives to United States (US) Environmental Protection Agency (EPA) *de minimis* thresholds to determine significant impacts under NEPA. The Proposed Action Alternatives are anticipated to increase the number of forecast aircraft operations and the number of vehicle trips compared to the No Action Alternative, therefore, additional aircraft and associated ancillary activities were included and evaluated in this EA for significant air quality impacts. The climate analysis presents the effect the Proposed Action Alternatives may have on climate change and compares those results using global factors.

The next sections present and discuss the potential for air quality impacts from the Proposed Action Alternatives including operations and construction and demolition activities.

2. Affected Environment

Under NEPA, federal agencies must consider the impact their actions will have on the environment compared to a No Action Alternative. According to Federal Aviation Administration (FAA) NEPA implementing guidance (FAA Order 1050.1F and Desk Reference, and FAA Order 5050.4B), impacts to air quality must be considered as part of the environmental analysis under NEPA. Potential effects of the Proposed Action Alternatives are evaluated against the National Ambient Air Quality Standards (NAAQS), as promulgated by the US EPA under the Federal Clean Air Act (CAA).

2.1 National Ambient Air Quality Standards

The US EPA currently regulates six criteria pollutants: ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter (PM), and lead (Pb). Particulate matter is divided into two particle size categories: coarse particles with a diameter less than 10 micrometers (PM₁₀) and fine particles with a diameter of less than 2.5 micrometers (PM_{2.5}). The NAAQS are expressed in terms of pollutant concentration measured (or averaged) over a defined period of time and are two-tiered. The first tier (the “primary standard”) is intended to protect public health; the second tier (the “secondary standard”) is intended to protect public welfare and prevent further degradation of the environment.

Table 1 shows the primary and secondary NAAQS for the criteria pollutants. Section 176(c) of the CAA states that federal agencies cannot engage, support, or provide financial assistance for licensing,

permitting, or approving any project that could cause or contribute to the severity and/or number of violations of the NAAQS, or could inhibit the expeditious attainment of these standards.

The standards in **Table 1** apply to the concentration of a pollutant in outdoor ambient air. If the air quality in a geographic area is equal to or better than the national standard, the US EPA will typically designate the region as an “attainment area.” An area where air quality does not meet the national standard is typically designated by the US EPA as a “non-attainment area.” Once the air quality in a non-attainment area improves to the point where it meets the standards and the additional requirements outlined in the CAA, the US EPA can re-designate the area to attainment upon approval of a Maintenance Plan, and these areas are then referred to as “maintenance areas.” Each state is required to prepare a State Implementation Plan (SIP) that outlines measures that regions within the state will implement to attain the applicable air quality standard in non-attainment areas for applicable criteria air pollutant, and to maintain compliance with the applicable air quality standard in maintenance areas. The status and severity of pollutant concentrations in a particular area will impact the types of measures a state must take to reach attainment with the NAAQS. The US EPA must review and approve each state’s SIP to ensure the proposed measures are sufficient to either attain or maintain compliance with the NAAQS within a set period of time.

The CAA Amendments of 1990 require states to make recommendations to the US EPA regarding the attainment status of all areas within their borders when the US EPA finalizes an update to any NAAQS. Under its CAA Amendments authority, the US EPA further classifies non-attainment areas for some pollutants – such as O₃ – based on the severity of the NAAQS violation as marginal, moderate, serious, severe, and extreme. To further improve the nation’s air quality, the US EPA lowered the O₃ standard in 2015 to 0.070 parts per million (ppm). Similarly in February 2024, US EPA strengthened the primary annual PM_{2.5} standard to 9 micrograms per cubic meter of air (µg/m³) from 12 µg/m³.¹

¹ <https://www.federalregister.gov/documents/2024/03/06/2024-02637/reconsideration-of-the-national-ambient-air-quality-standards-for-particulate-matter>.

Table 1. National Ambient Air Quality Standards

Source: US EPA NAAQS Accessed on February 20, 2024, <https://www.epa.gov/criteria-air-pollutants/naaqs-table>

Pollutant	Averaging Time	Primary Standards	Secondary Standards
CO	Eight-Hour	9 ppm	None
	One-hour	35 ppm	None
Pb	Rolling Three-Month Average	0.15 µg/m ³	Same as Primary
NO ₂	Annual Arithmetic Mean	0.053 ppm (100 µg/m ³)	Same as Primary
	One-hour	0.100 ppm ^{Note 2}	None
O ₃	Eight-hour (2015 standard) ^{Note 4}	0.070 ppm	Same as Primary
PM _{2.5}	Annual Arithmetic Mean	9 µg/m ³ ^{Note 5}	12 µg/m ³
	24-hour	35 µg/m ³	Same as Primary
PM ₁₀	24-hour	150 µg/m ³ ^{Note 1}	Same as Primary
SO ₂	One-hour	75 parts per billion (ppb) ^{Note 3}	None
	Three-hour	None	0.5 ppm

Notes

- For PM₁₀, the 24-hour standard is not to be exceeded more than once per year on average over three years. For PM_{2.5}, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or are less than the standard.
- To attain this standard, the three-year average of the 98th percentile of the daily maximum one-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
- Final rule signed June 2, 2010. To attain this standard, the three-year average of the 99th percentile of the daily maximum one-hour average at each monitor within an area must not exceed 75 ppb.
- US EPA updated the NAAQS for O₃ to strengthen the primary eight-hour standard to 0.07 ppm on October 1, 2015. An area will meet the standard if the fourth-highest maximum daily eight-hour O₃ concentration per year, averaged over three years is equal to or less than 70 ppb.
- US EPA strengthened the annual PM_{2.5} standard to 9 µg/m³ on February 7, 2024. <https://www.epa.gov/newsreleases/epa-finalizes-stronger-standards-harmful-soot-pollution-significantly-increasing>.

2.2 Attainment Status

The US EPA Green Book² lists non-attainment, maintenance, and attainment areas across the nation. It lists Frederick County, in which the project is located, as being in attainment for all of the NAAQS.

2.3 General Conformity Rule

The General Conformity Rule defines a federal action as any activity engaged in by a department, agency, or instrumentality of the federal government, or any activity that a department, agency, or instrumentality of the federal government supports in any way, provides financial assistance for, licenses, permits, or approves. General Conformity is defined as demonstrating that a project or action conforms to the SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. Federally funded and approved actions at airports are subject to the US EPA's General Conformity regulations. The General Conformity Rule³ applies to all federal actions except for certain highway and transit programs which must instead comply with the Transportation Conformity Plans.⁴

² US EPA Green Book: <https://www.epa.gov/green-book>.

³ Revisions to the General Conformity Rule are codified under 40 CFR Parts 51 and 93, Subpart W, Revisions to the General Conformity Regulations, Final Rule (April 2010).

⁴ 40 CFR Part 93, Subpart A.

The General Conformity Rule includes annual emissions thresholds for nonattainment and maintenance areas that trigger the need for a General Conformity determination and defines projects that are typically excluded from General Conformity requirements. Since OKV is located in a US EPA-designated attainment area for all criteria pollutants, the General Conformity requirements do not apply to this Proposed Action. However, the EPA *de minimis* thresholds were used to determine significant impacts under NEPA.

3. Environmental Consequences of Proposed Action

Potential air quality impacts associated with construction and demolition activity and aircraft operational changes for the Proposed Action Alternatives are discussed in this section. The Proposed Action Alternatives would induce changes in aircraft operations and/or additional vehicle trips compared to the No Action Alternative after construction. Therefore, air emissions associated with aircraft and general access vehicles were inventoried and evaluated as part of this analysis.

3.1 Methodology

This section documents the methods used to calculate emissions of CO, volatile organic compounds (VOCs), oxides of nitrogen (NO_x), SO₂, PM₁₀, and PM_{2.5}, and greenhouse gases (GHG) from construction sources associated with the Proposed Action Alternatives. This analysis develops emissions inventories pursuant to NEPA consistent with the FAA Aviation Emissions and Air Quality Handbook,⁵ as well as determining whether emissions associated with the Proposed Action Alternatives would exceed the NAAQS.

Estimates of construction-related emissions were developed for the Proposed Action using standard industry methodologies and techniques including the FAA Aviation Emissions and Air Quality Handbook and associated US EPA guidance, Motor Vehicle Emission Simulator (MOVES4; latest available edition) for both on road and nonroad source emission factors. These techniques are described in more detail in the following sections. Construction activities associated with the Proposed Action for were estimated for the years 2027 and 2028.

Airport operational emissions inventories were developed using FAA approved methodology and models for evaluating aircraft emissions under NEPA for the future opening year (2029) for those activities associated with the Proposed Action Alternatives where additional emissions are expected over the No Action Alternative.

Both construction activities and operational (direct and indirect) emissions were inventoried and compared to appropriate US EPA *de minimis* thresholds for determining significant impacts and compliance with the NAAQS.

⁵

https://www.faa.gov/sites/faa.gov/files/regulations_policies/policy_guidance/envir_policy/airquality_handbook/Air_Quality_Handbook_Appendices.pdf

3.2 Construction Activities

Construction emissions were not estimated for the No Action Alternative, because no construction activity would be associated with the No Action Alternative. The construction associated with the Proposed Action would result in short-term changes in air emissions from sources such as exhaust from nonroad construction equipment such as:

- milling and paving,
- site clearing, and
- grading.

On-road vehicles include those associated with:

- transport and delivery of supplies,
- materials and equipment to and from the site, and
- construction worker trips.

Additionally, fugitive dust emissions sources include:

- site preparation and land clearing,
- equipment movement on unpaved and paved roads, and
- evaporative emissions from the application of asphalt paving.

Construction activities associated with the Proposed Action are expected to begin early 2027 and be completed in late 2028. **Table 2** presents the primary components of the Proposed Action Alternatives, including area estimates (square feet) and anticipated start and end dates of construction. These area estimates were used for deriving construction equipment schedules with the Airport Cooperative Research Board's (ACRP) Airport Construction Emissions Inventory Tool (ACEIT).⁶

Table 2. Proposed Action Construction Activities

Source: Delta Airport Consultants, February 1, 2024, email along with preliminary project costs.

Project Action Component	Area (Square Feet)	Construction Start	Construction End
New Hangar Building	600,000	1/1/2027	12/31/2028
New Parking Area	225,000	1/1/2027	12/31/2028
New Apron	315,000	1/1/2027	12/31/2028
New Fuel Tank Storage	3 New Fuel Tanks	1/1/2027	12/31/2028
Additional Offsite Fill trips	4,000 trips	1/1/2027	12/31/2028

The ACRP ACEIT model⁷ was used to estimate the construction schedule of equipment only for each project component based on the project dimensions and project costs for each activity. The model has the ability to generate construction schedules for a variety of standard airport construction projects including the associated activity types and the equipment used for this project.

ACEIT can also produce emission factors for nonroad and on-road construction equipment, as well as for fugitive emission sources using US EPA and industry standard models and methodologies. However, the current version of ACEIT includes an older version of the US EPA's MOVES emission model, MOVES2010a

⁶ ACRP, 2014 <https://crp.trb.org/acrp0267/acrp-report-102-guidance-for-estimating-airport-construction-emissions/>

⁷ http://onlinepubs.trb.org/onlinepubs/acrp/docs/ACRP02-33_FR.pdf.

and NONROADs, which have both been updated over the years. For this analysis, emission factors were generated outside of ACEIT using the current version of MOVES4 to develop on-road and nonroad emission factors for Frederick County.⁸ These emission factors were applied to estimates of vehicle miles traveled (VMT) and construction equipment (hours, horsepower, load factor), respectively, for each construction activity and year. Spreadsheet calculations for construction are presented in **Appendix A**.

3.2.1 Off-Road Construction Equipment

As discussed above, off-road equipment emission factors for each construction year using the MOVES4 emission model which incorporates county level data representative of Frederick County for both criteria pollutants/precursors and greenhouse gases. Emission factors in grams per horsepower (hp-hr) for each off-road equipment type were applied to the equipment size (in hp), load factor, and anticipated activity levels (in hours per year) of expected equipment use, as generated in the construction equipment inventory by ACEIT.

The annual emissions for off-road construction equipment were computed using the following equation:

$$\text{Off-road Vehicle Construction emissions (tons per year)} = \text{emission factor (grams per hp-hr)} \times \text{size (hp)} \times \text{load factor} \times \text{hours per year} \times (1 \text{ pound}/453.6 \text{ grams}) \times (1 \text{ ton}/2,000 \text{ pounds})$$

3.2.2 On-Road Construction Passenger/Truck Delivery Vehicles

VMT data for each on-road employee trip and truck delivery vehicles were derived from round trip distances and the number of employee hours from the activity-specific construction schedule in ACEIT. It is assumed that all on-road equipment would use gasoline for passenger vehicles and diesel fuel for truck deliveries. Emission factors in grams per mile (g/mile) for each on-road vehicle type were applied to the anticipated VMT. Additional truck trips associated with the removal of offsite fill during the construction activities in 2027 and 2028 (total of 4,000 trips) were included. Similar to the way emissions are estimated for offroad equipment, the MOVES4 model uses US EPA vehicle default data representative of Frederick County for both criteria pollutants/precursors and greenhouse gases to estimate emissions factors in g/mile. A round trip distance of 30 miles was assumed for employee trips and 40 miles was assumed for material delivery trips, while a roundtrip of 4 miles was assumed for the additional offsite fill truck trips.

The annual emissions for on-road passenger/delivery vehicles were computed for each year using the following equation:

$$\text{On-road construction vehicles emissions (tons per year)} = \text{emission factor (g/mile)} \times \text{annual VMT} \times (1 \text{ pound}/453.6 \text{ grams}) \times (1 \text{ ton}/2,000 \text{ pounds})$$

⁸ Construction emissions used in MOVES4 NONROAD assumed a blend of Tier 1, Tier 2, Tier 3, and Tier 4 for Frederick County based on US EPA phasing ratios of older equipment in future years and does not reflect the primary use of either Tier 1 thru Tier 4 engines. MOVES emission factors are specific to Frederick County as generated within MOVES for each year.

3.2.3 Fugitive Dust Emissions

Fugitive dust emissions from site preparation and land clearing, equipment movement on unpaved and paved areas, along with evaporative emissions from asphalt paving activities were estimated using US EPA emission factors and methodologies. These are all included in the total construction emissions.

3.3 Summary of Construction-Related Emissions

Construction-related emissions of criteria pollutants during the 2027 and 2028 construction period under the Proposed Action Alternatives using the methodology discussed above are summarized in **Table 3**. Lead emissions are included and are expected to be zero as fuel for the construction and vehicles is expected to be ultra-low diesel fuel and gasoline, neither of which contain lead. The Construction emission spreadsheets are included in **Appendix A**.

Table 3. Construction Emission Inventory – Proposed Action

Source: HMMH, 2024, Based on MOVES4 for On-road and NONROAD using construction information provided by Delta Airport Consultants

Year	Relevant Criteria Pollutant Emissions (tons per year)						
	CO	VOC ^{Note 1}	NOx ^{Note 1}	SO ₂	PM ₁₀	PM _{2.5}	Lead
2027	14.05	1.08	1.67	0.02	0.65	0.07	0.00
2028	13.51	1.06	1.51	0.02	0.64	0.06	0.00

Notes:

1. Following standard industry practice, O₃ was evaluated by evaluating emissions of VOC and NOx, which are precursors in the formation of O₃.

3.4 Operational Emissions

Implementation of the Proposed Action Alternatives would increase the number of aircraft operations compared to the No Action Alternative; therefore, additional aircraft operational emissions were estimated as part of the Proposed Action Alternatives.

Operational emissions encompass a range of activities contributing to emissions, including aircraft operations, ground-based aviation-related emissions (from taxiing, auxiliary power units (APUs), and ground support equipment (GSE)), and roadway and parking emissions from additional vehicle trips. All these sources collectively contribute to environmental impacts.

3.4.1 Aircraft Operations

The FAA's Aviation Environmental Design Tool (AEDT) was used to estimate emissions from aviation activities, including aircraft takeoffs, landings, and ground emissions from aircraft taxiing and idling, APUs, and GSE. AEDT is the required tool for the environmental review of infrastructure projects and other Federal actions affecting airports and airspace in the US. The analysis includes an assessment of criteria and GHG air pollutants from these sources in two Proposed Action Alternatives:

1. **Alternative 1 Aircraft Manufacturing** – Alternative 1 assumes that the proposed facility would be used for aircraft manufacturing at OKV. This would most likely be Advanced Air Mobility (AAM) manufacturing, final assembly, and test flights. The facility would include employee

parking and access, and access for trucks to deliver aircraft parts. The Proposed Action (Alternative 1) has the No Action Alternative operations along with the proposed additional AAM test flight operations of 200 annual test flights and 400 annual operations.

2. **Alternative 2 Hangar Storage for Small Aircraft (such as King Airliners)** – Alternative 2 assumes that there is the addition of hangar storage for aircraft at OKV. There are two concepts under development including one concept for 24 100 feet by 100 feet hangars plus parking spaces (“Concept 1”) as well as another concept for four 200 feet by 200 feet hangars and four 100 feet by 100 feet hangars plus parking spaces (“Concept 2”). For the purposes of this analysis, it is assumed all aircraft using the new facility are new to OKV and not currently based and operating at the airport. Based on the number of new aircraft they could house and the associated number of new automobile trips, Concept 1 was determined to be the “worst case” scenario for Alternative 2 and was therefore carried forward for analysis. Concept 1 assumes up to 48 additional turboprops and up to 24 additional jet aircraft could be based at OKV, which are associated with up to 7,032 annual automobile trips. The Proposed Action (Alternative 2) case includes the No Action Alternative operations along with the proposed additional operations from newly based and operating aircraft.

The AEDT model estimated emissions for Alternative 1 and Alternative 2/Concept 1 using the same set of model inputs and forecast operations that were used for the noise calculations, as documented in the HMMH *Noise Technical Memorandum* for the Project. In addition, the aircraft operational emission estimates include emissions from GSE. APU's are used to supply energy or power to equipment on the aircraft like heating and cooling units. The expected aircraft type for the Proposed Alternatives do not have APU's, therefore APU usage was not estimated for this analysis.

The AEDT default taxi times, and AEDT default GSE equipment were assumed for this analysis. Aircraft operations emissions were estimated below the default 3,000-foot mixing height and include:

- Start up
- Taxi out
- Climb below the mixing height
- Descent below the mixing height
- Taxi in
- GSE
- Landing and takeoff (LTO)

3.4.2 Forecast

Delta Airport Consultants developed an aviation forecast for OKV through 2033 using the growth rates from the FAA Aerospace Forecast 2023-2033 which was approved for use on this project by FAA (see **Appendix B**).⁹ The forecasted future year 2029 operation numbers were scaled by category to the approved FAA forecast for the 2029 No Action Alternative scenario. HMMH used this aviation forecast for 2029, the expected year of implementation.

⁹ FAA forecast approval provided on March 7, 2024.

The flight operations modeled for this EA are derived from OKV Automatic Dependent Surveillance-Broadcast (ADS-B) data for calendar year 2023.¹⁰ These operations counts were organized by Area Equivalent Method (AEM) aircraft type and then scaled by category to the annual category counts for 2023 from the approved forecast provided to the FAA from Delta Airport Consultants (see **Appendix B**). Construction of the proposed facility is expected to occur in 2027 and 2028 resulting in 2029 being the first year after construction is complete.

- **Alternative 1** – Since the AAM equipment type is unknown and to be conservative, HMMH assigned 100 percent of the proposed operations (200 LTOs) to a representative fixed wing aircraft and 100 percent of the proposed operations (200 LTOs) to a representative rotorcraft. This approach ensures the analysis covers the possibility that all 200 LTOs (400 total operations) could be 100 percent associated with one or the other type of existing aircraft the AAM may resemble.
- **Alternative 2** – HMMH assigned the additional operations to the expected fleet mix for the proposed hangars from Scenario 1, described above. HMMH assumed the new facility is used for maintenance and aircraft storage like a traditional hangar. Alternative 2 assumes 24 new 100 feet x 100 feet hangars, each can hold two turboprops and one jet; therefore, full use would be 48 turbo props and 24 jets resulting in 7,032 operations (3,516 LTOs).

3.4.3 Aircraft Emission Factors

The aircraft engine emission factors are included in AEDT and are based on the most recent version of the International Civil Aviation Organization (ICAO) Engine Emissions Databank. Therefore, through AEDT, the ICAO emission factors are used to estimate emissions from aircraft engines. Lead emissions from aircraft utilizing aviation gasoline (avgas) which contains lead, were estimated using AEDT calculated fuel burn and equation A1.3 of the FAA Emission Handbook.¹¹

3.4.4 Ground Support Equipment

GSE at airports such as OKV includes baggage tractors, aircraft pushback tractors, and diesel, electric, and gasoline ground power units that provides services to aircraft while they are on the ground being loaded with passengers and cargo. GSE emissions were estimated using emission factors from FAA's AEDT model. GSE population, approximate age, and fuel type are estimated by AEDT from the aircraft operations. AEDT default GSE equipment for each aircraft type was used in the analysis for each year of analysis.

3.4.5 Auxiliary Power Units

The expected aircraft type for the Proposed Alternatives do not have APUs, therefore APU usage was not estimated for this analysis.

¹⁰ Flight operations data obtained through the Airport Monitoring Systems interface for OKV.

¹¹

https://www.faa.gov/sites/faa.gov/files/regulations_policies/policy_guidance/envir_policy/airquality_handbook/Air_Quality_Handbook_Appendices.pdf.

3.4.6 General Access Vehicles

Ground access vehicles (GAVs) include on-road vehicle activity associated with passengers, tenant operations, and airport employees' travel to and from the Airport. Criteria pollutant emission factors representing passenger vehicles in Frederick County were used in the US EPA's MOVES¹² for on-road equipment as discussed in **Section 3.1**. VMT was estimated using a conservative approach, by assuming a roundtrip distance of 30 miles traveled to and from the airport. It was assumed that for 2029 additional GAV traffic generated by the Proposed Action Alternatives would be for Alternative 1 (manufacturing facility) which represents the "worst case" in terms of vehicle trips, at 112,950 round trip automobile trips per year. Similarly, parking was assumed to accommodate up to 690 new vehicles (675 cars and 15 trucks) assuming a travel time of 1,250 feet in and 1,250 feet out assuming a vehicle speed of 15 miles per hour.

3.4.7 Summary of Operational Emissions

Table 4 provide the Opening Year 2029 Proposed Action Alternatives (Alternative 1 and Alternative 2) criteria pollutant emission summary for the additional aircraft activity (i.e., additional aircraft along with additional emissions from landside mobile sources). Lead emissions are also included for the aircraft utilizing avgas, which contains lead in the fuel. For this analysis, only Alternative 1 was expected to include aircraft using avgas¹³ and Alternative 2 did not have any aircraft utilizing avgas.¹⁴ It should be noted that FAA and its partners in the aviation community launched the Eliminate Aviation Gasoline Lead Emissions (EAGLE) with the goal to eliminate leaded aviation fuels in piston-engine aircraft safely by the end of 2030.¹⁵ Furthermore, Congress, in its 2024 FAA Reauthorization Act, prohibits restricting the sale of 100-octane low lead (100LL) aviation gasoline until the earlier of December 31, 2030, or the date the airport makes available unleaded gas authorized by EPA and FAA and meets industry standards or other standard determined by the FAA Administrator.

Similar to the construction equipment, there are no lead emissions associated with employee trips as the fuel usage is either natural gas or unleaded gasoline, which do not result in lead emissions.

The results show that for the criteria pollutant emissions, the Proposed Action operations would result in an increase in emissions for all pollutants compared to the No Action. It should be noted that the emissions presented in **Table 4** are reflective of only additional aircraft and GAV operations associated with the Proposed Alternatives, therefore, only these emissions are presented in **Table 4**. A full inventory of No Build emissions was not generated for this analysis. Also, GSE emissions are included for which AEDT assigns GSE equipment for the specific aircraft assumed in the two alternatives, while APU emissions were not estimated as discussed above.

¹² US EPA, MOVES User Guide for MOVES4, August 2023, <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P101862T.pdf>.

¹³ AAM aircraft in Alternative 1 were modeled as GASEPF, and COMSEP within AEDT which are assumed to use Avgas.

¹⁴ All turboprop and jet aircraft modeled in Alternative 2 are assumed to use Jet-A.

¹⁵ <https://www.faa.gov/unleaded>

Table 4. 2029 Opening Year Emissions Inventory – Proposed Action Alternatives

Source: HMMH, 2024

Alternative	Activity Type Note 5	Annual Aircraft Operations	Relevant Criteria Pollutant Emissions (tons per year)						
			CO	VOC Note 1	NO _x Note 1	SO ₂	PM ₁₀	PM _{2.5}	Lead Note 2,3,4
Proposed Action Alternative 1	Aircraft	800	7.50	0.11	<0.001	<0.001	<0.001	<0.001	0.004
	GSE	N/A	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0
	APU	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals Alternative 1			7.50	0.11	<0.001	<0.001	<0.001	<0.001	0.004
Proposed Action Alternative 2	Aircraft	7,032	20.7	5.68	3.30	0.72	0.21	0.21	0
	GSE	N/A	9.83	0.28	0.19	<0.001	0.01	0.01	0
	APU	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals Alternative 2			30.53	5.96	3.49	0.72	0.22	0.22	0
General Access Vehicles and Parking			12.91	0.35	0.32	0.01	0.01	0.01	0

N/A – not applicable

Notes

1. Following standard industry practice, O₃ was evaluated by evaluating emissions of VOC and NO_x, which are precursors in the formation of O₃.
2. Lead emissions associated with aircraft utilizing avgas for Alternative 1 only, no aircraft are utilizing avgas in Alternative 2.
3. AAM aircraft in Alternative 1 were modeled as GASEPF and COMSEP within AEDT which are assumed to use Avgas.
4. All turboprop and jet aircraft modeled in Alternative 2 are assumed to use Jet-A.
5. Operational emissions denote emissions associated with aircraft and related operations (i.e., GSE) only.

3.4.8 Significance Thresholds

As provided in FAA Order 1050.1F, an action would cause a significant air quality impact if pollutant concentrations would exceed one or more of the NAAQS established by the EPA under the CAA for any of the time periods analyzed or would increase the frequency or severity of any such existing violations. As discussed above, the airport is in Frederick County, which is designated as attainment by the EPA with the NAAQS for all criteria pollutants; therefore, these pollutants do not have EPA *de minimis* thresholds and the General Conformity Rule does not apply. Therefore, the EPA maintenance *de minimis* thresholds of 100 tons per year for CO, NO_x, VOC, SO₂, PM₁₀ and PM_{2.5} and the 25 tons per year for lead¹⁶ were used for the attainment pollutants to determine significant impacts under NEPA for the Proposed Action net emissions change. The *de minimis* thresholds represent emission quantities of a NAAQS-regulated pollutant or its applicable precursors over which net emissions in a nonattainment or maintenance area may cause or contribute to a new or continued violation of the NAAQS. The current EPA *de minimis* thresholds for maintenance areas relevant are listed in **Table 5**.

¹⁶ US EPA Maintenance thresholds for CO, NO_x, VOC, SO₂, PM₁₀, and PM_{2.5} are 100 tons per year and the Maintenance thresholds for Lead is 25 tons per year (see **Table 5**)

Table 5. General Conformity US EPA *De Minimis* Pollutant Emissions Thresholds ^{Note 2}

Source: US EPA, 2024

Pollutants	Attainment Status (Severity)	Pollutants	Threshold (tons per year)
CO	Attainment ^{Note 3}	CO	100
NO ₂	Attainment ^{Note 3}	NO ₂	100
O ₃ ^{Note 1}	Attainment ^{Note 3}	NO _x	100
		VOC	100
PM ₁₀ /PM _{2.5}	Attainment ^{Note 3}	PM ₁₀ /PM _{2.5}	100
SO ₂	Attainment ^{Note 3}	SO ₂	100
Pb	Attainment ^{Note 3}	Pb	25

Notes

1. Following standard industry practice, O₃ was evaluated by evaluating emissions of VOC and NO_x, which are precursors in the formation of O₃.
2. <https://www.epa.gov/general-conformity/de-minimis-tables>.
3. Pollutants designated as attainment, no *de minimis* threshold exists for attainment pollutants. Therefore, the *de minimis* threshold for maintenance was assumed for determining significant impacts under NEPA.
4. CO, Ozone, SO₂, NO_x, lead, and PM₁₀/PM_{2.5} are designated as attainment and no *de minimis* threshold exists for attainment pollutants. The *de minimis* threshold for maintenance was assumed to determine significant impacts.

3.4.9 Construction Emissions Impacts Compared to Significance Levels

Construction-related emissions of criteria pollutants during the construction period (2027 and 2028) under the Proposed Action Alternatives are summarized in **Table 6** and compared with the maintenance area *de minimis* thresholds. The table shows the emission totals for each construction year would be below the established maintenance area designation *de minimis* thresholds for all pollutants, therefore emissions from construction activities would not result in a significant air quality impact. Additionally, in accordance with the FAA Air Quality Handbook, the Proposed Action can be determined to “not cause a significant air quality impact, since it is unlikely the pollutant concentration analyzed would exceed a NAAQS.” No significant adverse air quality impacts would be expected to result from construction of the Proposed Action.

Table 6. Total Construction Emissions Compared to *De Minimis* Thresholds

Source: HMMH, 2024

Year	Relevant Criteria Pollutant Emissions (tons per year)						
	CO ^{Note 1}	VOC	NOx	SO ₂ ^{Note 1}	PM ₁₀ ^{Note 1}	PM _{2.5} ^{Note 1}	Lead ^{Note 2}
2027							
Total Emissions of Construction	14.05	1.08	1.67	0.02	0.65	0.07	0.0
US EPA <i>de minimis</i> Threshold	100	100	100	100	100	100	25
Emissions below <i>de minimis</i> thresholds?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2028							
Total Emissions of Construction	13.51	1.06	1.51	0.02	0.64	0.06	0.0
US EPA <i>de minimis</i> Threshold	100	100	100	100	100	100	25
Emissions below <i>de minimis</i> thresholds?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes

1. Since pollutants are designated attainment by US EPA, no *de minimis* thresholds exist. The maintenance area designation *de minimis* thresholds were used to determine significance under NEPA.
2. Pb emissions for construction emissions were not estimated since the fuel use for these sources is gasoline and diesel which do not contain lead.

3.4.10 Operational Emissions Compared to Significant Levels

Table 7 presents the net change in operational emissions (i.e., aircraft, ground access vehicles, and net new parking facilities) from the implementation of the Proposed Action Alternatives (as compared to the No Action Alternative) and compares those emission changes to the EPA maintenance *de minimis* thresholds for significance determination for the future 2029 conditions. As the table shows, the incremental change for both Proposed Action Alternatives would be below the established maintenance area *de minimis* thresholds for all pollutants. Therefore, like the construction emissions, the incremental change in operational emissions for either Proposed Action Alternatives would not result in a significant air quality impact. Additionally, in accordance with the FAA Air Quality Handbook, the Proposed Action Alternatives can be determined to “not cause a significant air quality impact, since it is unlikely the pollutant concentration analyzed would exceed a NAAQS.” No significant adverse air quality impacts would be expected to result from implementation of the Proposed Action.

Table 7. Net Operational Emission Changes for the Proposed Action Alternatives Compared to *De Minimis* Thresholds

Source: HMMH, 2024

Year ^{Note 1}	Relevant Criteria Pollutant Emissions (tons per year)						
	CO	VOC	NOx	SO ₂	PM ₁₀	PM _{2.5}	Lead
2029 Proposed Alternative 1 Aircraft and GAV/Parking	20.41	0.46	0.32	0.01	0.01	0.01	0.004
EPA <i>de minimis</i> Threshold	100	100	100	100	100	100	25
Emissions below <i>de minimis</i> thresholds?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2029 Proposed Alternative 2 Aircraft and GAV/Parking	43.44	6.34	3.81	0.73	0.23	0.23	0.00
EPA <i>de minimis</i> Threshold	100	100	100	100	100	100	25
Emissions below <i>de minimis</i> thresholds?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes

1. Proposed Alternatives totals include both aircraft and GAV/parking emissions.

3.4.11 No Action Alternative

The No Action Alternative assumes that the Proposed Action is not implemented, and air quality would remain unchanged for 2027 through 2029. Therefore, no additional air quality impacts would occur as a result of choosing the No Action Alternative.

3.4.12 Mitigation

As indicated in **Section 3.4.10**, air quality impacts associated with construction of the Proposed Action Alternatives would not be significant; therefore, no mitigation measures are required for construction emissions. However, the airport is committed to Best Management Practices (BMPs) to mitigate construction impacts which could include dust suppression, maintaining construction vehicles, limiting engine idling, etc.

4. Climate

Climate change is a global phenomenon that can have local impacts.¹⁷ Scientific measurements show that Earth's climate is warming, with concurrent impacts including warmer air temperatures, increased sea level rise, increased storm activity, and an increased intensity in precipitation events. Increasing

¹⁷ As explained by the US EPA, "greenhouse gases, once emitted, become well mixed in the atmosphere, meaning U.S. emissions can affect not only the U.S. population and environment but other regions of the world as well; likewise, emissions in other countries can affect the United States." U.S. Environmental Protection Agency, Climate Change Division, Office of Atmospheric Programs, Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the CAA 2-3, 2009, <https://www.epa.gov/ghgemissions/technical-support-document-endangerment-and-cause-or-contribute-findings-greenhouse>.

concentrations of GHG emissions in the atmosphere affect global climate.^{18, 19} GHG emissions result from anthropogenic sources, including the combustion of fossil fuels. GHGs include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), O₃, and fluorinated gases.²⁰ CO₂ is the most important anthropogenic GHG because it is a long-lived gas that remains in the atmosphere for up to 100 years. Anthropogenic sources of GHG emissions include the combustion of fossil fuels. Scientific measurements show that Earth's climate is warming, with concurrent impacts including warmer air temperatures, increased sea level rise, increased storm activity, and an increased intensity in precipitation events.

The earth's global temperature has risen by 1.5°F over the past century and is projected to continue to rise.²¹ Small changes in the global temperature over time can translate into large and potentially dangerous shifts in climate and weather on a global scale and even at the local level. Many states have seen changes in rainfall, resulting in more floods, droughts, or intense rain, as well as more frequent and severe heat waves.²²

4.1 Regulatory Framework

Research has shown that there is a direct link between fuel combustion and GHG emissions. Therefore, sources that require fuel or power at an airport are the primary sources that would generate GHGs including construction emissions.

While US aviation has seen increased traffic in terms of passengers over the past 30 years, aviation's share of US CO₂ emissions has remained relatively constant. In 2019, civil aviation's share of US CO₂ emissions was about 2.7 percent of total domestic emissions.²³ Aircraft in the national air space are operating much more efficiently, moving more passengers using the same amount of energy. In 2018, the US aviation sector carried about 32 percent more passengers than in the year 2000, while using almost the same amount of fuel (and emissions), due in large part as result of the fuel efficiency improvements of the fleet over time. Today's fleet of aircraft has an average fuel efficiency of 57.5 passenger-miles per gallon of fuel.²⁴

The most recent report by the Intergovernmental Panel on Climate Change (IPCC) was used for calculating Global Warming Potential (GWP) to account for the influence of future warming on the carbon cycle.²⁵ The GWP indicator is a way to compare the global warming impacts of different gases, by converting each gas amount to a carbon dioxide equivalent (CO₂e). GWPs provide a common unit of measure, which allows for consistency when estimating emissions of these different gases. CO₂ has a GWP of one because it is the gas used as the reference point. CH₄ does not last as long in the atmosphere as CO₂; however, it absorbs much more energy. In comparison, one ton of CH₄ has 29.8

¹⁸ Global warming potentials are based on the latest Intergovernmental Panel on Climate Change (IPCC), Sixth Assessment Report (AR6), March 2021. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter_07_Supplementary_Material.pdf.

¹⁹ US Global Change Research Program, Global Climate Change Impacts in the United States, 2009, <http://www.globalchange.gov/what-we-do/assessment/previous-assessments/global-climate-change-impacts-in-the-us-2009>.

²⁰ US Environmental Protection Agency, Overview of Greenhouse Gases, <http://www3.epa.gov/climatechange/ghgemissions/gases.html>.
²¹ <https://www.aqhelp.com/AQdocs.html>.

²² <https://aqhelp.com/Documents/FINAL%20-%20AF%20AQ%20EAP%20Guide%20Vol%201%20-%202019.pdf>.

²³ US EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks," available at: www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks.

²⁴ US, "United States Efforts to Address Aviation's Climate Impact," A40-WP/531, ICAO 40th General Assembly, Executive Committee, available at: www.icao.int/Meetings/a40/Documents/WP/wp_531_en.pdf.

²⁵ https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter_07_Supplementary_Material.pdf.

times more heat-capturing potential than one ton of CO₂. The amount of CH₄ emissions would be multiplied by 29.8 to determine its CO₂e value. Nitrous oxide lasts in the atmosphere far longer than CO₂. The amount of nitrous oxides emissions would be multiplied by 273 to determine its CO₂e value.

Although no federal standards have been set for GHG emissions, it is well established that GHG emissions can affect climate. The Council on Environmental Quality (CEQ) recently released interim guidance on GHG and climate impacts for NEPA and is currently in the comment period but can be used for new NEPA projects.²⁶ The recently issued interim guidance to assist agencies in analyzing GHG and climate change effects of their proposed actions under the NEPA.²⁷ This interim GHG guidance, effective upon publication, builds upon and updates CEQ's 2016 *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews* ("2016 GHG Guidance"), highlighting best practices for analysis grounded in science and agency experience.²⁸ CEQ issued this guidance to provide for greater clarity and more consistency in how agencies address climate change in NEPA reviews.

Furthermore, per FAA Order 1050.1F, the discussion of potential climate impacts should be documented in a separate section of the NEPA document, distinct from air quality.²⁹ Where the proposed action or alternative(s) would result in an increase in GHG emissions, the emissions should be assessed either qualitatively or quantitatively. The guidance recommends consideration of: (1) the potential effects of a proposed action or its alternatives on climate change as indicated by its GHG emissions; (2) the implications of climate change for the environmental effects of a proposed action or alternatives. The overall reduction of aviation related GHG emissions impacts on climate is a goal, but it is not a regulatory mandate.

4.2 Affected Environment

Virginia is committed to addressing the pollutants that contribute to climate change. The Virginia Clean Economy Act establishes renewable portfolio and energy efficiency standards, and advances offshore wind and solar generation, and the Clean Energy and Community Flood Preparedness Act addresses resiliency issues.

The Virginia Department of Environmental Quality (DEQ) has conducted economy wide GHG inventories for 2005, 2010, 2018, and 2020. An online review of local or county GHG was not found, therefore, the DEQ Virginia state inventory was used to represent the Affected Environment for comparison of GHG emissions from the Proposed Action Alternatives. **Table 8** presents the total economy wide GHG emissions summary for the state of Virginia for 2020 while **Table 9** shows the emissions broken down by sector.

²⁶ <https://www.federalregister.gov/documents/2023/01/09/2023-00158/national-environmental-policy-act-guidance-on-consideration-of-greenhouse-gas-emissions-and-climate>.

²⁷ Federal Register: National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change

²⁸ CEQ, Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews, 81 FR 51866 (Aug. 8, 2016), https://ceq.doe.gov/docs/ceq-regulations-and-guidance/NEPA_Final_GHG_Guidance.pdf. On April 5, 2017, CEQ withdrew the final 2016 guidance, as directed by E.O. 13783. 82 FR 16576 (Apr. 5, 2017). On June 26, 2019, CEQ issued draft GHG guidance. 84 FR 30097 (June 26, 2019). CEQ rescinded this draft guidance on February 19, 2021, pursuant to E.O. 13990. 86 FR 10252 (Feb. 19, 2021). In addition, on April 20, 2022, CEQ issued a Final Rule for its "Phase 1" NEPA rulemaking. 87 FR 23453. CEQ will be proceeding with updates to the NEPA regulations as set forth in the 2022 Regulatory Agenda.

²⁹ https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/apl/3-climate.pdf.

Table 8. Total Economy-Wide GHG Emissions from Virginia for 2020

Source: <https://www.deq.virginia.gov/our-programs/air/greenhouse-gases>

Sector	CO2	CH4	N2O	HFC, PFC, NF3, and SF6	CO2e
Mobile Combustion	43.345	0.048	0.332	-	43.725
CO2FFC	48.487	-	-	-	48.487
Electricity Consumption	7.353	-	-	-	7.353
Stationary Combustion	-	0.213	0.133	-	0.347
Industrial Processes	2.260	-	0.000	3.397	5.657
Coal	-	4.860	-	-	4.860
Agriculture	0.187	3.015	2.781	-	5.982
Natural Gas and Oil	-	2.689	-	-	2.689
Solid Waste	1.049	1.836	0.017	-	2.902
Wastewater	-	0.622	0.230	-	0.852
LULUCF	-	-	-	-	-50.275
TOTAL	102.680	13.283	3.493	3.397	72.577
all units in above table are MMTCO2e					

Note: MMTCO₂e = million metric tons of CO₂e

Table 9. Total Economy-Wide GHG Emissions from Virginia for 2020 Broken Down by Sector

Source: <https://www.deq.virginia.gov/our-programs/air/greenhouse-gases>

Sector	CO2	CH4	N2O	HFC, PFC, NF3, and SF6	CO2e
Transportation	43.395	0.048	0.332	-	43.776
Industry	15.943	0.052	0.066	3.397	19.458
Commercial Energy	22.176	0.032	0.008	-	22.217
Residential Energy	19.998	0.103	0.016	-	20.117
Energy Production	-	7.549	-	-	7.549
Agriculture	0.187	3.015	2.781	-	5.982
Solid Waste	1.049	1.836	0.017	-	2.902
Wastewater	-	0.622	0.230	-	0.852
LULUCF	-	-	-	-	-50.275
TOTAL	102.749	13.257	3.450	3.397	72.577
all units in above table are MMTCO2e					

Note: MMTCO₂e = million metric tons of CO₂e

According to the inventory, as of 2020, transportation remains the top emitter in the state followed by Commercial Energy, Residential Energy, and Industry. In 2020, Virginia emitted 72.6 million metric tons of carbon dioxide equivalent (MMTCO₂e) of GHG.

4.3 Analysis Methodology

For this analysis, GHG emissions associated with the Proposed Action Alternatives were prepared for CO₂, CH₄, and N₂O and presented as CO₂e in metric tons per year relevant to their GWP. The CO₂

equivalent is estimated by taking the mass equivalent of each pollutant (tons per year), multiplying by the GWP equivalent of each pollutant, and then adding them together. For example, CO₂ is 1 GWP, CH₄ is 29.8 GWP, and N₂O is 273 GWP, according to the IPCC Sixth Assessment Report.³⁰

The methodology and assumptions for the GHG analysis are consistent with the air quality analysis discussed in **Section 3.1**. GHG emissions associated with the construction activities were qualitatively evaluated.

4.4 Environmental Consequences of Proposed Action Alternative

Table 10 presents the annual greenhouse gas emissions for construction activities associated with the Proposed Action for 2027 and 2028 as well as the operational emissions for the Proposed Alternatives for the 2029 opening year.

In summary, while there are no significance thresholds established for climate impacts, GHGs associated with the Proposed Action have been calculated in accordance with the latest FAA guidelines (1050.1F) for climate impacts in a NEPA document^{31, 32} and included in the emission spreadsheets in **Appendix A**. As ongoing scientific research works to improve the understanding of construction and aviation's relationship to climate change, FAA guidance will evolve if new federal requirements are established. Given the low percentage of overall emissions generated by the Proposed Action Alternatives, the increase in construction and/or Proposed Action Alternatives emissions as a result of the project would not be substantial on a state, national or global scale.

**Table 10. GHG Emissions Associated with Construction and Operations
for the Proposed Action Alternatives**

Source: HMMH, 2024

Year	Greenhouse Gases (metric tons/year)			CO ₂ e (metric tons/year) ^{Notes 2, 3}
	CO ₂	CH ₄	N ₂ O	
Construction ^{Note 1}				
2027	3,513	0.033	0.020	3,519
2028	3,497	0.030	0.020	3,502
Operational				
2029 Proposed Alternative 1	36	0.029	0.0005	37
2029 Proposed Alternative 2	1,342	<0.001	0.0420	1,354
GAV/Parking	1,100	0.031	0.006	1,103

Notes

1. Construction emissions derived from ACEIT and MOVES.
2. GWP values derived from IPCC Sixth Assessment Report were used in the calculations of CO₂e.
3. Emissions presented in the table include the GWP for each pollutant.

³⁰ <https://erce.energy/erceipccsixthassessment/>.

³¹ 1050.1F Desk Reference, https://www.faa.gov/about/office_org/headquarters_offices/apl/envir_policy_guidance/policy/faa_nepa_order/desk_ref/media/3-climate.pdf.

³² FAA Aviation Emissions Air Quality Handbook. Accessed July 2023. https://www.faa.gov/sites/faa.gov/files/regulations_policies/policy_guidance/envir_policy/airquality_handbook/Air_Quality_Handbook_Tutorial.pdf.

4.5 Environmental Consequences of No Action Alternative

The No Action Alternative assumes that the Proposed Action is not implemented, and air quality would remain unchanged for 2026 and 2027. Therefore, no additional GHG impacts would occur as a result of the No Action Alternative.

4.6 Climate Assessment

To evaluate the effects of climate change on a proposed action, two subjective qualitative assessments are performed: (1) the impact of climate change on a proposed action, and (2) the impact of climate change on the action's environmental impacts to address the latest CEQ guidance on GHG and climate.

The following state and local impacts were discussed for addressing the potential impacts on climate change from the Proposed Action.

4.7 State Impacts

The US EPA has developed state specific factsheets regarding climate change impacts. The US EPA factsheet for Virginia is presented in **Figure 1** and shows the potential state impacts as follows:

- Rising Seas and Retreating Shores
- Saltwater Intrusion
- Storms, Homes, and Infrastructure
- Coastal Ecosystems
- Agriculture
- Energy
- Human Health

Figure 1. US EPA Climate Change Impacts for Virginia

Source: https://aqhelp.com/Documents/CCFactSheets/climate-change-VA_AUG2016.pdf



Storms, Homes, and Infrastructure

Tropical storms and hurricanes have become more intense during the past 20 years. Although warming oceans provide these storms with more potential energy, scientists are not sure whether the recent intensification reflects a long-term trend. Nevertheless, hurricane wind speeds and rainfall rates are likely to increase as the climate continues to warm.

