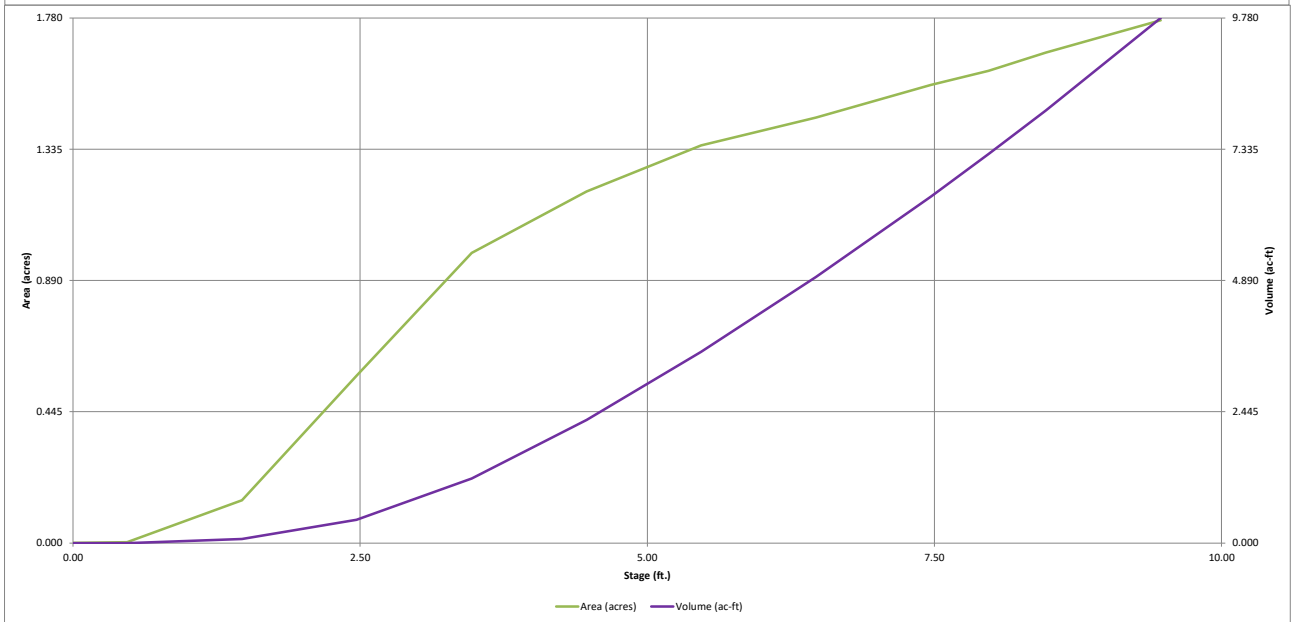
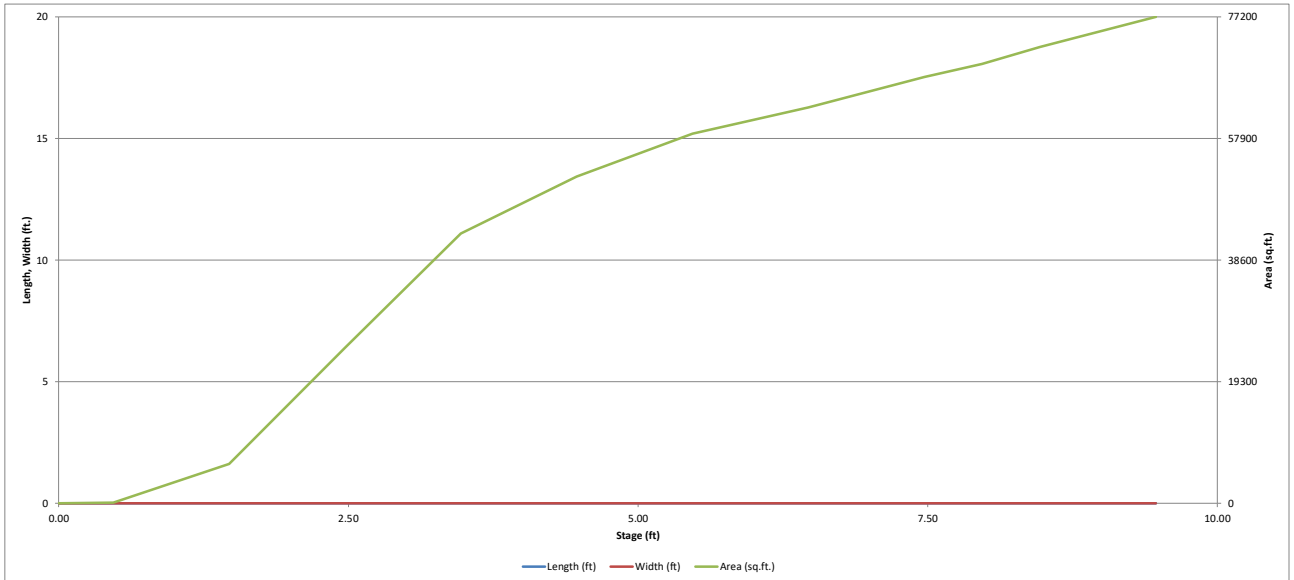


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

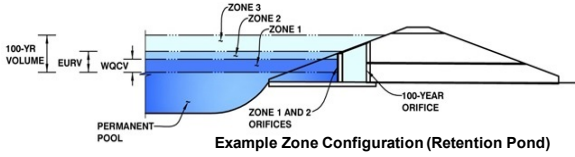


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-*Detention*, Version 4.06 (July 2022)

Project: Schmidt Phase 1 - District Infrastructure

Basin ID: Pond A



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.15	0.905	Orifice Plate
Zone 2 (EURV)	5.44	2.608	Rectangular Orifice
Zone 3 (100-year)	6.65	1.692	Weir&Pipe (Restrict)
Total (all zones)		5.205	

User Input: Orifice at Underdrain Outlet (typically used to drain WOCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft ²
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WOCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft ²
Depth at top of Zone using Orifice Plate =	3.09	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	sq. inches	Elliptical Slot Area =	N/A	ft ²

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.10	2.10					
Orifice Area (sq. inches)	2.81	2.82	2.82					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice =	3.09	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	ft ²
Depth at top of Zone using Vertical Orifice =	5.28	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.08	feet
Vertical Orifice Height =	2.00	N/A	inches			
Vertical Orifice Width =	6.50		inches			

User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

Overflow Weir Front Edge Height, Ho =	