Whether or not storms become more intense, coastal homes and infrastructure will flood more often as sea level rises, because storm surges will become higher as well. Many roads, railways, and ports are vulnerable to the impacts of storms and sea level rise, and most of the heavily populated Hampton Roads area could be flooded by a major hurricane. Poquoson and a few other communities along Chesapeake Bay are so low that water in roadside ditches rises and falls with the tides. As sea level rises and storms possibly become more severe, homes and infrastructure in these communities will flood more frequently. As a result, rising sea level is likely to increase flood insurance rates, while more frequent storms could increase the deductible for wind damage in homeowner insurance policies.

Increased rainfall could further exacerbate flooding in both coastal and inland areas. The amount of precipitation during very heavy storms increased by 27 percent between 1958 and 2012 in the Southeast, and the trend toward increasingly severe rainstorms is likely to continue.



The rising sea threatens low lying coastal towns such as Tangier, which is less than five feet above sea level. © James G. Titus; used by permission.

Coastal Ecosystems

The loss of tidal marshes could harm fish and birds that depend on a marsh for food or shelter. Marine organisms and small insects that feed in marshes are key sources of food for crabs, rockfish, and other commercially important fisheries. Striped bass, bluefish, sea trout, and summer flounder move into and out of marshes for food and shelter. Many birds inhabit the most vulnerable marshes along Chesapeake Bay, including great blue heron, bald eagle, American black duck, and snowy egret.

Marshes along the Atlantic coast provide forage for shorebirds, such as sandpipers and plovers, and several species of ducks and geese spend the winter in these marshes.

The loss of bay beaches would remove key habitat for diamond-back terrapin, which nest on these beaches. Other species that depend on bay beaches include horseshoe crabs, tiger beetles, sand fleas, snails, and several crab species. The loss of those species would remove important sources of food for birds.

Changing temperatures could also disrupt ecosystems. If water temperatures exceed 86°F during summer, eelgrass could be lost, which would remove habitat for summer flounder, blue crab, and bay scallop. Brants, canvasback ducks, and American black ducks would also lose a food source.

Agriculture

Changing the climate will have both harmful and beneficial effects on farming. Higher temperatures are likely to reduce livestock productivity, because heat stress disrupts the animals' metabolism. In the next few decades, hotter summers are likely to reduce yields of corn. But higher concentrations of atmospheric carbon dioxide increase crop yields, and that fertilizing effect is likely to offset the harmful effects of heat on cotton, soybeans, wheat, and peanuts—assuming that adequate water is available. Rising temperatures are likely to increase the need for irrigation, and where water is scarce, increasingly severe droughts are likely to reduce crop yields.

Energy

Seventy years from now, temperatures are likely to rise above 95°F approximately 20 to 40 days per year in the southeastern half of Virginia, compared with about 10 days per year today. Warmer temperatures will increase the use of air-conditioning, which will increase electricity consumption.

Human Health

Hot days can be unhealthy—even dangerous. Certain people are especially vulnerable, including children, the elderly, the sick, and the poor. High air temperatures can cause heat stroke and dehydration, and affect people's cardiovascular and nervous systems. Warmer temperatures can also increase the formation of ground-level ozone, a key component of smog. Because ozone has a variety of health effects, aggravates lung diseases such as asthma, and increases the risk of premature death from heart or lung disease, EPA and the Virginia Department of Environmental Quality have been working to reduce ozone concentrations. As the climate changes, continued progress toward clean air will be more difficult.

The sources of information about climate and the impacts of climate change in this publication are: the national climate assessments by the U.S. Global Change Research Program, synthesis and assessment products by the U.S. Climate Change Science Program, assessment reports by the Intergovernmental Panel on Climate Change, and EPA's *Climate Change Indicators in the United States*. Mention of a particular season, location, species, or any other aspect of an impact does not imply anything about the likelihood or importance of aspects that are not mentioned. For more information about climate change science, impacts, responses, and what you can do, visit EPA's Climate Change website at www.epa.gov/climatechange.

4.8 Local Impacts

Under this step, by applying the rule of reason to the state impacted resources, some of broader state impacts can be ruled out (or not impacted) based on the location of the Proposed Action. Based on the location of the airport away from the coast and interior Virginia along the Appalachian Mountains, the following state impacts can be ruled out, rising sea level and retreating shores, saltwater intrusion, and coastal ecosystems. Therefore, the potential local impacts for the Frederick County area are as follows:

- Storms, Homes, and Infrastructure
- Agriculture
- Energy
- Human Health

4.9 Potential Climate Impacts

As stated earlier, there are no defined significance thresholds for aviation GHG emissions, nor has FAA identified any factors to consider in making a significance determination for GHG emissions. Any increases in GHG emissions from construction associated with the Proposed Action Alternatives would be temporary and essential for implementation of the Proposed Action. The potential impacts of climate change to OKV as denoted by US EPA for Virginia in **Figure 1** may be narrowed down based on the location of the airport away from the coast, as such these coastal impacts can be discarded when evaluating potential impacts at the airport environs. Therefore, the potential climate impacts at OKV could include storms, homes and infrastructure, agriculture, energy, and human health.

Increases in construction and operational emissions compared to the No Action Alternative would be temporary on the construction side and slighter higher on the operational side, depending on the alternative compared to the No Build, but necessary for the proposed improvements at OKV. However, the increases would comprise a small portion of the state of Virginia 2020 GHG emissions 72.58 MMTCO₂e, the US-based emissions of 6,472 MMTCO₂e, and even less than the 49 gigatons of carbon dioxide equivalent global GHG emissions.^{33,34,35} Based on all this information, no significant impact on GHGs or climate is expected as a result of the Proposed Action.

It should be noted that for this EA, the best available science, data, and rationale for the GHG analysis is based on the interim guidance. FAA's guidance/policy will evolve and change going into the future.

4.10 Mitigation Measures

The FAA is developing policies for the aviation industry to reduce GHG and climate impacts including the Aviation Action Plan and the Net Zero Sustainable Aviation System. These are general mitigation measures the FAA is developing for the industry and may not be specific to OKV.

³³ <https://dec.ny.gov/sites/default/files/2023-12/summaryreportnysghgemissionsreport2023.pdf>.

³⁴ <https://www.epa.gov/sites/production/files/2019-02/documents/us-ghg-inventory-2019-main-text.pdf>.

³⁵ http://ipcc.ch/publications_and_data/ar4/syr/en/contents.html.

Aviation Action Plan

In November of 2021, the FAA published the US Aviation Climate Action Plan, which describes a whole-of-government approach to put the aviation sector on a path toward achieving net-zero emissions by 2050. The plan builds on individual and sector-wide commitments announced by the US aviation industry and highlights specific actions and policy measures to foster innovation and drive change across the entire US aviation sector.

The actions identified in the plan will decrease emissions through:

- Development of new, more efficient aircraft and engine technologies
- Improvements in aircraft operations throughout the National Airspace System
- Production and use of Sustainable Aviation Fuels (SAF)
- Electrification and, potentially hydrogen, as solutions for short-haul aviation
- Advancements in airport operations across the US
- International initiatives such as the airplane CO₂ standard and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)
- Support for research into climate science.

These actions will not only help the US meet ambitious climate goals, but they will also help improve the quality of life for those living near airports and under flight paths through reductions in community noise and pollutants that degrade air quality. In addition to their environmental benefits, these actions will also spur US economic and job growth.

4.10.1 Net Zero Sustainable Aviation System

The FAA is working to build a net zero sustainable aviation system by 2050 and is committed to making aviation cleaner, quieter, and more sustainable.

4.10.2 Commit to the US Aviation Climate Action Plan and International Leadership

At the United Nations Climate Change Conference in November of 2021, the US Aviation Climate Action Plan³⁶ was released by the United States Department of Transportation (US DOT) and sets out to achieve net-zero greenhouse gas emissions from the US aviation sector by 2050. Because transportation produces the most emissions, the US DOT and FAA will be a large part of the solution. This plan will create a sustainable aviation system that the US is committed to and will work with international partners to maintain and strengthen the Carbon Offsetting and Reduction Scheme for International Aviation.

4.10.3 Increase the Production of Sustainable Aviation Fuels

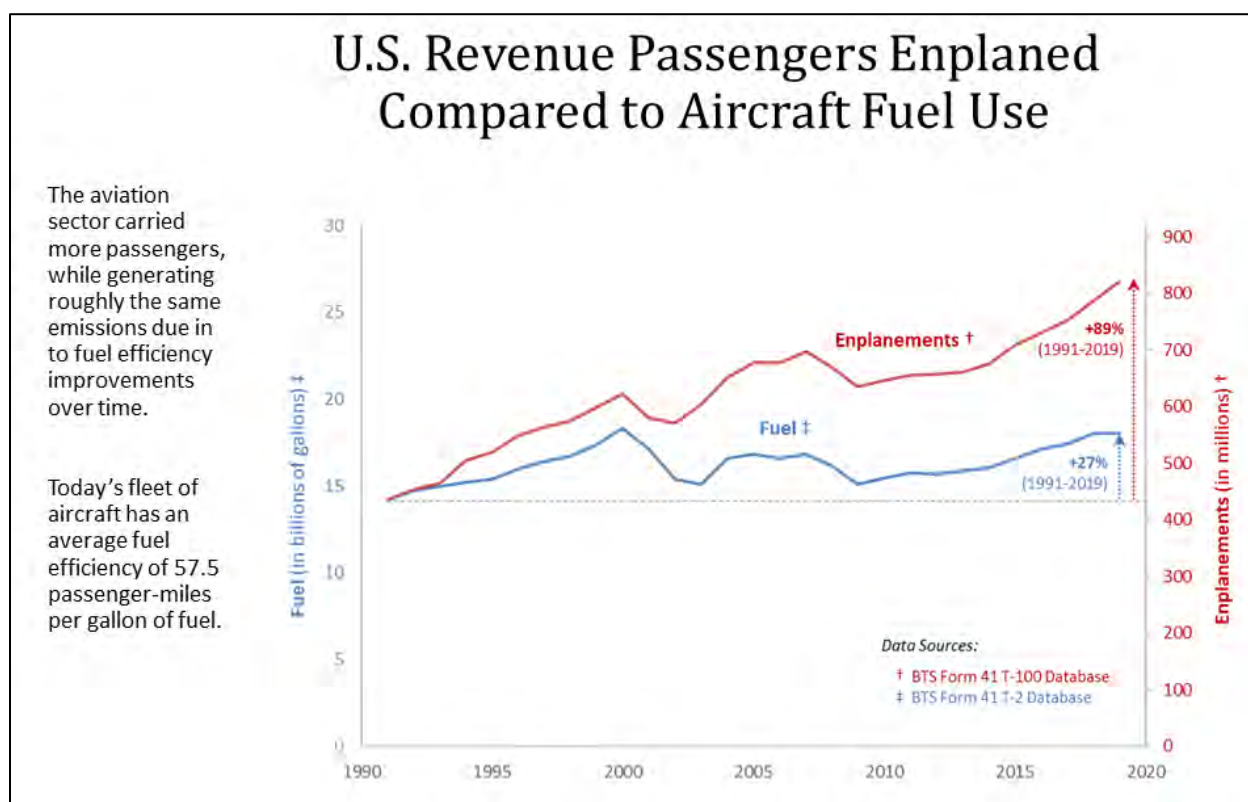
Sustainable aviation fuels produced from renewable and waste feedstock can provide the greatest impact in the FAA's effort to reduce greenhouse gas emissions. As shown in **Figure 2**, such fuels will be critical to the aviation industry's ability to meet the net-zero emissions goal and they have the potential

³⁶ https://www.faa.gov/sites/faa.gov/files/2021-11/Aviation_Climate_Action_Plan.pdf.

to slash emissions by up to 100 percent. Sustainable aviation fuels can be used in today's fleet of aircraft, without modification, and are produced from wastes, residues, biomass, sugar, oils, and gaseous sources of carbon. The FAA also is supporting research for piston aircraft to operate safely without leaded gasoline and encouraging actions that minimize potential exposure to aircraft lead emissions.

Figure 2. US Revenue Passengers Enplaned Compared to Aircraft Fuel Use

Source: FAA <https://www.faa.gov/sustainability#climate-action-plan-international-leadership>



4.10.4 Eliminate Aviation Gasoline Lead Emissions by the End of 2030

The FAA and partners in the aviation community launched the eliminated aviation gasoline lead emissions (EAGLE) initiative to eliminate leaded aviation fuels in piston-engine aircraft safely by the end of 2030. To achieve these goals, EAGLE will:

1. Identify at least one unleaded fuel acceptable for safe General Aviation fleet use.
2. Minimize the safety and technical impacts associated with high-performance engines using unleaded fuels.
3. Facilitate the increased production, distribution, and greater use of unleaded replacement fuels.
4. Ensure that 100 low-lead fuels are available during the transition to unleaded fuel.
5. Establish policies that support airport infrastructure funding for unleaded fuel.
6. Endorse plans that reduce or eliminate reliance upon leaded aviation fuels.

4.10.5 Develop New Aircraft and Engine Technologies

Through the Sustainable Flight National Partnership, the National Aeronautics and Space Administration (NASA) and FAA are working with industry to accelerate the development of more efficient aircraft and engine technologies with a 30-percent improvement in fuel savings compared to today's planes, while also delivering substantial noise and emissions reduction benefits. The FAA provides major support to the ASCENT (the Aviation Sustainability Center) program for university teams from across the country to research and demonstrate the viability of innovative airframe, engine and flight management technologies that reduce noise, emissions, and fuel burn. The Continuous Lower Energy, Emissions and Noise (CLEEN) Program also is a significant environmental effort by the FAA to accelerate the development of new aircraft and engine technologies.

4.10.6 Increase Operations Efficiency

While the US National Airspace System is efficient, there are opportunities for improvements in all phases of flight to reduce fuel burn. This includes improvements during taxiing, takeoff, and landing operations as well as airlines flying more optimal trajectories that reduce fuel usage. Research shows that aircraft operations also affect the climate through non-CO₂ emissions, especially via contrails and aviation-induced cloudiness. The US government is supporting research to cost-effectively reduce climate impacts of aviation by limiting contrail formation. The FAA's NextGen initiatives also support our environmental goals through innovative air traffic control procedures involving Performance Based Navigation and Optimized Profile Descents.

4.10.7 Reduce Airport Emissions and Improve Fuel Efficiency

The government provides incentives to reduce emissions from airports through funding and development of several grant programs. Among others, they include the Zero Emission Vehicle Program,³⁷ which provides grants to replace or convert on-road vehicles for zero-emission vehicles. The Energy Efficiency Program provides funding to identify and implement fuel reduction measures at airports.

³⁷ https://www.faa.gov/airports/environmental/zero_emissions_vehicles.

Appendix A. Air Emissions Spreadsheet Calculations

Airport Construction Emissions Inventory Tool (ACEIT)

Version 1.0

Run Date & Time: 2/27/2024 10:28:58 AM

STUDY

Study Name

OKV Northside Development

Study Description

Construction 2027

EMISSIONS INVENTORY - DETAILS:

Non-Road Sources

Units for Non-Greenhouse Gases Emission: Short Ton

Units for Greenhouse Gases (CO2, CH4, and N2O) Emission: Metric Ton

												MOVESA Em ss on Factors (g/hr)										NONROAD Em ss on TYP																				
Scenario ID	Year	Pro ect	Construct on Act v ty	Equip ment	Moves Equip p	Moves Loadup	Fuel	HP Average	Load Factor	Hours Act v ty	3					5					8					7					10					2						Exhaust
											CO2	NOx	SO2	PM10	PM2.5	VOC	CO2	CO2 tpy	NOx tpy	SO2 tpy	PM10 tpy	PM2.5 tpy	VOC tpy	CO2	CO2 tpy	NOx tpy	SO2 tpy	PM10 tpy	PM2.5 tpy	VOC tpy	CO2	CO2 tpy	NOx tpy	SO2 tpy	PM10 tpy		PM2.5 tpy	VOC tpy				
1	2027	Building - 3000 sqft - 3 stories	Concrete Foundations	Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	320.1	2.115	2.350	0.002	0.305	0.296	0.379	694.892	0.015669976	0.01741872	1.5141E-05	0.00226209	0.002194229	0.002806303	5.1490713	0.015669976	0.01741872	1.5141E-05	0.00226209	0.002194229	0.002806303	5.1490713	0.015669976	0.01741872	1.5141E-05	0.00226209	0.002194229	0.002806303	5.1490713				
1	2027	Building - 3000 sqft - 3 stories	Concrete Foundations	Concrete Ready Mix Trucks	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	60	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000678219	0.003075388	3.3178E-05	0.0001877	0.000182071	0.000249276	12.568191	0.000678219	0.003075388	3.3178E-05	0.0001877	0.000182071	0.000249276	12.568191	0.000678219	0.003075388	3.3178E-05	0.0001877	0.000182071	0.000249276	12.568191				
1	2027	Building - 3000 sqft - 3 stories	Concrete Foundations	Fork Truck	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.59	320.1	0.277	1.079	0.002	0.038	0.037	0.035	996.057	0.005756932	0.022471172	3.342E-05	0.0007976	0.000773667	0.000726754	12.408869	0.005756932	0.022471172	3.342E-05	0.0007976	0.000773667	0.000726754	12.408869	0.005756932	0.022471172	3.342E-05	0.0007976	0.000773667	0.000726754	12.408869				
1	2027	Building - 3000 sqft - 3 stories	Concrete Foundations	Tool Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	80.1	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000905423	0.004105644	4.4292E-05	0.00025508	0.000243065	0.000332784	16.78535	0.000905423	0.004105644	4.4292E-05	0.00025508	0.000243065	0.000332784	16.78535	0.000905423	0.004105644	4.4292E-05	0.00025508	0.000243065	0.000332784	16.78535				
1	2027	Building - 3000 sqft - 3 stories	Construction Mob & Layout	Tractor Trailer- Material Delivery	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	15.9	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000179728	0.000814978	8.7921E-06	4.9741E-05	4.82489E-05	6.60582E-05	3.3305707	0.000179728	0.000814978	8.7921E-06	4.9741E-05	4.82489E-05	6.60582E-05	3.3305707	0.000179728	0.000814978	8.7921E-06	4.9741E-05	4.82489E-05	6.60582E-05	3.3305707				
1	2027	Building - 3000 sqft - 3 stories	Construction Mob & Layout	Survey Crew Trucks	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	9.9	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000119906	0.000507439	5.4743E-06	3.0971E-05	3.00418E-05	4.11306E-05	2.0737515	0.000119906	0.000507439	5.4743E-06	3.0971E-05	3.00418E-05	4.11306E-05	2.0737515	0.000119906	0.000507439	5.4743E-06	3.0971E-05	3.00418E-05	4.11306E-05	2.0737515				
1	2027	Building - 3000 sqft - 3 stories	Construction Mob & Layout	Tractor Trailers Temp Fac.	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	3.9	0.029	0.131	0.001	0.008	0.008	0.011	536.799	4.40842E-05	0.0001999	2.1566E-06	1.2201E-05	1.18346E-05	1.6203E-05	0.8169324	4.40842E-05	0.0001999	2.1566E-06	1.2201E-05	1.18346E-05	1.6203E-05	0.8169324	4.40842E-05	0.0001999	2.1566E-06	1.2201E-05	1.18346E-05	1.6203E-05	0.8169324				
1	2027	Building - 3000 sqft - 3 stories	Exterior Wall Framing	Fork Truck	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.59	600	0.277	1.079	0.002	0.038	0.037	0.035	996.057	0.010790875	0.042120286	6.2643E-05	0.00149502	0.001450172	0.001362238	23.25936	0.010790875	0.042120286	6.2643E-05	0.00149502	0.001450172	0.001362238	23.25936	0.010790875	0.042120286	6.2643E-05	0.00149502	0.001450172	0.001362238	23.25936				
1	2027	Building - 3000 sqft - 3 stories	Exterior Wall Framing	Generator	Other Construction Equipment	Other Construction Equipment40	Diesel	40	0.43	300	0.283	2.532	0.002	0.021	0.021	0.093	995.879	0.001608616	0.014402006	8.9306E-06	0.00012154	0.000117895	0.000527809	3.3893359	0.001608616	0.014402006	8.9306E-06	0.00012154	0.000117895	0.000527809	3.3893359	0.001608616	0.014402006	8.9306E-06	0.00012154	0.000117895	0.000527809	3.3893359				
1	2027	Building - 3000 sqft - 3 stories	Exterior Wall Framing	Man Lift	Rough Terrain Forklifts	Rough Terrain Forklifts75	Diesel	75	0.21	600	0.303	2.605	0.002	0.030	0.029	0.063	995.966	0.003153334	0.027134458	1.6541E-05	0.00030768	0.000298449	0.000651168	6.2081153	0.003153334	0.027134458	1.6541E-05	0.00030768	0.000298449	0.000651168	6.2081153	0.003153334	0.027134458	1.6541E-05	0.00030768	0.000298449	0.000651168	6.2081153				
1	2027	Building - 3000 sqft - 3 stories	Exterior Wall Framing	Tool Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	150	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.001695548	0.007688471	8.2944E-05	0.00046926	0.000455178	0.000623191	31.420478	0.001695548	0.007688471	8.2944E-05	0.00046926	0.000455178	0.000623191	31.420478	0.001695548	0.007688471	8.2944E-05	0.00046926	0.000455178	0.000623191	31.420478				
1	2027	Building - 3000 sqft - 3 stories	Exterior Wall Framing	Tractor Trailer- Material Delivery	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	150	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.001695548	0.007688471	8.2944E-05	0.00046926	0.000455178	0.000623191	31.420478	0.001695548	0.007688471	8.2944E-05	0.00046926	0.000455178	0.000623191	31.420478	0.001695548	0.007688471	8.2944E-05	0.00046926	0.000455178	0.000623191	31.420478				
1	2027	Building - 3000 sqft - 3 stories	Interior Build-Out/ Finishes	Fork Truck	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.59	2400	0.277	1.079	0.002	0.038	0.037	0.035	996.057	0.0431635	0.168481142	0.00025057	0.00098009	0.000580689	0.005448952	93.073442	0.0431635	0.168481142	0.00025057	0.00098009	0.000580689	0.005448952	93.073442	0.0431635	0.168481142	0.00025057	0.00098009	0.000580689	0.005448952	93.073442				
1	2027	Building - 3000 sqft - 3 stories	Interior Build-Out/ Finishes	Man Lift	Rough Terrain Forklifts	Rough Terrain Forklifts75	Diesel	75	0.21	2400	0.303	2.605	0.002	0.030	0.029	0.063	995.966	0.01261335	0.108537831	6.6164E-05	0.00123072	0.001193795	0.002460471	24.832461	0.01261335	0.108537831	6.6164E-05	0.00123072	0.001193795	0.002460471	24.832461	0.01261335	0.108537831	6.6164E-05	0.00123072	0.001193795	0.002460471	24.832461				
1	2027	Building - 3000 sqft - 3 stories	Interior Build-Out/ Finishes	Tool Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	300	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.003391096	0.015376942	0.00016589	0.000939851	0.000910357	0.001246382	62.840956	0.003391096	0.015376942	0.00016589	0.000939851	0.000910357	0.001246382	62.840956	0.003391096	0.015376942	0.00016589	0.000939851	0.000910357	0.001246382	62.840956				
1	2027	Building - 3000 sqft - 3 stories	Interior Build-Out/ Finishes	Tractor Trailer- Material Delivery	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	600	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.006782192	0.030753885	0.00033178	0.00187702	0.001820714	0.002492764	125.68191	0.006782192	0.030753885	0.00033178	0.00187702	0.001820714	0.002492764	125.68191	0.006782192	0.030753885	0.00033178	0.00187702	0.001820714	0.002492764	125.68191				
1	2027	Building - 3000 sqft - 3 stories	Roofing	High Lift	Rough Terrain Forklifts	Rough Terrain Forklifts100	Diesel	100	0.59	120	0.029	1.012	0.002	0.033	0.032	0.023	996.052	0.001711787	0.007899784	1.2456E-05	0.00025659	0.000248888	0.000175797	4.6521415	0.001711787	0.007899784	1.2456E-05	0.00025659	0.000248888	0.000175797	4.6521415	0.001711787	0.007899784	1.2456E-05	0.00025659	0.000248888	0.000175797	4.6521415				
1	2027	Building - 3000 sqft - 3 stories	Roofing	Man Lift (Fascia Construction)	Rough Terrain Forklifts	Rough Terrain Forklifts75	Diesel	75	0.21	24	0.303	2.605	0.002	0.030	0.029	0.063	995.966	0.000126133	0.01085378	6.6164E-07	1.2307E-05	1.19379E-05	6.60467E-05	2.0483246	0.000126133	0.01085378	6.6164E-07	1.2307E-05	1.19379E-05	6.60467E-05	2.0483246	0.000126133	0.01085378	6.6164E-07	1.2307E-05	1.19379E-05	6.60467E-05	2.0483246				
1	2027	Building - 3000 sqft - 3 stories	Roofing	Material Deliveries	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	60	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000678219	0.003075388	3.3178E-05	0.0001877	0.000182071	0.000249276	12.568191	0.000678219	0.003075388	3.3178E-05	0.0001877	0.000182071	0.000249276	12.568191	0.000678219	0.003075388	3.3178E-05	0.0001877	0.000182071	0.000249276	12.568191				
1	2027	Building - 3000 sqft - 3 stories	Roofing	Tractor Trailer- Material Delivery	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	60	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000678219	0.003075388	3.3178E-05	0.0001877	0.000182071	0.000249276	12.568191	0.000678219	0.003075388	3.3178E-05	0.0001877	0.000182071	0.000249276	12.568191	0.000678219	0.003075388	3.3178E-05	0.0001877	0.000182071	0.000249276	12.568191				
1	2027	Building - 3000 sqft - 3 stories	Security & Safety Systems	High Lift	Rough Terrain Forklifts	Rough Terrain Forklifts100	Diesel	100	0.59	800.1	0.029	1.012	0.002	0.033	0.032	0.023	996.052	0.01141334	0.052671813	8.3049E-05	0.00171078	0.00165946	0.000184131	31.018153	0.01141334	0.052671813	8.3049E-05	0.00171078	0.00165946	0.000184131	31.018153	0.01141334	0.052671813	8.3049E-05	0.00171078	0.00165946	0.000184131	31.018153				
1	2027	Building - 3000 sqft - 3 stories	Security & Safety Systems	Off-highway Trucks	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	200.1	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000226181	0.010256421	0.00011065	0.000625599																					

3	2027	Apron (GA)	Asphalt Placement	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	21.853125	5.525	5.203	0.002	0.774	0.751	1.016	693.021	0.002096032	0.001979329	9.042E-07	0.00029362	0.00028481	0.000385394	0.2629343
3	2027	Apron (GA)	Asphalt Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	27.972	1.482	3.763	0.002	0.171	0.166	0.352	595.151	0.00078484	0.001713991	9.935E-07	7.7889E-05	7.55528E-05	0.000159966	0.2706755
3	2027	Apron (GA)	Clearing and Grubbing	Chain Saw	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.7	48	2.466	4.184	0.002	0.240	0.233	0.838	593.756	0.001004531	0.001704597	8.8948E-07	9.7817E-05	9.48829E-05	0.000314149	0.2419057
3	2027	Apron (GA)	Clearing and Grubbing	Chipper/Stump Grinder	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	0	0.277	1.079	0.002	0.038	0.037	0.035	596.057	0.000629169	0.002455827	3.6524E-06	8.7167E-05	8.45524E-05	7.94254E-05	1.356139
3	2027	Apron (GA)	Clearing and Grubbing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	64	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000723434	0.003280414	3.539E-05	0.00020022	0.000192409	0.000265895	13.406071
3	2027	Apron (GA)	Concrete Placement	Air Compressor	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	58.2752	0.277	1.079	0.002	0.038	0.037	0.035	596.057	0.000763846	0.002981357	4.4343E-06	0.00010563	0.000102652	8.64277E-05	1.6464431
3	2027	Apron (GA)	Concrete Placement	Concrete Saws	Other Construction Equipment	Other Construction Equipment40	Diesel	40	0.59	58.2752	0.283	2.532	0.002	0.021	0.021	0.093	595.879	0.000428744	0.00383726	2.9803E-06	3.2394E-05	3.14226E-05	0.000140677	0.9033596
3	2027	Apron (GA)	Concrete Placement	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	242.8133333	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.002744678	0.012445755	0.0013427	0.000799681	0.000736823	0.001008794	50.862073
3	2027	Apron (GA)	Concrete Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	116.5504	0.131	0.394	0.001	0.028	0.027	0.030	536.744	0.001263696	0.003808153	1.3976E-05	0.000299607	0.000260029	0.000290615	1.5919279
3	2027	Apron (GA)	Concrete Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	174.8256	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.00197168	0.008960944	9.6672E-05	0.00054692	0.000530512	0.000726332	36.620693
3	2027	Apron (GA)	Concrete Placement	Rubber Tired Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	58.2752	0.877	1.736	0.002	0.182	0.176	0.283	625.720	0.05881801	0.01513106	1.2204E-05	0.00120616	0.00116997	0.001879742	4.150119
3	2027	Apron (GA)	Concrete Placement	Slip Form Paver	Pavers	Pavers175	Diesel	175	0.59	58.2752	0.087	0.248	0.001	0.021	0.020	0.013	536.763	0.00054077	0.001642088	9.4983E-06	0.00013962	0.000135432	8.9433E-05	3.5603027
3	2027	Apron (GA)	Concrete Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	58.2752	1.482	3.763	0.002	0.171	0.166	0.352	595.151	0.001413421	0.00356541	2.0735E-06	0.00016227	0.000157402	0.000333327	0.5639093
3	2027	Apron (GA)	Drainage- 24 inch SICPP	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	50.72	0.075	0.249	0.001	0.018	0.017	0.012	536.797	0.000430882	0.001435483	8.2153E-06	0.00010246	9.9833E-05	6.79788E-05	3.0967444
3	2027	Apron (GA)	Drainage- 24 inch SICPP	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	50.72	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000573321	0.002599728	2.8046E-05	0.00015867	0.000153911	0.000210722	10.624311
3	2027	Apron (GA)	Drainage- 24 inch SICPP	Excavator	Excavators	Excavators175	Diesel	175	0.59	50.72	0.060	0.205	0.001	0.014	0.014	0.010	536.803	0.000347237	0.001185921	1.8183E-06	8.0413E-05	7.80006E-05	5.61034E-05	3.098783
3	2027	Apron (GA)	Drainage- 24 inch SICPP	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	50.72	0.077	1.736	0.002	0.182	0.176	0.283	625.720	0.00063723	0.010020467	1.0622E-05	0.00104978	0.001018287	0.001636039	3.6120688
3	2027	Apron (GA)	Drainage- 24 inch SICPP	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	50.72	0.131	0.394	0.001	0.028	0.027	0.030	536.744	0.000549931	0.001657219	6.0819E-06	0.00011666	0.000113158	0.000126409	2.2581867
3	2027	Apron (GA)	Drainage- 24 inch SICPP	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	50.72	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000573321	0.002599728	2.8046E-05	0.00015867	0.000153911	0.000210722	10.624311
3	2027	Apron (GA)	Drainage- 24 inch SICPP	Roller	Rollers	Rollers100	Diesel	100	0.59	50.72	0.157	0.930	0.002	0.028	0.027	0.013	596.120	0.00051688	0.003066168	5.232E-06	9.2167E-05	8.94017E-05	4.33914E-05	1.9683978
3	2027	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	26.17777778	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000318512	0.001444294	1.5581E-05	8.8151E-05	8.55061E-05	0.000117068	5.902396
3	2027	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	26.17777778	0.877	1.736	0.002	0.182	0.176	0.283	625.720	0.000381179	0.005566926	5.9611E-06	0.00056321	0.000565715	0.000900011	2.9067049
3	2027	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	26.17777778	0.131	0.394	0.001	0.028	0.027	0.030	536.744	0.000305517	0.000920677	3.7388E-06	6.481E-05	6.26858E-05	7.02056E-05	1.2545482
3	2027	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	26.17777778	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000318512	0.001444294	1.5581E-05	8.8151E-05	8.55061E-05	0.000117068	5.902396
3	2027	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Tractors/Loaders/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	26.17777778	2.115	2.350	0.002	0.305	0.296	0.379	694.892	0.00173997	0.00153316	1.3328E-06	0.00019913	0.000193514	0.000247033	4.5326227
3	2027	Apron (GA)	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	2880	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.032545251	0.147618647	0.00159253	0.00090671	0.000739426	0.001195626	603.27318
3	2027	Apron (GA)	Excavation (Borrow)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	97.12533333	0.075	0.249	0.001	0.018	0.017	0.012	536.797	0.00082511	0.002748553	1.5732E-05	0.0001962	0.000190312	0.000130175	5.9338837
3	2027	Apron (GA)	Excavation (Borrow)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	97.12533333	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.001097871	0.004978302	5.3707E-05	0.00030384	0.000294729	0.000403518	20.344829
3	2027	Apron (GA)	Excavation (Borrow)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	97.12533333	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.001097871	0.004978302	5.3707E-05	0.00030384	0.000294729	0.000403518	20.344829
3	2027	Apron (GA)	Excavation (Borrow)	Roller	Rollers	Rollers100	Diesel	100	0.59	44.8207692	0.157	0.930	0.002	0.028	0.027	0.013	596.120	0.000546808	0.002709924	4.6223E-06	8.1458E-05	7.90145E-05	8.83496E-05	1.7379311
3	2027	Apron (GA)	Excavation (Cut to Fill)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	72.844	0.075	0.249	0.001	0.018	0.017	0.012	536.797	0.000618832	0.002061639	1.1799E-05	0.00014715	0.000142794	9.7831E-05	4.4504128
3	2027	Apron (GA)	Excavation (Cut to Fill)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	194.2506667	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.002195742	0.00956604	0.00010741	0.00060769	0.000589458	0.000807035	40.889669
3	2027	Apron (GA)	Excavation (Cut to Fill)	Excavator	Excavators	Excavators175	Diesel	175	0.59	58.2752	0.060	0.205	0.001	0.014	0.014	0.010	536.803	0.000398961	0.001362575	9.4022E-06	9.2391E-05	8.96195E-05	4.44005E-05	3.5603746
3	2027	Apron (GA)	Excavation (Cut to Fill)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	58.2752	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000687292	0.002968981	3.2224E-05	0.00018231	0.000176837	0.000242111	12.206886
3	2027	Apron (GA)	Excavation (Cut to Fill)	Roller	Rollers	Rollers100	Diesel	100	0.59	58.2752	0.157	0.930	0.002	0.028	0.027	0.013	596.120	0.000563851	0.003529902	6.009E-06	0.00010509	0.000102719	9.48549E-05	2.2593104
3	2027	Apron (GA)	Excavation (Cut to Fill)	Scraper	Scrapers	Scrapers600	Diesel	600	0.59	72.844	0.114	0.335	0.001	0.020	0.020	0.021	536.767	0.000325569	0.009523016	4.1188E-05	0.00057624	0.000558957	0.000610018	15.257723
3	2027	Apron (GA)	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	27.42352941	0.075	0.249	0.001	0.018	0.017	0.012	536.797	0.000232971	0.000776144	4.4419E-06	5.5397E-05	5.37349E-05	6.3751E-05	1.6754438
3	2027	Apron (GA)	Fencing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	17.5	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000197814	0.000896988	9.6788E-06	5.4748E-05	5.31042E-05	2.70566E-05	3.6657224
3	2027	Apron (GA)	Fencing	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	70	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000791256	0.003587953	3.8707E-05	0.00021899	0.000212417	0.000290822	14.66289
3	2027	Apron (GA)	Fencing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	70	0.131	0.394	0.001	0.028	0.027	0.030	536.744	0.000758974	0.002287171	1.8938E-06	0.000161	0.000156173	0.000174543	3.1158626
3	2027	Apron (GA)	Fencing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	70	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.000791256	0.003587953	3.8707E-05	0.00021899	0.000212417	0.000290822	14.66289
3	2027	Apron (GA)	Fencing	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	70	5.525	5.203	0.002	0.774	0.751	1.016	693.021	0.000714017	0.006322895	2.8966E-06	0.00094052	0.000912303	0.001234495	8.4822321
3	2027	Apron (GA)	Fencing	Tractors/Loaders/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	70	2.115	2.350	0.002	0.305	0.296	0.379	694.892	0.003426737	0.003808717	3.311E-06	0.00040468	0.000479838	0.000613887	1.1260075
3	2027	Apron (GA)	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	19.3529	0.075	0.249	0.001	0.018	0.017	0.012								

4	2027	Fuel Tanks	Drainage- 24 inch SICPP	Excavator	Excavators	Excavators175	Diesel	175	0.59	1.088	0.060	0.205	0.001	0.014	0.014	0.010	536.803	7.44862E-06	2.54393E-05	1.7554E-07	1.7249E-06	1.6732E-06	1.20348E-06	0.0664723
4	2027	Fuel Tanks	Drainage	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	1.088	0.075	0.249	0.001	0.018	0.017	0.012	536.797	9.2429E-06	3.07927E-05	1.7632E-07	2.1978E-06	2.13188E-06	4.5822E-06	0.0664715
4	2027	Fuel Tanks	Drainage	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.088	0.029	0.131	0.001	0.008	0.008	0.011	536.799	1.22984E-05	5.5767E-05	6.0162E-07	3.4037E-06	3.30156E-06	4.52021E-06	0.2279032
4	2027	Fuel Tanks	Drainage	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	1.088	0.877	1.736	0.002	0.182	0.176	0.283	625.720	0.000108622	0.00021495	2.2785E-07	2.2519E-05	2.18434E-05	5.50948E-05	0.0774929
4	2027	Fuel Tanks	Drainage	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	1.088	0.131	0.094	0.001	0.028	0.027	0.030	536.744	1.17966E-05	3.55492E-05	1.3046E-07	2.5024E-06	2.42737E-06	2.7129E-06	0.0444066
4	2027	Fuel Tanks	Drainage	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.088	0.029	0.131	0.001	0.008	0.008	0.011	536.799	1.22984E-05	5.5767E-05	6.0162E-07	3.4037E-06	3.30156E-06	4.52021E-06	0.2279032
4	2027	Fuel Tanks	Drainage	Roller	Rollers	Rollers100	Diesel	100	0.59	1.088	0.157	0.930	0.002	0.028	0.027	0.013	596.120	1.10872E-05	6.57727E-05	1.1219E-07	1.9771E-06	1.91779E-06	3.0793E-07	0.0421814
4	2027	Fuel Tanks	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	2880	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0.032554521	0.147618647	0.00159253	0.00900971	0.008739426	0.011965266	603.27318
4	2027	Fuel Tanks	Excavation (Borrow)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	1.705333333	0.075	0.249	0.001	0.018	0.017	0.012	536.797	1.44873E-05	4.82645E-05	2.7622E-07	3.4449E-06	3.34151E-06	2.28562E-06	0.1041875
4	2027	Fuel Tanks	Excavation (Borrow)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.705333333	0.029	0.131	0.001	0.008	0.008	0.011	536.799	1.92765E-05	8.74094E-05	9.4298E-07	5.3349E-06	5.17487E-06	7.08499E-06	0.3572159
4	2027	Fuel Tanks	Excavation (Borrow)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.705333333	0.029	0.131	0.001	0.008	0.008	0.011	536.799	1.92765E-05	8.74094E-05	9.4298E-07	5.3349E-06	5.17487E-06	7.08499E-06	0.3572159
4	2027	Fuel Tanks	Excavation (Borrow)	Roller	Rollers	Rollers100	Diesel	100	0.59	0.787076923	0.157	0.930	0.002	0.028	0.027	0.013	596.120	8.02067E-06	4.7581E-05	8.1159E-08	1.4303E-06	1.38734E-06	6.73351E-07	0.0305147
4	2027	Fuel Tanks	Excavation (Cut to Fill)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	1.279	0.075	0.249	0.001	0.018	0.017	0.012	536.797	1.08655E-05	3.61984E-05	2.0716E-07	2.5836E-06	2.50613E-06	1.71421E-06	0.0781407
4	2027	Fuel Tanks	Excavation (Cut to Fill)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	3.410666667	0.029	0.131	0.001	0.008	0.008	0.011	536.799	3.8553E-05	0.000174819	1.886E-06	1.067E-05	1.03497E-05	1.417E-05	0.7144318
4	2027	Fuel Tanks	Excavation (Cut to Fill)	Excavator	Excavators	Excavators175	Diesel	175	0.59	1.0232	0.060	0.205	0.001	0.014	0.014	0.010	536.803	7.00499E-06	2.39342E-05	1.6509E-07	1.6222E-06	1.57354E-06	1.1318E-06	0.0625133
4	2027	Fuel Tanks	Excavation (Cut to Fill)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.0232	0.029	0.131	0.001	0.008	0.008	0.011	536.799	1.15695E-05	5.24456E-05	5.6579E-07	3.2009E-06	3.10492E-06	4.25099E-06	0.2143296
4	2027	Fuel Tanks	Excavation (Cut to Fill)	Roller	Rollers	Rollers100	Diesel	100	0.59	1.0232	0.157	0.930	0.002	0.028	0.027	0.013	596.120	1.04269E-05	6.18554E-05	1.0551E-07	1.8593E-06	1.80355E-06	8.73565E-07	0.0396681
4	2027	Fuel Tanks	Excavation (Cut to Fill)	Scraper	Scrapers	Scrapers600	Diesel	600	0.59	1.279	0.114	0.335	0.001	0.020	0.020	0.021	536.767	5.68103E-05	0.000167206	7.2318E-07	1.0118E-05	9.8142E-06	1.07107E-05	0.2678962
4	2027	Fuel Tanks	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	0.050196078	0.075	0.249	0.001	0.018	0.017	0.012	536.797	4.26431E-07	1.42066E-06	1.0304E-09	1.014E-07	9.83565E-06	6.72766E-06	0.0030687
4	2027	Fuel Tanks	Fencing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.266666667	0.029	0.131	0.001	0.008	0.008	0.011	536.799	3.01431E-06	1.36684E-05	1.4746E-07	8.3423E-07	8.09206E-07	1.07896E-06	0.0558586
4	2027	Fuel Tanks	Fencing	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.066666667	0.029	0.131	0.001	0.008	0.008	0.011	536.799	1.20572E-05	5.46736E-05	5.8983E-07	3.3369E-06	3.2682E-06	4.2158E-06	0.2234345
4	2027	Fuel Tanks	Fencing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	1.066666667	0.131	0.394	0.001	0.028	0.027	0.030	536.744	1.15653E-05	3.48521E-05	1.2791E-07	2.4534E-06	2.37978E-06	4.65971E-06	0.0474908
4	2027	Fuel Tanks	Fencing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.066666667	0.029	0.131	0.001	0.008	0.008	0.011	536.799	1.20572E-05	5.46736E-05	5.8983E-07	3.3369E-06	3.2682E-06	4.2158E-06	0.2234345
4	2027	Fuel Tanks	Fencing	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders175	Diesel	75	0.21	1.066666667	5.525	5.203	0.002	0.774	0.751	1.016	693.021	0.000102309	9.63489E-05	4.4139E-08	1.4332E-05	1.39018E-05	8.88114E-05	0.012834
4	2027	Fuel Tanks	Fencing	Tractors/Loaders/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	1.066666667	2.115	2.350	0.002	0.305	0.296	0.379	694.892	6.22169E-05	5.80376E-05	5.0435E-08	7.5379E-06	7.31181E-06	3.5214E-06	0.0171582
4	2027	Fuel Tanks	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	0.083	0.075	0.249	0.001	0.018	0.017	0.012	536.797	7.05111E-07	2.34908E-06	1.3444E-08	1.6766E-07	1.26234E-07	1.11243E-07	0.0050709
4	2027	Fuel Tanks	Grading	Grader	Graders	Graders300	Diesel	300	0.59	0.083	0.037	0.149	0.001	0.010	0.009	0.012	536.795	5.91999E-07	2.41528E-06	2.3009E-08	1.5724E-07	1.2525E-07	1.9704E-07	0.0080829
4	2027	Fuel Tanks	Grading	Roller	Rollers	Rollers100	Diesel	100	0.59	0.083	0.157	0.930	0.002	0.028	0.027	0.013	596.120	8.45808E-07	5.01759E-06	8.5585E-09	1.5082E-07	1.463E-07	7.10072E-08	0.0032179
4	2027	Fuel Tanks	Hydroseeder	Hydroseeder	Other Construction Equipment	Other Construction Equipment600	Diesel	600	0.59	0.0748	0.542	1.387	0.002	0.077	0.074	0.076	536.610	1.58222E-05	4.04827E-05	4.6071E-08	2.235E-06	2.16795E-06	2.22795E-06	0.0156628
4	2027	Fuel Tanks	Hydroseeder	Off-Road Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.0748	0.029	0.131	0.001	0.008	0.008	0.011	536.799	8.45513E-07	3.83398E-06	1.4362E-08	2.34E-07	2.20892E-07	1.07075E-07	0.0156683
4	2027	Fuel Tanks	Markings	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.658285714	0.029	0.131	0.001	0.008	0.008	0.011	536.799	7.44103E-06	3.37414E-05	3.6401E-07	2.0594E-06	1.99758E-06	7.73492E-06	0.137891
4	2027	Fuel Tanks	Markings	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	0.658285714	0.131	0.394	0.001	0.028	0.027	0.030	536.744	7.13745E-06	2.15087E-05	7.8936E-08	1.5141E-06	1.48866E-06	1.64142E-06	0.0239086
4	2027	Fuel Tanks	Markings	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.658285714	0.029	0.131	0.001	0.008	0.008	0.011	536.799	7.44103E-06	3.37414E-05	3.6401E-07	2.0594E-06	1.99758E-06	7.73492E-06	0.137891
4	2027	Fuel Tanks	Soil Erosion/Sediment Control	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	0	0.131	0.394	0.001	0.028	0.027	0.030	536.744	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Soil Erosion/Sediment Control	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Soil Erosion/Sediment Control	Pumps	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.43	0	2.466	4.184	0.002	0.240	0.233	0.838	593.756	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Soil Erosion/Sediment Control	Tractors/Loaders/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	0	2.115	2.350	0.002	0.305	0.296	0.379	694.892	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Street Lighting	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Street Lighting	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	0	0.877	1.736	0.002	0.182	0.176	0.283	625.720	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Street Lighting	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	0	0.131	0.394	0.001	0.028	0.027	0.030	536.744	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Street Lighting	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0	0.029	0.131	0.001	0.008	0.008	0.011	536.799	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Street Lighting	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders175	Diesel	75	0.21	0	5.525	5.203	0.002	0.774	0.751	1.016	693.021	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Street Lighting	Tractors/Loaders/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	0	2.115	2.350	0.002	0.305	0.296	0.379	694.892	0	0	0	0	0	0	0
4	2027	Fuel Tanks	Subbase Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	0.007368421	0.075	0.249	0.001	0.018	0.017	0.012	536.797	5.72315E-07	1.90667E-06	1.0912E-08	1.3609E-07	1.23005E-07	9.02292E-08	0.0041159
4	2027	Fuel Tanks	Subbase Placement	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.075555556	0.029	0.131	0.001	0.008	0.008	0.011	536.799	5.37552E-06	2.43735E-05	2.6296E-07	1.4877E-06	1.44308E-06	1.97575E-06	0.0996146
4	2027	Fuel Tanks	Subbase Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.007368421	0.029	0.131	0.001	0.008	0.008	0.011	536.799	7.61509E-07	3.45307E-06	3.7525E-08	2.1075E-07	2.04431E-07	7.79896E-07	0.0141117
4	2027	Fuel Tanks	Subbase Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	0.005846154	0.157	0.930	0.002	0.028	0.0									

3	2027	Apron (GA)	Asphalt Drying	12	0	0	0	0	0.25
3	2027	Apron (GA)	Asphalt Storage and Batching	12	0.3811	0.0238	0.004378	0.0261	0.0118
3	2027	Apron (GA)	Concrete Mixing/Batching	12	0	0	0	0.13475	0
3	2027	Apron (GA)	Material Movement (Paved Roads)	12	0	0	0	0.02995	0
3	2027	Apron (GA)	Material Movement (Unpaved Roads)	12	0	0	0	0.09585	0
3	2027	Apron (GA)	Soil Handling	12	0	0	0	0.0446	0
3	2027	Apron (GA)	Unstabilized Land and Wind Erosion	12	0	0	0	6.353E-08	0
4	2027	Fuel Tanks	Asphalt Drying	12	0	0	0	0	0.0107
4	2027	Fuel Tanks	Asphalt Storage and Batching	12	0.000697	4.351E-05	8.005E-06	4.772E-05	2.158E-05
4	2027	Fuel Tanks	Concrete Mixing/Batching	12	0	0	0	0.0002465	0
4	2027	Fuel Tanks	Material Movement (Paved Roads)	12	0	0	0	0.02395	0
4	2027	Fuel Tanks	Material Movement (Unpaved Roads)	12	0	0	0	0.07075	0
4	2027	Fuel Tanks	Soil Handling	12	0	0	0	8.15E-05	0
4	2027	Fuel Tanks	Unstabilized Land and Wind Erosion	12	0	0	0	1.162E-10	0
Totals					0.381797	0.0238	0.004378	0.573077	0.64345

Emission Source		CO	NOx	SO2	PM10	PM2.5	VOC	CO2	CH4	N2O	CO2e	GHG emissions in Metric Tons per Year
Emission Source												
NonRoad	NonRoad	0.302	1.178	0.007	0.060	0.059	0.076	2551.298	--	--		GHG in metric tons per year
OnRoad	OnRoad	13.368	0.464	0.007	0.012	0.011	0.365	1321.697	0.036	0.018		
Fugitive	Fugitive	0.382	0.024	0.004	0.573	--	0.64345	--	--	--		
TOTAL		14.05	1.67	0.018	0.65	0.07	1.08	3513.52	0.033	0.02	3.519	

Project Final Selections

Scenario	IC Project	Construction Activity	Equipment	Fuel Type
1	Building - 30	Concrete Foundations	Backhoe	Diesel
1	Building - 30	Concrete Foundations	Concrete Ready Mix Trucks	Diesel
1	Building - 30	Concrete Foundations	Fork Truck	Diesel
1	Building - 30	Concrete Foundations	Tool Truck	Diesel
1	Building - 30	Concrete Foundations	Tractor Trailer- Material Delivery	Diesel
1	Building - 30	Construction Mob & Layout	Survey Crew Trucks	Diesel
1	Building - 30	Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel
1	Building - 30	Exterior Wall Framing	Fork Truck	Diesel
1	Building - 30	Exterior Wall Framing	Generator	Diesel
1	Building - 30	Exterior Wall Framing	Man Lift	Diesel
1	Building - 30	Exterior Wall Framing	Tool Truck	Diesel
1	Building - 30	Exterior Wall Framing	Tractor Trailer- Material Delivery	Diesel
1	Building - 30	Interior Build-Out/ Finishes	Fork Truck	Diesel
1	Building - 30	Interior Build-Out/ Finishes	Man Lift	Diesel
1	Building - 30	Interior Build-Out/ Finishes	Tool Truck	Diesel
1	Building - 30	Interior Build-Out/ Finishes	Tractor Trailer- Material Delivery	Diesel
1	Building - 30	Roofing	High Lift	Diesel
1	Building - 30	Roofing	Man Lift (Fascia Construction)	Diesel
1	Building - 30	Roofing	Material Deliveries	Diesel
1	Building - 30	Roofing	Tractor Trailer- Material Delivery	Diesel
1	Building - 30	Security & Safety Systems	High Lift	Diesel
1	Building - 30	Security & Safety Systems	Tool Truck	Diesel
1	Building - 30	Structural Steel Frame	90 Ton Crane	Diesel
1	Building - 30	Structural Steel Frame	Concrete Pump	Diesel
1	Building - 30	Structural Steel Frame	Concrete Truck	Diesel
1	Building - 30	Structural Steel Frame	Fork Truck	Diesel
1	Building - 30	Structural Steel Frame	Tool Truck	Diesel
1	Building - 30	Structural Steel Frame	Tractor Trailer- Steel Deliveries	Diesel
1	Building - 30	Structural Steel Frame	Trowel Machine	Diesel
2	Open Parking	Binder Coat of Pavement	Paving Machine	Diesel
2	Open Parking	Binder Coat of Pavement	Ten Wheelers- Material Delivery	Diesel
2	Open Parking	Construction Mob & Layout	Survey Crew Trucks	Diesel
2	Open Parking	Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel
2	Open Parking	Curbing	Bob Cat	Diesel
2	Open Parking	Curbing	Concrete Ready Mix Trucks	Diesel
2	Open Parking	Curbing	Material Deliveries	Diesel
2	Open Parking	Curbing	Tractor Trailer with Boom Hoist- Delivery	Diesel
2	Open Parking	Grub the site down 2 ft.	Bulldozer	Diesel
2	Open Parking	Grub the site down 2 ft.	Front Loader	Diesel
2	Open Parking	Grub the site down 2 ft.	Ten Wheelers	Diesel
2	Open Parking	Lighting Pre-Cast Concrete Piers (10)	Auger Drill	Diesel
2	Open Parking	Lighting Pre-Cast Concrete Piers (10)	Fork Truck	Diesel
2	Open Parking	Lighting Pre-Cast Concrete Piers (10)	Front Loader	Diesel
2	Open Parking	Lighting Pre-Cast Concrete Piers (10)	Tractor Trailer- Material Delivery	Diesel
2	Open Parking	Remove Trees and shrubs	Bulldozer	Diesel
2	Open Parking	Remove Trees and shrubs	Chain Saws	Diesel
2	Open Parking	Remove Trees and shrubs	Flat Bed or Dump Trucks	Diesel
2	Open Parking	Remove Trees and shrubs	Log Chipper	Diesel
2	Open Parking	Remove Trees and shrubs	Mulcher	Diesel
2	Open Parking	Remove Trees and shrubs	Tractor	Diesel
2	Open Parking	Rough Grading	Compacting Equipment	Diesel
2	Open Parking	Rough Grading	Small Dozer	Diesel
2	Open Parking	Set in-place Light Poles	40 Ton Rough Terrain Crane	Diesel
2	Open Parking	Set in-place Light Poles	High Lift	Diesel
2	Open Parking	Set in-place Light Poles	Tractor Trailer- Material Delivery	Diesel
2	Open Parking	Shipping	Line Painting Truck and Sprayer	Diesel
2	Open Parking	Subgrade Materials installed	Backhoe	Diesel
2	Open Parking	Subgrade Materials installed	Roller	Diesel
2	Open Parking	Subgrade Materials installed	Tractor Trailer- Material Delivery	Diesel
2	Open Parking	Top Coat of Asphalt	Paving Machine	Diesel
2	Open Parking	Top Coat of Asphalt	Ten Wheelers- Material Delivery	Diesel
2	Open Parking	Underground Conduits	Backhoe	Diesel
2	Open Parking	Underground Conduits	Fork Truck	Diesel
2	Open Parking	Underground Conduits	Tractor Trailer- Material Delivery	Diesel
3	Apron (GA)	Asphalt Placement	Asphalt Paver	Diesel

*** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***

3	Apron (GA)	Asphalt Placement	Dump Truck	Diesel	*** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***
3	Apron (GA)	Asphalt Placement	Other General Equipment	Diesel	
3	Apron (GA)	Asphalt Placement	Pickup Truck	Diesel	
3	Apron (GA)	Asphalt Placement	Roller	Diesel	
3	Apron (GA)	Asphalt Placement	Skid Steer Loader	Diesel	
3	Apron (GA)	Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	
3	Apron (GA)	Clearing and Grubbing	Chain Saw	Diesel	
3	Apron (GA)	Clearing and Grubbing	Chipper/Stump Grinder	Diesel	
3	Apron (GA)	Clearing and Grubbing	Pickup Truck	Diesel	
3	Apron (GA)	Concrete Placement	Air Compressor	Diesel	
3	Apron (GA)	Concrete Placement	Concrete Saws	Diesel	
3	Apron (GA)	Concrete Placement	Concrete Truck	Diesel	
3	Apron (GA)	Concrete Placement	Other General Equipment	Diesel	
3	Apron (GA)	Concrete Placement	Pickup Truck	Diesel	
3	Apron (GA)	Concrete Placement	Rubber Tired Loader	Diesel	
3	Apron (GA)	Concrete Placement	Slip Form Paver	Diesel	
3	Apron (GA)	Concrete Placement	Surfacing Equipment (Grooving)	Diesel	
3	Apron (GA)	Drainage- 24 inch SICPP	Dozer	Diesel	
3	Apron (GA)	Drainage- 24 inch SICPP	Dump Truck	Diesel	
3	Apron (GA)	Drainage- 24 inch SICPP	Excavator	Diesel	
3	Apron (GA)	Drainage- 24 inch SICPP	Loader	Diesel	
3	Apron (GA)	Drainage- 24 inch SICPP	Other General Equipment	Diesel	
3	Apron (GA)	Drainage- 24 inch SICPP	Pickup Truck	Diesel	
3	Apron (GA)	Drainage- 24 inch SICPP	Roller	Diesel	
3	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Dump Truck	Diesel	
3	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Loader	Diesel	
3	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Other General Equipment	Diesel	
3	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Pickup Truck	Diesel	
3	Apron (GA)	Drainage- 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Diesel	
3	Apron (GA)	Dust Control	Water Truck	Diesel	
3	Apron (GA)	Excavation (Borrow)	Dozer	Diesel	
3	Apron (GA)	Excavation (Borrow)	Dump Truck (12 cy)	Diesel	
3	Apron (GA)	Excavation (Borrow)	Pickup Truck	Diesel	
3	Apron (GA)	Excavation (Borrow)	Roller	Diesel	
3	Apron (GA)	Excavation (Cut to Fill)	Dozer	Diesel	
3	Apron (GA)	Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel	
3	Apron (GA)	Excavation (Cut to Fill)	Excavator	Diesel	
3	Apron (GA)	Excavation (Cut to Fill)	Pickup Truck	Diesel	
3	Apron (GA)	Excavation (Cut to Fill)	Roller	Diesel	
3	Apron (GA)	Excavation (Cut to Fill)	Scraper	Diesel	
3	Apron (GA)	Excavation (Topsoil Stripping)	Dozer	Diesel	
3	Apron (GA)	Fencing	Concrete Truck	Diesel	
3	Apron (GA)	Fencing	Dump Truck	Diesel	
3	Apron (GA)	Fencing	Other General Equipment	Diesel	
3	Apron (GA)	Fencing	Pickup Truck	Diesel	
3	Apron (GA)	Fencing	Skid Steer Loader	Diesel	
3	Apron (GA)	Fencing	Tractors/Loader/Backhoe	Diesel	
3	Apron (GA)	Grading	Dozer	Diesel	
3	Apron (GA)	Grading	Grader	Diesel	
3	Apron (GA)	Grading	Roller	Diesel	
3	Apron (GA)	Hydroseeding	Hydroseeder	Diesel	
3	Apron (GA)	Hydroseeding	Off-Road Truck	Diesel	
3	Apron (GA)	Lighting	Dump Truck	Diesel	
3	Apron (GA)	Lighting	Loader	Diesel	
3	Apron (GA)	Lighting	Other General Equipment	Diesel	
3	Apron (GA)	Lighting	Pickup Truck	Diesel	
3	Apron (GA)	Lighting	Skid Steer Loader	Diesel	
3	Apron (GA)	Lighting	Tractors/Loader/Backhoe	Diesel	
3	Apron (GA)	Markings	Flatbed Truck	Diesel	
3	Apron (GA)	Markings	Other General Equipment	Diesel	
3	Apron (GA)	Markings	Pickup Truck	Diesel	
3	Apron (GA)	Sealing/Fuel Resistant	Distributing Tanker	Diesel	
3	Apron (GA)	Sealing/Fuel Resistant	Other General Equipment	Diesel	
3	Apron (GA)	Sealing/Fuel Resistant	Pickup Truck	Diesel	
3	Apron (GA)	Soil Erosion/Sediment Control	Other General Equipment	Diesel	
3	Apron (GA)	Soil Erosion/Sediment Control	Pickup Truck	Diesel	
3	Apron (GA)	Soil Erosion/Sediment Control	Pumps	Diesel	
3	Apron (GA)	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	
3	Apron (GA)	Subbase Placement	Dozer	Diesel	
3	Apron (GA)	Subbase Placement	Dump Truck (12 cy)	Diesel	
3	Apron (GA)	Subbase Placement	Pickup Truck	Diesel	
3	Apron (GA)	Subbase Placement	Roller	Diesel	
3	Apron (GA)	Topsoil Placement	Dozer	Diesel	
3	Apron (GA)	Topsoil Placement	Dump Truck	Diesel	
3	Apron (GA)	Topsoil Placement	Pickup Truck	Diesel	
4	Fuel Tanks	Asphalt Placement	Asphalt Paver	Diesel	*** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***
4	Fuel Tanks	Asphalt Placement	Dump Truck	Diesel	
4	Fuel Tanks	Asphalt Placement	Other General Equipment	Diesel	
4	Fuel Tanks	Asphalt Placement	Pickup Truck	Diesel	
4	Fuel Tanks	Asphalt Placement	Roller	Diesel	
4	Fuel Tanks	Asphalt Placement	Skid Steer Loader	Diesel	
4	Fuel Tanks	Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	
4	Fuel Tanks	Clearing and Grubbing	Chain Saw	Diesel	
4	Fuel Tanks	Clearing and Grubbing	Chipper/Stump Grinder	Diesel	
4	Fuel Tanks	Clearing and Grubbing	Pickup Truck	Diesel	
4	Fuel Tanks	Concrete Placement	Air Compressor	Diesel	
4	Fuel Tanks	Concrete Placement	Concrete Saws	Diesel	
4	Fuel Tanks	Concrete Placement	Concrete Truck	Diesel	
4	Fuel Tanks	Concrete Placement	Other General Equipment	Diesel	
4	Fuel Tanks	Concrete Placement	Pickup Truck	Diesel	
4	Fuel Tanks	Concrete Placement	Rubber Tired Loader	Diesel	
4	Fuel Tanks	Concrete Placement	Slip Form Paver	Diesel	

4	Fuel Tanks	Concrete Placement	Surfacing Equipment (Grooving)	Diesel
4	Fuel Tanks	Construction/Erect Tanks	Crane	Diesel
4	Fuel Tanks	Construction/Erect Tanks	Other General Equipment	Diesel
4	Fuel Tanks	Construction/Erect Tanks	Pickup Truck	Diesel
4	Fuel Tanks	Drainage - 24 inch SICPP	Excavator	Diesel
4	Fuel Tanks	Drainage	Dozer	Diesel
4	Fuel Tanks	Drainage	Dump Truck	Diesel
4	Fuel Tanks	Drainage	Loader	Diesel
4	Fuel Tanks	Drainage	Other General Equipment	Diesel
4	Fuel Tanks	Drainage	Pickup Truck	Diesel
4	Fuel Tanks	Drainage	Roller	Diesel
4	Fuel Tanks	Dust Control	Water Truck	Diesel
4	Fuel Tanks	Excavation (Borrow)	Dozer	Diesel
4	Fuel Tanks	Excavation (Borrow)	Dump Truck (12 cy)	Diesel
4	Fuel Tanks	Excavation (Borrow)	Pickup Truck	Diesel
4	Fuel Tanks	Excavation (Borrow)	Roller	Diesel
4	Fuel Tanks	Excavation (Cut to Fill)	Dozer	Diesel
4	Fuel Tanks	Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel
4	Fuel Tanks	Excavation (Cut to Fill)	Excavator	Diesel
4	Fuel Tanks	Excavation (Cut to Fill)	Pickup Truck	Diesel
4	Fuel Tanks	Excavation (Cut to Fill)	Roller	Diesel
4	Fuel Tanks	Excavation (Cut to Fill)	Scraper	Diesel
4	Fuel Tanks	Excavation (Topsoil Stripping)	Dozer	Diesel
4	Fuel Tanks	Fencing	Concrete Truck	Diesel
4	Fuel Tanks	Fencing	Dump Truck	Diesel
4	Fuel Tanks	Fencing	Other General Equipment	Diesel
4	Fuel Tanks	Fencing	Pickup Truck	Diesel
4	Fuel Tanks	Fencing	Skid Steer Loader	Diesel
4	Fuel Tanks	Fencing	Tractors/Loader/Backhoe	Diesel
4	Fuel Tanks	Grading	Dozer	Diesel
4	Fuel Tanks	Grading	Gader	Diesel
4	Fuel Tanks	Grading	Roller	Diesel
4	Fuel Tanks	Hydroseeding	Hydroseeder	Diesel
4	Fuel Tanks	Hydroseeding	Off-Road Truck	Diesel
4	Fuel Tanks	Markings	Flatbed Truck	Diesel
4	Fuel Tanks	Markings	Other General Equipment	Diesel
4	Fuel Tanks	Markings	Pickup Truck	Diesel
4	Fuel Tanks	Soil Erosion/Sediment Control	Other General Equipment	Diesel
4	Fuel Tanks	Soil Erosion/Sediment Control	Pickup Truck	Diesel
4	Fuel Tanks	Soil Erosion/Sediment Control	Pumps	Diesel
4	Fuel Tanks	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel
4	Fuel Tanks	Street Lighting	Dump Truck	Diesel
4	Fuel Tanks	Street Lighting	Loader	Diesel
4	Fuel Tanks	Street Lighting	Other General Equipment	Diesel
4	Fuel Tanks	Street Lighting	Pickup Truck	Diesel
4	Fuel Tanks	Street Lighting	Skid Steer Loader	Diesel
4	Fuel Tanks	Street Lighting	Tractors/Loader/Backhoe	Diesel
4	Fuel Tanks	Subbase Placement	Dozer	Diesel
4	Fuel Tanks	Subbase Placement	Dump Truck (12 cy)	Diesel
4	Fuel Tanks	Subbase Placement	Pickup Truck	Diesel
4	Fuel Tanks	Subbase Placement	Roller	Diesel
4	Fuel Tanks	Topsoil Placement	Dozer	Diesel
4	Fuel Tanks	Topsoil Placement	Dump Truck	Diesel
4	Fuel Tanks	Topsoil Placement	Pickup Truck	Diesel

Overall Size

Scenario	IC Project	Project Size Questions	User Input	Unit
1	Building - 30	What is the estimated cost of the project?	150	\$ Million(s)
2	Open Parking	What is the estimated cost of the project?	15	\$ Million(s)
3	Apron (GA)	What is the estimated cost of the project?	3.5	\$ Million(s)
3	Apron (GA)	What is the maximum length of the apron (L) in fee	1575	Feet
3	Apron (GA)	What is the maximum width of the apron (W) in fee	100	Feet
4	Fuel Tanks	What is the estimated cost of the project?	1.75	\$ Million(s)
4	Fuel Tanks	What is the maximum depth (D) of excavation for t	12	Feet
4	Fuel Tanks	What is the maximum length (L) of the fuel tank an	24	Feet
4	Fuel Tanks	What is the maximum width (W) of the fuel tank an	12	Feet
4	Fuel Tanks	What is the number of tanks (T) to be installed?	2	—

Size Detail (Estimated based on engineering experience)

Scenario	ID Project	Construction Activity	Default Activity Size	Unit	User Activity Size
3	Apron (GA)	Asphalt Placement	17482.5	Square Yards	
3	Apron (GA)	Clearing and Grubbing	4	Acres	
3	Apron (GA)	Concrete Placement	7284.4	Cubic Yards	
3	Apron (GA)	Drainage - 24 inch SICPP	1585	Linear Feet	
3	Apron (GA)	Drainage - 6 inch Perforated Underdrain	3170	Linear Feet	
3	Apron (GA)	Dust Control	360	Days	
3	Apron (GA)	Excavation (Borrow)	7284.4	Cubic Yards	
3	Apron (GA)	Excavation (Cut to Fill)	7284.4	Cubic Yards	
3	Apron (GA)	Excavation (Topsoil Stripping)	17482.5	Square Yards	
3	Apron (GA)	Fencing	1575	Linear Feet	
3	Apron (GA)	Grading	19352.9	Square Yards	
3	Apron (GA)	Hydroseeding	174350	Square Feet	
3	Apron (GA)	Lighting	3350	Linear Feet	
3	Apron (GA)	Markings	157500	Square Feet	
3	Apron (GA)	Sealing/Fuel Resistant	17482.5	Square Yards	
3	Apron (GA)	Soil Erosion/Sediment Control	4	Acres	
3	Apron (GA)	Subbase Placement	17482.5	Square Yards	
3	Apron (GA)	Subbase Placement	5827.5	Cubic Yards	

3	Apron (GA)	Topsoil Placement	3225.5	Cubic Yards
4	Fuel Tanks	Asphalt Placement	32	Square Yards
4	Fuel Tanks	Clearing and Grubbing	0	Acres
4	Fuel Tanks	Concrete Placement	13.3	Cubic Yards
4	Fuel Tanks	Construction/Erect Tanks	2	Tank
4	Fuel Tanks	Drainage - 24 inch SICPP	34	Linear Feet
4	Fuel Tanks	Drainage	34	Linear Feet
4	Fuel Tanks	Dust Control	360	Days
4	Fuel Tanks	Excavation (Borrow)	127.9	Cubic Yards
4	Fuel Tanks	Excavation (Cut to Fill)	127.9	Cubic Yards
4	Fuel Tanks	Excavation (Topsoil Stripping)	32	Square Yards
4	Fuel Tanks	Fencing	24	Linear Feet
4	Fuel Tanks	Grading	83	Square Yards
4	Fuel Tanks	Hydroseeding	748	Square Feet
4	Fuel Tanks	Markings	288	Square Feet
4	Fuel Tanks	Soil Erosion/Sediment Control	0	Acres
4	Fuel Tanks	Street Lighting	0	Lights
4	Fuel Tanks	Subbase Placement	32	Square Yards
4	Fuel Tanks	Subbase Placement	10.7	Cubic Yards
4	Fuel Tanks	Topsoil Placement	27.7	Cubic Yards

Activity: Non-Road (Estimated based on engineering experience)

Scenario IC Project	Construction Activity	Equipment	Fuel Type	Activity Size	Activity Rate	Default Activity	Activity Unit	User Activity Data
1	Building - 30 Concrete Foundations	Backhoe	Diesel	30000.00 SF	0.01067 Hours per 1.00 SF	320.1	hours	
1	Building - 30 Concrete Foundations	Concrete Ready Mix Trucks	Diesel	30000.00 SF	0.002 Hours per 1.00 SF	60	hours	
1	Building - 30 Concrete Foundations	Fork Truck	Diesel	30000.00 SF	0.01067 Hours per 1.00 SF	320.1	hours	
1	Building - 30 Concrete Foundations	Tool Truck	Diesel	30000.00 SF	0.00267 Hours per 1.00 SF	80.1	hours	
1	Building - 30 Concrete Foundations	Tractor-Trailer- Material Delivery	Diesel	30000.00 SF	0.00053 Hours per 1.00 SF	15.9	hours	
1	Building - 30 Construction Mob & Layout	Survey Crew Trucks	Diesel	30000.00 SF	0.00033 Hours per 1.00 SF	9.9	hours	
1	Building - 30 Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel	30000.00 SF	0.00013 Hours per 1.00 SF	3.9	hours	
1	Building - 30 Exterior Wall Framing	Fork Truck	Diesel	30000.00 SF	0.02 Hours per 1.00 SF	600	hours	
1	Building - 30 Exterior Wall Framing	Generator	Diesel	30000.00 SF	0.01 Hours per 1.00 SF	300	hours	
1	Building - 30 Exterior Wall Framing	Man Lift	Diesel	30000.00 SF	0.02 Hours per 1.00 SF	600	hours	
1	Building - 30 Exterior Wall Framing	Tool Truck	Diesel	30000.00 SF	0.005 Hours per 1.00 SF	150	hours	
1	Building - 30 Exterior Wall Framing	Tractor-Trailer- Material Delivery	Diesel	30000.00 SF	0.005 Hours per 1.00 SF	150	hours	
1	Building - 30 Interior Built-Out/ Finishes	Fork Truck	Diesel	30000.00 SF	0.08 Hours per 1.00 SF	2400	hours	
1	Building - 30 Interior Built-Out/ Finishes	Man Lift	Diesel	30000.00 SF	0.08 Hours per 1.00 SF	2400	hours	
1	Building - 30 Interior Built-Out/ Finishes	Tool Truck	Diesel	30000.00 SF	0.01 Hours per 1.00 SF	300	hours	
1	Building - 30 Interior Built-Out/ Finishes	Tractor-Trailer- Material Delivery	Diesel	30000.00 SF	0.02 Hours per 1.00 SF	600	hours	
1	Building - 30 Roofing	High Lift	Diesel	30000.00 SF	0.004 Hours per 1.00 SF	120	hours	
1	Building - 30 Roofing	Man Lift (Fascia Construction)	Diesel	30000.00 SF	0.0008 Hours per 1.00 SF	24	hours	
1	Building - 30 Roofing	Material Deliveries	Diesel	30000.00 SF	0.002 Hours per 1.00 SF	60	hours	
1	Building - 30 Roofing	Tractor-Trailer- Material Delivery	Diesel	30000.00 SF	0.002 Hours per 1.00 SF	60	hours	
1	Building - 30 Security & Safety Systems	High Lift	Diesel	30000.00 SF	0.02667 Hours per 1.00 SF	800.1	hours	
1	Building - 30 Security & Safety Systems	Tool Truck	Diesel	30000.00 SF	0.00667 Hours per 1.00 SF	200.1	hours	
1	Building - 30 Structural Steel Frame	90 Ton Crane	Diesel	30000.00 SF	0.01067 Hours per 1.00 SF	320.1	hours	
1	Building - 30 Structural Steel Frame	Concrete Pump	Diesel	30000.00 SF	0.0004 Hours per 1.00 SF	12	hours	
1	Building - 30 Structural Steel Frame	Concrete Truck	Diesel	30000.00 SF	0.0008 Hours per 1.00 SF	24	hours	
1	Building - 30 Structural Steel Frame	Fork Truck	Diesel	30000.00 SF	0.00267 Hours per 1.00 SF	80.1	hours	
1	Building - 30 Structural Steel Frame	Tool Truck	Diesel	30000.00 SF	0.0004 Hours per 1.00 SF	12	hours	
1	Building - 30 Structural Steel Frame	Tractor-Trailer- Steel Deliveries	Diesel	30000.00 SF	0.00133 Hours per 1.00 SF	39.9	hours	
1	Building - 30 Structural Steel Frame	Trowel Machine	Diesel	30000.00 SF	0.0004 Hours per 1.00 SF	12	hours	
2	Open Parking/Binder Coat of Pavement	Paving Machine	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Binder Coat of Pavement	Ten Wheelers- Material Delivery	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Construction Mob & Layout	Survey Crew Trucks	Diesel	10000.00 SF	0.0004 Hours per 1.00 SF	4	hours	
2	Open Parking/Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel	10000.00 SF	0.0004 Hours per 1.00 SF	4	hours	
2	Open Parking/Curbing	Bob Cat	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Curbing	Concrete Ready Mix Trucks	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Curbing	Material Deliveries	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Curbing	Tractor-Trailer with Boom Hoist- Delivery	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Grub the site down 2 ft.	Buildozer	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Grub the site down 2 ft.	Front Loader	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Grub the site down 2 ft.	Ten Wheelers	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Lighting Pre-Cast Concrete Piers (10)	Auger Drill	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Lighting Pre-Cast Concrete Piers (10)	Fork Truck	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Lighting Pre-Cast Concrete Piers (10)	Front Loader	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Lighting Pre-Cast Concrete Piers (10)	Tractor-Trailer- Material Delivery	Diesel	10000.00 SF	0.0012 Hours per 1.00 SF	12	hours	
2	Open Parking/Remove Trees and shrubs	Buildozer	Diesel	10000.00 SF	0.004 Hours per 1.00 SF	40	hours	
2	Open Parking/Remove Trees and shrubs	Chain Saws	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	*** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***
2	Open Parking/Remove Trees and shrubs	Flat Bed or Dump Trucks	Diesel	10000.00 SF	0.004 Hours per 1.00 SF	40	hours	
2	Open Parking/Remove Trees and shrubs	Log Chipper	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Remove Trees and shrubs	Mulcher	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Remove Trees and shrubs	Tractor	Diesel	10000.00 SF	0.004 Hours per 1.00 SF	40	hours	
2	Open Parking/Rough Grading	Compacting Equipment	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Rough Grading	Small Dozer	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Set in-place Light Poles	40 Ton Rough Terrain Crane	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Set in-place Light Poles	High Lift	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Set in-place Light Poles	Tractor-Trailer- Material Delivery	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Stripping	Line Painting Truck and Sprayer	Diesel	10000.00 SF	0.0008 Hours per 1.00 SF	8	hours	
2	Open Parking/Subgrade Materials installed	Backhoe	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Subgrade Materials installed	Roller	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Subgrade Materials installed	Tractor-Trailer- Material Delivery	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Top Coat of Asphalt	Paving Machine	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Top Coat of Asphalt	Ten Wheelers- Material Delivery	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking/Underground Conduits	Backhoe	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Underground Conduits	Fork Truck	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking/Underground Conduits	Tractor-Trailer- Material Delivery	Diesel	10000.00 SF	0.0012 Hours per 1.00 SF	12	hours	
3	Apron (GA)	Asphalt Paver	Diesel	17482.50 SY	8 Hours per 6400.00 SY	21.85	hours	
3	Apron (GA)	Dump Truck	Diesel	17482.50 SY	8 Hours per 1777.00 SY	78.71	hours	
3	Apron (GA)	Other General Equipment	Diesel	17482.50 SY	16 Hours per 6400.00 SY	43.71	hours	

3	Apron (GA)	Asphalt Placement	Pickup Truck	Diesel	17482.50 SY	8 Hours per 6400.00 SY	21.85 hours
3	Apron (GA)	Asphalt Placement	Roller	Diesel	17482.50 SY	8 Hours per 6400.00 SY	21.85 hours
3	Apron (GA)	Asphalt Placement	Skid Steer Loader	Diesel	17482.50 SY	8 Hours per 6400.00 SY	21.85 hours
3	Apron (GA)	Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	17482.50 SY	8 Hours per 5000.00 SY	27.97 hours
3	Apron (GA)	Clearing and Grubbing	Chain Saw	Diesel	4.00 Acre	12 Hours per 1.00 Acre	48 hours
3	Apron (GA)	Clearing and Grubbing	Chipper/Stump Grinder	Diesel	4.00 Acre	12 Hours per 1.00 Acre	48 hours
3	Apron (GA)	Clearing and Grubbing	Pickup Truck	Diesel	4.00 Acre	16 Hours per 1.00 Acre	64 hours
3	Apron (GA)	Concrete Placement	Air Compressor	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28 hours
3	Apron (GA)	Concrete Placement	Concrete Saws	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28 hours
3	Apron (GA)	Concrete Placement	Concrete Truck	Diesel	7284.40 CY	8 Hours per 240.00 CY	242.81 hours
3	Apron (GA)	Concrete Placement	Other General Equipment	Diesel	7284.40 CY	16 Hours per 1000.00 CY	116.55 hours
3	Apron (GA)	Concrete Placement	Pickup Truck	Diesel	7284.40 CY	24 Hours per 1000.00 CY	174.83 hours
3	Apron (GA)	Concrete Placement	Rubber Tired Loader	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28 hours
3	Apron (GA)	Concrete Placement	Slip Form Paver	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28 hours
3	Apron (GA)	Concrete Placement	Surfacing Equipment (Grooving)	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28 hours
3	Apron (GA)	Drainage - 24 inch SICPP	Dozer	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72 hours
3	Apron (GA)	Drainage - 24 inch SICPP	Dump Truck	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72 hours
3	Apron (GA)	Drainage - 24 inch SICPP	Excavator	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72 hours
3	Apron (GA)	Drainage - 24 inch SICPP	Loader	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72 hours
3	Apron (GA)	Drainage - 24 inch SICPP	Other General Equipment	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72 hours
3	Apron (GA)	Drainage - 24 inch SICPP	Pickup Truck	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72 hours
3	Apron (GA)	Drainage - 24 inch SICPP	Roller	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72 hours
3	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Dump Truck	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18 hours
3	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Loader	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18 hours
3	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Other General Equipment	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18 hours
3	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Pickup Truck	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18 hours
3	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18 hours
3	Apron (GA)	Dust Control	Water Truck	Diesel	360.00 Day	8 Hours per 1.00 Day	2880 hours
3	Apron (GA)	Excavation (Borrow)	Dozer	Diesel	7284.40 CY	8 Hours per 600.00 CY	97.13 hours
3	Apron (GA)	Excavation (Borrow)	Dump Truck (12 cy)	Diesel	7284.40 CY	8 Hours per 600.00 CY	97.13 hours
3	Apron (GA)	Excavation (Borrow)	Pickup Truck	Diesel	7284.40 CY	8 Hours per 600.00 CY	97.13 hours
3	Apron (GA)	Excavation (Borrow)	Roller	Diesel	7284.40 CY	8 Hours per 1300.00 CY	44.83 hours
3	Apron (GA)	Excavation (Cut to Fill)	Dozer	Diesel	7284.40 CY	8 Hours per 800.00 CY	72.84 hours
3	Apron (GA)	Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel	7284.40 CY	8 Hours per 300.00 CY	194.25 hours
3	Apron (GA)	Excavation (Cut to Fill)	Excavator	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28 hours
3	Apron (GA)	Excavation (Cut to Fill)	Pickup Truck	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28 hours
3	Apron (GA)	Excavation (Cut to Fill)	Roller	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28 hours
3	Apron (GA)	Excavation (Cut to Fill)	Scraper	Diesel	7284.40 CY	8 Hours per 800.00 CY	72.84 hours
3	Apron (GA)	Excavation (Topsoil Stripping)	Dozer	Diesel	17482.50 SY	8 Hours per 5100.00 SY	27.42 hours
3	Apron (GA)	Fencing	Concrete Truck	Diesel	1575.00 LF	2 Hours per 180.00 LF	17.5 hours
3	Apron (GA)	Fencing	Dump Truck	Diesel	1575.00 LF	8 Hours per 180.00 LF	70 hours
3	Apron (GA)	Fencing	Other General Equipment	Diesel	1575.00 LF	8 Hours per 180.00 LF	70 hours
3	Apron (GA)	Fencing	Pickup Truck	Diesel	1575.00 LF	8 Hours per 180.00 LF	70 hours
3	Apron (GA)	Fencing	Skid Steer Loader	Diesel	1575.00 LF	8 Hours per 180.00 LF	70 hours
3	Apron (GA)	Fencing	Tractors/Loader/Backhoe	Diesel	1575.00 LF	8 Hours per 180.00 LF	70 hours
3	Apron (GA)	Grading	Dozer	Diesel	19352.90 SY	8 Hours per 8000.00 SY	19.35 hours
3	Apron (GA)	Grading	Grader	Diesel	19352.90 SY	8 Hours per 8000.00 SY	19.35 hours
3	Apron (GA)	Grading	Roller	Diesel	19352.90 SY	8 Hours per 8000.00 SY	19.35 hours
3	Apron (GA)	Hydroseeding	Hydroseeder	Diesel	174350.00 SF	8 Hours per 80000.00 SF	17.44 hours
3	Apron (GA)	Hydroseeding	Off-Road Truck	Diesel	174350.00 SF	8 Hours per 80000.00 SF	17.44 hours
3	Apron (GA)	Lighting	Dump Truck	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33 hours
3	Apron (GA)	Lighting	Loader	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33 hours
3	Apron (GA)	Lighting	Other General Equipment	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33 hours
3	Apron (GA)	Lighting	Pickup Truck	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33 hours
3	Apron (GA)	Lighting	Skid Steer Loader	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33 hours
3	Apron (GA)	Lighting	Tractors/Loader/Backhoe	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33 hours
3	Apron (GA)	Markings	Flatbed Truck	Diesel	157500.00 SF	8 Hours per 3500.00 SF	360 hours
3	Apron (GA)	Markings	Other General Equipment	Diesel	157500.00 SF	8 Hours per 3500.00 SF	360 hours
3	Apron (GA)	Markings	Pickup Truck	Diesel	157500.00 SF	8 Hours per 3500.00 SF	360 hours
3	Apron (GA)	Sealing/Fuel Resistant	Distributing Tanker	Diesel	17482.50 SY	8 Hours per 3000.00 SY	46.62 hours
3	Apron (GA)	Sealing/Fuel Resistant	Other General Equipment	Diesel	17482.50 SY	8 Hours per 3000.00 SY	46.62 hours
3	Apron (GA)	Sealing/Fuel Resistant	Pickup Truck	Diesel	17482.50 SY	8 Hours per 3000.00 SY	46.62 hours
3	Apron (GA)	Soil Erosion/Sediment Control	Other General Equipment	Diesel	4.00 Acre	4 Hours per 1.00 Acre	16 hours
3	Apron (GA)	Soil Erosion/Sediment Control	Pickup Truck	Diesel	4.00 Acre	8 Hours per 1.00 Acre	32 hours
3	Apron (GA)	Soil Erosion/Sediment Control	Pumps	Diesel	4.00 Acre	4 Hours per 1.00 Acre	16 hours
3	Apron (GA)	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	4.00 Acre	4 Hours per 1.00 Acre	16 hours
3	Apron (GA)	Subbase Placement	Dozer	Diesel	17482.50 SY	8 Hours per 3800.00 SY	36.81 hours
3	Apron (GA)	Subbase Placement	Dump Truck (12 cy)	Diesel	5827.50 CY	8 Hours per 180.00 CY	259 hours
3	Apron (GA)	Subbase Placement	Pickup Truck	Diesel	17482.50 SY	8 Hours per 3800.00 SY	36.81 hours
3	Apron (GA)	Subbase Placement	Roller	Diesel	5827.50 CY	8 Hours per 1300.00 CY	35.86 hours
3	Apron (GA)	Topsoil Placement	Dozer	Diesel	3225.50 CY	8 Hours per 600.00 CY	43.01 hours
3	Apron (GA)	Topsoil Placement	Dump Truck	Diesel	3225.50 CY	8 Hours per 600.00 CY	43.01 hours
3	Apron (GA)	Topsoil Placement	Pickup Truck	Diesel	3225.50 CY	8 Hours per 600.00 CY	43.01 hours
4	Fuel Tanks	Asphalt Placement	Asphalt Paver	Diesel	32.00 SY	8 Hours per 6400.00 SY	0.04 hours
4	Fuel Tanks	Asphalt Placement	Dump Truck	Diesel	32.00 SY	8 Hours per 1777.00 SY	0.14 hours
4	Fuel Tanks	Asphalt Placement	Other General Equipment	Diesel	32.00 SY	16 Hours per 6400.00 SY	0.08 hours
4	Fuel Tanks	Asphalt Placement	Pickup Truck	Diesel	32.00 SY	8 Hours per 6400.00 SY	0.04 hours
4	Fuel Tanks	Asphalt Placement	Roller	Diesel	32.00 SY	8 Hours per 6400.00 SY	0.04 hours
4	Fuel Tanks	Asphalt Placement	Skid Steer Loader	Diesel	32.00 SY	8 Hours per 6400.00 SY	0.04 hours
4	Fuel Tanks	Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	32.00 SY	8 Hours per 5000.00 SY	0.05 hours
4	Fuel Tanks	Clearing and Grubbing	Chain Saw	Diesel	0.00 Acre	12 Hours per 1.00 Acre	0 hours
4	Fuel Tanks	Clearing and Grubbing	Chipper/Stump Grinder	Diesel	0.00 Acre	12 Hours per 1.00 Acre	0 hours
4	Fuel Tanks	Clearing and Grubbing	Pickup Truck	Diesel	0.00 Acre	16 Hours per 1.00 Acre	0 hours
4	Fuel Tanks	Concrete Placement	Air Compressor	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4	Fuel Tanks	Concrete Placement	Concrete Saws	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4	Fuel Tanks	Concrete Placement	Concrete Truck	Diesel	13.30 CY	8 Hours per 240.00 CY	0.44 hours
4	Fuel Tanks	Concrete Placement	Other General Equipment	Diesel	13.30 CY	16 Hours per 1000.00 CY	0.21 hours
4	Fuel Tanks	Concrete Placement	Pickup Truck	Diesel	13.30 CY	24 Hours per 1000.00 CY	0.32 hours
4	Fuel Tanks	Concrete Placement	Rubber Tired Loader	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4	Fuel Tanks	Concrete Placement	Slip Form Paver	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4	Fuel Tanks	Concrete Placement	Surfacing Equipment (Grooving)	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4	Fuel Tanks	Construction/Erect Tanks	Crane	Diesel	2.00 Tank	3 Hours per 1.00 Tank	6 hours

*** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***

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4 Fuel Tanks	Construction/Erect Tanks	Other General Equipment	Diesel	2.00 Tank	8 Hours per 1.00 Tank	16 hours
4 Fuel Tanks	Construction/Erect Tanks	Pickup Truck	Diesel	2.00 Tank	8 Hours per 1.00 Tank	16 hours
4 Fuel Tanks	Drainage - 24 inch SICPP	Excavator	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Dozer	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Dump Truck	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Loader	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Other General Equipment	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Pickup Truck	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Roller	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Dust Control	Water Truck	Diesel	360.00 Day	8 Hours per 1.00 Day	2880 hours
4 Fuel Tanks	Excavation (Borrow)	Dozer	Diesel	127.90 CY	8 Hours per 600.00 CY	1.71 hours
4 Fuel Tanks	Excavation (Borrow)	Dump Truck (12 cy)	Diesel	127.90 CY	8 Hours per 600.00 CY	1.71 hours
4 Fuel Tanks	Excavation (Borrow)	Pickup Truck	Diesel	127.90 CY	8 Hours per 600.00 CY	1.71 hours
4 Fuel Tanks	Excavation (Borrow)	Roller	Diesel	127.90 CY	8 Hours per 1300.00 CY	0.79 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Dozer	Diesel	127.90 CY	8 Hours per 800.00 CY	1.28 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel	127.90 CY	8 Hours per 300.00 CY	3.41 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Excavator	Diesel	127.90 CY	8 Hours per 1000.00 CY	1.02 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Pickup Truck	Diesel	127.90 CY	8 Hours per 1000.00 CY	1.02 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Roller	Diesel	127.90 CY	8 Hours per 1000.00 CY	1.02 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Scaper	Diesel	127.90 CY	8 Hours per 800.00 CY	1.28 hours
4 Fuel Tanks	Excavation (Topsoil Stripping)	Dozer	Diesel	32.00 SY	8 Hours per 5100.00 SY	0.05 hours
4 Fuel Tanks	Fencing	Concrete Truck	Diesel	24.00 LF	2 Hours per 180.00 LF	0.27 hours
4 Fuel Tanks	Fencing	Dump Truck	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Fencing	Other General Equipment	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Fencing	Pickup Truck	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Fencing	Skid Steer Loader	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Fencing	Tractors/Loader/Backhoe	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Grading	Dozer	Diesel	83.00 SY	8 Hours per 8000.00 SY	0.08 hours
4 Fuel Tanks	Grading	Grader	Diesel	83.00 SY	8 Hours per 8000.00 SY	0.08 hours
4 Fuel Tanks	Grading	Roller	Diesel	83.00 SY	8 Hours per 8000.00 SY	0.08 hours
4 Fuel Tanks	Hydroseeding	Hydroseeder	Diesel	748.00 SF	8 Hours per 80000.00 SF	0.07 hours
4 Fuel Tanks	Hydroseeding	Off-Road Truck	Diesel	748.00 SF	8 Hours per 80000.00 SF	0.07 hours
4 Fuel Tanks	Markings	Flatbed Truck	Diesel	288.00 SF	8 Hours per 3500.00 SF	0.66 hours
4 Fuel Tanks	Markings	Other General Equipment	Diesel	288.00 SF	8 Hours per 3500.00 SF	0.66 hours
4 Fuel Tanks	Markings	Pickup Truck	Diesel	288.00 SF	8 Hours per 3500.00 SF	0.66 hours
4 Fuel Tanks	Soil Erosion/Sediment Control	Other General Equipment	Diesel	0.00 Acre	4 Hours per 1.00 Acre	0 hours
4 Fuel Tanks	Soil Erosion/Sediment Control	Pickup Truck	Diesel	0.00 Acre	8 Hours per 1.00 Acre	0 hours
4 Fuel Tanks	Soil Erosion/Sediment Control	Pumps	Diesel	0.00 Acre	4 Hours per 1.00 Acre	0 hours
4 Fuel Tanks	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	0.00 Acre	4 Hours per 1.00 Acre	0 hours
4 Fuel Tanks	Street Lighting	Dump Truck	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Loader	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Other General Equipment	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Pickup Truck	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Skid Steer Loader	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Tractors/Loader/Backhoe	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Subbase Placement	Dozer	Diesel	32.00 SY	8 Hours per 3800.00 SY	0.07 hours
4 Fuel Tanks	Subbase Placement	Dump Truck (12 cy)	Diesel	10.70 CY	8 Hours per 180.00 CY	0.48 hours
4 Fuel Tanks	Subbase Placement	Pickup Truck	Diesel	32.00 SY	8 Hours per 3800.00 SY	0.07 hours
4 Fuel Tanks	Subbase Placement	Roller	Diesel	10.70 CY	8 Hours per 1300.00 CY	0.07 hours
4 Fuel Tanks	Topsoil Placement	Dozer	Diesel	27.70 CY	8 Hours per 600.00 CY	0.37 hours
4 Fuel Tanks	Topsoil Placement	Dump Truck	Diesel	27.70 CY	8 Hours per 600.00 CY	0.37 hours
4 Fuel Tanks	Topsoil Placement	Pickup Truck	Diesel	27.70 CY	8 Hours per 600.00 CY	0.37 hours

Activity: On-Road (Estimated based on engineering experience)

Scenario IC Project	Equipment	On-road Activity	Fuel	Roadway Type	Round Trip Distance (miles)	Number of Empl	Number of Proji	Project Length	Project Width	Project Are	Building He	Open Space	Number of	Activity Size	Activity Rat	Default VM	User VMT
1 Building - 30 Cement Mixer	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	30000 --	--	--	--	--	--	--	6938			
1 Building - 30 Dump Truck Subbase Material	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	30000 --	--	--	--	--	--	--	3700			
1 Building - 30 Passenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	1650	258 --	--	--	--	--	--	--	--	12771000			
1 Building - 30 Tractor Trailer	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	30000 --	--	--	--	--	--	0.00053	159			
2 Open Parking Cement Mixer	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	10000 --	--	--	--	--	--	--	2313			
2 Open Parking Dump Truck - Asphalt	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	10000 --	--	--	--	--	--	--	206			
2 Open Parking Dump Truck Subbase Material	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	10000 --	--	--	--	--	--	--	1233			
2 Open Parking Passenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	165	258 --	--	--	--	--	--	--	--	12771000			
2 Open Parking Tractor Trailer	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	10000 --	--	--	--	--	--	0.0012	120			
3 Apron (GA) Asphalt 18 Wheeler	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	1575	100 --	--	--	--	--	--	--	2285			
3 Apron (GA) Cement Mixer	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	1575	100 --	--	--	--	--	--	--	36422			
3 Apron (GA) Dump Truck - Asphalt	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	1575	100 --	--	--	--	--	--	--	3238			
3 Apron (GA) Dump Truck Subbase Material	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	1575	100 --	--	--	--	--	--	--	19425			
3 Apron (GA) Passenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	76	258 --	--	--	--	--	--	--	--	588240			
4 Fuel Tanks Asphalt 18 Wheeler	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	24	12 --	--	--	--	--	--	--	4			
4 Fuel Tanks Cement Mixer	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	24	12 --	--	--	--	--	--	--	67			
4 Fuel Tanks Dump Truck - Asphalt	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	24	12 --	--	--	--	--	--	--	6			
4 Fuel Tanks Dump Truck Subbase Material	Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	24	12 --	--	--	--	--	--	--	36			
4 Fuel Tanks Passenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	71	258 --	--	--	--	--	--	--	--	549540			

Emission Factor: Non-Road (from NONROAD)

Scenario IC Project	Construction Activity	Equipment	Fuel Type	Avg Rated HP	Load Factor	CO (g/tp-hr)	NOx (g/tp-hr)	CO2 (g/tp-hr)	SO2 (g/tp-hr)	PM10 (g/tp-hr)	PM2.5 (g/tp-hr)	VOC Exhaust	VOC Evaporative	(g/equipment-day)
1 Building - 30 Concrete Foundations	Backhoe	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.00368965	0.24843	0.228556	0.309016	0.244277		
1 Building - 30 Concrete Foundations	Concrete Ready Mix Trucks	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116		
1 Building - 30 Concrete Foundations	Fork Truck	Diesel	100	0.59	0.395069277	0.281444821	595.734901	0.002875088	0.01044	0.009603	0.139274	0		
1 Building - 30 Concrete Foundations	Tool Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116		
1 Building - 30 Concrete Foundations	Tractor Trailer- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116		
1 Building - 30 Construction Mob & Layout	Survey Crew Trucks	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116		
1 Building - 30 Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116		
1 Building - 30 Exterior Wall Framing	Fork Truck	Diesel	100	0.59	0.395069277	0.281444821	595.734901	0.002875088	0.01044	0.009603	0.139274	0		
1 Building - 30 Exterior Wall Framing	Generator	Diesel	40	0.43	0.511496895	3.79390872	589.795328	0.003066045	0.09055	0.083303	0.189317	0.010598		
1 Building - 30 Exterior Wall Framing	Man Lift	Diesel	75	0.21	2.382286823	3.799562901	694.684375	0.003861097	0.27513	0.253122	0.433804	0.084755		
1 Building - 30 Exterior Wall Framing	Tool Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116		

1 Building -30 Exterior Wall Framing	Tractor-Trailer- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
1 Building -30 Interior Built-Out/ Finishes	Fork Truck	Diesel	100	0.59	0.395069277	0.281444821	595.734901	0.002875088	0.01044	0.009603	0.139274	0
1 Building -30 Interior Built-Out/ Finishes	Man Lift	Diesel	75	0.21	2.382286823	3.799562901	694.684375	0.003861097	0.27513	0.253122	0.433804	0.084755
1 Building -30 Interior Built-Out/ Finishes	Tool Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
1 Building -30 Interior Built-Out/ Finishes	Tractor-Trailer- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
1 Building -30 Roofing	High Lift	Diesel	100	0.59	0.395069277	0.281444821	595.734901	0.002875088	0.01044	0.009603	0.139274	0
1 Building -30 Roofing	Man Lift (Fascia Construction)	Diesel	75	0.21	2.382286823	3.799562901	694.684375	0.003861097	0.27513	0.253122	0.433804	0.084755
1 Building -30 Roofing	Material Deliveries	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
1 Building -30 Roofing	Tractor-Trailer- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
1 Building -30 Security & Safety Systems	High Lift	Diesel	100	0.59	0.395069277	0.281444821	595.734901	0.002875088	0.01044	0.009603	0.139274	0
1 Building -30 Security & Safety Systems	Tool Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
1 Building -30 Structural Steel Frame	90 Ton Crane	Diesel	300	0.43	0.093745703	0.388372453	530.616471	0.002583908	0.01402	0.012899	0.140665	0.028717
1 Building -30 Structural Steel Frame	Concrete Pump	Diesel	11	0.43	4.447144264	4.352809166	588.568052	0.003967603	0.35748	0.328879	0.594432	0.002143
1 Building -30 Structural Steel Frame	Concrete Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
1 Building -30 Structural Steel Frame	Fork Truck	Diesel	100	0.59	0.395069277	0.281444821	595.734901	0.002875088	0.01044	0.009603	0.139274	0
1 Building -30 Structural Steel Frame	Tool Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
1 Building -30 Structural Steel Frame	Tractor-Trailer- Steel Deliveries	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
1 Building -30 Structural Steel Frame	Trowel Machine	Diesel	600	0.59	0.450394485	1.069555749	536.361927	0.002787398	0.06192	0.059669	0.154856	0.395466
2 Open Parking/Binder Coat of Pavement	Paving Machine	Diesel	175	0.59	0.227317497	0.504177774	536.38949	0.002653518	0.03491	0.032114	0.145571	0.043421
2 Open Parking/Binder Coat of Pavement	Ten Wheelers- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Construction Mob & Layout	Survey Crew Trucks	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Construction Mob & Layout	Tractor-Trailers Temp Fac.	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Curbing	Bob Cat	Diesel	75	0.21	2.543963195	3.780331263	694.62712	0.003860401	0.32225	0.296702	0.452736	0.194825
2 Open Parking/Curbing	Concrete Ready Mix Trucks	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Curbing	Material Deliveries	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Curbing	Tractor-Trailer with Boom Hoist- Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Grub the site down 2 ft.	Buildozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
2 Open Parking/Grub the site down 2 ft.	Front Loader	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
2 Open Parking/Grub the site down 2 ft.	Ten Wheelers	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Lighting Pre-Cast Concrete Piers (10)	Auger Drill	Diesel	175	0.43	0.455402903	1.61284914	530.43735	0.00282355	0.1031	0.094853	0.199772	0.161878
2 Open Parking/Lighting Pre-Cast Concrete Piers (10)	Fork Truck	Diesel	100	0.59	0.395069277	0.281444821	595.734901	0.002875088	0.01044	0.009603	0.139274	0
2 Open Parking/Lighting Pre-Cast Concrete Piers (10)	Front Loader	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
2 Open Parking/Lighting Pre-Cast Concrete Piers (10)	Tractor-Trailer- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Remove Trees and shrubs	Buildozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
2 Open Parking/Remove Trees and shrubs	Chain Saws	Diesel	11	0.7	293.5349872	1.32992811	685.996358	0.140191551	1.74819	8.968333	61.88836	26.45543
2 Open Parking/Remove Trees and shrubs	Flat Bed or Dump Trucks	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Remove Trees and shrubs	Log Chipper	Diesel	100	0.43	1.008404769	1.645581456	589.68522	0.003181327	0.15209	0.139922	0.225679	0.16024
2 Open Parking/Remove Trees and shrubs	Mulcher	Diesel	100	0.43	1.008404769	1.645581456	589.68522	0.003181327	0.15209	0.139922	0.225679	0.16024
2 Open Parking/Remove Trees and shrubs	Tractor	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
2 Open Parking/Rough Grading	Compacting Equipment	Diesel	6	0.43	4.45805974	4.326096803	588.583401	0.003967709	0.35293	0.324699	0.589355	0.000541
2 Open Parking/Rough Grading	Small Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
2 Open Parking/Set in-place Light Poles	40 Ton Rough Terrain Crane	Diesel	300	0.43	0.093745703	0.388372453	530.616471	0.002583908	0.01402	0.012899	0.140665	0.028717
2 Open Parking/Set in-place Light Poles	High Lift	Diesel	100	0.59	0.395069277	0.281444821	595.734901	0.002875088	0.01044	0.009603	0.139274	0
2 Open Parking/Set in-place Light Poles	Tractor-Trailer- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Stripping	Line Painting Truck and Sprayer	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Subgrade Materials installed	Backhoe	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
2 Open Parking/Subgrade Materials installed	Roller	Diesel	100	0.59	0.485012845	0.401998969	595.727059	0.002903822	0.02534	0.023316	0.14186	0.014125
2 Open Parking/Subgrade Materials installed	Tractor-Trailer- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Top Coat of Asphalt	Paving Machine	Diesel	175	0.59	0.227317497	0.504177774	536.38949	0.002653518	0.03491	0.032114	0.145571	0.043421
2 Open Parking/Top Coat of Asphalt	Ten Wheelers- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
2 Open Parking/Underground Conduits	Backhoe	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
2 Open Parking/Underground Conduits	Fork Truck	Diesel	100	0.59	0.395069277	0.281444821	595.734901	0.002875088	0.01044	0.009603	0.139274	0
2 Open Parking/Underground Conduits	Tractor-Trailer- Material Delivery	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA) Asphalt Placement	Asphalt Paver	Diesel	175	0.59	0.16379106	0.345078514	536.405328	0.002605434	0.01883	0.015481	0.140334	0.013649
3 Apron (GA) Asphalt Placement	Dump Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA) Asphalt Placement	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
3 Apron (GA) Asphalt Placement	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA) Asphalt Placement	Roller	Diesel	100	0.59	0.485012845	0.401998969	595.727059	0.002903822	0.02534	0.023316	0.14186	0.014125
3 Apron (GA) Asphalt Placement	Skid Steer Loader	Diesel	75	0.21	2.543963195	3.780331263	694.62712	0.003860401	0.32225	0.296702	0.452736	0.194825
3 Apron (GA) Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	25	0.59	2.355219775	4.461255432	594.730474	0.004009206	0.35393	0.325617	0.470807	0
3 Apron (GA) Clearing and Grubbing	Chain Saw	Diesel	11	0.7	293.5349872	1.32992811	685.996358	0.140191551	1.74819	8.968333	61.88836	26.45543
3 Apron (GA) Clearing and Grubbing	Chipper/Stump Grinder	Diesel	100	0.43	1.008404769	1.645581456	589.68522	0.003181327	0.15209	0.139922	0.225679	0.16024
3 Apron (GA) Clearing and Grubbing	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA) Concrete Placement	Air Compressor	Diesel	100	0.43	0.374141543	0.595301705	589.915265	0.002929903	0.04088	0.037606	0.149715	0.033711
3 Apron (GA) Concrete Placement	Concrete Saws	Diesel	40	0.59	0.258522182	3.023286141	595.732835	0.002880827	0.02339	0.021518	0.13994	0
3 Apron (GA) Concrete Placement	Concrete Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA) Concrete Placement	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
3 Apron (GA) Concrete Placement	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA) Concrete Placement	Rubber Tired Loader	Diesel	175	0.59	0.17582404	0.378537188	536.402929	0.002614497	0.02028	0.01866	0.141159	0.02021
3 Apron (GA) Concrete Placement	Slip Form Paver	Diesel	175	0.59	0.16379106	0.345078514	536.405328	0.002605434	0.01883	0.015481	0.140334	0.013649
3 Apron (GA) Concrete Placement	Surfacing Equipment (Grooving)	Diesel	25	0.59	2.355219775	4.461255432	594.730474	0.004009206	0.35393	0.325617	0.470807	0
3 Apron (GA) Drainage -24 inch SICPP	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
3 Apron (GA) Drainage -24 inch SICPP	Dump Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA) Drainage -24 inch SICPP	Excavator	Diesel	175	0.59	0.145639702	0.293820641	536.408468	0.002591475	0.01153	0.010604	0.139305	0.002874
3 Apron (GA) Drainage -24 inch SICPP	Loader	Diesel	175	0.59	0.17582404	0.378537188	536.402929	0.002614497	0.02028	0.01866	0.141159	0.02021
3 Apron (GA) Drainage -24 inch SICPP	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
3 Apron (GA) Drainage -24 inch SICPP</												

3 Apron (GA)	Excavation (Cut to Fill)	Roller	Diesel	100	0.59	0.485012845	0.401998969	595.727059	0.002903822	0.02534	0.023316	0.14186	0.014125
3 Apron (GA)	Excavation (Cut to Fill)	Scraper	Diesel	600	0.59	0.209993617	0.49104724	536.402469	0.002640817	0.02302	0.021178	0.141269	0.125234
3 Apron (GA)	Excavation (Topsoil Stripping)	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
3 Apron (GA)	Fencing	Concrete Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Fencing	Dump Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Fencing	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
3 Apron (GA)	Fencing	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Fencing	Skid Steer Loader	Diesel	75	0.21	2.543963195	3.780331263	694.62712	0.003860401	0.3225	0.296702	0.452736	0.194825
3 Apron (GA)	Fencing	Tractors/Loader/Backhoe	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
3 Apron (GA)	Grading	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
3 Apron (GA)	Grading	Grader	Diesel	300	0.59	0.124150751	0.304454132	536.408308	0.002592393	0.01132	0.010412	0.139334	0.005745
3 Apron (GA)	Grading	Roller	Diesel	100	0.59	0.485012845	0.401998969	595.727059	0.002903822	0.02534	0.023316	0.14186	0.014125
3 Apron (GA)	Hydroseeding	Hydroseeder	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Hydroseeding	Off-Road Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Lighting	Dump Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Lighting	Loader	Diesel	175	0.59	0.17582404	0.378537188	536.402929	0.002614497	0.02028	0.01866	0.141159	0.02021
3 Apron (GA)	Lighting	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
3 Apron (GA)	Lighting	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Lighting	Skid Steer Loader	Diesel	75	0.21	2.543963195	3.780331263	694.62712	0.003860401	0.3225	0.296702	0.452736	0.194825
3 Apron (GA)	Lighting	Tractors/Loader/Backhoe	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
3 Apron (GA)	Markings	Flatbed Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Markings	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
3 Apron (GA)	Markings	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Sealing/Fuel Resistant	Distributing Tanker	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Sealing/Fuel Resistant	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
3 Apron (GA)	Sealing/Fuel Resistant	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Soil Erosion/Sediment Control	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
3 Apron (GA)	Soil Erosion/Sediment Control	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Soil Erosion/Sediment Control	Pumps	Diesel	11	0.43	4.447144264	4.352809166	588.568052	0.003967603	0.35748	0.328879	0.594432	0.002143
3 Apron (GA)	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
3 Apron (GA)	Subbase Placement	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
3 Apron (GA)	Subbase Placement	Dump Truck (12 cy)	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Subbase Placement	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Subbase Placement	Roller	Diesel	100	0.59	0.485012845	0.401998969	595.727059	0.002903822	0.02534	0.023316	0.14186	0.014125
3 Apron (GA)	Topsoil Placement	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
3 Apron (GA)	Topsoil Placement	Dump Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
3 Apron (GA)	Topsoil Placement	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Asphalt Placement	Asphalt Paver	Diesel	175	0.59	0.16379106	0.345078514	536.405328	0.002605434	0.01683	0.015481	0.140334	0.013649
4 Fuel Tanks	Asphalt Placement	Dump Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Asphalt Placement	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
4 Fuel Tanks	Asphalt Placement	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Asphalt Placement	Roller	Diesel	100	0.59	0.485012845	0.401998969	595.727059	0.002903822	0.02534	0.023316	0.14186	0.014125
4 Fuel Tanks	Asphalt Placement	Skid Steer Loader	Diesel	75	0.21	2.543963195	3.780331263	694.62712	0.003860401	0.3225	0.296702	0.452736	0.194825
4 Fuel Tanks	Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	25	0.29	2.352519775	4.461255432	594.730474	0.004009206	0.35393	0.325617	0.470807	0
4 Fuel Tanks	Clearing and Grubbing	Chain Saw	Diesel	11	0.7	293.5349872	1.322992811	685.996358	0.140191551	9.74819	8.968333	61.88836	26.45543
4 Fuel Tanks	Clearing and Grubbing	Chipper/Stump Grinder	Diesel	100	0.43	0.100840709	1.645581456	589.68522	0.003181327	0.15209	0.139922	0.225679	0.16024
4 Fuel Tanks	Clearing and Grubbing	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Concrete Placement	Air Compressor	Diesel	100	0.43	0.437141543	0.595301705	589.915265	0.002929903	0.40488	0.337606	0.140715	0.033711
4 Fuel Tanks	Concrete Placement	Concrete Saws	Diesel	40	0.59	0.258522182	3.023286141	595.732835	0.002880827	0.02339	0.021518	0.13994	0
4 Fuel Tanks	Concrete Placement	Concrete Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Concrete Placement	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
4 Fuel Tanks	Concrete Placement	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Concrete Placement	Rubber Tired Loader	Diesel	175	0.59	0.17582404	0.378537188	536.402929	0.002614497	0.02028	0.01866	0.141159	0.02021
4 Fuel Tanks	Concrete Placement	Slip Form Paver	Diesel	175	0.59	0.16379106	0.345078514	536.405328	0.002605434	0.01683	0.015481	0.140334	0.013649
4 Fuel Tanks	Concrete Placement	Surfacing Equipment (Grooving)	Diesel	25	0.29	2.352519775	4.461255432	594.730474	0.004009206	0.35393	0.325617	0.470807	0
4 Fuel Tanks	Construction/Erect Tanks	Crane	Diesel	300	0.43	0.093745703	0.388372453	530.616471	0.002583908	0.14002	0.012899	0.140665	0.028717
4 Fuel Tanks	Construction/Erect Tanks	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
4 Fuel Tanks	Construction/Erect Tanks	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Drainage - 24 inch SICPP	Excavator	Diesel	175	0.59	0.145639702	0.293820641	536.408468	0.002591475	0.01153	0.010604	0.139305	0.002874
4 Fuel Tanks	Drainage	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
4 Fuel Tanks	Drainage	Dump Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Drainage	Loader	Diesel	175	0.59	0.17582404	0.378537188	536.402929	0.002614497	0.02028	0.01866	0.141159	0.02021
4 Fuel Tanks	Drainage	Other General Equipment	Diesel	175	0.43	0.147929991	0.479668063	530.606228	0.002618145	0.02503	0.023028	0.144019	0.0348
4 Fuel Tanks	Drainage	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Drainage	Roller	Diesel	100	0.59	0.485012845	0.401998969	595.727059	0.002903822	0.02534	0.023316	0.14186	0.014125
4 Fuel Tanks	Dust Control	Water Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Excavation (Borrow)	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
4 Fuel Tanks	Excavation (Borrow)	Dump Truck (12 cy)	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Excavation (Borrow)	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Excavation (Borrow)	Roller	Diesel	100	0.59	0.485012845	0.401998969	595.727059	0.002903822	0.02534	0.023316	0.14186	0.014125
4 Fuel Tanks	Excavation (Cut to Fill)	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
4 Fuel Tanks	Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Excavation (Cut to Fill)	Excavator	Diesel	175	0.59	0.145639702	0.293820641	536.408468	0.002591475	0.01153	0.010604	0.139305	0.002874
4 Fuel Tanks	Excavation (Cut to Fill)	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Excavation (Cut to Fill)	Roller	Diesel	100	0.59	0.485012845							

4 Fuel Tanks	Soil Erosion/Sediment Control	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Soil Erosion/Sediment Control	Pumps	Diesel	11	0.43	4.447144264	4.352809166	588.568052	0.003967603	0.35748	0.328879	0.584432	0.002143
4 Fuel Tanks	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
4 Fuel Tanks	Street Lighting	Dump Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Street Lighting	Loader	Diesel	175	0.59	0.17582404	0.378537188	536.402929	0.002614497	0.02028	0.01866	0.141159	0.02021
4 Fuel Tanks	Street Lighting	Other General Equipment	Diesel	175	0.43	0.147629991	0.479668063	530.666228	0.002618145	0.02503	0.023028	0.144019	0.0348
4 Fuel Tanks	Street Lighting	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Street Lighting	Skid Steer Loader	Diesel	75	0.21	2.543963195	3.780331263	694.62712	0.003860401	0.3225	0.296702	0.452736	0.194825
4 Fuel Tanks	Street Lighting	Tractors/Loader/Backhoe	Diesel	100	0.21	2.121795441	1.439314356	695.062492	0.003658965	0.24843	0.228556	0.309016	0.244277
4 Fuel Tanks	Subbase Placement	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
4 Fuel Tanks	Subbase Placement	Dump Truck (12 cy)	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Subbase Placement	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Subbase Placement	Roller	Diesel	100	0.59	0.485012845	0.401998969	595.727059	0.002903822	0.02534	0.023316	0.14186	0.014125
4 Fuel Tanks	Topsoil Placement	Dozer	Diesel	175	0.59	0.150967068	0.311610201	536.407713	0.002595669	0.01312	0.012069	0.139532	0.006194
4 Fuel Tanks	Topsoil Placement	Dump Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116
4 Fuel Tanks	Topsoil Placement	Pickup Truck	Diesel	600	0.59	0.143469645	0.291818641	536.408849	0.002589898	0.01073	0.009871	0.139181	0.005116

Emission Factors: On Road (from MOVES)

IC Project	Equipment	Fuel Type	Roadway Type	CO2(g/mi)	NO2(g/mi)	CO2(g/mi)	SO2(g/mi)	PM10(g/mi)	PM2.5(g/mi)	CH4(g/mi)	N2O(g/mi)	VOC(g/mi)	RV CO2(g/ve	RV NO2(g/ve	RV CO2(g/ve	RV SO2(g/ve	RV PM10(g/ve	RV PM2.5(g/ve	RV VOC(g/ve	RV VOC(g/veh-day)	
1	Building - 30 Cement Mixer	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
1	Building - 30 Dump Truck Subbase Material	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
1	Building - 30 Passenger Car	Gasoline	Urban Unrestricted Access	2.384775898		0.093385607	364.5428422	0.005356236	0.00411632	0.00379037	0.05715	0.00498	0.001666	25.65335	1.44064	251.718	0.003698	0.030763605	0.028327455	5.37917222	0.8994293
1	Building - 30 Tractor Trailer	Diesel	Urban Unrestricted Access	0.620391856		1.883934174	2591.024525	0.017853257	0.07396172	0.071745357	0.16629	0.071673	0.003464	26.35617	0.018521	329.073	0.002338	0.019235663	0.018659307	13.6985475	0
2	Open Parking Cement Mixer	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
2	Open Parking Dump Truck - Asphalt	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
2	Open Parking Dump Truck Subbase Material	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
2	Open Parking Passenger Car	Gasoline	Urban Unrestricted Access	2.384775898		0.093385607	364.5428422	0.005356236	0.00411632	0.00379037	0.05715	0.00498	0.001666	25.65335	1.44064	251.718	0.003698	0.030763605	0.028327455	5.37917222	0.8994293
2	Open Parking Tractor Trailer	Diesel	Urban Unrestricted Access	0.620391856		1.883934174	2591.024525	0.017853257	0.07396172	0.071745357	0.16629	0.071673	0.003464	26.35617	0.018521	329.073	0.002338	0.019235663	0.018659307	13.6985475	0
3	Apron (GA) Asphalt 18 Wheeler	Diesel	Urban Unrestricted Access	0.620391856		1.883934174	2591.024525	0.017853257	0.07396172	0.071745357	0.16629	0.071673	0.003464	26.35617	0.018521	329.073	0.002338	0.019235663	0.018659307	13.6985475	0
3	Apron (GA) Cement Mixer	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
3	Apron (GA) Dump Truck - Asphalt	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
3	Apron (GA) Dump Truck Subbase Material	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
3	Apron (GA) Passenger Car	Gasoline	Urban Unrestricted Access	2.384775898		0.093385607	364.5428422	0.005356236	0.00411632	0.00379037	0.05715	0.00498	0.001666	25.65335	1.44064	251.718	0.003698	0.030763605	0.028327455	5.37917222	0.8994293
4	Fuel Tanks Asphalt 18 Wheeler	Diesel	Urban Unrestricted Access	0.620391856		1.883934174	2591.024525	0.017853257	0.07396172	0.071745357	0.16629	0.071673	0.003464	26.35617	0.018521	329.073	0.002338	0.019235663	0.018659307	13.6985475	0
4	Fuel Tanks Cement Mixer	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
4	Fuel Tanks Dump Truck - Asphalt	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
4	Fuel Tanks Dump Truck Subbase Material	Diesel	Urban Unrestricted Access	0.483369316		1.024247026	1432.314503	0.009847059	0.02816246	0.02731859	0.10889	0.071178	0.003464	22.46717	0.009383	257.375	0.001799	0.008375561	0.008124633	1.17413476	0
4	Fuel Tanks Passenger Car	Gasoline	Urban Unrestricted Access	2.384775898		0.093385607	364.5428422	0.005356236	0.00411632	0.00379037	0.05715	0.00498	0.001666	25.65335	1.44064	251.718	0.003698	0.030763605	0.028327455	5.37917222	0.8994293

Fugitive Emissions (Emission Factors from Various Sources including AP-42)

Scenario	IC Project	Fugitive Type	Variable	Default Values	Units	User Value
1	Building	-30 Concrete Mixing/Batching	V = Volume of asphalt = 0.111 x L x W x 1.2i		1387.5 yd3	
1	Building	-30 Concrete Mixing/Batching	PM10 = 0.037 x V		51.3 lbs	
1	Building	-30 Material Movement (Paved Roads)	sl = Road surface silt loading		0.1 g/m3	
1	Building	-30 Material Movement (Paved Roads)	Wt. = Mean vehicle weight		32 tons	
1	Building	-30 Material Movement (Paved Roads)	VMT = Vehicle miles traveled		2580 miles	
1	Building	-30 Material Movement (Paved Roads)	PM10 = 0.0022 x (sl*0.91) x (Wt*1.02) x Vt		23.9 lbs	
1	Building	-30 Material Movement (Unpaved Roads)	s = Surface material silt content		0.043 fraction	
1	Building	-30 Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight		32 tons	
1	Building	-30 Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled		2580 miles	
1	Building	-30 Material Movement (Unpaved Roads)	PM10 = 1.5 x [(sl/2)*0.9] x [(Wt./3)*0.45] x		70.7 lbs	
2	Open Parking	Material Movement (Paved Roads)	sl = Road surface silt loading		0.1 g/m3	
2	Open Parking	Material Movement (Paved Roads)	Wt. = Mean vehicle weight		32 tons	
2	Open Parking	Material Movement (Paved Roads)	VMT = Vehicle miles traveled		3870 miles	
2	Open Parking	Material Movement (Paved Roads)	PM10 = 0.0022 x (sl*0.91) x (Wt*1.02) x Vt		35.9 lbs	
2	Open Parking	Material Movement (Unpaved Roads)	s = Surface material silt content		0.043 fraction	
2	Open Parking	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight		32 tons	
2	Open Parking	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled		3880 miles	
2	Open Parking	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(sl/2)*0.9] x [(Wt./3)*0.45] x		106.3 lbs	
2	Open Parking	Soil Handling	u = Wind speed		5 mph	
2	Open Parking	Soil Handling	m = Moisture content		0.25 fraction	
2	Open Parking	Soil Handling	T = Mass of aggregate storage pile = L x W x		275 tons	
2	Open Parking	Soil Handling	PM10 = T x 0.35 x 0.0032 x [(u/5)*1.3]/[(m		5.661 lbs	
2	Open Parking	Unstabilized Land and Wind Erosion	A = Area affected = L x W / 43560.0		0.23 acres	
2	Open Parking	Unstabilized Land and Wind Erosion	TPConv = TSP/PM10 conversion		0.5 fraction	
2	Open Parking	Unstabilized Land and Wind Erosion	CE = Control efficiency		0.63 fraction	
2	Open Parking	Unstabilized Land and Wind Erosion	t = year (e.g. 0.65 year)		1 years	
2	Open Parking	Unstabilized Land and Wind Erosion	PM10 = 0.38 x A x TPConv x (1-CE) x t / 200l		0 lbs	
2	Open Parking	Asphalt Drying	A = Area of land affected = L x W x 0.0929		929 m2	
2	Open Parking	Asphalt Drying	AR = Application rate of liquefied asphalt o		1.811 Um/2	
2	Open Parking	Asphalt Drying	VD = Volume fraction of diluent in liquefie		0.35 fraction	
2	Open Parking	Asphalt Drying	EF = Mass fraction of diluent which evapor		0.7 fraction	
2	Open Parking	Asphalt Drying	D = Density of solvent utilized		1.8 lbs/ft	
2	Open Parking	Asphalt Drying	VOC = A x AR x VD x EF x D		741.9 lbs	
3	Apron (GA)	Asphalt Drying	A = Area of land affected = L x W x 0.0929		14031.8 m2	
3	Apron (GA)	Asphalt Drying	AR = Application rate of liquefied asphalt o		1.811 Um/2	
3	Apron (GA)	Asphalt Drying	VD = Volume fraction of diluent in liquefie		0.35 fraction	
3	Apron (GA)	Asphalt Drying	EF = Mass fraction of diluent which evapor		0.7 fraction	
3	Apron (GA)	Asphalt Drying	D = Density of solvent utilized		1.8 lbs/ft	
3	Apron (GA)	Asphalt Drying	VOC = A x AR x VD x EF x D		11685.7 lbs	500
3	Apron (GA)	Asphalt Storage and Batching	T = Mass of asphalt loaded = L x W x 0.166i		1903.5 tons	
3	Apron (GA)	Asphalt Storage and Batching	PM10 = (0.027 + 0.00042) x T		52.2 lbs	
3	Apron (GA)	Asphalt Storage and Batching	CO = (0.4 + 0.0004) x T		762.2 lbs	
3	Apron (GA)	Asphalt Storage and Batching	NOx = [(0.025) x T		47.6 lbs	
3	Apron (GA)	Asphalt Storage and Batching	SOx = [(0.0046) x T		8.756 lbs	
3	Apron (GA)	Asphalt Storage and Batching	VOC = [(0.0082 + 0.0042) x T		23.6 lbs	
3	Apron (GA)	Material Movement (Unpaved Roads)	s = Surface material silt content		0.043 fraction	
3	Apron (GA)	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight		32 tons	
3	Apron (GA)	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled		7000.4 miles	

3	Apron (GA)	Material Movement (Unpaved Roads)	$PM_{10} = 1.5 \times [(s/12)^*0.9] \times [(WL/2)^*0.45] \times$	191.7 lbs
3	Apron (GA)	Material Movement (Paved Roads)	$sL =$ Road surface silt loading	0.1 g/m3
3	Apron (GA)	Material Movement (Paved Roads)	$Wt. =$ Mean vehicle weight	32 tons
3	Apron (GA)	Material Movement (Paved Roads)	$VMT =$ Vehicle miles traveled	6450 miles
3	Apron (GA)	Material Movement (Paved Roads)	$PM_{10} = 0.0022 \times (sL^*0.91) \times (Wt^*1.02) \times Vt$	56.9 lbs
3	Apron (GA)	Concrete Mixing/Batching	$V =$ Volume of asphalt = 0.111 x L x W x 1.2i	7284.4 yd3
3	Apron (GA)	Concrete Mixing/Batching	$PM_{10} = 0.037 \times V$	269.5 lbs
3	Apron (GA)	Unstabilized Land and Wind Erosion	$A =$ Area affected = L x W / 43560.0	3.616 acres
3	Apron (GA)	Unstabilized Land and Wind Erosion	$TPConv = TSP/PM_{10}$ conversion	0.5 fraction
3	Apron (GA)	Unstabilized Land and Wind Erosion	$CE =$ Control efficiency	0.63 fraction
3	Apron (GA)	Unstabilized Land and Wind Erosion	$t =$ year (e.g. 0.65 year)	1 years
3	Apron (GA)	Unstabilized Land and Wind Erosion	$PM_{10} = 0.38 \times A \times TPConv \times (1-CE) \times t / 200i$	0 lbs
3	Apron (GA)	Soil Handling	$u =$ Wind speed	5 mph
3	Apron (GA)	Soil Handling	$m =$ Moisture content	0.25 fraction
3	Apron (GA)	Soil Handling	$T =$ Mass of aggregate storage pile = L x W x	4331.3 tons
3	Apron (GA)	Soil Handling	$PM_{10} = T \times 0.35 \times 0.0032 \times [(u/5)^*1.3] / [(m$	86.2 lbs
4	Fuel Tanks	Asphalt Drying	$A =$ Area of land affected = L x W x 0.0929	26.8 m2
4	Fuel Tanks	Asphalt Drying	$AR =$ Application rate of liquefied asphalt o	1.811 Um2
4	Fuel Tanks	Asphalt Drying	$VD =$ Volume fraction of diluent in liquefied	0.35 fraction
4	Fuel Tanks	Asphalt Drying	$EF =$ Mass fraction of diluent which evapor	0.7 fraction
4	Fuel Tanks	Asphalt Drying	$D =$ Density of solvent utilized	1.8 lbs/ft
4	Fuel Tanks	Asphalt Drying	$VOC = A \times AR \times VD \times EF \times D$	21.4 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$T =$ Mass of asphalt loaded = L x W x 0.166i	3.481 tons
4	Fuel Tanks	Asphalt Storage and Batching	$PM_{10} = (0.027 + 0.00042) \times T$	0.095 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$CO = (0.4 + 0.0004) \times T$	1.394 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$NOx = (0.025) \times T$	0.087 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$SOx = (0.0046) \times T$	0.016 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$VOC = (0.0082 + 0.0042) \times T$	0.043 lbs
4	Fuel Tanks	Material Movement (Unpaved Roads)	$s =$ Surface material silt content	0.043 fraction
4	Fuel Tanks	Material Movement (Unpaved Roads)	$Wt. =$ Mean vehicle weight	32 tons
4	Fuel Tanks	Material Movement (Unpaved Roads)	$VMT =$ Vehicle miles traveled	5167.7 miles
4	Fuel Tanks	Material Movement (Unpaved Roads)	$PM_{10} = 1.5 \times [(s/12)^*0.9] \times [(WL/2)^*0.45] \times$	141.5 lbs
4	Fuel Tanks	Material Movement (Paved Roads)	$sL =$ Road surface silt loading	0.1 g/m3
4	Fuel Tanks	Material Movement (Paved Roads)	$Wt. =$ Mean vehicle weight	32 tons
4	Fuel Tanks	Material Movement (Paved Roads)	$VMT =$ Vehicle miles traveled	5160 miles
4	Fuel Tanks	Material Movement (Paved Roads)	$PM_{10} = 0.0022 \times (sL^*0.91) \times (Wt^*1.02) \times Vt$	47.9 lbs
4	Fuel Tanks	Concrete Mixing/Batching	$V =$ Volume of asphalt = 0.111 x L x W x 1.2i	13.3 yd3
4	Fuel Tanks	Concrete Mixing/Batching	$PM_{10} = 0.037 \times V$	0.493 lbs
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$A =$ Area affected = L x W / 43560.0	0.007 acres
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$TPConv = TSP/PM_{10}$ conversion	0.5 fraction
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$CE =$ Control efficiency	0.63 fraction
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$t =$ year (e.g. 0.65 year)	1 years
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$PM_{10} = 0.38 \times A \times TPConv \times (1-CE) \times t / 200i$	0 lbs
4	Fuel Tanks	Soil Handling	$u =$ Wind speed	5 mph
4	Fuel Tanks	Soil Handling	$m =$ Moisture content	0.25 fraction
4	Fuel Tanks	Soil Handling	$T =$ Mass of aggregate storage pile = L x W x	7.92 tons
4	Fuel Tanks	Soil Handling	$PM_{10} = T \times 0.35 \times 0.0032 \times [(u/5)^*1.3] / [(m$	0.163 lbs

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ASSUMPTIONS

Emission factors were developed from the following models:

- On-Road Vehicles: MOVES 4
- Non-Road Equipment: MOVES4

In addition to the overall project size dimensions (e.g., Length and width) provided by the user, an additional 10 ft length and 10 ft width is added to account for disturbance areas.

The number of employees is based on the higher of two methods: (1) number of equipment, and (2) multiply the project cost in million by 11.

The average employee travels 30 miles round-trip from home to construction site each day.

The average on-road material delivery round-trip distance per truck is 40 miles per day.

For calculating fugitive, re-entrained PM emissions from on-road and non-road material delivery and handling equipment, a nominal VMT of 5 miles is used for each vehicle per day.

In deriving emission factors from NONROAD, the horsepower for each equipment represents the most popular in each equipment category.

The total length of each modeled scenario is used to define the number of days associated with vehicle/equipment evaporative emissions.

The choice of location and season are assumed to adequately represent differences in fuel characteristics affecting emissions.

Only two seasons (Summer and Winter) are used to represent all seasons.

14 U.S. Counties are used to represent all other counties in the U.S., (all other counties are mapped to the 14).

The default methods assume that all construction equipment use diesel as well as heavy-duty on-road vehicles, while passenger vehicles (including motorcycles) use gasoline.

Fugitive emissions are only modeled for:

- Asphalt drying
- Asphalt storage and batching
- Concrete mixing/batching
- Soil handling
- Unstabilized land and wind erosion
- Material movement (unpaved roads)
- Material movement (paved roads)

On-Road vehicle speeds are not explicitly modeled. The associated emission factors for each modeled vehicle from MOVES represent averages over the driving cycles, the roadway type, and daily temperature variations.

The default equipment hours-of-use data are developed based on the overall size of the project provided by the user and activity rates based on expert engineering judgment.

Under the Construction Activity Type list (Activity Tab), when a choice between asphalt and concrete materials occurs, asphalt is always selected as default. To choose concrete, de-select the asphalt item and select the corresponding concrete item.

Two trips per day were assumed for each on-road material handling trucks.

Only CO2, CH4, and N2O are used to represent greenhouse gas emissions. Other potential greenhouse gases including air conditioning refrigerants were not included.

The following equipment are always modeled using diesel emission factors since gasoline-based emission factors are not available:

- Asphalt Deliveries/Ten Wheelers
- Bulldozer
- Concrete Ready Mix Trucks
- Concrete Ready Trucks Mix for Cores
- Concrete Truck
- Crack Filler (Trailer Mounted)
- Delivery of Tanks (3)
- Distributing Tanker
- Dozer
- Dump Truck
- Dump Truck (12 cy)
- Excavator
- Excavator for U/G Services/Tanks
- Flat Bed or Dump Trucks
- Flatbed Truck
- Grader
- Grout Wheel Truck
- Hoist Equipment with 40 Ton Rig
- Hydraulic Hammer
- Hydroseeder
- Line Painting Truck and Sprayer
- Material Deliveries
- Off-Road Truck
- Pickup Truck
- Scraper
- Seed Truck Spreader
- Small Dozer
- Survey Crew Trucks
- Ten Wheelers
- Ten Wheelers- Material Delivery
- Tool Truck
- Tractor Trailer- Equipment Delivery
- Tractor Trailer- Material Delivery
- Tractor Trailer- Steel Deliveries
- Tractor Trailer- Stone Delivery
- Tractor Trailer- Topsoil & Seed
- Tractor Trailer- Truck Delivery
- Tractor Trailer with Boom Hoist- Curbs Det & Place
- Tractor Trailer with Boom Hoist- Delivery
- Tractor Trailers- Rebar Deliveries
- Tractor Trailers Temp Fac.
- Truck for Topsoil & Seed Del&Spread
- Water Truck
- Excavator with Bucket
- Excavator with Hoe Ram

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0.01078471 0.36504278 1321.69724 0.03589313 0.01770637

Construction Emissions Inventory Tool (ACEIT)																															
Version 1.0																															
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STUDY																															
Study Name																															
OKV Northside Development																															
Study Description																															
Construction 2028																															
EMISSIONS INVENTORY - DETAILS:																															
Non-Road Sources																															
Units for Non-Greenhouse Gases Emission: Short Ton																															
Units for Greenhouse Gases (CO2, CH4, and N2O) Emission: Metric Ton																															
Scenario	Year	Pro ect	Construct on Act v ty	Eq ipment	Moves Eq ipment	Moves Location	Fuel	HP Average	Load Factor	Hours of Activity	CO2	CH4	NOx	SO2	PM10	PM2.5	VOC	CO2	CO2 tpy	NOx tpy	SO2 tpy	PM10 tpy	PM2.5 tpy	VOC tpy	CO2 Exhaust						
1	2028	Building - 30000 sqft- 3 stories	Concrete Foundations	Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	320.1	1.84775	2.15906	0.0202	0.26679	0.25878	0.32988	695.03544	0.0136916	0.0159984	1.494E-05	0.0019789	0.0019176	0.00244439	5.1501331	0.0136916	0.0159984	1.494E-05	0.0019789	0.0019176	0.00244439	5.1501331
1	2028	Building - 30000 sqft- 3 stories	Concrete Foundations	Concrete Ready Mix Trucks	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	60	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0005547	0.0027955	3.313E-05	0.0001671	0.0001621	0.00023516	12.568241	0.0005547	0.0027955	3.313E-05	0.0001671	0.0001621	0.00023516	12.568241
1	2028	Building - 30000 sqft- 3 stories	Concrete Foundations	Fork Truck	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.59	320.1	0.20847	1.01033	0.00159	0.02973	0.02884	0.02632	596.08168	0.0043399	0.0210334	3.32E-05	0.000619	0.0006005	0.00054803	12.409377	0.0043399	0.0210334	3.32E-05	0.000619	0.0006005	0.00054803	12.409377
1	2028	Building - 30000 sqft- 3 stories	Concrete Foundations	Tool Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	80.1	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0007405	0.0037319	4.242E-05	0.0002231	0.0002164	0.00031394	16.778602	0.0007405	0.0037319	4.242E-05	0.0002231	0.0002164	0.00031394	16.778602
1	2028	Building - 30000 sqft- 3 stories	Concrete Foundations	Tractor Trailer- Material Delivery	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	15.9	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.000147	0.0007408	8.781E-06	4.429E-05	4.297E-05	6.2317E-05	3.330584	0.000147	0.0007408	8.781E-06	4.429E-05	4.297E-05	6.2317E-05	3.330584
1	2028	Building - 30000 sqft- 3 stories	Construction Mob & Layout	Survey Crew Trucks	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	9.9	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	9.153E-05	0.0004613	5.467E-06	2.758E-05	2.675E-05	3.8801E-05	2.0737598	9.153E-05	0.0004613	5.467E-06	2.758E-05	2.675E-05	3.8801E-05	2.0737598
1	2028	Building - 30000 sqft- 3 stories	Construction Mob & Layout	Tractor Trailers Temp Fac.	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	3.9	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	3.606E-05	0.0001817	2.154E-06	1.086E-05	1.054E-05	1.5285E-05	5.1869357	3.606E-05	0.0001817	2.154E-06	1.086E-05	1.054E-05	1.5285E-05	5.1869357
1	2028	Building - 30000 sqft- 3 stories	Exterior Wall Framing	Fork Truck	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.59	600	0.20847	1.01033	0.00159	0.02973	0.02884	0.02632	596.08168	0.0081348	0.0394253	6.222E-05	0.0011603	0.0011255	0.00102723	23.260314	0.0081348	0.0394253	6.222E-05	0.0011603	0.0011255	0.00102723	23.260314
1	2028	Building - 30000 sqft- 3 stories	Exterior Wall Framing	Generator	Other Construction Equipment	Other Construction Equipment40	Diesel	40	0.43	300	0.27880	2.52869	0.00157	0.02041	0.01980	0.09246	595.88073	0.0015858	0.0143848	8.925E-06	0.0001161	0.0001126	0.00052591	3.3893434	0.0015858	0.0143848	8.925E-06	0.0001161	0.0001126	0.00052591	3.3893434
1	2028	Building - 30000 sqft- 3 stories	Exterior Wall Framing	Man Lift	Rough Terrain Forklifts	Rough Terrain Forklifts75	Diesel	75	0.21	600	0.25051	2.57738	0.00158	0.02400	0.02328	0.05695	595.98141	0.0026095	0.0268475	1.645E-05	0.00025	0.0002425	0.00059323	6.2082766	0.0026095	0.0268475	1.645E-05	0.00025	0.0002425	0.00059323	6.2082766
1	2028	Building - 30000 sqft- 3 stories	Exterior Wall Framing	Tool Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	150	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0013867	0.0069886	8.284E-05	0.0004179	0.0004053	0.00058789	31.420603	0.0013867	0.0069886	8.284E-05	0.0004179	0.0004053	0.00058789	31.420603
1	2028	Building - 30000 sqft- 3 stories	Exterior Wall Framing	Tractor Trailer- Material Delivery	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	150	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0013867	0.0069886	8.284E-05	0.0004179	0.0004053	0.00058789	31.420603	0.0013867	0.0069886	8.284E-05	0.0004179	0.0004053	0.00058789	31.420603
1	2028	Building - 30000 sqft- 3 stories	Interior Build-Out/ Finishes	Fork Truck	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.59	2400	0.20847	1.01033	0.00159	0.02973	0.02884	0.02632	596.08168	0.0325391	0.1577012	0.0002489	0.0048412	0.004052	0.00410893	93.041255	0.0325391	0.1577012	0.0002489	0.0048412	0.004052	0.00410893	93.041255
1	2028	Building - 30000 sqft- 3 stories	Interior Build-Out/ Finishes	Man Lift	Rough Terrain Forklifts	Rough Terrain Forklifts75	Diesel	75	0.21	2400	0.25051	2.57738	0.00158	0.02400	0.02328	0.05695	595.98141	0.0104382	0.1073899	5.68E-05	0.001	0.00097	0.00237204	24.833106	0.0104382	0.1073899	5.68E-05	0.001	0.00097	0.00237204	24.833106
1	2028	Building - 30000 sqft- 3 stories	Interior Build-Out/ Finishes	Tool Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	300	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0027735	0.0139773	0.0001657	0.0008357	0.0008107	0.00117579	6.8142107	0.0027735	0.0139773	0.0001657	0.0008357	0.0008107	0.00117579	6.8142107
1	2028	Building - 30000 sqft- 3 stories	Interior Build-Out/ Finishes	Tractor Trailer- Material Delivery	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	600	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.005547	0.0279945	0.0003313	0.0016175	0.0016213	0.00235158	12.568241	0.005547	0.0279945	0.0003313	0.0016175	0.0016213	0.00235158	12.568241
1	2028	Building - 30000 sqft- 3 stories	Roofing	High Lift	Rough Terrain Forklifts	Rough Terrain Forklifts100	Diesel	100	0.59	120	0.14373	0.94190	0.00158	0.02363	0.22292	0.01574	596.11246	0.0011217	0.0073509	2.296E-05	0.0001844	0.0001789	0.00012287	4.652303	0.0011217	0.0073509	2.296E-05	0.0001844	0.0001789	0.00012287	4.652303
1	2028	Building - 30000 sqft- 3 stories	Roofing	Man Lift (Fascia Construction)	Rough Terrain Forklifts	Rough Terrain Forklifts75	Diesel	75	0.21	24	0.25051	2.57738	0.00158	0.02400	0.02328	0.05695	595.98141	0.0001044	0.0010739	5.68E-07	1E-05	9.7E-06	2.3729E-05	0.2483311	0.0001044	0.0010739	5.68E-07	1E-05	9.7E-06	2.3729E-05	0.2483311
1	2028	Building - 30000 sqft- 3 stories	Roofing	Material Deliveries	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	60	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0005547	0.0027955	3.313E-05	0.0001671	0.0001621	0.00023516	12.568241	0.0005547	0.0027955	3.313E-05	0.0001671	0.0001621	0.00023516	12.568241
1	2028	Building - 30000 sqft- 3 stories	Roofing	Tractor Trailer- Material Delivery	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	60	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0005547	0.0027955	3.313E-05	0.0001671	0.0001621	0.00023516	12.568241	0.0005547	0.0027955	3.313E-05	0.0001671	0.0001621	0.00023516	12.568241
1	2028	Building - 30000 sqft- 3 stories	Security & Safety Systems	High Lift	Rough Terrain Forklifts	Rough Terrain Forklifts100	Diesel	100	0.59	800.1	0.14373	0.94190	0.00158	0.02363	0.22292	0.01574	596.11246	0.0074792	0.0490124	2.244E-05	0.0012296	0.0011927	0.00081953	31.01923	0.0074792	0.0490124	2.244E-05	0.0012296	0.0011927	0.00081953	31.01923
1	2028	Building - 30000 sqft- 3 stories	Security & Safety Systems	Tractor Trailer- Steel Deliveries	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	200.1	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0018499	0.0093228	0.0001105	0.0005574	0.0005407	0.00078425	41.915085	0.0018499	0.0093228	0.0001105	0.0005574	0.0005407	0.00078425	41.915085
1	2028	Building - 30000 sqft- 3 stories	Structural Steel Frame	90 Ton Crane	Cranes	Cranes300	Diesel	300	0.43	320.1	0.30020	0.14387	0.00141	0.00842	0.00816	0.01206	531.00892	0.0001539	0.0002617	1.966E-07	1.492E-05	1.448E-05	5.2415E-05	0.0371498	0.0001539	0.0002617	1.966E-07	1.492E-05	1.448E-05	5.2415E-05	0.0371498
1	2028	Building - 30000 sqft- 3 stories	Structural Steel Frame	Concrete Pump	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.43	12	2.45907	4.18340	0.00218	0.23854	0.23138	0.83774	593.75610	0.0001539	0.0002617	1.966E-07	1.492E-05	1.448E-05	5.2415E-05	0.0371498	0.0001539	0.0002617	1.966E-07	1.492E-05	1.448E-05	5.2415E-05	0.0371498
1	2028	Building - 30000 sqft- 3 stories	Structural Steel Frame	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	24	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0002219	0.0011182	1.325E-05	6.686E-05	6.485E-05	9.4063E-05	5.0272969	0.0002219	0.0011182	1.325E-05	6.686E-05	6.485E-05	9.4063E-05	5.0272969
1	2028	Building - 30000 sqft- 3 stories	Structural Steel Frame	Fork Truck	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.59	80.1	0.20847	1.01033	0.00159	0.02973	0.02884	0.02632	596.08168	0.001086	0.0052633	8.307E-06	0.0001549	0.0001503	0.0001714	1.1052519	0.001086	0.0052633	8.307E-06	0.0001549	0.0001503	0.0001714	1.1052519
1	2028	Building - 30000 sqft- 3 stories	Structural Steel Frame	Tool Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	12	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.000109	0.0005591	6.627E-06	3.343E-05	3.243E-05	4.7032E-05	2.5136483	0.000109	0.0005591	6.627E-06	3.343E-05	3.243E-05	4.7032E-05	2.5136483
1	2028	Building - 30000 sqft- 3 stories	Structural Steel Frame	Tractor Trailer- Steel Deliveries	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	39.9	0.02369	0.01940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0003689	0.001859	2.204E-05	0.0001112	0.0010178	0.00015638	8.3578809	0.0003689	0.001					

3	2028	Apron (GA)	Clearing and Grubbing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	64	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0005917	0.0029818	3.534E+05	0.0001783	0.0001729	0.00025083	13.406124
3	2028	Apron (GA)	Concrete Placement	Air Compressor	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	58.2752	0.20847	1.01033	0.00159	0.02973	0.02884	0.02632	596.08188	0.0005758	0.0027908	4.405E+06	8.213E+05	7.967E+05	7.2714E+05	1.6465108
3	2028	Apron (GA)	Concrete Placement	Concrete Saws	Other Construction Equipment	Other Construction Equipment400	Diesel	40	0.59	58.2752	0.27880	2.52899	0.00157	0.02041	0.01980	0.05046	595.88073	0.0004227	0.003834	2.379E+06	3.095E+05	3.002E+05	0.00014017	0.9033617
3	2028	Apron (GA)	Concrete Placement	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	242.81333	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0022448	0.0113129	0.0001341	0.0006764	0.0006561	0.00095166	50.862276
3	2028	Apron (GA)	Concrete Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	116.5504	0.10639	0.32339	0.00144	0.02273	0.02204	0.02338	536.76554	0.0010286	0.0031265	1.388E+05	0.0002197	0.0002131	0.0000226	5.1893317
3	2028	Apron (GA)	Concrete Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	174.8256	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0016163	0.0081453	6.655E+05	0.000487	0.0004724	0.00068859	36.208298
3	2028	Apron (GA)	Concrete Placement	Rubber Tired Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	58.2752	0.76236	1.52346	0.00182	0.15937	0.15459	0.24737	625.82578	0.0005054	0.0101641	1.205E+05	0.001057	0.0010253	0.00164068	4.1508152
3	2028	Apron (GA)	Concrete Placement	Slip Form Paver	Pavers	Pavers175	Diesel	175	0.59	58.2752	0.07865	0.23124	0.00142	0.01887	0.01830	0.01238	536.79643	0.00050521	0.0015337	9.45E+06	0.0001251	0.0001214	8.2121E+05	3.5602378
3	2028	Apron (GA)	Concrete Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	58.2752	1.48790	3.76234	0.00219	0.17019	0.16508	0.35160	595.15145	0.0014098	0.0035648	2.074E+06	0.0001613	0.0001564	0.00033314	0.56391
3	2028	Apron (GA)	Drainage - 24 inch SICPP	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	50.72	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	0.0003938	0.0013139	8.201E+06	9.255E+05	8.977E+05	6.2774E+05	3.0981764
3	2028	Apron (GA)	Drainage - 24 inch SICPP	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	50.72	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0004689	0.0023631	2.801E+05	0.0001413	0.0001371	0.00019879	10.624353
3	2028	Apron (GA)	Drainage - 24 inch SICPP	Excavator	Excavators	Excavators175	Diesel	175	0.59	50.72	0.05501	0.18299	0.00142	0.01255	0.01217	0.00901	536.80483	0.0003176	0.0010563	8.172E+06	7.245E+05	7.028E+05	5.2015E+05	3.0987908
3	2028	Apron (GA)	Drainage - 24 inch SICPP	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	50.72	0.76236	1.52346	0.00182	0.15937	0.15459	0.24737	625.82578	0.0044008	0.0084644	1.048E+05	0.00092	0.0008924	0.00142797	3.6126783
3	2028	Apron (GA)	Drainage - 24 inch SICPP	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	50.72	0.10639	0.32339	0.00144	0.02273	0.02204	0.02338	536.76554	0.0004476	0.0013606	6.041E+06	9.561E+05	9.274E+05	8.935E+05	2.2582754
3	2028	Apron (GA)	Drainage - 24 inch SICPP	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	50.72	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0004689	0.0023631	2.801E+05	0.0001413	0.0001371	0.00019879	10.624353
3	2028	Apron (GA)	Drainage - 24 inch SICPP	Roller	Rollers	Rollers100	Diesel	100	0.59	50.72	0.12964	0.90926	0.00158	0.02387	0.02315	0.01153	596.12533	0.0004277	0.0029993	5.217E+06	7.873E+05	7.638E+05	3.803E+05	1.9664158
3	2028	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	26.177778	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0002605	0.0013128	1.556E+05	7.85E+05	7.614E+05	0.00011044	5.9024185
3	2028	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	26.177778	0.76236	1.52346	0.00182	0.15937	0.15459	0.24737	625.82578	0.0024449	0.0049146	5.824E+06	0.000511	0.0004958	0.00079332	2.0074035
3	2028	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	26.177778	0.10639	0.32339	0.00144	0.02273	0.02204	0.02338	536.76554	0.0002487	0.0007559	3.566E+06	5.312E+05	5.152E+05	5.4639E+05	1.2545975
3	2028	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	26.177778	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0002605	0.0013128	1.556E+05	7.85E+05	7.614E+05	0.00011044	5.9024185
3	2028	Apron (GA)	Drainage - 6 inch Perforated Underdrain	Tractors/Loaders/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	26.177778	1.84775	2.15906	0.00202	0.26679	0.25878	0.32988	695.03544	0.0012052	0.0014083	3.151E+06	0.000174	0.0001688	0.00021517	0.4533562
3	2028	Apron (GA)	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	2880	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0266255	0.1341818	0.0015905	0.0080231	0.0077824	0.01128756	60.327508
3	2028	Apron (GA)	Excavation (Borrow)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	97.125333	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	0.0007541	0.0025156	1.57E+05	0.0001772	0.0001719	0.00012021	0.53939163
3	2028	Apron (GA)	Excavation (Borrow)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	97.125333	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0008979	0.0045252	3.564E+05	0.0002706	0.0002625	0.00038066	20.34491
3	2028	Apron (GA)	Excavation (Borrow)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	97.125333	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0008979	0.0045252	3.564E+05	0.0002706	0.0002625	0.00038066	20.34491
3	2028	Apron (GA)	Excavation (Borrow)	Roller	Rollers	Rollers100	Diesel	100	0.59	44.827077	0.12964	0.90926	0.00158	0.02387	0.02315	0.01153	596.12533	0.000378	0.0026509	6.611E+06	6.958E+05	6.749E+05	3.3611E+05	1.717947
3	2028	Apron (GA)	Excavation (Cut to Fill)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	72.844	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	0.0005655	0.00187	1.178E+05	0.0001329	0.0001289	0.00156E+05	4.4504372
3	2028	Apron (GA)	Excavation (Cut to Fill)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	194.25067	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0017958	0.0090503	0.0001073	0.0005411	0.0005249	0.00076133	40.688921
3	2028	Apron (GA)	Excavation (Cut to Fill)	Excavator	Excavators	Excavators175	Diesel	175	0.59	58.2752	0.05501	0.18299	0.00142	0.01255	0.01217	0.00901	536.80483	0.0003649	0.0012137	9.39E+06	8.324E+05	8.075E+05	5.9783E+05	3.5603835
3	2028	Apron (GA)	Excavation (Cut to Fill)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	58.2752	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0005388	0.0027151	3.218E+05	0.0001623	0.0001575	0.0002284	12.209646
3	2028	Apron (GA)	Excavation (Cut to Fill)	Roller	Rollers	Rollers100	Diesel	100	0.59	58.2752	0.12964	0.90926	0.00158	0.02387	0.02315	0.01153	596.12533	0.0004914	0.0034461	5.944E+06	9.045E+05	8.774E+05	4.3695E+05	2.2593311
3	2028	Apron (GA)	Excavation (Cut to Fill)	Scrapper	Scrapers	Scrapers600	Diesel	600	0.59	72.844	0.08879	0.27079	0.00144	0.01690	0.01640	0.01827	536.77884	0.0025239	0.0076974	4.092E+05	0.0004805	0.0004461	0.00051942	15.257991
3	2028	Apron (GA)	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	27.423529	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	0.0002129	0.0007104	4.434E+06	5.004E+05	4.854E+05	3.3941E+05	1.674553
3	2028	Apron (GA)	Fencing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	17.5	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0006118	0.0081513	6.644E+06	4.875E+05	4.799E+05	6.6858E+05	3.6657371
3	2028	Apron (GA)	Fencing	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	70	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0006471	0.0032614	3.866E+05	0.000195	0.0001892	0.00027435	14.662948
3	2028	Apron (GA)	Fencing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	70	0.10639	0.32339	0.00144	0.02273	0.02204	0.02338	536.76554	0.0006178	0.0018778	3.386E+06	0.000132	0.000128	0.00013574	3.1167051
3	2028	Apron (GA)	Fencing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	70	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.0006471	0.0032614	3.866E+05	0.000195	0.0001892	0.00027435	14.662948
3	2028	Apron (GA)	Fencing	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	70	4.89894	4.90578	0.00223	0.68739	0.66677	0.90836	693.33713	0.0006042	0.005962	2.829E+06	0.0008354	0.0008103	0.00110393	8.4261158
3	2028	Apron (GA)	Fencing	Tractors/Loaders/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	70	1.84775	2.15906	0.00202	0.26679	0.25878	0.32988	695.03544	0.0029941	0.0034985	3.268E+06	0.0004323	0.0004193	0.00053544	1.1262397
3	2028	Apron (GA)	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	19.3529	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	0.0001503	0.0005013	3.129E+06	3.531E+05	3.425E+05	2.3852E+05	1.1823742
3	2028	Apron (GA)	Grading	Grader	Graders	Graders300	Diesel	300	0.59	19.3529	0.01665	0.13815	0.00142	0.00877	0.00850	0.01142	536.79718	0.0001195	0.0005216	3.637E+06	3.31E+05	3.211E+05	4.3124E+05	2.0269175
3	2028	Apron (GA)	Grading	Roller	Rollers	Rollers100	Diesel	100	0.59	19.3529	0.12964	0.90926	0.00158	0.02387	0.02315	0.01153	596.12533	0.0001632	0.0011444	1.991E+06	3.004E+05	2.914E+05	1.4511E+05	0.7503215
3	2028	Apron (GA)	Hydroseeding	Hydroseeder	Other Construction Equipment	Other Construction Equipment800	Diesel	600	0.59	17.435	0.47025	1.22161	0.00156	0.06862	0.06482	0.06669	536.63640	0.0031993	0.0083112	1.06E+05	0.0004546	0.000441	0.00045375	3.6510003
3	2028																							

4	2028	Fuel Tanks	Drainage	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	1.088	0.10639	0.32339	0.00144	0.02273	0.02204	0.02338	536.76554	6.002E-06	2.919E-05	1.296E-07	2.051E-06	1.989E-06	2.1097E-06	0.0484420
4	2028	Fuel Tanks	Drainage	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.088	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	1.008E-05	5.089E-05	6.008E-07	3.031E-06	2.94E-06	4.2642E-06	0.2279041
4	2028	Fuel Tanks	Drainage	Roller	Rollers	Rollers100	Diesel	100	0.59	1.088	0.12964	0.90926	0.00158	0.02387	0.02315	0.01153	596.12533	9.174E-06	6.434E-05	1.119E-07	1.688E-06	1.638E-06	8.1579E-07	0.0421818
4	2028	Fuel Tanks	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	2880	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.026255	0.1341818	0.0015905	0.0080231	0.0077824	0.01128756	0.03127508
4	2028	Fuel Tanks	Excavation (Borrow)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	1.7053333	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	1.324E-05	4.418E-05	2.757E-07	3.112E-06	3.018E-06	2.11006E-06	0.1041881
4	2028	Fuel Tanks	Excavation (Borrow)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.7053333	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	1.577E-05	7.945E-05	9.418E-07	4.751E-06	4.608E-06	6.6837E-06	0.3571723
4	2028	Fuel Tanks	Excavation (Borrow)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.7053333	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	1.577E-05	7.945E-05	9.418E-07	4.751E-06	4.608E-06	6.6837E-06	0.3571723
4	2028	Fuel Tanks	Excavation (Borrow)	Roller	Rollers	Rollers100	Diesel	100	0.59	0.7879769	0.12964	0.90926	0.00158	0.02387	0.02315	0.01153	596.12533	6.638E-06	4.654E-05	8.096E-08	1.222E-06	1.185E-06	5.9015E-07	0.030515
4	2028	Fuel Tanks	Excavation (Cut to Fill)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	1.279	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	9.93E-06	3.313E-05	2.088E-07	2.334E-06	2.264E-06	1.583E-06	0.0781411
4	2028	Fuel Tanks	Excavation (Cut to Fill)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	3.4106667	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	3.153E-05	0.0001589	1.884E-06	9.501E-06	9.216E-06	1.3307E-05	0.7144347
4	2028	Fuel Tanks	Excavation (Cut to Fill)	Excavator	Excavators175	Diesel	175	0.59	1.0232	0.05501	0.18290	0.00142	0.01255	0.01217	0.00901	536.80483	6.406E-06	2.131E-05	1.649E-07	1.462E-06	1.418E-06	1.0493E-06	0.0625130	
4	2028	Fuel Tanks	Excavation (Cut to Fill)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.0232	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	6.459E-06	4.767E-05	5.651E-07	2.85E-06	2.765E-06	4.0102E-06	0.2143304
4	2028	Fuel Tanks	Excavation (Cut to Fill)	Roller	Rollers	Rollers100	Diesel	100	0.59	1.0232	0.12964	0.90926	0.00158	0.02387	0.02315	0.01153	596.12533	8.627E-06	6.051E-05	1.052E-07	1.588E-06	1.541E-06	7.672E-07	0.0396690
4	2028	Fuel Tanks	Excavation (Cut to Fill)	Scrapper	Scrapers	Scrapers600	Diesel	600	0.59	1.279	0.08879	0.27079	0.00144	0.01690	0.01640	0.01827	536.77884	4.432E-05	0.0001352	7.185E-07	8.437E-06	8.184E-06	9.12E-06	0.2679009
4	2028	Fuel Tanks	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	0.0501961	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	3.897E-07	1.3E-06	8.117E-09	9.159E-08	8.884E-08	6.2126E-08	0.0030668
4	2028	Fuel Tanks	Fencing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.2666667	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	2.485E-06	1.242E-05	1.473E-07	7.429E-07	7.206E-07	1.0451E-06	0.0558589
4	2028	Fuel Tanks	Fencing	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.0666667	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	9.861E-06	4.97E-05	5.891E-07	2.972E-06	2.882E-06	4.1806E-06	0.2234354
4	2028	Fuel Tanks	Fencing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	1.0666667	0.10639	0.32339	0.00144	0.02273	0.02204	0.02338	536.76554	9.413E-06	2.861E-05	1.27E-07	2.011E-06	1.95E-06	2.0683E-06	0.0474028
4	2028	Fuel Tanks	Fencing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1.0666667	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	9.861E-06	4.97E-05	5.891E-07	2.972E-06	2.882E-06	4.1806E-06	0.2234354
4	2028	Fuel Tanks	Fencing	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	1.0666667	4.89894	4.90578	0.00233	0.68739	0.66677	0.90836	693.33713	9.241E-05	9.085E-05	4.311E-08	1.273E-05	1.235E-05	1.6822E-05	0.0128399
4	2028	Fuel Tanks	Fencing	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	1.0666667	1.84775	2.15906	0.00202	0.26679	0.25878	0.32988	695.03544	4.562E-05	5.331E-05	4.98E-08	6.587E-06	6.39E-06	8.154E-06	0.0171617
4	2028	Fuel Tanks	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	0.083	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	6.444E-07	2.15E-06	1.342E-08	1.514E-07	1.469E-07	1.0273E-07	0.0050709
4	2028	Fuel Tanks	Grading	Grader	Graders	Graders300	Diesel	300	0.59	0.083	0.03165	0.13815	0.00142	0.00877	0.00850	0.01142	536.79718	5.126E-07	2.237E-06	2.298E-08	1.42E-07	1.377E-07	1.849E-07	0.0080603
4	2028	Fuel Tanks	Grading	Roller	Rollers	Rollers100	Diesel	100	0.59	0.083	0.01264	0.90926	0.00158	0.02387	0.02315	0.01153	596.12533	6.998E-07	4.908E-06	8.537E-09	1.288E-07	1.25E-07	6.2234E-08	0.0032179
4	2028	Fuel Tanks	Hydroseeding	Hydroseeder	Other Construction Equipment	Other Construction Equipment600	Diesel	600	0.59	0.0748	0.47025	1.22161	0.00156	0.06682	0.06482	0.06669	536.63640	1.373E-05	3.566E-05	4.548E-08	1.951E-06	1.892E-06	1.9467E-06	0.0156630
4	2028	Fuel Tanks	Hydroseeding	Off-Road Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.0748	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	6.915E-07	3.485E-06	4.131E-08	2.084E-07	2.021E-07	2.9316E-07	0.0156684
4	2028	Fuel Tanks	Markings	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.682857	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.088E-06	3.067E-05	6.35E-07	1.834E-06	1.779E-06	2.58E-06	0.1378919
4	2028	Fuel Tanks	Markings	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	0.682857	0.10639	0.32339	0.00144	0.02273	0.02204	0.02338	536.76554	5.809E-06	1.766E-05	7.841E-08	1.241E-06	1.204E-06	1.2785E-06	0.0259307
4	2028	Fuel Tanks	Markings	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.682857	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0.088E-06	3.067E-05	6.35E-07	1.834E-06	1.779E-06	2.58E-06	0.1378919
4	2028	Fuel Tanks	Soil Erosion/Sediment Control	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	0	0.10639	0.32339	0.00144	0.02273	0.02204	0.02338	536.76554	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Soil Erosion/Sediment Control	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Soil Erosion/Sediment Control	Pumps	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.43	0	2.45907	4.18340	0.00218	0.23854	0.23138	0.83774	593.75610	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	0	1.84775	2.15906	0.00202	0.26679	0.25878	0.32988	695.03544	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Street Lighting	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Street Lighting	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	0	0.76236	1.53246	0.00182	0.15937	0.15459	0.24737	625.82578	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Street Lighting	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	0	0.10639	0.32339	0.00144	0.02273	0.02204	0.02338	536.76554	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Street Lighting	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Street Lighting	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	0	4.89894	4.90578	0.00233	0.68739	0.66677	0.90836	693.33713	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Street Lighting	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	0	1.84775	2.15906	0.00202	0.26679	0.25878	0.32988	695.03544	0	0	0	0	0	0	0
4	2028	Fuel Tanks	Subbase Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	0.0073684	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	5.23E-07	1.745E-06	1.089E-08	1.229E-07	1.192E-07	8.3379E-08	0.0041159
4	2028	Fuel Tanks	Subbase Placement	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.4755556	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	4.396E-06	2.216E-05	2.626E-07	1.325E-06	1.285E-06	1.8638E-06	0.0996149
4	2028	Fuel Tanks	Subbase Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.0073684	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	6.228E-07	3.139E-06	3.72E-08	1.877E-07	1.82E-07	2.6404E-07	0.0141117
4	2028	Fuel Tanks	Subbase Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	0.0654642	0.12964	0.90926	0.00158	0.02387	0.02315	0.01153	596.12533	5.552E-07	3.894E-06	6.73E-09	1.022E-07	9.914E-08	4.9372E-08	0.0002559
4	2028	Fuel Tanks	Topsoil Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	0.3693333	0.06821	0.22760	0.00142	0.01603	0.01555	0.01087	536.79974	2.867E-06	9.567E-06	5.972E-08	6.739E-07	6.537E-07	4.5711E-07	0.0225646
4	2028	Fuel Tanks	Topsoil Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.3693333	0.02369	0.11940	0.00142	0.00714	0.00692	0.01004	536.80119	3.414E-06	1.721E-05	2.04E-07	1.029E-06	9.98E-07	1.4475E-06	0.0773645
4	2028	Fuel Tanks	Topsoil Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0.3693333	0.02369	0.11940	0.00142	0.00714	0.00692									

3	2028	Apron (GA)	Soil Handling	12	0	0	0	0.0448	0
3	2028	Apron (GA)	Unstabilized Land and Wind Erosion	12	0	0	0	8.355E-08	0
4	2028	Fuel Tanks	Asphalt Drying	12	0	0	0	0	0.0107
4	2028	Fuel Tanks	Asphalt Storage and Batching	12	0.000697	4.351E-05	8.005E-06	4.772E-05	2.158E-05
4	2028	Fuel Tanks	Concrete Mixing/Batching	12	0	0	0	0.0002465	0
4	2028	Fuel Tanks	Material Movement (Paved Roads)	12	0	0	0	0.02395	0
4	2028	Fuel Tanks	Material Movement (Unpaved Roads)	12	0	0	0	0.07075	0
4	2028	Fuel Tanks	Soil Handling	12	0	0	0	8.15E-05	0
4	2028	Fuel Tanks	Unstabilized Land and Wind Erosion	12	0	0	0	1.162E-10	0
Total					0.381797	0.0238	0.004378	0.573077	0.64345

GHG emissions in Metric Tons per Year											
Em ss on Source	Em ss on Source	CO	NOx	SO2	PM10	PM2.5	VOC	CO2	CH4	N2O	CO2e
NonRoad	NonRoad	0.246	1.089	0.007	0.052	0.050	0.068	2551.322	--	--	
OnRoad	OnRoad	12.881	0.395	0.006	0.011	0.010	0.345	1302.903	0.034	0.018	
Fugitive	Fugitive	0.382	0.024	0.004	0.573	--	0.64345	--	--	--	
TOTAL		13.51	1.51	0.018	0.64	0.06	1.06	3496.49	0.030	0.02	3,502
GHG in metric tons per year											

INPUT DATA AND SPECIFICATIONS

State/County
Virginia
Frederick County

Scenarios		Scenario I/C	Year	Number of Months	Season	Average Daily Temp (degF)	Max Daily Temp Change (degF)	Min Daily Temp Change (degF)
1	2028		12	Summer	50 < T <= 80	20 <= Change in T	20 <= Change in T	20 <= Change in T
2	2028		12	Summer	50 < T <= 80	20 <= Change in T	20 <= Change in T	20 <= Change in T
3	2028		12	Summer	50 < T <= 80	20 <= Change in T	20 <= Change in T	20 <= Change in T
4	2028		12	Summer	50 < T <= 80	20 <= Change in T	20 <= Change in T	20 <= Change in T
5								

Project Final Selections

Scenario I/C	Project	Construction Activity	Equipment	Fuel Type
1	Building - 30	Concrete Foundations	Backhoe	Diesel
1	Building - 30	Concrete Foundations	Concrete Ready Mix Trucks	Diesel
1	Building - 30	Concrete Foundations	Fork Truck	Diesel
1	Building - 30	Concrete Foundations	Tool Truck	Diesel
1	Building - 30	Concrete Foundations	Tractor Trailer- Material Delivery	Diesel
1	Building - 30	Construction Mob & Layout	Survey Crew Trucks	Diesel
1	Building - 30	Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel
1	Building - 30	Exterior Wall Framing	Fork Truck	Diesel
1	Building - 30	Exterior Wall Framing	Generator	Diesel
1	Building - 30	Exterior Wall Framing	Man Lift	Diesel
1	Building - 30	Exterior Wall Framing	Tool Truck	Diesel
1	Building - 30	Exterior Wall Framing	Tractor Trailer- Material Delivery	Diesel
1	Building - 30	Interior Build-Out/ Finishes	Fork Truck	Diesel
1	Building - 30	Interior Build-Out/ Finishes	Man Lift	Diesel
1	Building - 30	Interior Build-Out/ Finishes	Tool Truck	Diesel
1	Building - 30	Interior Build-Out/ Finishes	Tractor Trailer- Material Delivery	Diesel
1	Building - 30	Roofing	High Lift	Diesel
1	Building - 30	Roofing	Man Lift (Fascia Construction)	Diesel
1	Building - 30	Roofing	Material Deliveries	Diesel
1	Building - 30	Roofing	Tractor Trailer- Material Delivery	Diesel
1	Building - 30	Security & Safety Systems	High Lift	Diesel
1	Building - 30	Security & Safety Systems	Tool Truck	Diesel
1	Building - 30	Structural Steel Frame	90 Ton Crane	Diesel
1	Building - 30	Structural Steel Frame	Concrete Pump	Diesel
1	Building - 30	Structural Steel Frame	Concrete Truck	Diesel
1	Building - 30	Structural Steel Frame	Fork Truck	Diesel
1	Building - 30	Structural Steel Frame	Tool Truck	Diesel
1	Building - 30	Structural Steel Frame	Tractor Trailer- Steel Deliveries	Diesel
1	Building - 30	Structural Steel Frame	Trowel Machine	Diesel
2	Open Parking	Binder Coat of Pavement	Paving Machine	Diesel
2	Open Parking	Binder Coat of Pavement	Ten Wheelers- Material Delivery	Diesel
2	Open Parking	Construction Mob & Layout	Survey Crew Trucks	Diesel
2	Open Parking	Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel
2	Open Parking	Curbing	Bob Cat	Diesel
2	Open Parking	Curbing	Concrete Ready Mix Trucks	Diesel
2	Open Parking	Curbing	Material Deliveries	Diesel
2	Open Parking	Curbing	Tractor Trailer with Boom Hoist- Deliver	Diesel
2	Open Parking	Grub the site down 2 ft.	Buildozer	Diesel
2	Open Parking	Grub the site down 2 ft.	Front Loader	Diesel
2	Open Parking	Grub the site down 2 ft.	Ten Wheelers	Diesel
2	Open Parking	Lighting Pre-Cast Concrete Piers (10)	Auger Drill	Diesel
2	Open Parking	Lighting Pre-Cast Concrete Piers (10)	Fork Truck	Diesel
2	Open Parking	Lighting Pre-Cast Concrete Piers (10)	Front Loader	Diesel
2	Open Parking	Lighting Pre-Cast Concrete Piers (10)	Tractor Trailer- Material Delivery	Diesel
2	Open Parking	Remove Trees and shrubs	Buildozer	Diesel
2	Open Parking	Remove Trees and shrubs	Chain Saws	Diesel
2	Open Parking	Remove Trees and shrubs	Flat Bed or Dump Trucks	Diesel
2	Open Parking	Remove Trees and shrubs	Log Chipper	Diesel
2	Open Parking	Remove Trees and shrubs	Mulcher	Diesel
2	Open Parking	Remove Trees and shrubs	Tractor	Diesel
2	Open Parking	Rough Grading	Compacting Equipment	Diesel
2	Open Parking	Rough Grading	Small Dozer	Diesel
2	Open Parking	Set in-place Light Poles	40 Ton Rough Terrain Crane	Diesel
2	Open Parking	Set in-place Light Poles	High Lift	Diesel
2	Open Parking	Set in-place Light Poles	Tractor Trailer- Material Delivery	Diesel
2	Open Parking	Stripping	Line Painting Truck and Sprayer	Diesel

*** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***

2	Open Parking Subgrade Materials installed	Backhoe	Diesel	
2	Open Parking Subgrade Materials installed	Roller	Diesel	
2	Open Parking Subgrade Materials installed	Tractor Trailer- Material Delivery	Diesel	
2	Open Parking Top Coat of Asphalt	Paving Machine	Diesel	
2	Open Parking Top Coat of Asphalt	Ten Wheelers- Material Delivery	Diesel	
2	Open Parking Underground Conduits	Backhoe	Diesel	
2	Open Parking Underground Conduits	Fork Truck	Diesel	
2	Open Parking Underground Conduits	Tractor Trailer- Material Delivery	Diesel	
3	Apron (GA) Asphalt Placement	Asphalt Paver	Diesel	
3	Apron (GA) Asphalt Placement	Dump Truck	Diesel	
3	Apron (GA) Asphalt Placement	Other General Equipment	Diesel	
3	Apron (GA) Asphalt Placement	Pickup Truck	Diesel	
3	Apron (GA) Asphalt Placement	Roller	Diesel	
3	Apron (GA) Asphalt Placement	Skid Steer Loader	Diesel	
3	Apron (GA) Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	
3	Apron (GA) Clearing and Grubbing	Chain Saw	Diesel	*** GASOLINE DATA USED ; DIESEL DATA NOT AVAILABLE ***
3	Apron (GA) Clearing and Grubbing	Chipper/Stump Grinder	Diesel	
3	Apron (GA) Clearing and Grubbing	Pickup Truck	Diesel	
3	Apron (GA) Concrete Placement	Air Compressor	Diesel	
3	Apron (GA) Concrete Placement	Concrete Saws	Diesel	
3	Apron (GA) Concrete Placement	Concrete Truck	Diesel	
3	Apron (GA) Concrete Placement	Other General Equipment	Diesel	
3	Apron (GA) Concrete Placement	Pickup Truck	Diesel	
3	Apron (GA) Concrete Placement	Rubber Tired Loader	Diesel	
3	Apron (GA) Concrete Placement	Slip Form Paver	Diesel	
3	Apron (GA) Concrete Placement	Surfacing Equipment (Grooving)	Diesel	
3	Apron (GA) Drainage- 24 inch SICPP	Dozer	Diesel	
3	Apron (GA) Drainage- 24 inch SICPP	Dump Truck	Diesel	
3	Apron (GA) Drainage- 24 inch SICPP	Excavator	Diesel	
3	Apron (GA) Drainage- 24 inch SICPP	Loader	Diesel	
3	Apron (GA) Drainage- 24 inch SICPP	Other General Equipment	Diesel	
3	Apron (GA) Drainage- 24 inch SICPP	Pickup Truck	Diesel	
3	Apron (GA) Drainage- 24 inch SICPP	Roller	Diesel	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Dump Truck	Diesel	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Loader	Diesel	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Other General Equipment	Diesel	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Pickup Truck	Diesel	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Diesel	
3	Apron (GA) Dust Control	Water Truck	Diesel	
3	Apron (GA) Excavation (Borrow)	Dozer	Diesel	
3	Apron (GA) Excavation (Borrow)	Dump Truck (12 cy)	Diesel	
3	Apron (GA) Excavation (Borrow)	Pickup Truck	Diesel	
3	Apron (GA) Excavation (Borrow)	Roller	Diesel	
3	Apron (GA) Excavation (Cut to Fill)	Dozer	Diesel	
3	Apron (GA) Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel	
3	Apron (GA) Excavation (Cut to Fill)	Excavator	Diesel	
3	Apron (GA) Excavation (Cut to Fill)	Pickup Truck	Diesel	
3	Apron (GA) Excavation (Cut to Fill)	Roller	Diesel	
3	Apron (GA) Excavation (Cut to Fill)	Scraper	Diesel	
3	Apron (GA) Excavation (Topsoil Stripping)	Dozer	Diesel	
3	Apron (GA) Fencing	Concrete Truck	Diesel	
3	Apron (GA) Fencing	Dump Truck	Diesel	
3	Apron (GA) Fencing	Other General Equipment	Diesel	
3	Apron (GA) Fencing	Pickup Truck	Diesel	
3	Apron (GA) Fencing	Skid Steer Loader	Diesel	
3	Apron (GA) Fencing	Tractors/Loader/Backhoe	Diesel	
3	Apron (GA) Grading	Dozer	Diesel	
3	Apron (GA) Grading	Grader	Diesel	
3	Apron (GA) Grading	Roller	Diesel	
3	Apron (GA) Hydroseeding	Hydroseeder	Diesel	
3	Apron (GA) Hydroseeding	Off Road Truck	Diesel	
3	Apron (GA) Lighting	Dump Truck	Diesel	
3	Apron (GA) Lighting	Loader	Diesel	
3	Apron (GA) Lighting	Other General Equipment	Diesel	
3	Apron (GA) Lighting	Pickup Truck	Diesel	
3	Apron (GA) Lighting	Skid Steer Loader	Diesel	
3	Apron (GA) Lighting	Tractors/Loader/Backhoe	Diesel	
3	Apron (GA) Markings	Flatbed Truck	Diesel	
3	Apron (GA) Markings	Other General Equipment	Diesel	
3	Apron (GA) Markings	Pickup Truck	Diesel	
3	Apron (GA) Sealing/Fuel Resistant	Distributing Tanker	Diesel	
3	Apron (GA) Sealing/Fuel Resistant	Other General Equipment	Diesel	
3	Apron (GA) Sealing/Fuel Resistant	Pickup Truck	Diesel	
3	Apron (GA) Soil Erosion/Sediment Control	Other General Equipment	Diesel	
3	Apron (GA) Soil Erosion/Sediment Control	Pickup Truck	Diesel	
3	Apron (GA) Soil Erosion/Sediment Control	Pumps	Diesel	
3	Apron (GA) Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	
3	Apron (GA) Subbase Placement	Dozer	Diesel	
3	Apron (GA) Subbase Placement	Dump Truck (12 cy)	Diesel	
3	Apron (GA) Subbase Placement	Pickup Truck	Diesel	
3	Apron (GA) Subbase Placement	Roller	Diesel	
3	Apron (GA) Topsoil Placement	Dozer	Diesel	
3	Apron (GA) Topsoil Placement	Dump Truck	Diesel	
3	Apron (GA) Topsoil Placement	Pickup Truck	Diesel	
4	Fuel Tanks Asphalt Placement	Asphalt Paver	Diesel	
4	Fuel Tanks Asphalt Placement	Dump Truck	Diesel	
4	Fuel Tanks Asphalt Placement	Other General Equipment	Diesel	
4	Fuel Tanks Asphalt Placement	Pickup Truck	Diesel	
4	Fuel Tanks Asphalt Placement	Roller	Diesel	
4	Fuel Tanks Asphalt Placement	Skid Steer Loader	Diesel	
4	Fuel Tanks Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	
4	Fuel Tanks Clearing and Grubbing	Chain Saw	Diesel	*** GASOLINE DATA USED ; DIESEL DATA NOT AVAILABLE ***

4 Fuel Tanks	Clearing and Grubbing	Chipper/Stump Grinder	Diesel
4 Fuel Tanks	Clearing and Grubbing	Pickup Truck	Diesel
4 Fuel Tanks	Concrete Placement	Air Compressor	Diesel
4 Fuel Tanks	Concrete Placement	Concrete Saws	Diesel
4 Fuel Tanks	Concrete Placement	Concrete Truck	Diesel
4 Fuel Tanks	Concrete Placement	Other General Equipment	Diesel
4 Fuel Tanks	Concrete Placement	Pickup Truck	Diesel
4 Fuel Tanks	Concrete Placement	Rubber Tired Loader	Diesel
4 Fuel Tanks	Concrete Placement	Slip Form Paver	Diesel
4 Fuel Tanks	Concrete Placement	Surfacing Equipment (Grooving)	Diesel
4 Fuel Tanks	Construction/Erect Tanks	Crane	Diesel
4 Fuel Tanks	Construction/Erect Tanks	Other General Equipment	Diesel
4 Fuel Tanks	Construction/Erect Tanks	Pickup Truck	Diesel
4 Fuel Tanks	Drainage - 24 inch SICPP	Excavator	Diesel
4 Fuel Tanks	Drainage	Dozer	Diesel
4 Fuel Tanks	Drainage	Dump Truck	Diesel
4 Fuel Tanks	Drainage	Loader	Diesel
4 Fuel Tanks	Drainage	Other General Equipment	Diesel
4 Fuel Tanks	Drainage	Pickup Truck	Diesel
4 Fuel Tanks	Drainage	Roller	Diesel
4 Fuel Tanks	Dust Control	Water Truck	Diesel
4 Fuel Tanks	Excavation (Borrow)	Dozer	Diesel
4 Fuel Tanks	Excavation (Borrow)	Dump Truck (12 cy)	Diesel
4 Fuel Tanks	Excavation (Borrow)	Pickup Truck	Diesel
4 Fuel Tanks	Excavation (Borrow)	Roller	Diesel
4 Fuel Tanks	Excavation (Cut to Fill)	Dozer	Diesel
4 Fuel Tanks	Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel
4 Fuel Tanks	Excavation (Cut to Fill)	Excavator	Diesel
4 Fuel Tanks	Excavation (Cut to Fill)	Pickup Truck	Diesel
4 Fuel Tanks	Excavation (Cut to Fill)	Roller	Diesel
4 Fuel Tanks	Excavation (Cut to Fill)	Scraper	Diesel
4 Fuel Tanks	Excavation (Topsoil Stripping)	Dozer	Diesel
4 Fuel Tanks	Fencing	Concrete Truck	Diesel
4 Fuel Tanks	Fencing	Dump Truck	Diesel
4 Fuel Tanks	Fencing	Other General Equipment	Diesel
4 Fuel Tanks	Fencing	Pickup Truck	Diesel
4 Fuel Tanks	Fencing	Skid Steer Loader	Diesel
4 Fuel Tanks	Fencing	Tractor's/Loader/Backhoe	Diesel
4 Fuel Tanks	Grading	Dozer	Diesel
4 Fuel Tanks	Grading	Grader	Diesel
4 Fuel Tanks	Grading	Roller	Diesel
4 Fuel Tanks	Hydroseeding	Hydroseeder	Diesel
4 Fuel Tanks	Hydroseeding	Off-Road Truck	Diesel
4 Fuel Tanks	Markings	Flatbed Truck	Diesel
4 Fuel Tanks	Markings	Other General Equipment	Diesel
4 Fuel Tanks	Markings	Pickup Truck	Diesel
4 Fuel Tanks	Soil Erosion/Sediment Control	Other General Equipment	Diesel
4 Fuel Tanks	Soil Erosion/Sediment Control	Pickup Truck	Diesel
4 Fuel Tanks	Soil Erosion/Sediment Control	Pumps	Diesel
4 Fuel Tanks	Soil Erosion/Sediment Control	Tractor's/Loader/Backhoe	Diesel
4 Fuel Tanks	Street Lighting	Dump Truck	Diesel
4 Fuel Tanks	Street Lighting	Loader	Diesel
4 Fuel Tanks	Street Lighting	Other General Equipment	Diesel
4 Fuel Tanks	Street Lighting	Pickup Truck	Diesel
4 Fuel Tanks	Street Lighting	Skid Steer Loader	Diesel
4 Fuel Tanks	Street Lighting	Tractor's/Loader/Backhoe	Diesel
4 Fuel Tanks	Subbase Placement	Dozer	Diesel
4 Fuel Tanks	Subbase Placement	Dump Truck (12 cy)	Diesel
4 Fuel Tanks	Subbase Placement	Pickup Truck	Diesel
4 Fuel Tanks	Subbase Placement	Roller	Diesel
4 Fuel Tanks	Topsoil Placement	Dozer	Diesel
4 Fuel Tanks	Topsoil Placement	Dump Truck	Diesel
4 Fuel Tanks	Topsoil Placement	Pickup Truck	Diesel

Overall Size

ScenarioID	Project	Project Size Questions	User Input	Unit
1	Building - 30	What is the estimated cost of the project?		150 \$ Million(s)
2	Open Parking	What is the estimated cost of the project?		15 \$ Million(s)
3	Apron (GA)	What is the estimated cost of the project?		3.5 \$ Million(s)
3	Apron (GA)	What is the maximum length of the apron (L) in f		1575 Feet
3	Apron (GA)	What is the maximum width of the apron (W) in		100 Feet
4	Fuel Tanks	What is the estimated cost of the project?		1.75 \$ Million(s)
4	Fuel Tanks	What is the maximum depth (D) of excavation ft		12 Feet
4	Fuel Tanks	What is the maximum length (L) of the fuel tank		24 Feet
4	Fuel Tanks	What is the maximum width (W) of the fuel tank		12 Feet
4	Fuel Tanks	What is the number of tanks (T) to be installed?		2 ---

Size Detail (Estimated based on engineering experience)

ScenarioID	Project	Construction Activity	Default Activity Size	Unit	User Activity Size
3	Apron (GA)	Asphalt Placement		17482.5	Square Yards
3	Apron (GA)	Clearing and Grubbing		4	Acres
3	Apron (GA)	Concrete Placement		7284.4	Cubic Yards
3	Apron (GA)	Drainage - 24 inch SICPP		1585	Linear Feet
3	Apron (GA)	Drainage - 6 inch Perforated Underdrain		3170	Linear Feet
3	Apron (GA)	Dust Control		360	Days
3	Apron (GA)	Excavation (Borrow)		7284.4	Cubic Yards
3	Apron (GA)	Excavation (Cut to Fill)		7284.4	Cubic Yards
3	Apron (GA)	Excavation (Topsoil Stripping)		17482.5	Square Yards

3	Apron (GA)	Fencing	1575	Linear Feet
3	Apron (GA)	Grading	19352.9	Square Yards
3	Apron (GA)	Hydroseeding	174350	Square Feet
3	Apron (GA)	Lighting	3350	Linear Feet
3	Apron (GA)	Markings	157500	Square Feet
3	Apron (GA)	Sealing/Fuel Resistant	17482.5	Square Yards
3	Apron (GA)	Soil Erosion/Sediment Control	4	Acres
3	Apron (GA)	Subbase Placement	17482.5	Square Yards
3	Apron (GA)	Subbase Placement	5827.5	Cubic Yards
3	Apron (GA)	Topsoil Placement	3225.5	Cubic Yards
4	Fuel Tanks	Asphalt Placement	32	Square Yards
4	Fuel Tanks	Clearing and Grubbing	0	Acres
4	Fuel Tanks	Concrete Placement	13.3	Cubic Yards
4	Fuel Tanks	Construction/Erect Tanks	2	Tank
4	Fuel Tanks	Drainage- 24 inch SICPP	34	Linear Feet
4	Fuel Tanks	Drainage	34	Linear Feet
4	Fuel Tanks	Dust Control	360	Days
4	Fuel Tanks	Excavation (Borrow)	127.9	Cubic Yards
4	Fuel Tanks	Excavation (Cut to Fill)	127.9	Cubic Yards
4	Fuel Tanks	Excavation (Topsoil Stripping)	32	Square Yards
4	Fuel Tanks	Fencing	24	Linear Feet
4	Fuel Tanks	Grading	83	Square Yards
4	Fuel Tanks	Hydroseeding	748	Square Feet
4	Fuel Tanks	Markings	288	Square Feet
4	Fuel Tanks	Soil Erosion/Sediment Control	0	Acres
4	Fuel Tanks	Street Lighting	0	Lights
4	Fuel Tanks	Subbase Placement	32	Square Yards
4	Fuel Tanks	Subbase Placement	10.7	Cubic Yards
4	Fuel Tanks	Topsoil Placement	27.7	Cubic Yards

Activity: Non-Road (Estimated based on engineering experience)

Scenario I/C Project	Construction Activity	Equipment	Fuel Type	Activity Size	Activity Rate	Default Activit	Activity Unit	User Activity Data
1	Building - 30 Concrete Foundations	Backhoe	Diesel	30000.00 SF	0.01067 Hours per 1.00 SF		320.1 hours	
1	Building - 30 Concrete Foundations	Concrete Ready Mix Trucks	Diesel	30000.00 SF	0.002 Hours per 1.00 SF		60 hours	
1	Building - 30 Concrete Foundations	Fork Truck	Diesel	30000.00 SF	0.01067 Hours per 1.00 SF		320.1 hours	
1	Building - 30 Concrete Foundations	Tool Truck	Diesel	30000.00 SF	0.00267 Hours per 1.00 SF		80.1 hours	
1	Building - 30 Concrete Foundations	Tractor Trailer- Material Delivery	Diesel	30000.00 SF	0.00053 Hours per 1.00 SF		15.9 hours	
1	Building - 30 Construction Mob & Layout	Survey Crew Trucks	Diesel	30000.00 SF	0.00033 Hours per 1.00 SF		9.9 hours	
1	Building - 30 Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel	30000.00 SF	0.00013 Hours per 1.00 SF		3.9 hours	
1	Building - 30 Exterior Wall Framing	Fork Truck	Diesel	30000.00 SF	0.02 Hours per 1.00 SF		600 hours	
1	Building - 30 Exterior Wall Framing	Generator	Diesel	30000.00 SF	0.01 Hours per 1.00 SF		300 hours	
1	Building - 30 Exterior Wall Framing	Man Lift	Diesel	30000.00 SF	0.02 Hours per 1.00 SF		600 hours	
1	Building - 30 Exterior Wall Framing	Tool Truck	Diesel	30000.00 SF	0.005 Hours per 1.00 SF		150 hours	
1	Building - 30 Exterior Wall Framing	Tractor Trailer- Material Delivery	Diesel	30000.00 SF	0.005 Hours per 1.00 SF		150 hours	
1	Building - 30 Interior Build-Out/ Finishes	Fork Truck	Diesel	30000.00 SF	0.08 Hours per 1.00 SF		2400 hours	
1	Building - 30 Interior Build-Out/ Finishes	Man Lift	Diesel	30000.00 SF	0.08 Hours per 1.00 SF		2400 hours	
1	Building - 30 Interior Build-Out/ Finishes	Tool Truck	Diesel	30000.00 SF	0.01 Hours per 1.00 SF		300 hours	
1	Building - 30 Interior Build-Out/ Finishes	Tractor Trailer- Material Delivery	Diesel	30000.00 SF	0.02 Hours per 1.00 SF		600 hours	
1	Building - 30 Roofing	High Lift	Diesel	30000.00 SF	0.004 Hours per 1.00 SF		120 hours	
1	Building - 30 Roofing	Man Lift (Fascia Construction)	Diesel	30000.00 SF	0.0008 Hours per 1.00 SF		24 hours	
1	Building - 30 Roofing	Material Deliveries	Diesel	30000.00 SF	0.002 Hours per 1.00 SF		60 hours	
1	Building - 30 Roofing	Tractor Trailer- Material Delivery	Diesel	30000.00 SF	0.002 Hours per 1.00 SF		60 hours	
1	Building - 30 Security & Safety Systems	High Lift	Diesel	30000.00 SF	0.02867 Hours per 1.00 SF		800.1 hours	
1	Building - 30 Security & Safety Systems	Tool Truck	Diesel	30000.00 SF	0.00667 Hours per 1.00 SF		200.1 hours	
1	Building - 30 Structural Steel Frame	90 Ton Crane	Diesel	30000.00 SF	0.01067 Hours per 1.00 SF		320.1 hours	
1	Building - 30 Structural Steel Frame	Concrete Pump	Diesel	30000.00 SF	0.0004 Hours per 1.00 SF		12 hours	
1	Building - 30 Structural Steel Frame	Concrete Truck	Diesel	30000.00 SF	0.0008 Hours per 1.00 SF		24 hours	
1	Building - 30 Structural Steel Frame	Fork Truck	Diesel	30000.00 SF	0.00267 Hours per 1.00 SF		80.1 hours	
1	Building - 30 Structural Steel Frame	Tool Truck	Diesel	30000.00 SF	0.0004 Hours per 1.00 SF		12 hours	
1	Building - 30 Structural Steel Frame	Tractor Trailer- Steel Deliveries	Diesel	30000.00 SF	0.00133 Hours per 1.00 SF		39.9 hours	
1	Building - 30 Structural Steel Frame	Trowel Machine	Diesel	30000.00 SF	0.0004 Hours per 1.00 SF		12 hours	
2	Open Parking Binder Coat of Pavement	Paving Machine	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Binder Coat of Pavement	Ten Wheelers- Material Delivery	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Construction Mob & Layout	Survey Crew Trucks	Diesel	10000.00 SF	0.0004 Hours per 1.00 SF		4 hours	
2	Open Parking Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel	10000.00 SF	0.0004 Hours per 1.00 SF		4 hours	
2	Open Parking Curbing	Bob Cat	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Curbing	Concrete Ready Mix Trucks	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Curbing	Material Deliveries	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Curbing	Tractor Trailer with Boom Hoist- Deliver	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Grub the site down 2 ft.	Buildozer	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Grub the site down 2 ft.	Front Loader	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Grub the site down 2 ft.	Ten Wheelers	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Lighting Pre-Cast Concrete Piers (10)	Auger Drill	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Lighting Pre-Cast Concrete Piers (10)	Fork Truck	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Lighting Pre-Cast Concrete Piers (10)	Front Loader	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Lighting Pre-Cast Concrete Piers (10)	Tractor Trailer- Material Delivery	Diesel	10000.00 SF	0.0012 Hours per 1.00 SF		12 hours	
2	Open Parking Remove Trees and shrubs	Buildozer	Diesel	10000.00 SF	0.004 Hours per 1.00 SF		40 hours	
2	Open Parking Remove Trees and shrubs	Chain Saws	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Remove Trees and shrubs	Flat Bed or Dump Trucks	Diesel	10000.00 SF	0.004 Hours per 1.00 SF		40 hours	
2	Open Parking Remove Trees and shrubs	Log Chipper	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Remove Trees and shrubs	Mulcher	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF		24 hours	
2	Open Parking Remove Trees and shrubs	Tractor	Diesel	10000.00 SF	0.004 Hours per 1.00 SF		40 hours	
2	Open Parking Rough Grading	Compacting Equipment	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Rough Grading	Small Dozer	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Set in-place Light Poles	40 Ton Rough Terrain Crane	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Set in-place Light Poles	High Lift	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Set in-place Light Poles	Tractor Trailer- Material Delivery	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Stripping	Line Painting Truck and Sprayer	Diesel	10000.00 SF	0.0008 Hours per 1.00 SF		8 hours	
2	Open Parking Subgrade Materials installed	Backhoe	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	
2	Open Parking Subgrade Materials installed	Roller	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF		16 hours	

*** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***

2	Open Parking Subgrade Materials installed	Tractor Trailer- Material Delivery	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking Top Coat of Asphalt	Paving Machine	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking Top Coat of Asphalt	Ten Wheelers- Material Delivery	Diesel	10000.00 SF	0.0016 Hours per 1.00 SF	16	hours	
2	Open Parking Underground Conduits	Backhoe	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking Underground Conduits	Fork Truck	Diesel	10000.00 SF	0.0024 Hours per 1.00 SF	24	hours	
2	Open Parking Underground Conduits	Tractor Trailer- Material Delivery	Diesel	10000.00 SF	0.0012 Hours per 1.00 SF	12	hours	
3	Apron (GA) Asphalt Placement	Asphalt Paver	Diesel	17482.50 SY	8 Hours per 6400.00 SY	21.85	hours	
3	Apron (GA) Asphalt Placement	Dump Truck	Diesel	17482.50 SY	8 Hours per 1777.00 SY	78.71	hours	
3	Apron (GA) Asphalt Placement	Other General Equipment	Diesel	17482.50 SY	16 Hours per 6400.00 SY	43.71	hours	
3	Apron (GA) Asphalt Placement	Pickup Truck	Diesel	17482.50 SY	8 Hours per 6400.00 SY	21.85	hours	
3	Apron (GA) Asphalt Placement	Roller	Diesel	17482.50 SY	8 Hours per 6400.00 SY	21.85	hours	
3	Apron (GA) Asphalt Placement	Skid Steer Loader	Diesel	17482.50 SY	8 Hours per 6400.00 SY	21.85	hours	
3	Apron (GA) Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	17482.50 SY	8 Hours per 5000.00 SY	27.97	hours	
3	Apron (GA) Clearing and Grubbing	Chain Saw	Diesel	4.00 Acre	12 Hours per 1.00 Acre	48	hours	*** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***
3	Apron (GA) Clearing and Grubbing	Chipper/Slump Grinder	Diesel	4.00 Acre	12 Hours per 1.00 Acre	48	hours	
3	Apron (GA) Clearing and Grubbing	Pickup Truck	Diesel	4.00 Acre	16 Hours per 1.00 Acre	64	hours	
3	Apron (GA) Concrete Placement	Air Compressor	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28	hours	
3	Apron (GA) Concrete Placement	Concrete Saws	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28	hours	
3	Apron (GA) Concrete Placement	Concrete Truck	Diesel	7284.40 CY	8 Hours per 240.00 CY	242.81	hours	
3	Apron (GA) Concrete Placement	Other General Equipment	Diesel	7284.40 CY	16 Hours per 1000.00 CY	116.55	hours	
3	Apron (GA) Concrete Placement	Pickup Truck	Diesel	7284.40 CY	24 Hours per 1000.00 CY	174.83	hours	
3	Apron (GA) Concrete Placement	Rubber Tired Loader	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28	hours	
3	Apron (GA) Concrete Placement	Slip Form Paver	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28	hours	
3	Apron (GA) Concrete Placement	Surfacing Equipment (Grooving)	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28	hours	
3	Apron (GA) Drainage- 24 inch SICPP	Dozer	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72	hours	
3	Apron (GA) Drainage- 24 inch SICPP	Dump Truck	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72	hours	
3	Apron (GA) Drainage- 24 inch SICPP	Excavator	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72	hours	
3	Apron (GA) Drainage- 24 inch SICPP	Loader	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72	hours	
3	Apron (GA) Drainage- 24 inch SICPP	Other General Equipment	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72	hours	
3	Apron (GA) Drainage- 24 inch SICPP	Pickup Truck	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72	hours	
3	Apron (GA) Drainage- 24 inch SICPP	Roller	Diesel	1585.00 LF	8 Hours per 250.00 LF	50.72	hours	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Dump Truck	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18	hours	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Loader	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18	hours	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Other General Equipment	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18	hours	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Pickup Truck	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18	hours	
3	Apron (GA) Drainage- 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Diesel	3170.00 LF	8 Hours per 900.00 LF	28.18	hours	
3	Apron (GA) Dust Control	Water Truck	Diesel	360.00 Day	8 Hours per 1.00 Day	2880	hours	
3	Apron (GA) Excavation (Borrow)	Dozer	Diesel	7284.40 CY	8 Hours per 600.00 CY	97.13	hours	
3	Apron (GA) Excavation (Borrow)	Dump Truck (12 cy)	Diesel	7284.40 CY	8 Hours per 600.00 CY	97.13	hours	
3	Apron (GA) Excavation (Borrow)	Pickup Truck	Diesel	7284.40 CY	8 Hours per 600.00 CY	97.13	hours	
3	Apron (GA) Excavation (Borrow)	Roller	Diesel	7284.40 CY	8 Hours per 1300.00 CY	44.83	hours	
3	Apron (GA) Excavation (Cut to Fill)	Dozer	Diesel	7284.40 CY	8 Hours per 800.00 CY	72.84	hours	
3	Apron (GA) Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel	7284.40 CY	8 Hours per 300.00 CY	194.25	hours	
3	Apron (GA) Excavation (Cut to Fill)	Excavator	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28	hours	
3	Apron (GA) Excavation (Cut to Fill)	Pickup Truck	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28	hours	
3	Apron (GA) Excavation (Cut to Fill)	Roller	Diesel	7284.40 CY	8 Hours per 1000.00 CY	58.28	hours	
3	Apron (GA) Excavation (Cut to Fill)	Scraper	Diesel	7284.40 CY	8 Hours per 800.00 CY	72.84	hours	
3	Apron (GA) Excavation (Topsoil Stripping)	Dozer	Diesel	17482.50 SY	8 Hours per 5100.00 SY	27.42	hours	
3	Apron (GA) Fencing	Concrete Truck	Diesel	1575.00 LF	2 Hours per 180.00 LF	17.5	hours	
3	Apron (GA) Fencing	Dump Truck	Diesel	1575.00 LF	8 Hours per 180.00 LF	70	hours	
3	Apron (GA) Fencing	Other General Equipment	Diesel	1575.00 LF	8 Hours per 180.00 LF	70	hours	
3	Apron (GA) Fencing	Pickup Truck	Diesel	1575.00 LF	8 Hours per 180.00 LF	70	hours	
3	Apron (GA) Fencing	Skid Steer Loader	Diesel	1575.00 LF	8 Hours per 180.00 LF	70	hours	
3	Apron (GA) Fencing	Tractors/Loader/Backhoe	Diesel	1575.00 LF	8 Hours per 180.00 LF	70	hours	
3	Apron (GA) Grading	Dozer	Diesel	19352.90 SY	8 Hours per 8000.00 SY	19.35	hours	
3	Apron (GA) Grading	Grader	Diesel	19352.90 SY	8 Hours per 8000.00 SY	19.35	hours	
3	Apron (GA) Grading	Roller	Diesel	19352.90 SY	8 Hours per 8000.00 SY	19.35	hours	
3	Apron (GA) Hydroseeding	Hydroseeder	Diesel	174350.00 SF	8 Hours per 80000.00 SF	17.44	hours	
3	Apron (GA) Hydroseeding	Off-Road Truck	Diesel	174350.00 SF	8 Hours per 80000.00 SF	17.44	hours	
3	Apron (GA) Lighting	Dump Truck	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33	hours	
3	Apron (GA) Lighting	Loader	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33	hours	
3	Apron (GA) Lighting	Other General Equipment	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33	hours	
3	Apron (GA) Lighting	Pickup Truck	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33	hours	
3	Apron (GA) Lighting	Skid Steer Loader	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33	hours	
3	Apron (GA) Lighting	Tractors/Loader/Backhoe	Diesel	3350.00 LF	8 Hours per 1200.00 LF	22.33	hours	
3	Apron (GA) Markings	Flatbed Truck	Diesel	157500.00 SF	8 Hours per 3500.00 SF	360	hours	
3	Apron (GA) Markings	Other General Equipment	Diesel	157500.00 SF	8 Hours per 3500.00 SF	360	hours	
3	Apron (GA) Markings	Pickup Truck	Diesel	157500.00 SF	8 Hours per 3500.00 SF	360	hours	
3	Apron (GA) Sealing/Fuel Resistant	Distributing Tanker	Diesel	17482.50 SY	8 Hours per 3000.00 SY	46.62	hours	
3	Apron (GA) Sealing/Fuel Resistant	Other General Equipment	Diesel	17482.50 SY	8 Hours per 3000.00 SY	46.62	hours	
3	Apron (GA) Sealing/Fuel Resistant	Pickup Truck	Diesel	17482.50 SY	8 Hours per 3000.00 SY	46.62	hours	
3	Apron (GA) Soil Erosion/Sediment Control	Other General Equipment	Diesel	4.00 Acre	4 Hours per 1.00 Acre	16	hours	
3	Apron (GA) Soil Erosion/Sediment Control	Pickup Truck	Diesel	4.00 Acre	8 Hours per 1.00 Acre	32	hours	
3	Apron (GA) Soil Erosion/Sediment Control	Pumps	Diesel	4.00 Acre	4 Hours per 1.00 Acre	16	hours	
3	Apron (GA) Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	4.00 Acre	4 Hours per 1.00 Acre	16	hours	
3	Apron (GA) Subbase Placement	Dozer	Diesel	17482.50 SY	8 Hours per 3800.00 SY	36.81	hours	
3	Apron (GA) Subbase Placement	Dump Truck (12 cy)	Diesel	5827.50 CY	8 Hours per 180.00 CY	259	hours	
3	Apron (GA) Subbase Placement	Pickup Truck	Diesel	17482.50 SY	8 Hours per 3800.00 SY	36.81	hours	
3	Apron (GA) Subbase Placement	Roller	Diesel	5827.50 CY	8 Hours per 1300.00 CY	35.86	hours	
3	Apron (GA) Topsoil Placement	Dozer	Diesel	3225.50 CY	8 Hours per 600.00 CY	43.01	hours	
3	Apron (GA) Topsoil Placement	Dump Truck	Diesel	3225.50 CY	8 Hours per 600.00 CY	43.01	hours	
3	Apron (GA) Topsoil Placement	Pickup Truck	Diesel	3225.50 CY	8 Hours per 600.00 CY	43.01	hours	
4	Fuel Tanks Asphalt Placement	Asphalt Paver	Diesel	32.00 SY	8 Hours per 6400.00 SY	0.04	hours	
4	Fuel Tanks Asphalt Placement	Dump Truck	Diesel	32.00 SY	8 Hours per 1777.00 SY	0.14	hours	
4	Fuel Tanks Asphalt Placement	Other General Equipment	Diesel	32.00 SY	16 Hours per 6400.00 SY	0.08	hours	
4	Fuel Tanks Asphalt Placement	Pickup Truck	Diesel	32.00 SY	8 Hours per 6400.00 SY	0.04	hours	
4	Fuel Tanks Asphalt Placement	Roller	Diesel	32.00 SY	8 Hours per 6400.00 SY	0.04	hours	
4	Fuel Tanks Asphalt Placement	Skid Steer Loader	Diesel	32.00 SY	8 Hours per 6400.00 SY	0.04	hours	
4	Fuel Tanks Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	32.00 SY	8 Hours per 5000.00 SY	0.05	hours	
4	Fuel Tanks Clearing and Grubbing	Chain Saw	Diesel	0.00 Acre	12 Hours per 1.00 Acre	0	hours	*** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***
4	Fuel Tanks Clearing and Grubbing	Chipper/Slump Grinder	Diesel	0.00 Acre	12 Hours per 1.00 Acre	0	hours	
4	Fuel Tanks Clearing and Grubbing	Pickup Truck	Diesel	0.00 Acre	16 Hours per 1.00 Acre	0	hours	

4 Fuel Tanks	Concrete Placement	Air Compressor	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4 Fuel Tanks	Concrete Placement	Concrete Saws	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4 Fuel Tanks	Concrete Placement	Concrete Truck	Diesel	13.30 CY	8 Hours per 240.00 CY	0.44 hours
4 Fuel Tanks	Concrete Placement	Other General Equipment	Diesel	13.30 CY	16 Hours per 1000.00 CY	0.21 hours
4 Fuel Tanks	Concrete Placement	Pickup Truck	Diesel	13.30 CY	24 Hours per 1000.00 CY	0.32 hours
4 Fuel Tanks	Concrete Placement	Rubber Tired Loader	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4 Fuel Tanks	Concrete Placement	Slip Form Paver	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4 Fuel Tanks	Concrete Placement	Surfacing Equipment (Grooving)	Diesel	13.30 CY	8 Hours per 1000.00 CY	0.11 hours
4 Fuel Tanks	Construction/Erect Tanks	Crane	Diesel	2.00 Tank	3 Hours per 1.00 Tank	6 hours
4 Fuel Tanks	Construction/Erect Tanks	Other General Equipment	Diesel	2.00 Tank	8 Hours per 1.00 Tank	16 hours
4 Fuel Tanks	Construction/Erect Tanks	Pickup Truck	Diesel	2.00 Tank	8 Hours per 1.00 Tank	16 hours
4 Fuel Tanks	Drainage - 24 inch SICPP	Excavator	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Dozer	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Dump Truck	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Loader	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Other General Equipment	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Pickup Truck	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Drainage	Roller	Diesel	34.00 LF	8 Hours per 250.00 LF	1.09 hours
4 Fuel Tanks	Dust Control	Water Truck	Diesel	360.00 Day	8 Hours per 1.00 Day	2880 hours
4 Fuel Tanks	Excavation (Borrow)	Dozer	Diesel	127.90 CY	8 Hours per 600.00 CY	1.71 hours
4 Fuel Tanks	Excavation (Borrow)	Dump Truck (12 cy)	Diesel	127.90 CY	8 Hours per 600.00 CY	1.71 hours
4 Fuel Tanks	Excavation (Borrow)	Pickup Truck	Diesel	127.90 CY	8 Hours per 600.00 CY	1.71 hours
4 Fuel Tanks	Excavation (Borrow)	Roller	Diesel	127.90 CY	8 Hours per 1300.00 CY	0.79 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Dozer	Diesel	127.90 CY	8 Hours per 800.00 CY	1.28 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel	127.90 CY	8 Hours per 300.00 CY	3.41 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Excavator	Diesel	127.90 CY	8 Hours per 1000.00 CY	1.02 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Pickup Truck	Diesel	127.90 CY	8 Hours per 1000.00 CY	1.02 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Roller	Diesel	127.90 CY	8 Hours per 1000.00 CY	1.02 hours
4 Fuel Tanks	Excavation (Cut to Fill)	Scraper	Diesel	127.90 CY	8 Hours per 800.00 CY	1.28 hours
4 Fuel Tanks	Excavation (Topsoil Stripping)	Dozer	Diesel	32.00 SY	8 Hours per 5100.00 SY	0.05 hours
4 Fuel Tanks	Fencing	Concrete Truck	Diesel	24.00 LF	2 Hours per 180.00 LF	0.27 hours
4 Fuel Tanks	Fencing	Dump Truck	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Fencing	Other General Equipment	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Fencing	Pickup Truck	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Fencing	Skid Steer Loader	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Fencing	Tractors/Loader/Backhoe	Diesel	24.00 LF	8 Hours per 180.00 LF	1.07 hours
4 Fuel Tanks	Grading	Dozer	Diesel	83.00 SY	8 Hours per 8000.00 SY	0.08 hours
4 Fuel Tanks	Grading	Grader	Diesel	83.00 SY	8 Hours per 8000.00 SY	0.08 hours
4 Fuel Tanks	Grading	Roller	Diesel	83.00 SY	8 Hours per 8000.00 SY	0.08 hours
4 Fuel Tanks	Hydroseeding	Hydroseeder	Diesel	748.00 SF	8 Hours per 80000.00 SF	0.07 hours
4 Fuel Tanks	Hydroseeding	Off-Road Truck	Diesel	748.00 SF	8 Hours per 80000.00 SF	0.07 hours
4 Fuel Tanks	Markings	Flatbed Truck	Diesel	288.00 SF	8 Hours per 3500.00 SF	0.66 hours
4 Fuel Tanks	Markings	Other General Equipment	Diesel	288.00 SF	8 Hours per 3500.00 SF	0.66 hours
4 Fuel Tanks	Markings	Pickup Truck	Diesel	288.00 SF	8 Hours per 3500.00 SF	0.66 hours
4 Fuel Tanks	Soil Erosion/Sediment Control	Other General Equipment	Diesel	0.00 Acre	4 Hours per 1.00 Acre	0 hours
4 Fuel Tanks	Soil Erosion/Sediment Control	Pickup Truck	Diesel	0.00 Acre	8 Hours per 1.00 Acre	0 hours
4 Fuel Tanks	Soil Erosion/Sediment Control	Pumps	Diesel	0.00 Acre	4 Hours per 1.00 Acre	0 hours
4 Fuel Tanks	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	0.00 Acre	4 Hours per 1.00 Acre	0 hours
4 Fuel Tanks	Street Lighting	Dump Truck	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Loader	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Other General Equipment	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Pickup Truck	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Skid Steer Loader	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Street Lighting	Tractors/Loader/Backhoe	Diesel	0.00 Lights	8 Hours per 3.00 Lights	0 hours
4 Fuel Tanks	Subbase Placement	Dozer	Diesel	32.00 SY	8 Hours per 3800.00 SY	0.07 hours
4 Fuel Tanks	Subbase Placement	Dump Truck (12 cy)	Diesel	10.70 CY	8 Hours per 180.00 CY	0.48 hours
4 Fuel Tanks	Subbase Placement	Pickup Truck	Diesel	32.00 SY	8 Hours per 3800.00 SY	0.07 hours
4 Fuel Tanks	Subbase Placement	Roller	Diesel	10.70 CY	8 Hours per 1300.00 CY	0.07 hours
4 Fuel Tanks	Topsoil Placement	Dozer	Diesel	27.70 CY	8 Hours per 600.00 CY	0.37 hours
4 Fuel Tanks	Topsoil Placement	Dump Truck	Diesel	27.70 CY	8 Hours per 600.00 CY	0.37 hours
4 Fuel Tanks	Topsoil Placement	Pickup Truck	Diesel	27.70 CY	8 Hours per 600.00 CY	0.37 hours

Activity: On-Road (Estimated based on engineering experience)

Scenario I/C Project	Equipment	On-road Activity	Fuel	Roadway Type	Round Trip Distance (miles)	Number of Em Number of Proj	g/hp-hr	CO2 (g/hp-hr)	SO2 (g/hp-hr)	PM10 (g/hp-hr)	PM2.5 (g/hp-hr)	VOC Exhaust (g/equipment-day)	Evaporative (g/equipment-day)	Default VMT	User VMT
1 Building - 30 Cement Mixer		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	30000 --	--	--	--	--	--	--	6938
1 Building - 30 Dump Truck Subbase Material		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	30000 --	--	--	--	--	--	--	3700
1 Building - 30 Passenger Car		Employee Commute	Gasoline	Urban Unrestricted Access	30	1650	258 --	--	--	--	--	--	--	--	12771000
1 Building - 30 Tractor Trailer		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	30000 --	--	--	--	0.00053	--	--	159
2 Open Parking Cement Mixer		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	10000 --	--	--	--	--	--	--	2313
2 Open Parking Dump Truck - Asphalt		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	10000 --	--	--	--	--	--	--	206
2 Open Parking Dump Truck Subbase Material		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	10000 --	--	--	--	--	--	--	1233
2 Open Parking Passenger Car		Employee Commute	Gasoline	Urban Unrestricted Access	30	165	258 --	--	--	--	--	--	--	--	1277100
2 Open Parking Tractor Trailer		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258 --	--	10000 --	--	--	--	0.0012	--	--	120
3 Apron (GA) Asphalt 18 Wheeler		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	1575	100 --	--	--	--	--	--	--	2285
3 Apron (GA) Cement Mixer		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	1575	100 --	--	--	--	--	--	--	36422
3 Apron (GA) Dump Truck - Asphalt		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	1575	100 --	--	--	--	--	--	--	3238
3 Apron (GA) Dump Truck Subbase Material		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	1575	100 --	--	--	--	--	--	--	19425
3 Apron (GA) Passenger Car		Employee Commute	Gasoline	Urban Unrestricted Access	30	76	258 --	--	--	--	--	--	--	--	588240
4 Fuel Tanks Asphalt 18 Wheeler		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	24	12 --	--	--	--	--	--	--	4
4 Fuel Tanks Cement Mixer		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	24	12 --	--	--	--	--	--	--	67
4 Fuel Tanks Dump Truck - Asphalt		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	24	12 --	--	--	--	--	--	--	6
4 Fuel Tanks Dump Truck Subbase Material		Material Delivery	Diesel	Urban Unrestricted Access	40 --	258	24	12 --	--	--	--	--	--	--	36
4 Fuel Tanks Passenger Car		Employee Commute	Gasoline	Urban Unrestricted Access	30	71	258 --	--	--	--	--	--	--	--	549540

Emission Factor: Non-Road (from NONROAD)

Scenario I/C Project	Construction Activity	Equipment	Fuel Type	Avg Rated HP	Load Factor	CO (g/hp-hr)	NOx (g/hp-hr)	CO2 (g/hp-hr)	SO2 (g/hp-hr)	PM10 (g/hp-hr)	PM2.5 (g/hp-hr)	VOC Exhaust (g/equipment-day)	VOC Evaporative (g/equipment-day)	
1 Building - 30 Concrete Foundations		Backhoe	Diesel	100		0.21	1.87973379	1.237555541	695.17112	0.0036087	0.2115091	0.194588	0.273165	0.1945372
1 Building - 30 Concrete Foundations		Concrete Ready Mix Trucks	Diesel	600		0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0

1 Building - 30 Concrete Foundations	Fork Truck	Diesel	100	0.59	0.3950886	0.281445628	595.73491	0.0028751	0.0104391	0.009604	0.139276	0
1 Building - 30 Concrete Foundations	Tool Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Concrete Foundations	Tractor Trailer- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Construction Mob & Layout	Survey Crew Trucks	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Exterior Wall Framing	Fork Truck	Diesel	100	0.59	0.3950886	0.281445628	595.73491	0.0028751	0.0104391	0.009604	0.139276	0
1 Building - 30 Exterior Wall Framing	Generator	Diesel	40	0.43	0.43214843	3.297692225	589.83555	0.0030193	0.0744227	0.068469	0.176041	0.0072811
1 Building - 30 Exterior Wall Framing	Man Lift	Diesel	75	0.21	2.18902445	3.683792209	694.80756	0.0038166	0.2429591	0.223522	0.393127	0.0729826
1 Building - 30 Exterior Wall Framing	Tool Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Exterior Wall Framing	Tractor Trailer- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Interior Build-Out/ Finishes	Fork Truck	Diesel	100	0.59	0.3950886	0.281445628	595.73491	0.0028751	0.0104391	0.009604	0.139276	0
1 Building - 30 Interior Build-Out/ Finishes	Man Lift	Diesel	75	0.21	2.18902445	3.683792209	694.80756	0.0038166	0.2429591	0.223522	0.393127	0.0729826
1 Building - 30 Interior Build-Out/ Finishes	Tool Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Interior Build-Out/ Finishes	Tractor Trailer- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Roofing	High Lift	Diesel	100	0.59	0.3950886	0.281445628	595.73491	0.0028751	0.0104391	0.009604	0.139276	0
1 Building - 30 Roofing	Man Lift (Fascia Construction)	Diesel	75	0.21	2.18902445	3.683792209	694.80756	0.0038166	0.2429591	0.223522	0.393127	0.0729826
1 Building - 30 Roofing	Material Deliveries	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Roofing	Tractor Trailer- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Security & Safety Systems	High Lift	Diesel	100	0.59	0.3950886	0.281445628	595.73491	0.0028751	0.0104391	0.009604	0.139276	0
1 Building - 30 Security & Safety Systems	Tool Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Structural Steel Frame	90 Ton Crane	Diesel	300	0.43	0.08521886	0.338029175	530.61948	0.0025727	0.0121596	0.011187	0.139676	0.0137754
1 Building - 30 Structural Steel Frame	Concrete Pump	Diesel	11	0.43	4.46035968	4.335257551	588.57819	0.0039677	0.35375	0.32545	0.591092	0.0013911
1 Building - 30 Structural Steel Frame	Concrete Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Structural Steel Frame	Fork Truck	Diesel	100	0.59	0.3950886	0.281445628	595.73491	0.0028751	0.0104391	0.009604	0.139276	0
1 Building - 30 Structural Steel Frame	Tool Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Structural Steel Frame	Tractor Trailer- Steel Deliveries	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
1 Building - 30 Structural Steel Frame	Trowel Machine	Diesel	600	0.59	0.3873235	0.926073031	536.37374	0.0027498	0.0520465	0.047883	0.150759	0.312487
2 Open Parking Binder Coat of Pavement	Paving Machine	Diesel	175	0.59	0.19563595	0.417347773	536.3977	0.0026298	0.0259175	0.023844	0.142858	0.0267177
2 Open Parking Binder Coat of Pavement	Ten Wheelers- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Construction Mob & Layout	Survey Crew Trucks	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Curbing	Bob Cat	Diesel	75	0.21	3.228307	3.670547016	694.76179	0.0038154	0.2845416	0.261778	0.408287	0.1670203
2 Open Parking Curbing	Concrete Ready Mix Trucks	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Curbing	Material Deliveries	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Curbing	Tractor Trailer with Boom Hoist- Delvier	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Grub the site down 2 ft.	Buildozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
2 Open Parking Grub the site down 2 ft.	Front Loader	Diesel	100	0.21	1.87973379	1.237555541	695.17112	0.0036087	0.02115091	0.194588	0.273165	0.1945372
2 Open Parking Grub the site down 2 ft.	Ten Wheelers	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Lighting Pre-Cast Concrete Piers (10)	Auger Drill	Diesel	175	0.43	0.4103404	1.432257249	530.46664	0.0028472	0.0920621	0.084697	0.190093	0.1395884
2 Open Parking Lighting Pre-Cast Concrete Piers (10)	Fork Truck	Diesel	100	0.59	0.3950886	0.281445628	595.73491	0.0028751	0.0104391	0.009604	0.139276	0
2 Open Parking Lighting Pre-Cast Concrete Piers (10)	Front Loader	Diesel	100	0.21	1.87973379	1.237555541	695.17112	0.0036087	0.02115091	0.194588	0.273165	0.1945372
2 Open Parking Lighting Pre-Cast Concrete Piers (10)	Tractor Trailer- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Remove Trees and shrubs	Buildozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
2 Open Parking Remove Trees and shrubs	Chain Saws	Diesel	11	0.7	293.534979	1.322962806	685.99636	0.1401916	9.7481881	8.968333	61.88836	26.454429 *** GASOLINE DATA USED, DIESEL DATA NOT AVAILABLE ***
2 Open Parking Remove Trees and shrubs	Flat Bed or Dump Trucks	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Remove Trees and shrubs	Log Chipper	Diesel	100	0.43	0.92311186	1.472593149	589.7279	0.0031437	0.1345902	0.123823	0.2116	0.1368736
2 Open Parking Remove Trees and shrubs	Mulcher	Diesel	100	0.43	0.92311186	1.472593149	589.7279	0.0031437	0.1345902	0.123823	0.2116	0.1368736
2 Open Parking Remove Trees and shrubs	Tractor	Diesel	100	0.21	1.87973379	1.237555541	695.17112	0.0036087	0.02115091	0.194588	0.273165	0.1945372
2 Open Parking Rough Grading	Compacting Equipment	Diesel	6	0.43	4.45972158	4.320419126	588.58692	0.0039677	0.3511401	0.323049	0.588196	0.0002262
2 Open Parking Rough Grading	Small Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
2 Open Parking Set in-place Light Poles	40 Ton Rough Terrain Crane	Diesel	300	0.43	0.08521886	0.338029175	530.61948	0.0025727	0.0121596	0.011187	0.139676	0.0137754
2 Open Parking Set in-place Light Poles	High Lift	Diesel	100	0.59	0.3950886	0.281445628	595.73491	0.0028751	0.0104391	0.009604	0.139276	0
2 Open Parking Set in-place Light Poles	Tractor Trailer- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Striping	Line Painting Truck and Sprayer	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Subgrade Materials installed	Backhoe	Diesel	100	0.21	1.87973379	1.237555541	695.17112	0.0036087	0.02115091	0.194588	0.273165	0.1945372
2 Open Parking Subgrade Materials installed	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139982	0.0061297
2 Open Parking Subgrade Materials installed	Tractor Trailer- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Top Coat of Asphalt	Paving Machine	Diesel	175	0.59	0.19563595	0.417347773	536.3977	0.0026298	0.0259175	0.023844	0.142858	0.0267177
2 Open Parking Top Coat of Asphalt	Ten Wheelers- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
2 Open Parking Underground Conduits	Backhoe	Diesel	100	0.21	1.87973379	1.237555541	695.17112	0.0036087	0.02115091	0.194588	0.273165	0.1945372
2 Open Parking Underground Conduits	Fork Truck	Diesel	100	0.59	0.3950886	0.281445628	595.73491	0.0028751	0.0104391	0.009604	0.139276	0
2 Open Parking Underground Conduits	Tractor Trailer- Material Delivery	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3 Apron (GA) Asphalt Placement	Asphalt Paver	Diesel	175	0.59	0.14957523	0.309632979	536.40813	0.0025948	0.012724	0.011706	0.139413	0.0046373
3 Apron (GA) Asphalt Placement	Dump Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3 Apron (GA) Asphalt Placement	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
3 Apron (GA) Asphalt Placement	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3 Apron (GA) Asphalt Placement	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139982	0.0061297
3 Apron (GA) Asphalt Placement	Skid Steer Loader	Diesel	75	0.21	3.228307	3.670547016	694.76179	0.0038154	0.2845416	0.261778	0.408287	0.1670203
3 Apron (GA) Asphalt Placement (Grooving)	Surfacing Equipment (Grooving)	Diesel	25	0.29	2.35529628	4.46126373	594.73048	0.0040092	0.3540519	0.325728	0.47081	0
3 Apron (GA) Clearing and Grubbing	Chain Saw	Diesel	11	0.7	293.534979	1.322962806	685.99636	0.1401916	9.7481881	8.968333	61.88836	26.454429 *** GASOLINE DATA USED, DIESEL DATA NOT AVAILABLE ***
3 Apron (GA) Clearing and Grubbing	Chipper/Stump Grinder	Diesel	100	0.43	0.92311186	1.472593149	589.7279	0.0031437	0.1345902	0.123823	0.2116	0.1368736
3 Apron (GA) Clearing and Grubbing	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3 Apron (GA) Concrete Placement	Air Compressor	Diesel	100	0.43	0.37216258	0.479476626	589.92788	0.0028996	0.0292404	0.026901	0.145558	0.0210241
3 Apron (GA) Concrete Placement	Concrete Saws	Diesel	40	0.59	0.25098599	3.014499543	595.73533	0.0028751	0.0220892	0.020322	0.139123	0
3 Apron (GA) Concrete Placement	Concrete Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3 Apron (GA) Concrete Placement	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
3 Apron (GA) Concrete Placement	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3 Apron (GA) Concrete Placement	Rubber Tired Loader	Diesel	175	0.59	0.15901357	0.330314968	536.40686	0.0026019	0.015509	0.014268	0.139865	0.0094527
3 Apron (GA) Concrete Placement	Slip Form Paver	Diesel	175	0.59	0.14957523	0.30963						

3	Apron (GA)	Dust Control	Water Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Excavation (Borrow)	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
3	Apron (GA)	Excavation (Borrow)	Dump Truck (12 cy)	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Excavation (Borrow)	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Excavation (Borrow)	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139682	0.0061297
3	Apron (GA)	Excavation (Cut to Fill)	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
3	Apron (GA)	Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Excavation (Cut to Fill)	Excavator	Diesel	175	0.59	0.14189399	0.281356939	536.409	0.0025887	0.0104231	0.009589	0.139129	0
3	Apron (GA)	Excavation (Cut to Fill)	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Excavation (Cut to Fill)	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139682	0.0061297
3	Apron (GA)	Excavation (Cut to Fill)	Scraper	Diesel	600	0.59	0.18628277	0.412372125	536.40495	0.0026233	0.0187662	0.017265	0.140451	0.0826672
3	Apron (GA)	Excavation (Topsoil Stripping)	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
3	Apron (GA)	Fencing	Concrete Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Fencing	Dump Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Fencing	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
3	Apron (GA)	Fencing	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Fencing	Skid Steer Loader	Diesel	75	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Fencing	Tractors/Loader/Backhoe	Diesel	100	0.21	2.328307	3.670547016	694.76179	0.0038154	0.2845416	0.261778	0.408287	0.1870203
3	Apron (GA)	Grading	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
3	Apron (GA)	Grading	Grader	Diesel	300	0.59	0.11988098	0.286066163	536.40903	0.0025887	0.0103751	0.009545	0.139089	0
3	Apron (GA)	Grading	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139682	0.0061297
3	Apron (GA)	Hydroseeding	Hydroseeder	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Hydroseeding	Off-Road Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Lighting	Dump Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Lighting	Loader	Diesel	175	0.59	0.15901357	0.330314968	536.40686	0.0026019	0.015099	0.014268	0.139865	0.0094527
3	Apron (GA)	Lighting	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
3	Apron (GA)	Lighting	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Lighting	Skid Steer Loader	Diesel	75	0.21	2.328307	3.670547016	694.76179	0.0038154	0.2845416	0.261778	0.408287	0.1870203
3	Apron (GA)	Lighting	Tractors/Loader/Backhoe	Diesel	100	0.21	1.87973379	1.237555541	695.17112	0.0036087	0.2115091	0.194588	0.273165	0.1945372
3	Apron (GA)	Markings	Flatbed Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Markings	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
3	Apron (GA)	Markings	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Sealing/Fuel Resistant	Distributing Tanker	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Sealing/Fuel Resistant	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
3	Apron (GA)	Sealing/Fuel Resistant	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Soil Erosion/Sediment Control	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
3	Apron (GA)	Soil Erosion/Sediment Control	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Soil Erosion/Sediment Control	Pumps	Diesel	11	0.43	4.46635968	4.33257551	588.57819	0.0039677	0.35375	0.32545	0.591092	0.013911
3	Apron (GA)	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	100	0.21	1.87973379	1.237555541	695.17112	0.0036087	0.2115091	0.194588	0.273165	0.1945372
3	Apron (GA)	Subbase Placement	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
3	Apron (GA)	Subbase Placement	Dump Truck (12 cy)	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Subbase Placement	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Subbase Placement	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139682	0.0061297
3	Apron (GA)	Topsoil Placement	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
3	Apron (GA)	Topsoil Placement	Dump Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
3	Apron (GA)	Topsoil Placement	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4	Fuel Tanks	Asphalt Placement	Asphalt Paver	Diesel	175	0.59	0.14957523	0.309632979	536.40813	0.0025948	0.012724	0.011706	0.139413	0.0046373
4	Fuel Tanks	Asphalt Placement	Dump Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4	Fuel Tanks	Asphalt Placement	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
4	Fuel Tanks	Asphalt Placement	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4	Fuel Tanks	Asphalt Placement	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139682	0.0061297
4	Fuel Tanks	Asphalt Placement	Skid Steer Loader	Diesel	75	0.21	2.328307	3.670547016	694.76179	0.0038154	0.2845416	0.261778	0.408287	0.1870203
4	Fuel Tanks	Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	25	0.59	2.35529628	4.46126373	584.73048	0.0040092	0.3540519	0.325728	0.47081	0
4	Fuel Tanks	Clearing and Grubbing	Chain Saw	Diesel	11	0.7	293.534979	1.322962806	685.99636	0.1401916	9.7481881	8.968333	61.88836	26.455429 *** GASOLINE DATA USED. DIESEL DATA NOT AVAILABLE ***
4	Fuel Tanks	Clearing and Grubbing	Chipper/Shump Grinder	Diesel	100	0.43	0.92311186	1.472593149	589.7279	0.0031437	0.1345902	0.123823	0.2116	0.1368736
4	Fuel Tanks	Clearing and Grubbing	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4	Fuel Tanks	Concrete Placement	Air Compressor	Diesel	100	0.43	0.37216258	0.479476626	589.92788	0.0028996	0.0292404	0.026901	0.145558	0.0210241
4	Fuel Tanks	Concrete Placement	Concrete Saws	Diesel	40	0.59	0.25908599	3.014499543	595.73533	0.0028751	0.0220892	0.020322	0.139123	0
4	Fuel Tanks	Concrete Placement	Concrete Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4	Fuel Tanks	Concrete Placement	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
4	Fuel Tanks	Concrete Placement	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4	Fuel Tanks	Concrete Placement	Roller Tired Loader	Diesel	175	0.59	0.15901357	0.330314968	536.40686	0.0026019	0.015099	0.014268	0.139865	0.0094527
4	Fuel Tanks	Concrete Placement	Slip Form Paver	Diesel	175	0.59	0.14957523	0.309632979	536.40813	0.0025948	0.012724	0.011706	0.139413	0.0046373
4	Fuel Tanks	Concrete Placement	Surfacing Equipment (Grooving)	Diesel	25	0.59	2.35529628	4.46126373	584.73048	0.0040092	0.3540519	0.325728	0.47081	0
4	Fuel Tanks	Construction/Erect Tanks	Crane	Diesel	300	0.43	0.08521886	0.338029175	530.61948	0.0025727	0.0121596	0.011187	0.139676	0.0137754
4	Fuel Tanks	Construction/Erect Tanks	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
4	Fuel Tanks	Construction/Erect Tanks	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4	Fuel Tanks	Drainage - 24 inch SSCP	Excavator	Diesel	175	0.59	0.14189399	0.281356939	536.409	0.0025887	0.0104231	0.009589	0.139129	0
4	Fuel Tanks	Drainage	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
4	Fuel Tanks	Drainage	Dump Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4	Fuel Tanks	Drainage	Loader	Diesel	175	0.59	0.15901357	0.330314968	536.40686	0.0026019	0.015099	0.014268	0.139865	0.0094527
4	Fuel Tanks	Drainage	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
4	Fuel Tanks	Drainage	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4	Fuel Tanks	Drainage	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139682	0.0061297
4	Fuel Tanks	Dust Control	Water Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887				

4 Fuel Tanks	Grading	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
4 Fuel Tanks	Grading	Grader	Diesel	300	0.59	0.11988098	0.286066613	536.40903	0.0025887	0.0103751	0.009545	0.139089	0
4 Fuel Tanks	Grading	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139982	0.0061297
4 Fuel Tanks	Hydroseeding	Hydroseeder	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Hydroseeding	Off Road Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Markings	Flatbed Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Markings	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
4 Fuel Tanks	Markings	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Soil Erosion/Sediment Control	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
4 Fuel Tanks	Soil Erosion/Sediment Control	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Soil Erosion/Sediment Control	Pumps	Diesel	11	0.43	4.46035968	4.335257551	588.57819	0.0039677	0.35375	0.32545	0.591092	0.0013911
4 Fuel Tanks	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	100	0.21	1.87973379	1.237555541	695.17112	0.0036087	0.2115091	0.194588	0.273165	0.1945372
4 Fuel Tanks	Street Lighting	Dump Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Street Lighting	Loader	Diesel	175	0.59	0.15901357	0.330314968	536.40686	0.0026019	0.015509	0.014268	0.139865	0.0094527
4 Fuel Tanks	Street Lighting	Other General Equipment	Diesel	175	0.43	0.12884541	0.398054598	530.61309	0.0025963	0.0193542	0.017806	0.141759	0.0206314
4 Fuel Tanks	Street Lighting	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Street Lighting	Skid Steer Loader	Diesel	75	0.21	2.328307	3.670547016	694.76179	0.0038154	0.2845416	0.261778	0.408287	0.1670203
4 Fuel Tanks	Street Lighting	Tractors/Loader/Backhoe	Diesel	100	0.21	1.87973379	1.237555541	695.17112	0.0036087	0.2115091	0.194588	0.273165	0.1945372
4 Fuel Tanks	Subbase Placement	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
4 Fuel Tanks	Subbase Placement	Dump Truck (12 cy)	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Subbase Placement	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Subbase Placement	Roller	Diesel	100	0.59	0.43932927	0.341713134	595.73275	0.0028897	0.0181926	0.016737	0.139982	0.0061297
4 Fuel Tanks	Topsoil Placement	Dozer	Diesel	175	0.59	0.14158539	0.288030274	536.40911	0.0025887	0.0103547	0.009526	0.139071	0
4 Fuel Tanks	Topsoil Placement	Dump Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0
4 Fuel Tanks	Topsoil Placement	Pickup Truck	Diesel	600	0.59	0.14190104	0.281357748	536.409	0.0025887	0.0104247	0.009591	0.139131	0

Emission Factors: On-Road (from MOVES)

IC Project	Equipment	Fuel Type	Roadway Type	CO(g/mi)	NOx(g/mi)	CO2(g/mi)	SO2(g/mi)	PM10(g/mi)	PM2.5(g/mi)	CH4(g/mi)	N2O(g/mi)	VOC(g/mi)	RV CO(g/veh)	RV NOx(g/veh)	RV CO2(g/veh)	RV SO2(g/veh)	RV PM10(g/veh)	RV PM2.5(g/veh)	RV VOC(g/veh-day)	
1 Building - 30	Cement Mixer	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
1 Building - 30	Dump Truck Subbase Material	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
1 Building - 30	Passenger Car	Gasoline	Urban Unrestricted Access	2.442901316	0.089655639	355.434512	0.00522241	0.004248	0.0039116	0.0585539	0.004706	0.001668	26.089727	1.374485	243.2407	0.0035739	0.0319097	0.0293828	5.6814464	0.7622881
1 Building - 30	Tractor Trailer	Diesel	Urban Unrestricted Access	0.458112135	1.435824828	2591.11973	0.017731586	0.037674	0.036545	0.1299982	0.072776	0.003464	26.340841	0.01852	329.5742	0.0022553	0.0001626	0.0001578	14.521261	0
2 Open Parking	Cement Mixer	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
2 Open Parking	Dump Truck - Asphalt	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
2 Open Parking	Dump Truck Subbase Material	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
2 Open Parking	Passenger Car	Gasoline	Urban Unrestricted Access	2.442901316	0.089655639	355.434512	0.00522241	0.004248	0.0039116	0.0585539	0.004706	0.001668	26.089727	1.374485	243.2407	0.0035739	0.0319097	0.0293828	5.6814464	0.7622881
2 Open Parking	Tractor Trailer	Diesel	Urban Unrestricted Access	0.458112135	1.435824828	2591.11973	0.017731586	0.037674	0.036545	0.1299982	0.072776	0.003464	26.340841	0.01852	329.5742	0.0022553	0.0001626	0.0001578	14.521261	0
3 Apron (GA)	Asphalt 18 Wheeler	Diesel	Urban Unrestricted Access	0.458112135	1.435824828	2591.11973	0.017731586	0.037674	0.036545	0.1299982	0.072776	0.003464	26.340841	0.01852	329.5742	0.0022553	0.0001626	0.0001578	14.521261	0
3 Apron (GA)	Cement Mixer	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
3 Apron (GA)	Dump Truck - Asphalt	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
3 Apron (GA)	Dump Truck Subbase Material	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
3 Apron (GA)	Passenger Car	Gasoline	Urban Unrestricted Access	2.442901316	0.089655639	355.434512	0.00522241	0.004248	0.0039116	0.0585539	0.004706	0.001668	26.089727	1.374485	243.2407	0.0035739	0.0319097	0.0293828	5.6814464	0.7622881
4 Fuel Tanks	Asphalt 18 Wheeler	Diesel	Urban Unrestricted Access	0.458112135	1.435824828	2591.11973	0.017731586	0.037674	0.036545	0.1299982	0.072776	0.003464	26.340841	0.01852	329.5742	0.0022553	0.0001626	0.0001578	14.521261	0
4 Fuel Tanks	Cement Mixer	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
4 Fuel Tanks	Dump Truck - Asphalt	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
4 Fuel Tanks	Dump Truck Subbase Material	Diesel	Urban Unrestricted Access	0.405183713	0.85998178	1432.28749	0.009801437	0.0171574	0.0166433	0.083484	0.07126	0.003464	22.459968	0.009383	257.5549	0.0017625	0.0001271	0.0001233	1.1563854	0
4 Fuel Tanks	Passenger Car	Gasoline	Urban Unrestricted Access	2.442901316	0.089655639	355.434512	0.00522241	0.004248	0.0039116	0.0585539	0.004706	0.001668	26.089727	1.374485	243.2407	0.0035739	0.0319097	0.0293828	5.6814464	0.7622881

Fugitive Emissions (Emission Factors from Various Sources including AP-42)

Scenario	IC Project	Fugitive Type	Variable	Default Values	Units	User Value
1 Building - 30	Concrete Mixing/Batching	V = Volume of asphalt = 0.111 x L x W x		1387.5	yd3	
1 Building - 30	Concrete Mixing/Batching	PM10 = 0.037 x V		51.3	lbs	
1 Building - 30	Material Movement (Paved Roads)	sL = Road surface silt loading		0.1	g/m3	
1 Building - 30	Material Movement (Paved Roads)	Wt. = Mean vehicle weight		32	tons	
1 Building - 30	Material Movement (Paved Roads)	VMT = Vehicle miles traveled		2580	miles	
1 Building - 30	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL*0.91) x (Wt*1.02)		23.9	lbs	
1 Building - 30	Material Movement (Unpaved Roads)	s = Surface material silt content		0.043	fraction	
1 Building - 30	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight		32	tons	
1 Building - 30	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled		2580	miles	
1 Building - 30	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)*0.91] x (Wt./3)*0.4		70.7	lbs	
2 Open Parking	Material Movement (Paved Roads)	sL = Road surface silt loading		0.1	g/m3	
2 Open Parking	Material Movement (Paved Roads)	Wt. = Mean vehicle weight		32	tons	
2 Open Parking	Material Movement (Paved Roads)	VMT = Vehicle miles traveled		3870	miles	
2 Open Parking	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL*0.91) x (Wt*1.02)		35.9	lbs	
2 Open Parking	Material Movement (Unpaved Roads)	s = Surface material silt content		0.043	fraction	
2 Open Parking	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight		32	tons	
2 Open Parking	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled		3880	miles	
2 Open Parking	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)*0.91] x (Wt./3)*0.4		106.3	lbs	
2 Open Parking	Soil Handling	u = Wind speed		5	mph	
2 Open Parking	Soil Handling	m = Moisture content		0.25	fraction	
2 Open Parking	Soil Handling	T = Mass of aggregate storage pile = L x l		275	tons	
2 Open Parking	Soil Handling	PM10 = T x 0.35 x 0.0032 x [(u/5)*1.3] /		5.661	lbs	
2 Open Parking	Unstabilized Land and Wind Erosion	A = Area affected = L x W / 43560.0		0.23	acres	
2 Open Parking	Unstabilized Land and Wind Erosion	TPConv = TSP/PM10 conversion		0.5	fraction	
2 Open Parking	Unstabilized Land and Wind Erosion	CE = Control efficiency		0.63	fraction	
2 Open Parking	Unstabilized Land and Wind Erosion	t = year (e.g. 0.65 year)		1	years	
2 Open Parking	Unstabilized Land and Wind Erosion	PM10 = 0.38 x A x TPConv x (1-CE) x t / 2		0	lbs	
2 Open Parking	Asphalt Drying	A = Area of land affected = L x W x 0.093		929	m2	
2 Open Parking	Asphalt Drying	AR = Application rate of liquefied aspha		1.811	lb/m2	
2 Open Parking	Asphalt Drying	VD = Volume fraction of diluent in lique		0.35	fraction	
2 Open Parking	Asphalt Drying	EF = Mass fraction of diluent which eva		0.7	fraction	
2 Open Parking	Asphalt Drying	D = Density of solvent utilized		1.8	lbs/l	
2 Open Parking	Asphalt Drying	VOC = A x AR x VD x EF x D		741.9	lbs	
3 Apron (GA)	Asphalt Drying	A = Area of land affected = L x W x 0.093		14631.8	m2	
3 Apron (GA)	Asphalt Drying	AR = Application rate of liquefied aspha		1.811	lb/m2	
3 Apron (GA)	Asphalt Drying	VD = Volume fraction of diluent in lique		0.35	fraction	
3 Apron (GA)	Asphalt Drying	EF = Mass fraction of diluent which eva		0.7	fraction	
3 Apron (GA)	Asphalt Drying	D = Density of solvent utilized		1.8	lbs/l	
3 Apron (GA)	Asphalt Drying	VOC = A x AR x VD x EF x D		11685.7	lbs	

3	Apron (GA)	Asphalt Storage and Batching	$T = \text{Mass of asphalt loaded} = L \times W \times 0.1$	1903.5 tons
3	Apron (GA)	Asphalt Storage and Batching	$PM_{10} = (0.027 + 0.00042) \times T$	52.2 lbs
3	Apron (GA)	Asphalt Storage and Batching	$CO = (0.4 + 0.0004) \times T$	762.2 lbs
3	Apron (GA)	Asphalt Storage and Batching	$NO_x = (0.025) \times T$	47.6 lbs
3	Apron (GA)	Asphalt Storage and Batching	$SO_x = (0.0046) \times T$	8.756 lbs
3	Apron (GA)	Asphalt Storage and Batching	$VOC = (0.0082 + 0.0042) \times T$	23.6 lbs
3	Apron (GA)	Material Movement (Unpaved Roads)	$s = \text{Surface material silt content}$	0.043 fraction
3	Apron (GA)	Material Movement (Unpaved Roads)	$Wt = \text{Mean vehicle weight}$	32 tons
3	Apron (GA)	Material Movement (Unpaved Roads)	$VMT = \text{Vehicle miles traveled}$	7000.4 miles
3	Apron (GA)	Material Movement (Unpaved Roads)	$PM_{10} = 1.5 \times [(1/12)^{-0.9}] \times [(Wt./3)^{-0.4}$	191.7 lbs
3	Apron (GA)	Material Movement (Paved Roads)	$sl = \text{Road surface silt loading}$	0.1 g/m3
3	Apron (GA)	Material Movement (Paved Roads)	$Wt = \text{Mean vehicle weight}$	32 tons
3	Apron (GA)	Material Movement (Paved Roads)	$VMT = \text{Vehicle miles traveled}$	6450 miles
3	Apron (GA)	Material Movement (Paved Roads)	$PM_{10} = 0.0022 \times (sl^{*}0.91) \times (Wt^{*}1.02)$	59.9 lbs
3	Apron (GA)	Concrete Mixing/Batching	$V = \text{Volume of asphalt} = 0.111 \times L \times W \times$	7284.4 yd3
3	Apron (GA)	Concrete Mixing/Batching	$PM_{10} = 0.037 \times V$	269.5 lbs
3	Apron (GA)	Unstabilized Land and Wind Erosion	$A = \text{Area affected} = L \times W / 43560.0$	3.616 acres
3	Apron (GA)	Unstabilized Land and Wind Erosion	$TPConv = TSP/PM_{10} \text{ conversion}$	0.5 fraction
3	Apron (GA)	Unstabilized Land and Wind Erosion	$CE = \text{Control efficiency}$	0.63 fraction
3	Apron (GA)	Unstabilized Land and Wind Erosion	$t = \text{year (e.g. 0.65 year)}$	1 years
3	Apron (GA)	Unstabilized Land and Wind Erosion	$PM_{10} = 0.38 \times A \times TPConv \times (1 - CE) \times t / 2$	0 lbs
3	Apron (GA)	Soil Handling	$u = \text{Wind speed}$	5 mph
3	Apron (GA)	Soil Handling	$m = \text{Moisture content}$	0.25 fraction
3	Apron (GA)	Soil Handling	$T = \text{Mass of aggregate storage pile} = L \times l$	4331.3 tons
3	Apron (GA)	Soil Handling	$PM_{10} = T \times 0.35 \times 0.0032 \times [(u/5)^{-1.3}] /$	89.2 lbs
4	Fuel Tanks	Asphalt Drying	$A = \text{Area of land affected} = L \times W \times 0.093$	26.8 m2
4	Fuel Tanks	Asphalt Drying	$ARL = \text{Application rate of liquefied aspha}$	1.811 l/m2
4	Fuel Tanks	Asphalt Drying	$VD = \text{Volume fraction of diluent in lique}$	0.35 fraction
4	Fuel Tanks	Asphalt Drying	$EF = \text{Mass fraction of diluent which eva}$	0.7 fraction
4	Fuel Tanks	Asphalt Drying	$D = \text{Density of solvent utilized}$	1.8 lbs/l
4	Fuel Tanks	Asphalt Drying	$VOC = A \times AR \times VD \times EF \times D$	21.4 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$T = \text{Mass of asphalt loaded} = L \times W \times 0.1$	3.481 tons
4	Fuel Tanks	Asphalt Storage and Batching	$PM_{10} = (0.027 + 0.00042) \times T$	0.095 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$CO = (0.4 + 0.0004) \times T$	1.394 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$NO_x = (0.025) \times T$	0.087 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$SO_x = (0.0046) \times T$	0.016 lbs
4	Fuel Tanks	Asphalt Storage and Batching	$VOC = (0.0082 + 0.0042) \times T$	0.043 lbs
4	Fuel Tanks	Material Movement (Unpaved Roads)	$s = \text{Surface material silt content}$	0.043 fraction
4	Fuel Tanks	Material Movement (Unpaved Roads)	$Wt = \text{Mean vehicle weight}$	32 tons
4	Fuel Tanks	Material Movement (Unpaved Roads)	$VMT = \text{Vehicle miles traveled}$	5167.7 miles
4	Fuel Tanks	Material Movement (Unpaved Roads)	$PM_{10} = 1.5 \times [(1/12)^{-0.9}] \times [(Wt./3)^{-0.4}$	141.5 lbs
4	Fuel Tanks	Material Movement (Paved Roads)	$sl = \text{Road surface silt loading}$	0.1 g/m3
4	Fuel Tanks	Material Movement (Paved Roads)	$Wt = \text{Mean vehicle weight}$	32 tons
4	Fuel Tanks	Material Movement (Paved Roads)	$VMT = \text{Vehicle miles traveled}$	5160 miles
4	Fuel Tanks	Material Movement (Paved Roads)	$PM_{10} = 0.0022 \times (sl^{*}0.91) \times (Wt^{*}1.02)$	47.9 lbs
4	Fuel Tanks	Concrete Mixing/Batching	$V = \text{Volume of asphalt} = 0.111 \times L \times W \times$	13.3 yd3
4	Fuel Tanks	Concrete Mixing/Batching	$PM_{10} = 0.037 \times V$	0.493 lbs
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$A = \text{Area affected} = L \times W / 43560.0$	0.007 acres
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$TPConv = TSP/PM_{10} \text{ conversion}$	0.5 fraction
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$CE = \text{Control efficiency}$	0.63 fraction
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$t = \text{year (e.g. 0.65 year)}$	1 years
4	Fuel Tanks	Unstabilized Land and Wind Erosion	$PM_{10} = 0.38 \times A \times TPConv \times (1 - CE) \times t / 2$	0 lbs
4	Fuel Tanks	Soil Handling	$u = \text{Wind speed}$	5 mph
4	Fuel Tanks	Soil Handling	$m = \text{Moisture content}$	0.25 fraction
4	Fuel Tanks	Soil Handling	$T = \text{Mass of aggregate storage pile} = L \times l$	7.92 tons
4	Fuel Tanks	Soil Handling	$PM_{10} = T \times 0.35 \times 0.0032 \times [(u/5)^{-1.3}] /$	0.163 lbs

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ASSUMPTIONS

Emission factors were developed from the following models:

- On-Road Vehicles: MOVES4
- Non-Road Equipment: MOVES4

In addition to the overall project size dimensions (e.g., Length and width) provided by the user, an additional 10 ft length and 20 ft width is added to account for disturbance areas.

The number of employees is based on the higher of two methods: (1) number of equipment, and (2) multiply the project cost in million by 11.

The average employee travels 30 miles round-trip from home to construction site each day.

The average on-road material delivery round-trip distance per truck is 40 miles per day.

For calculating fugitive, re-entrained PM emissions from on-road and non-road material delivery and handling equipment, a nominal VMT of 5 miles is used for each vehicle per day.

In deriving emission factors from NONROAD, the horsepower for each equipment represents the most popular in each equipment category.

The total length of each modeled scenario is used to define the number of days associated with vehicle/equipment evaporative emissions.

The choice of location and season are assumed to adequately represent differences in fuel characteristics affecting emissions.

Only two seasons (Summer and Winter) are used to represent all seasons.

14 U.S. Counties are used to represent all other counties in the U.S. (all other counties are mapped to the 14).

The default methods assume that all construction equipment use diesel as well as heavy-duty on-road vehicles, while passenger vehicles (including motorcycles) use gasoline.

Fugitive emissions are only modeled for:

- Asphalt drying
- Asphalt storage and batching

Concrete mixing/batching
Soil handling
Unstabilized land and wind erosion
Material movement (unpaved roads)
Material movement (paved roads)

On-Road vehicle speeds are not explicitly modeled. The associated emission factors for each modeled vehicle from MOVES represent averages over the driving cycles, the roadway type, and daily temperature variations.

The default equipment hours-of-use data are developed based on the overall size of the project provided by the user and activity rates based on expert engineering judgment.

Under the Construction Activity Type list (Activity Tab), when a choice between asphalt and concrete materials occurs, asphalt is always selected as default. To choose concrete, de-select the asphalt item and select the corresponding concrete item.

Two trips per day were assumed for each on-road material handling trucks.

Only CO2, CH4, and N2O are used to represent greenhouse gas emissions. Other potential greenhouse gases including air conditioning refrigerants were not included.

The following equipment are always modeled using diesel emission factors since gasoline-based emission factors are not available:

Asphalt Deliveries/Ten Wheelers
Bulldozer
Concrete Ready Mix Trucks
Concrete Ready Trucks Mix for Cores
Concrete Truck
Crack Filler (Trailer Mounted)
Delivery of Tanks (3)
Distributing Tanker
Dozer
Dump Truck
Dump Truck (12 cy)
Excavator
Excavator for U/G Services/Tanks
Flat Bed or Dump Trucks
Flatbed Truck
Grader
Grout Wheel Truck
Hoist Equipment with 40 Ton Rig
Hydraulic Hammer
Hydroseeder
Line Painting Truck and Sprayer
Material Deliveries
Off-Road Truck
Pickup Truck
Scraper
Seed Truck Spreader
Small Dozer
Survey Crew Trucks
Ten Wheelers
Ten Wheelers- Material Delivery
Tool Truck
Tractor Trailer- Equipment Delivery
Tractor Trailer- Material Delivery
Tractor Trailer- Steel Deliveries
Tractor Trailer- Stone Delivery
Tractor Trailer- Topsoil & Seed
Tractor Trailer- Truck Delivery
Tractor Trailer with Boom Hoist- Curb& Del & Place
Tractor Trailer with Boom Hoist- Delivery
Tractor Trailers- Rebar Deliveries
Tractor Trailers Temp Fac.
Truck for Topsoil & Seed Del&Spread
Water Truck
Excavator with Bucket
Excavator with Hoe Ram

Operation Group	Mode	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	CO2 (ST)	CH4 (ST)	CO2e (ST)	H2O (ST)
Alt1	Startup	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	0.00	N/A	0.00	0.00
Alt1	Taxi Out	1	0	0.03	0.96	0.05	0.05	0.04	0.04	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	2.46	N/A	2.46	0.96
Alt1	Climb Ground	1	63	0.03	1.07	0.05	0.05	0.04	0.04	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	2.74	N/A	2.74	1.07
Alt1	Climb Below 1000 ft AFE	1	949	0.04	1.70	0.05	0.05	0.05	0.05	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	4.32	N/A	4.32	1.69
Alt1	Climb Below Mixing Height (3000 ft AFE)	3	3,410	0.05	3.19	0.07	0.07	0.06	0.06	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	8.02	N/A	8.02	3.14
Alt1	Climb Below 10000 ft AFE	7	13,705	0.09	9.21	0.14	0.13	0.11	0.12	0.01	0	0.00E+00	0.00	0.00	0	N/A	N/A	22.05	N/A	22.05	8.65
Alt1	Above 10000 ft AFE	0	208	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	0.35	N/A	0.35	0.14
Alt1	Descend Below 10000 ft AFE	5	8,721	0.06	6.87	0.09	0.09	0.08	0.08	0.01	0	0.00E+00	0.00	0.00	0	N/A	N/A	16.83	N/A	16.83	6.60
Alt1	Descend Below Mixing Height (3000 ft AFE)	3	4,378	0.04	4.31	0.07	0.06	0.05	0.06	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	10.74	N/A	10.74	4.21
Alt1	Descend Below 1000 ft AFE	1	1,483	0.03	1.84	0.04	0.04	0.03	0.03	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	4.66	N/A	4.66	1.83
Alt1	Descend Ground	0	36	0.02	0.52	0.02	0.02	0.02	0.02	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	1.33	N/A	1.33	0.52
Alt1	Taxi In	0	0	0.02	0.48	0.02	0.02	0.02	0.02	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	1.22	N/A	1.22	0.48
Alt1	Full Flight	12	22,634	0.15	16.25	0.23	0.23	0.19	0.20	0.01	0	0.00E+00	0.01	0.01	0	N/A	N/A	39.23	N/A	39.23	15.38
		Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	CO2 (ST)	CH4 (ST)	CO2e (ST)	H2O (ST)
Flight below mixing height		4.78	7,788.50	0.04	6.06			0.05		0.00					0	#VALUE!	#VALUE!	15.08	#VALUE!	15.08	5.91
Taxi		1.17	0.00	0.05	1.44			0.06		0.00					0	#VALUE!	#VALUE!	3.68	#VALUE!	3.68	1.44
SUBTOTAL: Aircraft (Flight+taxi)		5.95	7,788.50	0.09	7.50			0.11		0.00					0	#VALUE!	#VALUE!	18.76	#VALUE!	18.76	7.35
APU					0.00			0.00		0.00					0	0	0.00	0.00	0.00	0.00	0.00
SUBTOTAL: Aircraft (Flight+taxi+APU)					7.50			0.11		0.00					0	#VALUE!	#VALUE!	18.76	#VALUE!	18.76	7.35
GSE					0.00			0.00		0.00					0	0	0.00	0.00	0.00	0.00	0.00
Total					7.50			0.11		0.00					0	#VALUE!	#VALUE!	18.76	#VALUE!	18.76	7.35

Alt1 GHG Emissisons (Avgas)							
AEDT Scenario	Fuel Use (ST)	Short Tons To Lbs	Gallons of AvGas/ Jet A	CO2 (MT)	N2O (MT)	CH4 (MT)	CO2e (MT)
Alt1 GHG Emissisons	12.43	24,860.00	4,143.33	35.59	0.00046	0.029130	36.58

Fuel	CO ₂	N ₂ O	CH ₄ ⁶³	Units	Density
Jet A - LTO	21.098	0.000683	0.0	lb/gallon	6.84
Jet A – startup mode			0.000595		
Avgas – LTO/startup modes	18.342	0.000243	0.0155	lb/gallon	6.00
Source: Department of Energy, Energy Information Administration, 2012, Voluntary Reporting of Greenhouse Gases Emissions.					

CO₂ (metric tons) = Fuel Usage (gallons) x 21.098 pounds CO₂ per gallon x short ton per 2,000 pound x 0.907185 metric ton per short ton

CH₄ (metric tons) = Fuel Usage (gallons) x 0.000595 pounds CH₄ per gallon x short ton per 2,000 pound x 0.907185 metric ton per short ton

N₂O (metric tons) = Fuel Usage (gallons) x 0.000683 pounds N₂O per gallon x short ton per 2,000 pound x 0.907185 metric ton per short ton

CO_{2e} (in metric tons) = CO₂ + CH₄ x 34 + N₂O x 298

AEDT Modeling Results Alternative 1 Criteria Pollutants

Operation	Mode	Fuel (ST)	Distance (r	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mas	nvPM Num	CO2 (ST)	CH4 (ST)	CO2e (ST)	H2O (ST)
Alt1	Startup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 N/A	N/A	0 N/A		0	0
Alt1	Taxi Out	0.78	0	0.03	0.96	0.05	0.05	0.04	0.04	0	0	0	0	0	0	0 N/A	N/A	2.46 N/A		2.46	0.96
Alt1	Climb Ground	0.87	63.08	0.03	1.07	0.05	0.05	0.04	0.04	0	0	0	0	0	0	0 N/A	N/A	2.74 N/A		2.74	1.07
Alt1	Climb Below 1000 ft AFE	1.37	949.35	0.04	1.7	0.05	0.05	0.05	0.05	0	0	0	0	0	0	0 N/A	N/A	4.32 N/A		4.32	1.69
Alt1	Climb Below Mixing Height (3000 ft AFE)	2.54	3410.3	0.05	3.19	0.07	0.07	0.06	0.06	0	0	0	0	0	0	0 N/A	N/A	8.02 N/A		8.02	3.14
Alt1	Climb Below 10000 ft AFE	6.99	13705	0.09	9.21	0.14	0.13	0.11	0.12	0.01	0.01	0	0	0	0	0 N/A	N/A	22.05 N/A		22.05	8.65
Alt1	Above 10000 ft AFE	0.11	208.43	0	0.17	0	0	0	0	0	0	0	0	0	0	0 N/A	N/A	0.35 N/A		0.35	0.14
Alt1	Descend Below 10000 ft AFE	5.34	8720.8	0.06	6.87	0.09	0.09	0.08	0.08	0.01	0.01	0	0	0	0	0 N/A	N/A	16.83 N/A		16.83	6.6
Alt1	Descend Below Mixing Height (3000 ft AFE)	3.41	4378.2	0.04	4.31	0.07	0.06	0.05	0.06	0	0	0	0	0	0	0 N/A	N/A	10.74 N/A		10.74	4.21
Alt1	Descend Below 1000 ft AFE	1.48	1483.1	0.03	1.84	0.04	0.04	0.03	0.03	0	0	0	0	0	0	0 N/A	N/A	4.66 N/A		4.66	1.83
Alt1	Descend Ground	0.42	35.61	0.02	0.52	0.02	0.02	0.02	0.02	0	0	0	0	0	0	0 N/A	N/A	1.33 N/A		1.33	0.52
Alt1	Taxi In	0.39	0	0.02	0.48	0.02	0.02	0.02	0.02	0	0	0	0	0	0	0 N/A	N/A	1.22 N/A		1.22	0.48
Alt1	Full Flight	12.43	22634	0.15	16.25	0.23	0.23	0.19	0.2	0.01	0.02	0	0.01	0.01	0.01	0 N/A	N/A	39.23 N/A		39.23	15.38

		Fuel (ST)	Distance (	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mas	nvPM Num	CO2 (ST)	CH4 (ST)	CO2e (ST)	H2O (ST)
Aircraft		5.95	7788.5	0.09	7.5	0.14	0.13	0.11	0.12	0	0	0	0	0	0	#VALUE!	#VALUE!	18.76	#VALUE!	18.76	7.35
GSE LTO		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
APU		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Total		5.95	7788.5	0.09	7.5	0.14	0.13	0.11	0.12	0.000	0	0	0	0	0	#VALUE!	#VALUE!	18.76	#VALUE!	18.76	7.35

$$E_{Pb} = LTO \times 3.46 \times 2.12 \times \frac{1}{907,180} \times 0.95$$

Where:

E_{Pb} = total Pb emissions (in short tons) produced by all piston engine aircraft,
LTO = total number of LTO cycles for all piston engine aircraft, and
3.46 = assumed gallons of avgas consumed per LTO cycle
2.12 = assumed grams of lead per gallon of avgas
 $\frac{1}{907,180}$ = number of short tons per gram
0.95 = fraction of lead emitted from the total avgas lead content.

UPDATED EQUATION BASED ON FUEL BURN (Short Tons)
 $E_{Pb} = (1983.33 \text{ gal} \times 2.12 \times 0.95) / 907,180$

Fuel	CO ₂	N ₂ O	CH ₄ ⁶³	Units	Density
Jet A - LTO	21.098	0.000683	0.0	lb/gallon	6.84
Jet A – startup mode			0.000595		
Avgas – LTO/startup modes	18.342	0.000243	0.0155	lb/gallon	6.00
Source: Department of Energy, Energy Information Administration, 2012, Voluntary Reporting of Greenhouse Gases Emissions.					

Flight Below Mixing Height		
Time Duration	Emissions (Short Tons)	Emissions (lb.)
Per Hour	5.02305E-07	0.00100461
Per Day	1.20553E-05	0.024110633
Per Month	0.000366928	0.733855342
Annual Emissions	0.0044031	8.8062641

	Fuel Use Short Tons (Below Mixing Height)	Pounds	GALLONS
Flight Below Mixing Height	5.950	11,900	1983.333333

6 lb Avgas = 1 Gallon

Operation Group	Mode	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	CO2 (ST)	CH4 (ST)	CO2e (ST)	H2O (ST)
Alt2_C680	Startup	0	0	0.00	0.00	0.27	0.31	0.31	0.31	0.00	0	0.00E+00	0.00	0.00	0	N/A	N/A	0.00	N/A	0.00	0.00
Alt2_C680	Taxi Out	81	0	0.02	2.98	0.03	0.04	0.04	0.04	0.29	0	0.00E+00	0.00	0.04	0	0	00000000000	254.49	N/A	254.49	99.78
Alt2_C680	Climb Ground	99	669	0.02	2.99	0.30	0.34	0.34	0.34	0.52	0	0.00E+00	0.00	0.06	0	0	00000000000	313.89	N/A	313.89	123.07
Alt2_C680	Climb Below 1000 ft AFE	108	1,175	0.02	2.99	0.30	0.34	0.34	0.34	0.64	0	1.00E-02	0.00	0.06	0	0	00000000000	340.02	N/A	340.02	133.31
Alt2_C680	Climb Below Mixing Height (3000 ft AFE)	175	6,125	0.02	3.03	0.30	0.34	0.34	0.34	1.60	0	1.00E-02	0.00	0.11	0	0	00000000000	552.37	N/A	552.37	216.57
Alt2_C680	Climb Below 10000 ft AFE	317	25,791	0.02	3.11	0.30	0.34	0.34	0.34	3.67	0	1.00E-02	0.00	0.23	0	0	00000000000	1,001.50	N/A	1,001.50	392.67
Alt2_C680	Above 10000 ft AFE	13	2,103	0.00	0.01	0.00	0.00	0.00	0.00	0.18	0	0.00E+00	0.00	0.01	0	0	00000000000	39.61	N/A	39.61	15.53
Alt2_C680	Descend Below 10000 ft AFE	139	27,783	0.02	3.19	0.03	0.03	0.03	0.03	0.71	0	1.00E-02	0.00	0.05	0	0	00000000000	438.59	N/A	438.59	171.96
Alt2_C680	Descend Below Mixing Height (3000 ft AFE)	117	14,104	0.02	2.40	0.02	0.03	0.03	0.03	0.63	0	1.00E-02	0.00	0.04	0	0	00000000000	369.64	N/A	369.64	144.93
Alt2_C680	Descend Below 1000 ft AFE	86	4,985	0.01	1.64	0.02	0.02	0.02	0.02	0.48	0	0.00E+00	0.00	0.03	0	0	00000000000	270.30	N/A	270.30	105.98
Alt2_C680	Descend Ground	45	425	0.01	1.51	0.02	0.02	0.02	0.02	0.18	0	0.00E+00	0.00	0.02	0	0	00000000000	141.35	N/A	141.35	55.42
Alt2_C680	Taxi In	40	0	0.01	1.48	0.02	0.02	0.02	0.02	0.14	0	0.00E+00	0.00	0.02	0	0	00000000000	126.21	N/A	126.21	49.48
Alt2_C680	Full Flight	469	55,676	0.04	6.31	0.33	0.38	0.37	0.38	4.56	1	2.00E-02	0.01	0.29	0	0	00000000000	1,479.70	N/A	1,479.70	580.16
Alt2_C680	GSE LTO	N/A	N/A	0.09	9.22	0.26	0.27	0.24	0.23	0.08	0	N/A	N/A	0.00	0	N/A	N/A	41.24	0.03	41.92	N/A

	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	CO2 (ST)	CH4 (ST)	CO2e (ST)	H2O (ST)
Flight below mixing height	171.58	20,228.50	0.01	0.97			0.31		1.80					0	0	#####	541.31	#VALUE!	541.31	212.24
Taxi	120.66	0.00	0.03	4.46			0.06		0.43					0	0	#####	380.70	#VALUE!	380.70	149.26
SUBTOTAL: Aircraft (Flight+taxi)	292.24	20,228.50	0.04	5.43			0.37		2.23					0	0	#####	922.01	#VALUE!	922.01	361.50
APU				0.00			0.00		0.00					0	0	0.00	0.00	0.00	0.00	0.00
SUBTOTAL: Aircraft (Flight+taxi+APU)				5.43			0.37		2.23					0	0	#####	922.01	#VALUE!	922.01	361.50
GSE				9.22			0.24		0.08					0	N/A	N/A	41.24	0.03	41.92	N/A
Total				14.65			0.61		2.31					0	#VALUE!	#VALUE!	963.25	#VALUE!	963.93	#VALUE!

Alt2 GHG Emissions (JET-A)							
AEDT Scenario	Fuel Use (ST)	Short Tons To Lbs	Gallons of AvGas/ Jet A	CO2 (MT)	N2O (MT)	CH4 (MT)	CO2e (MT)
Alt1 GHG Emissions	469.01	938,020.00	137,137.43	1,342	0.04249	0.000000	1,354

Actual AEDT Output CO2

Fuel	CO ₂	N ₂ O	CH ₄ ⁶³	Units	Density
Jet A - LTO	21.098	0.000683	0.0	lb/gallon	6.84
Jet A – startup mode			0.000595		
Avgas – LTO/startup modes	18.342	0.000243	0.0155	lb/gallon	6.00

Source: Department of Energy, Energy Information Administration, 2012, Voluntary Reporting of Greenhouse Gases Emissions

****Methane Emsision factor was assumed to be JET-A LTO (0.0). This is due the fact that 0 ST of fuel is used in startup as reported by AEDT****

CO₂ (metric tons) = Fuel Usage (gallons) x 21.098 pounds CO₂ per gallon x short ton per 2,000 pound x 0.907185 metric ton per short ton

CH₄ (metric tons) = Fuel Usage (gallons) x 0.000595 pounds CH₄ per gallon x short ton per 2,000 pound x 0.907185 metric ton per short ton

N₂O (metric tons) = Fuel Usage (gallons) x 0.000683 pounds N₂O per gallon x short ton per 2,000 pound x 0.907185 metric ton per short ton

CO_{2e} (in metric tons) = CO₂ + CH₄ x 34 + N₂O x 298

Total AEDT Criteria Pollutants Alternative 2

Turbojets

	Fuel (ST)	Distance (	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mas	nvPM Nun	CO2 (ST)	CH4 (ST)	CO2e (ST)	H2O (ST)
Aircraft	292.24	20228.5	0.04	5.43	0.32	0.37	0.37	0.37	2.23	0.39	0.02	0	0.15	0.15	0.13	1.6E+21	922.01	#VALUE!	922.01	361.5
GSE LTO	N/A	N/A	0.09	9.22	0.26	0.27	0.24	0.23	0.08	0	N/A	N/A	0	0	N/A	N/A	41.24	0.03	41.92	N/A
APU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	292.24	20228.5	0.13	14.65	0.58	0.64	0.61	0.6	2.31	0.39	0.02	0	0.15	0.15	0.13	1.6E+21	963.25	#VALUE!	963.93	361.5

Turbo Propos

	Fuel (ST)	Distance (	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mas	nvPM Nun	CO2 (ST)	CH4 (ST)	CO2e (ST)	H2O (ST)
Aircraft	251.8	32438.6	0.04	15.27	4.62	5.34	5.31	5.34	1.07	0.33	0.01	0.06	0.06	0.06	#VALUE!	#VALUE!	794.41	#VALUE!	794.41	311.47
GSE LTO	N/A	N/A	0.12	0.61	0.04	0.04	0.04	0.03	0.11	0	N/A	N/A	0.01	0.01	N/A	N/A	37.17	0	37.25	N/A
APU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	251.8	32438.6	0.16	15.88	4.66	5.38	5.35	5.37	1.18	0.33	0.01	0.06	0.07	0.07	#VALUE!	#VALUE!	831.58	#VALUE!	831.66	311.47

Total Combined

	Fuel (ST)	Distance (	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mas	nvPM Nun	CO2 (ST)	CH4 (ST)	CO2e (ST)	H2O (ST)	Lead
Aircraft	544.04	52667.1	0.08	20.7	4.94	5.71	5.68	5.71	3.3	0.72	0.03	0.06	0.21	0.21	#VALUE!	#VALUE!	1716.42	#VALUE!	1716.42	672.97	
GSE LTO	#VALUE!	#VALUE!	0.21	9.83	0.3	0.31	0.28	0.26	0.19	0	#VALUE!	#VALUE!	0.01	0.01	#VALUE!	#VALUE!	78.41	0.03	79.17	#VALUE!	
APU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	544.04	52667.1	0.29	30.53	5.24	6.02	5.96	5.97	3.49	0.72	0.03	0.06	0.22	0.22	#VALUE!	#VALUE!	1794.83	#VALUE!	1795.59	672.97	0

OKV Ground Access Vehicles

		Proposed Alternative (Net Change)	
Segment	Distance to and from airport	Annual 2029	VMT
Incoming and Outgoing	30	112,950	3,388,500
Parking	690	251,850	32,912

OKV Ground Access Vehicles

MOVES4 Emission Factors (grams per mile)								
CO	NOx	PM10	PM2.5	VOC	SO2	CH4	N2O	CO2
3.44614	0.08477	0.002335	0.002066	0.0925	0.00163	0.008992	0.00174	322.0258
1.17702	0.02006	0.000862	0.000763	0.0088	0.00202	0.003462	0.00215	304.8172

OKV Ground Access Vehicles

2029 Criteria Emissions (TPY)						2029 GHG Emissions (metric tons per year)		
CO	NOx	PM10	PM2.5	VOC	SO2	CH4	N2O	CO2
12.86266	0.316393	0.008717	0.007711	0.345322	0.006071	0.033562	0.006484	1201.957
0.042671	0.000727	3.13E-05	2.76E-05	0.000321	7.34E-05	0.000126	7.78E-05	11.05064
0	0	0	0	0	0	0	0	0
Totals	12.91	0.32	0.01	0.01	0.35	0.01	0.030561	0.005953
				GWP			0.910717	1.625182
								1100.422
								1102.958

Distance assumes a roundtrip distance of 30 miles roundtrip

GAV ADT assumes a net change of 112,950 ADT roundtrips per day 2/1/2024 email responding to Data Needs.

GAV ADT assumes a net change of 690 ADT roundtrips per day.

Vehicle speeds for parking assume 15 mph.

Parking assumes 1250 feet and 1250 feet out and up to 675 spaces

Emission Factors based on MOVES4 for 2027 as a conservative Assumption

Appendix B. **Delta's Forecast and Assumptions, FAA** Approval Letter



U. S. Department
Of Transportation

**Federal Aviation
Administration**

WASHINGTON AIRPORTS DISTRICT OFFICE

13873 Park Center Road, Suite 490 S
Herndon, Virginia 20171
Telephone: 703/487-3980
Fax: 703/487-3982

March 7, 2024

VIA EMAIL to nsabo@flyokv.com

Mr. Nicholas Sabo, A.A.E.
Executive Director
Winchester Regional Airport
491 Airport Road
Winchester, VA 22602

Re: Winchester Regional Airport
Environmental Assessment for Northside Development
Baseline Aviation Activity Forecast (Calendar Year 2023)
Federal Aviation Administration Review

Dear Mr. Sabo:

The Federal Aviation Administration (FAA) received the January 2024 Forecast Assumptions associated with the Environmental Assessment for the Northside Development project at Winchester Regional Airport (OKV). Delta Airport Consultants submitted the forecast with a March 1, 2024 email requesting FAA review. In support of the forecast, you also provided raw data from OKV's Virtower Airport Operations Tracking System for calendar year (CY) 2023.

The forecasts and supporting data were reviewed by the FAA's Washington Airports District Office. The FAA concurs with the January 2024 forecast of aircraft operations for use in the Environmental Assessment for the Northside Development project at OKV subject to the following conditions:

- The FAA finds the Baseline CY 2023 forecast operations from Virtower consistent with the CY 2023 operations from the FAA's Traffic Flow Management System Counts (TFMSC).
- The FAA finds the Baseline aviation activity forecast growth rates consistent with the FAA's FY 2022 Terminal Area Forecast (TAF) 5-year and 10-year forecast periods.

- This forecast was prepared at the same time as the evolving impacts of the COVID-19 public health emergency. Forecast approval is based on the methodology, data and conclusions at the time the document was prepared. However, consideration of the impacts of the COVID-19 public health emergency on aviation activity is warranted to acknowledge the reduced confidence in growth projections using currently-available data.
- FAA concurrence with this forecast does not constitute justification for future projects. Justification for future projects will be made based on activity levels at the time the project is requested for development. Documentation of actual activity levels meeting planning activity levels will be necessary to justify Airport Improvement Program (AIP) funding for eligible projects.

Should you have any questions please do not hesitate to contact me at 703.487.3973 or chad.carper@faa.gov.

Sincerely,

Chad Carper
Engineer, Washington Airports District Office

Encl: January 2024 Forecast Assumptions (3 pages)

cc: Susan Stafford, FAA BEK-ADO
Eleanor Scorgia, FAA AEA-610
Scott Denny, DOAV
Mary Ashburn Pearson, Delta

**FORECAST ASSUMPTIONS IN SUPPORT OF
ENVIRONMENTAL ASSESSMENT
FOR NORTHSIDE DEVELOPMENT AT OKV**

**Winchester Regional Airport (OKV)
Winchester, Virginia**

**Delta Project No. 22081
January 2024**

1. Operations – No Action Alternative

- a. Annual operations and by aircraft type provided by OKV ADS-B data for calendar year 2023
- b. Growth rates by aircraft type sourced from FAA Aerospace Forecast 2023-2033 and applied to each aircraft category. Forecast extended to 2033, which is five years from the end of construction. Construction is assumed to occur in 2027 and 2028.

2. Operations – Scenario 1 (AAM/eVTOL manufacture and 200 annual test flights/400 annual operations)

- a. Began with No Action alternative forecast
- b. Manually added 200 annual single-engine piston and 200 annual rotorcraft operations in 2029 (first year after construction complete)
- c. Assuming 3% of test flights occur at night, based on current GA usage at OKV
- d. Automobile trips- assuming 1,000-sf of warehouse space per employee and assuming 75% of the building is warehouse space, there would be 450 employees at maximum (“worst case”) capacity. Assuming one round-trip per employee, 450 daily or *450 x 251 working days per year* = 112,950 annual automobile trips.

3. Operations- Scenario 2 (Aircraft Maintenance/Hangar Storage)

- a. Began with No Action alternative forecast
- b. Prepared estimated additional operations resulting from the two “Build” concepts prepared during Delta project 23051. Assuming “worst case” that all aircraft stored in hangars are new to OKV and are not currently based and operating there.
 - i. Concept 1 (24, 100’ x 100’ hangars) plus parking
 1. Assume a 100’ x 100’ hangar can accommodate 2 turboprops and one jet
 2. Therefore, full build-out can accommodate 48 turboprops and 24 jets
 3. From 2023 FAA Aerospace Forecast, turboprops will operate approximately 281 hours per year in 2029, which is one year past construction completion. Assuming a three-hour trip duration, this equates to around 94 annual operations per turboprop.
 4. From 2023 FAA Aerospace Forecast, jets will operate 316 hours per year in 2029, which equates to approximately 105 annual operations with a three-hour trip duration.

5. Using these assumptions, Concept 1 represents an additional 7,032 annual operations at OKV beginning in 2029.

$$(48 \text{ turboprops} \times 94 \text{ annual ops}) + (24 \text{ jets} \times 105 \text{ annual ops})$$

6. Assuming two round-trip auto trips per departure (pilot and passengers), so 7,032 annual auto trips.
- ii. Concept 2 (Four, 200' x 200' hangars and four, 100' x 100' hangars, plus parking)
1. Assume a 200' x 200' hangar can accommodate 3 turboprops and 2 jets
 2. Therefore, full build-out can accommodate 20 turboprops and 12 jets
 3. Using FAA Aerospace assumptions on annual operations, Concept 2 represents an additional 3,140 annual operations at OKV beginning in 2029.

$$(20 \text{ turboprops} \times 94 \text{ annual ops}) + (12 \text{ jets} \times 105 \text{ annual ops})$$

4. Two round-trip automobile trips per departure, so 3,140 auto trips
- iii. Because Concept 1 is the "worst case", will use these assumptions for the air and noise analysis for Scenario 2.

No Action

FAA Aerospace Forecast 2023-2043

	2023 (base)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Fixed Wing SE	51,950	51,379	50,813	50,254	49,702	49,155	48,614	48,079	47,551	47,026	46,510	-1.1%
Fixed Wing ME	978	978	978	978	978	978	978	978	978	978	978	0.0%
Turboprop	1,111	1,119	1,127	1,134	1,142	1,150	1,158	1,167	1,175	1,183	1,191	0.7%
Turbojet	683	704	726	749	772	796	820	846	872	899	927	3.1%
Rotorcraft	849	866	887	906	926	947	967	989	1,010	1,033	1,055	2.2%
Other	416	421	425	430	435	439	444	449	454	459	464	1.1%
Total	55,987	55,468	54,956	54,452	53,955	53,465	52,983	52,508	52,040	51,579	51,126	-0.9%

Scenario 1, AAM/eVTOL manufacturing plus 200 annual test flights. Added 200 annual Fixed Wing SE operations and 200 annual Rotorcraft operations in 2029.

	2023 (base)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Fixed Wing SE	51,950	51,379	50,813	50,254	49,702	49,155	48,614	48,077	47,545	47,021	46,502	-1.1%
Fixed Wing ME	978	978	978	978	978	978	978	978	978	978	978	0.0%
Turboprop	1,111	1,119	1,127	1,134	1,142	1,150	1,158	1,167	1,175	1,183	1,191	0.7%
Turbojet	683	704	726	749	772	796	820	846	872	899	927	3.1%
Rotorcraft	849	866	887	906	926	947	1,167	1,193	1,219	1,246	1,274	4.6%
Other	416	421	425	430	435	439	444	449	454	459	464	1.1%
Total	55,987	55,468	54,956	54,452	53,955	53,465	53,383	52,910	52,444	51,986	51,535	-0.8%

Scenario 2, Aircraft maintenance and/or hangar storage - see White Paper for assumptions made

	2023 (base)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Fixed Wing SE	51,950	51,379	50,813	50,254	49,702	49,155	48,614	48,079	47,551	47,026	46,510	-1.1%
Fixed Wing ME	978	978	978	978	978	978	978	978	978	978	978	0.0%
Turboprop	1,111	1,119	1,127	1,134	1,142	1,150	3,035	3,060	3,081	3,103	3,124	12.1%
Turbojet	683	704	726	749	772	796	2,080	2,145	2,211	2,280	2,351	14.3%
Rotorcraft	849	866	887	906	926	947	967	989	1,010	1,033	1,055	2.2%
Other	416	421	425	430	435	439	444	449	454	459	464	1.1%
Total	55,987	55,468	54,956	54,452	53,955	53,465	56,123	55,708	55,288	54,868	54,483	-0.2%



WINCHESTER REGIONAL AIRPORT

491 AIRPORT ROAD
WINCHESTER, VIRGINIA 22602
(540) 662-5786

April 29, 2025

To Whom It May Concern,

The Winchester Regional Airport Authority is preparing an Environmental Assessment (EA) for Northside Development at the Winchester Regional Airport (OKV). During preparation of the EA, the Federal Aviation Administration (FAA) requested that the Airport Authority provide a written commitment to comply with the FAA's "Eliminate Aviation Gasoline Lead Emissions" (EAGLE) initiative, and to include the letter as an attachment to the EA document. This letter is being provided for that express purpose.

As stated in the EA narrative, the FAA have partnered with aviation stakeholders to launch the EAGLE initiative, which has a stated goal to eliminate leaded aviation fuels in piston-engine aircraft safely by the end of 2030. Congress, in its 2024 FAA Reauthorization Act, prohibits restricting the sale of 100-octane low lead (100LL) aviation gasoline until the earlier of December 31, 2030 or the date the airport makes available unleaded gas authorized by EPA and FAA and meets industry standards or other standards determined by the FAA Administrator.

As of today's date, regulatory proposals from the FAA and from the Environmental Protection Agency (EPA) have not been released and a replacement for 100LL that is authorized by FAA for use in "nearly all" piston-engine aircraft and engine models, as specified by the 2024 FAA Reauthorization Act, has not yet been identified. The Airport Authority fully intends to comply with national, state, and local regulations, as applicable, once an acceptable substitute has been identified and certified by FAA. The Authority does offer 100LL for sale and is able to continue to do so in accordance with Section 770 of the 2024 FAA Reauthorization Act.

If you have any questions about this letter, please feel free to contact me directly at (540) 662-2422.

Sincerely,

A handwritten signature in black ink, appearing to read "Nick Sabo", is written over a horizontal line.

Nick Sabo, A.A.E.
Executive Director

Attachment H



TECHNICAL MEMORANDUM

To: Mary Ashburn Pearson, AICP
Delta Airport Consultants, Inc.

From: Vincent Ma
Robert Mentzer Jr.
Scott Polzin, PMP

Date: May 24, 2024

Subject: Winchester Regional Airport Northside Development Project
Environmental Assessment, Area Equivalent Method Noise Modeling

Reference: HMMH Project Number 23-0015A

Harris Miller Miller & Hanson Inc. (HMMH) is assisting Delta Airport Consultants, Inc. (Delta) by preparing a noise screening analysis and supporting documentation for the proposed Northside Development Project Environmental Assessment (EA) at Winchester Regional Airport (OKV or the Airport). This technical memorandum provides the proposed noise modeling input into the Federal Aviation Administration's (FAA's) Area Equivalent Method (AEM) Screening Tool. The AEM screening tool is used to help determine the need for further detailed noise analysis with the FAA's Aviation Environmental Design Tool (AEDT). The noise modeling for this analysis uses the most current version of AEM, Version 2c SP2.1

1. Aircraft Noise and Performance Characteristics

AEM is a mathematical procedure that provides an estimated change in noise contour area for an airport given the types of aircraft, operating times, and the number of operations for each aircraft. The noise contour area is a measure of the size of the landmass enclosed within a level of noise as produced by a given set of aircraft operations. The AEM provides an estimated noise contour area, for each alternative (No Action and Proposed Action) for a forecast year using the algorithms and parameters found in AEDT 2c SP2. These areas are compared and a percentage of change for each contour level is provided. For those aircraft types operating at OKV that are not directly represented in AEM, the FAA has documented appropriate substitutions for noise modeling.

2. Aircraft Flight Operations

The flight operations modeled for this EA are derived from OKV Automatic Dependent Surveillance-Broadcast (ADS-B) data for calendar year 2023.² These operations counts were organized by AEM aircraft type and then scaled by category to the annual category counts for 2023 provided to the FAA from Delta. Construction of the proposed facility is expected to occur in 2027 and 2028 resulting in 2029 being the first year after construction is complete. Delta developed an aviation forecast for OKV through 2033 using the growth rates from the FAA Aerospace Forecast 2023-2033, which was approved for use on this project by FAA.³ Details on the forecast and the FAA approval can be found in **Appendix A**. The

¹ Published September 5, 2023, https://www.faa.gov/about/office_org/headquarters_offices/apl/research/models/aem_model.

² Flight operations data obtained through the Airport Monitoring Systems interface for OKV.

³ FAA forecast approval provided on March 7, 2024.

forecasted future year 2029 operation numbers were scaled by category to the approved FAA forecast for the 2029 No Action scenario.

There are two Proposed Action alternative scenarios for this EA. Alternative 1 assumes that the proposed facility would be used for aircraft manufacturing at OKV. This would most likely be Advanced Air Mobility (AAM) manufacturing, final assembly, and test flights. The Proposed Action (Alternative 1) case has the No Action operations along with the proposed additional AAM test flight operations and are shown in **Table 1**. Since the type of AAM is unknown, two different types of aircraft were included in the AEM, each with the 400 annual operations. This is a conservative assumption to provide coverage for any type of proposed AAM manufacturing facility.

Alternative 2 assumes that there is the addition of hangar storage for aircraft at OKV. There are two concepts under development including one concept for 24 100 feet by 100 feet hangars plus parking spaces as well as another concept for 4 200 feet by 200 feet hangars and 4 100 feet by 100 feet hangars plus parking spaces. For the purposes of this analysis, it is assumed all aircraft using the new facility are new to OKV and not currently based and operating at the Airport. The build concept that would result in the addition of more aircraft will be analyzed as this results in the “worst case” scenario. The forecast assumes up to 48 additional turboprops and up to 24 additional jet aircraft could be based at the facility. The Proposed Action (Alternative 2) case includes the No Action operations along with the proposed additional operations from newly based and operating aircraft and are shown in **Table 1**.

Table 1: Forecasted Annual Operations for No Action and Proposed Action

Source: Delta, Winchester Regional Airport, FAA Aerospace Forecast, HMMH 2024

Year	Fixed Wing Single Engine	Fixed Wing Multi Engine	Turboprop	Turbojet	Rotorcraft	Other	Total
2029 No Action	48,614	978	1,158	820	967	444	52,981
2029 Proposed Action Alternative 1	49,014	978	1,158	820	1,367	444	53,781
Difference	400	0	0	0	400	0	800
2029 No Action	48,614	978	1,158	820	967	444	52,981
2029 Proposed Action Alternative 2	48,614	978	5,670	3,340	967	444	60,013
Difference	0	0	4,512	2,520	0	0	7,032

Note: Alternative 1 forecast includes 400 test flights, but two types of aircraft are modeled at 400 operations each.
Alternative 2 assumes all aircraft at the new facility are new to the airport.

The required AEM inputs include counts of arrival and departure operations as Landing and Take-Off Cycle (LTO's) by each specific aircraft type separated into the day (7:00 am – 10:00 pm) and night (10:00 pm – 7:00 am) time periods that are used in calculating the Day Night Average Sound Level (DNL). Day/night splits were determined through operational data provided by the OKV ADS-B data. From the radar data samples, night usage was between two percent to three percent, therefore three percent was used to be conservative. The day/night split for each aircraft type utilized within AEM are described in **Table 2** and **Table 3**.

Table 2. No Action Alternative Day/Night Splits by Aircraft Category

Source: Delta, Winchester Regional Airport, FAA Aerospace Forecast, HMMH 2024

Day %	Night %
97%	3%

Table 3. Proposed Action Alternatives Day/Night Splits by Aircraft Category

Source: Delta, Winchester Regional Airport, FAA Aerospace Forecast, HMMH 2024

Day %	Night %
97%	3%

3. AEM Model Inputs

The Alternative 1 Proposed Action estimates approximately 200 annual AAM test flights (LTO's) or 400 annual AAM operations (approximately 1.1 LTO's per day). Since the type of AAM is unknown, two different types of aircraft were included in the AEM, each with the 400 annual operations. The GASEPF represents a fixed wing type AAM and the COMSEP represents a rotorcraft type AAM.⁴ To be conservative, 100 percent of these additional operations were added to both GASEPF (400 annual operations) and COMSEP (400 annual operations) aircraft types and assumed to have the same day/night split of three percent as the no action case.

This analysis is using the screening tool AEM, therefore an AEM type has to be selected to represent the potential AAM aircraft type. Various AAM types of vehicles are being test flown and several have conducted noise tests. These have shown they are quieter than fixed-wing and helicopter types being flown today,⁵ therefore, any substitution for the AEM model will be a conservative estimate. Since the type of AAM is unknown, the original approach was to select one fixed wing type and one helicopter type. However, the AEM does not include helicopter types as an option so a fixed wing type with similar noise levels to the selected helicopter was used.

The Robinson R44 is one of the quieter helicopter types in the FAA AEDT model and an electric version of the R44 has been developed and test flown, therefore, it was chosen as the representative helicopter type. The fixed wing COMSEP type provided a good match to the R44 noise levels and was chosen for this analysis.

For the fixed-wing type, the GASEPF provides one of the lowest noise levels and was being proposed as a substitute in the model for another project in the northeast United States. Therefore, the GASEPF was selected to represent the fixed wing version of an AAM type in the AEM model.

The Alternative 2 Proposed Action would result in the potential for an additional 7,032 annual operations (3,516 LTO's) or 19.3 daily operations (approximately 9.6 LTO's per day). The new hangar space is estimated to allow for the addition of up to 48 turboprops, each operating 94 annual operations. As well as the addition of up to 24 turbojets, each operating 105 annual operations. The aircraft assignments for these new operations were determined from the OKV ADS-B data using the most typical type of aircraft operating at OKV in that category. From the OKV ADS-B data, the representative types are the Beech Super King Air 350 for the turboprop and the Cessna Latitude 680 for

⁴ Rotorcraft types are not available in the AEM screening tool therefore a fixed wing substitute was used.

⁵ https://ntrs.nasa.gov/api/citations/20220006729/downloads/Aeroacoustics2022_Pascioni_STRIVES5.pdf.

the jet aircraft. The additional turboprop operations were assigned to the DHC6 (substitute for the B350), and the additional turbojet operations were assigned to the CNA680 AEDT types.

Table 4 presents the detailed modeled Average Annual Day (AAD) operational model inputs for both the 2029 No Action and 2029 Proposed Action input to AEM for each Alternative scenario, respectively.

Table 4. AEM Model Inputs

Source: Delta, Winchester Regional Airport, FAA Aerospace Forecast, HMMH 2024

AEM Type	Aircraft Type	2029 Forecast Year					
		No Action		Alternative 1 Proposed Action		Alternative 2 Proposed Action	
		Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
BEC58P	Beechcraft Baron 58	0.89	0.03	0.89	0.03	0.89	0.03
CL600	Bombardier Challenger 600	0.06	0.00	0.06	0.00	0.06	0.00
CNA172	Cessna 172	30.65	0.95	30.65	0.95	30.65	0.95
CNA182	Cessna 182	3.45	0.11	3.45	0.11	3.45	0.11
CNA208	Cessna 208	1.01	0.03	1.01	0.03	1.01	0.03
CNA441	Cessna 441	0.09	0.00	0.09	0.00	0.09	0.00
CNA510	Cessna Mustang	0.29	0.01	0.29	0.01	0.29	0.01
CNA525C	Cessna 525 Citation	0.11	0.00	0.11	0.00	0.11	0.00
CNA55B	Cessna 550 Bravo	0.25	0.01	0.25	0.01	0.25	0.01
CNA680	Cessna 680 Sovereign	0.28	0.01	0.28	0.01	3.63	0.11
COMSEP ¹	1-Engine Composite Piston	9.52	0.29	10.05	0.31	9.52	0.29
DHC6	De Havilland Canada Twin Otter	0.43	0.01	0.43	0.01	6.42	0.20
GASEPF ²	1-Engine Fixed-Propeller	7.77	0.24	8.30	0.26	7.77	0.24
GASEPV ³	1-Engine Variable-Propeller	3.00	0.09	3.00	0.09	3.00	0.09
LEAR35	Lear Jet 35	0.13	0.00	0.13	0.00	0.13	0.00
PA28	Piper 28 Warrior	11.73	0.36	11.73	0.36	11.73	0.36
PA30	Piper 30 Comanche	0.08	0.00	0.08	0.00	0.08	0.00
PA42	Piper 42 Cheyenne	0.58	0.02	0.58	0.02	0.58	0.02
T33A	T-33A	0.09	0.00	0.09	0.00	0.09	0.00
Total LTOs		70.40	2.18	71.46	2.21	79.74	2.47

Note: Totals may not match exactly due to rounding.

LTO – Landing-Takeoff-Operation

Orange shaded cells represent where Proposed Action numbers are higher than No Action.

¹ COMSEP aircraft type includes, but is not limited to SR20, SR22, EC135, R22, R44

² GASEPF aircraft type includes, but is not limited to C152, C150, S4

³ GASEPV aircraft type includes, but is not limited to PA22, DA40, PA24, RV6

4. Results

The Future Year (2029) Alternative 1 Proposed Action DNL 65 dB noise contour encompasses an area of approximately 0.1325 square miles, which is a 0.447 percent increase from the Future Year (2029) No Action DNL 65 dB noise contour that encompasses 0.1319 square miles.

The Future Year (2029) Alternative 2 Proposed Action DNL 65 dB noise contour encompasses an area of approximately 0.1467 square miles, which is a 11.3 percent increase from the Future Year (2029) No Action DNL 65 dB noise contour that encompasses 0.1319 square miles.

The AEM requires a 17 percent change from the No Action to the Proposed Action in order to trigger the threshold of significance within the DNL 65 dB contour which would require detailed noise modeling. The largest increase due to the Proposed Action is 11.3 percent in 2029 for Alternative 2, which is below the 17 percent threshold; therefore, there is no likelihood of a significant noise increase due to the Alternative 1 or Alternative 2 Proposed Action.

The changes in the contour areas in 2029 as a result of the Alternative 1 Proposed Action and Alternative 2 Proposed Action calculated in AEM are shown in **Table 5**. The AEM workbooks utilized to calculate the total percent change in area are attached in **Appendix B**.

Table 5. AEM Contour Areas for 2029

Source: HMMH, 2024

Alternative	DNL (dBA)	No Action Area (Sq. Mi.)	Proposed Action Area (Sq. Mi.)	Percent Change in Area
Alternative 1	65	0.1319	0.1325	0.4473%
Alternative 2	65	0.1319	0.1467	11.28%

5. Construction

Construction of the facility is expected to occur during 2027 and 2028. Construction operations would be short term and temporary to residential land uses near the project site. The closest residential land uses are along the north and south sides of Bufflick Road, to the south of the runway and the on-airport access road.

Typically, construction noise does not cause noise exceedance thresholds beyond 500 feet from the source to receiver (house) for standard construction activities such as those planned for this project (i.e., grading and paving). For this project, the closest residences are 1,500 feet from the project site. Therefore, construction noise impacts are not anticipated. However, construction would be heard at times during daytime. Construction work at night is not anticipated, therefore, nighttime construction noise limits would not apply, and residents would not expect to hear construction noise during nighttime hours. Daytime construction noise is exempt from most noise ordinances.

To avoid, minimize, and abate temporary adverse construction noise, most local and transportation agency guidance goals are to implement common and easy noise control measures to abate construction noise impacts. The following best management practices (BMPs) to reduce construction noise are examples of common noise abatement measures on construction projects:

- Do not perform construction within 1,000 feet of an occupied dwelling on Sundays or legal holidays, or between the hours of 10:00 p.m. and 6:00 a.m. on other days, without the approval of the Engineer.

- Use equipment with sound control devices no less effective than those provided on the original equipment. Equipment with un-muffled exhausts is prohibited.
- Use equipment complying with pertinent equipment noise standards of the United States Environmental Protection Agency (USEPA).
- Do not drive piling or perform blasting operations within 3,000 feet of an occupied dwelling on Sundays or legal holidays, or between the hours of 8:00 p.m. and 8:00 a.m. on other days, without the approval of the Engineer.
- Mitigate the noise from rock crushing or screening operations performed within 3,000 feet of all occupied dwellings by placing material stockpiles between the operation and the affected dwellings, or by other means approved by the Engineer.

If a specific noise impact complaint occurs during the construction of the project, one or more of the following noise mitigation measures may be required:

- Locate stationary construction equipment as far from nearby noise sensitive properties as feasible.
- Shut off idling equipment.
- Reschedule construction operations to avoid periods of noise annoyance identified in the complaint.
- Notify nearby residents whenever extremely noisy work is occurring.
- Install temporary or portable acoustic barriers around stationary construction noise sources.
- Operate electric-powered equipment using line voltage power or solar power.

The Federal Highway Administration (FHWA) has developed the Roadway Construction Noise Model (RCNM), which is used to predict sound levels for construction equipment and distance. Typical noisy equipment used for roadway and development projects include but are not limited to dump trucks, excavators, pavers, rollers, back hoes, and other earth moving and paving equipment. **Appendix C** presents a table of noise levels from equipment and distances developed by FHWA. This table is used as a reference for worst-case noise levels at 50 feet. With standard doubling of distance reductions for construction activity from the project area to residences.

Construction noise typically dissipates between 4.5 dB to 6.0 dB for each doubling of distance (between the noise source and the receptor). As an example, construction equipment with mufflers (independent of background ambient noise levels) during excavation and grading may generate a noise level of 86 dBA Leq at 50 feet from the noise source. Based on a sound dissipation rate of 6 dB per doubling of distance, this equipment would generate a noise of 80 dBA at a distance of 100 feet, 74 dBA at a distance of 200 feet, and so on. At 800 feet, the level would be estimated to be 62 dBA, below the level of speech interference. That sound drop-off rate does not consider intervening shielding (including landscaping or trees) or barriers, such as structures or hills between the noise source and noise receptor.

Appendix A. Delta's Forecast and Assumptions, FAA Approval Letter



U. S. Department
Of Transportation

**Federal Aviation
Administration**

WASHINGTON AIRPORTS DISTRICT OFFICE

13873 Park Center Road, Suite 490 S
Herndon, Virginia 20171
Telephone: 703/487-3980
Fax: 703/487-3982

March 7, 2024

VIA EMAIL to nsabo@flyokv.com

Mr. Nicholas Sabo, A.A.E.
Executive Director
Winchester Regional Airport
491 Airport Road
Winchester, VA 22602

Re: Winchester Regional Airport
Environmental Assessment for Northside Development
Baseline Aviation Activity Forecast (Calendar Year 2023)
Federal Aviation Administration Review

Dear Mr. Sabo:

The Federal Aviation Administration (FAA) received the January 2024 Forecast Assumptions associated with the Environmental Assessment for the Northside Development project at Winchester Regional Airport (OKV). Delta Airport Consultants submitted the forecast with a March 1, 2024 email requesting FAA review. In support of the forecast, you also provided raw data from OKV's Virtower Airport Operations Tracking System for calendar year (CY) 2023.

The forecasts and supporting data were reviewed by the FAA's Washington Airports District Office. The FAA concurs with the January 2024 forecast of aircraft operations for use in the Environmental Assessment for the Northside Development project at OKV subject to the following conditions:

- The FAA finds the Baseline CY 2023 forecast operations from Virtower consistent with the CY 2023 operations from the FAA's Traffic Flow Management System Counts (TFMSC).
- The FAA finds the Baseline aviation activity forecast growth rates consistent with the FAA's FY 2022 Terminal Area Forecast (TAF) 5-year and 10-year forecast periods.

- This forecast was prepared at the same time as the evolving impacts of the COVID-19 public health emergency. Forecast approval is based on the methodology, data and conclusions at the time the document was prepared. However, consideration of the impacts of the COVID-19 public health emergency on aviation activity is warranted to acknowledge the reduced confidence in growth projections using currently-available data.
- FAA concurrence with this forecast does not constitute justification for future projects. Justification for future projects will be made based on activity levels at the time the project is requested for development. Documentation of actual activity levels meeting planning activity levels will be necessary to justify Airport Improvement Program (AIP) funding for eligible projects.

Should you have any questions please do not hesitate to contact me at 703.487.3973 or chad.carper@faa.gov.

Sincerely,

Chad Carper
Engineer, Washington Airports District Office

Encl: January 2024 Forecast Assumptions (3 pages)

cc: Susan Stafford, FAA BEK-ADO
Eleanor Scordia, FAA AEA-610
Scott Denny, DOAV
Mary Ashburn Pearson, Delta

**FORECAST ASSUMPTIONS IN SUPPORT OF
ENVIRONMENTAL ASSESSMENT
FOR NORTHSIDE DEVELOPMENT AT OKV**

**Winchester Regional Airport (OKV)
Winchester, Virginia**

**Delta Project No. 22081
January 2024**

1. Operations – No Action Alternative

- a. Annual operations and by aircraft type provided by OKV ADS-B data for calendar year 2023
- b. Growth rates by aircraft type sourced from FAA Aerospace Forecast 2023-2033 and applied to each aircraft category. Forecast extended to 2033, which is five years from the end of construction. Construction is assumed to occur in 2027 and 2028.

2. Operations – Scenario 1 (AAM/eVTOL manufacture and 200 annual test flights/400 annual operations)

- a. Began with No Action alternative forecast
- b. Manually added 200 annual single-engine piston and 200 annual rotorcraft operations in 2029 (first year after construction complete)
- c. Assuming 3% of test flights occur at night, based on current GA usage at OKV
- d. Automobile trips- assuming 1,000-sf of warehouse space per employee and assuming 75% of the building is warehouse space, there would be 450 employees at maximum (“worst case”) capacity. Assuming one round-trip per employee, 450 daily or $450 \times 251 \text{ working days per year} = 112,950$ annual automobile trips.

3. Operations- Scenario 2 (Aircraft Maintenance/Hangar Storage)

- a. Began with No Action alternative forecast
- b. Prepared estimated additional operations resulting from the two “Build” concepts prepared during Delta project 23051. Assuming “worst case” that all aircraft stored in hangars are new to OKV and are not currently based and operating there.
 - i. Concept 1 (24, 100’ x 100’ hangars) plus parking
 1. Assume a 100’ x 100’ hangar can accommodate 2 turboprops and one jet
 2. Therefore, full build-out can accommodate 48 turboprops and 24 jets
 3. From 2023 FAA Aerospace Forecast, turboprops will operate approximately 281 hours per year in 2029, which is one year past construction completion. Assuming a three-hour trip duration, this equates to around 94 annual operations per turboprop.
 4. From 2023 FAA Aerospace Forecast, jets will operate 316 hours per year in 2029, which equates to approximately 105 annual operations with a three-hour trip duration.

5. Using these assumptions, Concept 1 represents an additional 7,032 annual operations at OKV beginning in 2029.

$$(48 \text{ turboprops} \times 94 \text{ annual ops}) + (24 \text{ jets} \times 105 \text{ annual ops})$$

6. Assuming two round-trip auto trips per departure (pilot and passengers), so 7,032 annual auto trips.
- ii. Concept 2 (Four, 200' x 200' hangars and four, 100' x 100' hangars, plus parking)
1. Assume a 200' x 200' hangar can accommodate 3 turboprops and 2 jets
 2. Therefore, full build-out can accommodate 20 turboprops and 12 jets
 3. Using FAA Aerospace assumptions on annual operations, Concept 2 represents an additional 3,140 annual operations at OKV beginning in 2029.

$$(20 \text{ turboprops} \times 94 \text{ annual ops}) + (12 \text{ jets} \times 105 \text{ annual ops})$$

4. Two round-trip automobile trips per departure, so 3,140 auto trips
- iii. Because Concept 1 is the "worst case", will use these assumptions for the air and noise analysis for Scenario 2.

No Action

FAA Aerospace Forecast 2023-2043

	2023 (base)	2024	2025	2026	Construction		2029	2030	2031	2032	2033	
Fixed Wing SE	51,950	51,379	50,813	50,254	49,702	49,155	48,614	48,079	47,551	47,028	46,510	-1.1%
Fixed Wing ME	978	978	978	978	978	978	978	978	978	978	978	0.0%
Turboprop	1,111	1,119	1,127	1,134	1,142	1,150	1,158	1,167	1,175	1,183	1,191	0.7%
Turbojet	683	704	726	749	772	796	820	846	872	899	927	3.1%
Rotorcraft	849	868	887	906	926	947	967	989	1,010	1,033	1,055	2.2%
Other	416	421	425	430	435	439	444	449	454	459	464	1.1%
Total	55,987	55,468	54,956	54,452	53,955	53,465	52,983	52,508	52,040	51,579	51,126	-0.9%

Scenario 1, AAM/eVTOL manufacturing plus 200 annual test flights. Added 200 annual Fixed Wing SE operations and 200 annual Rotorcraft operations in 2029.

	2023 (base)	2024	2025	2026	Construction		2029	2030	2031	2032	2033	
Fixed Wing SE	51,950	51,379	50,813	50,254	49,702	49,155	48,614	48,277	47,746	47,221	46,702	-1.1%
Fixed Wing ME	978	978	978	978	978	978	978	978	978	978	978	0.0%
Turboprop	1,111	1,119	1,127	1,134	1,142	1,150	1,158	1,167	1,175	1,183	1,191	0.7%
Turbojet	683	704	726	749	772	796	820	846	872	899	927	3.1%
Rotorcraft	849	868	887	906	926	947	1,167	1,193	1,219	1,246	1,274	4.4%
Other	416	421	425	430	435	439	444	449	454	459	464	1.1%
Total	55,987	55,468	54,956	54,452	53,955	53,465	53,383	52,910	52,444	51,986	51,535	-0.8%

Scenario 2, Aircraft maintenance and/or hangar storage- see White Paper for assumptions made

	2023 (base)	2024	2025	2026	Construction		2029	2030	2031	2032	2033	
Fixed Wing SE	51,950	51,379	50,813	50,254	49,702	49,155	48,614	48,079	47,551	47,028	46,510	-1.1%
Fixed Wing ME	978	978	978	978	978	978	978	978	978	978	978	0.0%
Turboprop	1,111	1,119	1,127	1,134	1,142	1,150	3,038	3,060	3,081	3,103	3,124	12.1%
Turbojet	683	704	726	749	772	796	2,080	2,145	2,211	2,280	2,351	14.3%
Rotorcraft	849	868	887	906	926	947	967	989	1,010	1,033	1,055	2.2%
Other	416	421	425	430	435	439	444	449	454	459	464	1.1%
Total	55,987	55,468	54,956	54,452	53,955	53,465	56,123	56,700	55,286	54,880	54,483	-0.2%

Appendix B. AEM Workbooks

Federal Aviation Administration
Office of Environment and Energy

4/3/2024



Federal Aviation Administration
Office of Environment and Energy
http://www.faa.gov/about/office_org/headquarters_offices/apl/research/models/aem_model/

Area Equivalent Method (AEM) Version 2c SP2

Airport Name/Code: OKV

DNL (dBA)	Baseline Area (Sq. Mi.)	Alternative Area (Sq. Mi.)	Percent Change in Area
65	0.1319	0.1325	0.447%
70	0.0675	0.0678	0.398%

Aircraft Type	BASE Case		ALTERNATIVE Case	
	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
707				
720				
737				
7478				
707120				
707320				
717200				
727100				
727200				
737300				
737400				
737500				
737700				
737800				
747100				
747200				
747400				
757300				
767300				
767400				
777200				
777300				
1900D				
707QN				
720B				
727D15				
727D17				
727EM1				
727EM2				
727Q15				
727Q7				
727Q9				
727QF				
7373B2				
737D17				
737N17				
737N9				
737QN				
74710Q				
74720A				
74720B				
747SP				
757PW				
757RR				
767CF6				
767JT9				
7773ER				
7878R				
A10A				
A3				
A300-622R				
A300B4-203				

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Aircraft Type	BASE Case		ALTERNATIVE Case	
	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
A310-304				
A319-131				
A320-211				
A320-232				
A321-232				
A330-301				
A330-343				
A340-211				
A340-642				
A37				
A380-841				
A380-861				
A4C				
A6A				
A7D				
A7E				
B1				
B2A				
B52BDE				
B52G				
B52H				
B57E				
BAC111				
BAE146				
BAE300				
BEC58P	0.892126314	0.027591535	0.892126314	0.027591535
C118				
C12				
C130				
C130AD				
C130E				
C-130E				
C130HP				
C131B				
C135A				
C135B				
C137				
C140				
C141A				
C17				
C18A				
C-20				
C21A				
C22				
C23				
C5A				
C7A				
C9A				
CIT3				
CL600	0.064642856	0.001999264	0.064642856	0.001999264
CL601				
CNA172	30.65268127	0.94802107	30.65268127	0.94802107
CNA182	3.44828053	0.106647851	3.44828053	0.106647851
CNA182FLT				
CNA206				
CNA208	1.010137976	0.031241381	1.010137976	0.031241381
CNA20T				
CNA441	0.08991787	0.002780965	0.08991787	0.002780965
CNA500				
CNA510	0.287454401	0.008890342	0.287454401	0.008890342
CNA525C	0.111405773	0.003445539	0.111405773	0.003445539
CNA55B	0.248943764	0.007699292	0.248943764	0.007699292
CNA560E				
CNA560U				
CNA560XL				
CNA680	0.279202122	0.008635117	0.279202122	0.008635117
CNA750				
COMJET				
COMSEP	9.522931112	0.294523643	10.05443796	0.310961999
CONCRD				
CRJ9-ER				

AEM 6.0c

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Aircraft Type	BASE Case		ALTERNATIVE Case	
	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
CRJ9-LR				
CVR580				
DC1010				
DC1030				
DC1040				
DC3				
DC6				
DC820				
DC850				
DC860				
DC870				
DC8QN				
DC910				
DC930				
DC93LW				
DC950				
DC95HW				
DC9Q7				
DC9Q9				
DHC-2FLT				
DHC6	0.425034003	0.013145382	0.425034003	0.013145382
DHC6QP				
DHC7				
DHC8				
DHC830				
DO228				
DO328				
E3A				
E4				
EA6B				
ECLIPSE500				
EMB120				
EMB145				
EMB14L				
EMB170				
EMB175				
EMB190				
EMB195				
F10062				
F10065				
F100D				
F101B				
F102				
F104G				
F105D				
F106				
F111AE				
F111D				
F-111F				
F117A				
F14A				
F15A				
F15E20				
F15E29				
F16A				
F16GE				
F16PW0				
F-18				
F28MK2				
F28MK4				
F4C				
F-4C				
F5AB				
F5E				
F8				
FAL20				
FB111A				
GASEPF	7.766748613	0.24020872	8.298255462	0.256647076
GASEPV	2.998900091	0.092749487	2.998900091	0.092749487
GIIL				
GIIB				

AEM 6.0c

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Federal Aviation Administration
Office of Environment and Energy

4/3/2024

Aircraft Type	BASE Case		ALTERNATIVE Case	
	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
GIV				
GV				
HS748A				
JA1125				
JAGUAR				
KC10A				
KC135				
KC-135				
KC135B				
KC135R				
L1011				
L1011S				
L188				
LEAR25				
LEAR35	0.127910332	0.00395599	0.127910332	0.00395599
MD11GE				
MD11PW				
MD81				
MD82				
MD83				
MD9025				
MD9028				
MU3001				
OV10A				
P3A				
PA28	11.72805016	0.362723201	11.72805016	0.362723201
PA30	0.075813106	0.002344735	0.075813106	0.002344735
PA31				
PA42	0.581206349	0.017975454	0.581206349	0.017975454
S3A&B				
SABR80				
SD330				
SF340				
SR71				
T1				
T29				
T-2C				
T3				
T33A	0.088024314	0.002722401	0.088024314	0.002722401
T34				
T37B				
T-38A				
T39A				
T41				
T42				
T-43A				
T44				
TORNAD				
TR1				
U2				
U21				
U6				
U8F				
Total LTOs	70.40	2.18	71.46	2.21

AEM 6.0c

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http://www.faa.gov/about/office_org/headquarters_offices/apl/research/models/aem_model/

Area Equivalent Method (AEM) Version 2c SP2

Airport Name/Code: OKV

DNL (dBA)	Baseline Area (Sq. Mi.)	Alternative Area (Sq. Mi.)	Percent Change in Area
65	0.132	0.147	11.3%
70	0.068	0.073	7.6%

Aircraft Type	BASE Case		ALTERNATIVE Case	
	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
707				
720				
737				
7478				
707120				
707320				
717200				
727100				
727200				
737300				
737400				
737500				
737700				
737800				
747100				
747200				
747400				
757300				
767300				
767400				
777200				
777300				
1900D				
707QN				
720B				
727D15				
727D17				
727EM1				
727EM2				
727Q15				
727Q7				
727Q9				
727QF				
737B2				
737D17				
737N17				
737N9				
737QN				
74710Q				
74720A				
74720B				
747SP				
757PW				
757RR				
767CF6				
767JT9				
7773ER				
7878R				
A10A				
A3				
A300-622R				
A300B4-203				

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Aircraft Type	BASE Case		ALTERNATIVE Case	
	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
A310-304				
A319-131				
A320-211				
A320-232				
A321-232				
A330-301				
A330-343				
A340-211				
A340-642				
A37				
A380-841				
A380-861				
A4C				
A6A				
A7D				
A7E				
B1				
B2A				
B52BDE				
B52G				
B52H				
B57E				
BAC111				
BAE146				
BAE300				
BEC58P	0.892126314	0.027591535	0.892126314	0.027591535
C118				
C12				
C130				
C130AD				
C130E				
C-130E				
C130HP				
C131B				
C135A				
C135B				
C137				
C140				
C141A				
C17				
C18A				
C-20				
C21A				
C22				
C23				
C5A				
C7A				
C9A				
CIT3				
CL600	0.064642856	0.001999264	0.064642856	0.001999264
CL601				
CNA172	30.65268127	0.94802107	30.65268127	0.94802107
CNA182	3.44828053	0.106647851	3.44828053	0.106647851
CNA182FLT				
CNA206				
CNA208	1.010137976	0.031241381	1.010137976	0.031241381
CNA20T				
CNA441	0.08991787	0.002780965	0.08991787	0.002780965
CNA500				
CNA510	0.287454401	0.008890342	0.287454401	0.008890342
CNA525C	0.111405773	0.003445539	0.111405773	0.003445539
CNA55B	0.248943764	0.007699292	0.248943764	0.007699292
CNA560E				
CNA560U				
CNA560XL				
CNA680	0.279202122	0.008635117	3.627695273	0.112196761
CNA750				
COMJET				
COMSEP	9.522931112	0.294523643	9.522931112	0.294523643
CONCRD				
CRJ9-ER				

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Aircraft Type	BASE Case		ALTERNATIVE Case	
	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
CRJ9-LR				
CVR580				
DC1010				
DC1030				
DC1040				
DC3				
DC6				
DC820				
DC850				
DC860				
DC870				
DC8QN				
DC910				
DC930				
DC93LW				
DC950				
DC95HW				
DC9Q7				
DC9Q9				
DHC-2FLT				
DHC6	0.425034003	0.013145382	6.420431263	0.198570039
DHC6QP				
DHC7				
DHC8				
DHC830				
DO228				
DO328				
E3A				
E4				
E46B				
ECLIPSE500				
EMB120				
EMB145				
EMB14L				
EMB170				
EMB175				
EMB190				
EMB195				
F10062				
F10065				
F100D				
F101B				
F102				
F104G				
F105D				
F106				
F111AE				
F111D				
F-111F				
F117A				
F14A				
F15A				
F15E20				
F15E29				
F16A				
F16GE				
F16PW0				
F-18				
F28MK2				
F28MK4				
F4C				
F-4C				
F5AB				
F5E				
F8				
FAL20				
FB111A				
GASEPF	7.766748613	0.24020872	7.766748613	0.24020872
GASEPV	2.998900091	0.092749487	2.998900091	0.092749487
GIIL				
GIIB				

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Aircraft Type	BASE Case		ALTERNATIVE Case	
	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
GIV				
GV				
HS748A				
JA1125				
JAGUAR				
KC10A				
KC135				
KC-135				
KC135B				
KC135R				
L1011				
L1011S				
L188				
LEAR25				
LEAR35	0.127910332	0.00395599	0.127910332	0.00395599
MD11GE				
MD11PW				
MD81				
MD82				
MD83				
MD9025				
MD9028				
MU3001				
OV10A				
P3A				
PA28	11.72805016	0.362723201	11.72805016	0.362723201
PA30	0.075813106	0.002344735	0.075813106	0.002344735
PA31				
PA42	0.581206349	0.017975454	0.581206349	0.017975454
S3A&B				
SABR80				
SD330				
SF340				
SR71				
T1				
T29				
T-2C				
T3				
T33A	0.088024314	0.002722401	0.088024314	0.002722401
T34				
T37B				
T-38A				
T39A				
T41				
T42				
T-43A				
T44				
TORNAD				
TR1				
U2				
U21				
U6				
U8F				
Total LTOs	70.40	2.18	79.74	2.47

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Appendix C. Construction Noise Equipment

FHWA Roadway Construction Noise Model (RCNM) Construction Equipment Noise Levels

Source: FHWA, 2015

Equipment Description	Impact Device?	Acoustical use Factor (%)	Specified Lmax @ 50 ft. (dBA, slow)	Actual Measured Lmax @ 50 ft. (dBA, slow)
All Other Equipment > 5 HP	No	50	85	-N/A-
Auger Drill Rig	No	20	85	84
Backhoe	No	40	80	78
Bar Bender	No	20	80	-N/A-
Blasting	Yes	-N/A-	94	-N/A-
Boring Jack Power Unit	No	50	80	83
Chain Saw	No	20	85	84
Clam Shovel (dropping)	Yes	20	93	87
Compactor (ground)	No	20	80	83
Compressor (air)	No	40	80	78
Concrete Batch Plant	No	15	83	-N/A-
Concrete Mixer Truck	No	40	85	79
Concrete Pump Truck	No	20	82	81
Concrete Saw	No	20	90	90
Crane	No	16	85	81
Dozer	No	40	85	82
Drill Rig Truck	No	20	84	79
Drum Mixer	No	50	80	80
Dump Truck	No	40	84	76
Excavator	No	40	85	81
Flat Bed Truck	No	40	84	74
Front End Loader	No	40	80	79
Generator	No	50	82	81
Generator (<25KVA, VMS signs)	No	50	70	73
Gradall	No	40	85	83
Grader	No	40	85	-N/A-
Grapple (on backhoe)	No	40	85	87
Horizontal Boring Hydraulic Jack	No	25	80	82
Hydra Break Ram	Yes	10	90	-N/A-
Impact Pile Driver	Yes	20	95	101
Jackhammer	Yes	20	85	89
Man Lift	No	20	85	75
Mounted Impact hammer (hoe ram)	Yes	20	90	90

Equipment Description	Impact Device?	Acoustical use Factor (%)	Specified Lmax @ 50 ft. (dBA, slow)	Actual Measured Lmax @ 50 ft. (dBA, slow)
Pavement Scarafier	No	20	85	90
Paver	No	50	85	77
Pickup Truck	No	40	55	75
Pneumatic Tools	No	50	85	85
Pumps	No	50	77	81
Refrigerator Unit	No	100	82	73
Rivet Buster/Chipping Gun	Yes	20	85	79
Rock Drill	No	20	85	81
Roller	No	20	85	80
Sand Blasting (Single Nozzle)	No	20	85	96
Scraper	No	40	85	84
Shears (on backhoe)	No	40	85	96
Slurry Plant	No	100	78	78
Slurry Trenching Machine	No	50	82	80
Soil Mix Drill Rig	No	50	80	-N/A-
Tractor	No	40	84	-N/A-
Vacuum Excavator (Vac-Truck)	No	40	85	85
Vacuum Street Sweeper	No	10	80	82
Ventilation Fan	No	100	85	79
Vibrating Hopper	No	50	85	87
Vibratory Concrete Mixer	No	20	80	80
Vibratory Pile Driver	No	20	95	101
Warning Horn	No	5	85	83
Welder/Torch	No	40	73	74

Attachment I

Research Summary on Noise Levels of Electric Aircraft

Environmental Assessment (EA) for North Side Development at OKV

Desktop research was conducted in spring 2024 on the noise levels of advanced air mobility (AAM)/electric vertical take-off and landing (eVTOL) aircraft.

At the time that research was conducted, no noise studies specific to electric aircraft that were conducted by or sponsored by the Federal Aviation Administration (FAA) were found online.

The research suggests that electric aircraft are significantly quieter than traditional aircraft. For example, testing conducted in 2022 as part of the National Aeronautics and Space Administration (NASA)'s Advanced Air Mobility National Campaign showed that an all-electric eVTOL aircraft produced by Joby Aviation, Inc. produced a noise level of 45.2 A-weighted decibels (dBA) while flying 500 meters above the ground at 100 knots airspeed, a sound level that the company believes will be barely detectable to humans on the ground. (Whiting, 2022)

In 2024, the Waterloo Institute for Sustainable Aeronautics at The University of Waterloo, Canada found that average sound levels of their Pipstel Velis Electro aircraft during take-off were over 25 dB lower than traditional Cessna aircraft, which is a significant difference because the dB sound scale is logarithmic. During landing, the Velis aircraft noise measurements produced an average sound level of 62 dBA, where the Cessna flights averaged a noise reading of 71 dBA. (Song, 2024)

Archer, a company which has designed an all-electric eVTOL aircraft it calls the Maker, writes on its website that the aircraft produces a 45 dBA noise output when flying overhead at around 2,000 feet above the ground. The company notes for comparison that a traditional helicopter flying at 1,000 feet generates approximately 78 dBA, and a jet aircraft taking off generates approximately 140 dBA when measured from 100 feet away from the source. (How Loud is an eVTOL?, 2021)

Similarly, magniX Aero reported in 2021 that compared to the standard de Havilland Canada DHC-2 Beaver aircraft, its eBeaver aircraft (in which the traditional aircraft is retrofitted with an all- electric engine) recorded noise decreases ranging from 16 to 22 dBA across all phases of flight. (Staff, 2021)

Other anecdotal evidence that AAM and eVTOL aircraft are quieter than traditional aircraft includes the following:

- A group of pilots flying a Beta Technologies aircraft called the CX300 were able to take their headsets off while flying the aircraft and talk to each other, due to how quiet the aircraft is. (Tangermann, 2023)
- NASA's 2021 Regional Air Mobility (RAM) report notes that electrifying aircraft can virtually eliminate engine noise, and the ability to turn propellers slower and climb faster also contributes to reduced aircraft noise in a surrounding community. (NASA, 2021)

The data suggests that electric aircraft will become a part of the ambient noise of urban areas and will be much harder to detect by the human ear than operations by traditional aircraft. The introduction and widespread implementation of electric aircraft and their significantly lower noise pollution levels are anticipated to allow operations to take place throughout the day without noise restrictions. Residents in the vicinity of airports or living under flight paths are expected to be less affected by the negative impacts of noise pollution, such as sleep, health, and socio-economic impacts.

No noise standards for AAM/eVTOL aircraft have been established in the United States as of spring 2024. However, the European Union Aviation Safety Agency (EASA) published noise standards in December

2023. (European Union Aviation Safety Agency, 2023) The noise limits, which are based on existing international noise standards for conventional aircraft and adjusted to accommodate the characteristics of VTOL-capable aircraft, are 86-106 effective perceived noise in decibels (EPNdB) for takeoff, 84-104 EPNdB for overflight, and 89-109 EPNdB for approach. For comparison, a single turbine fixed-wing aircraft such as the Daher TBM 900 has a takeoff noise level of 79.6 EPNdB, and a typical light twin-turbine helicopter such as the Airbus EC135 has a takeoff noise level of 88.6 EPNdB. A direct comparison between EPNdB and dBA is not possible because dBA measures loudness while EPNdB measures annoyance based on the human response. (Warwick, 2023)

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Attachment J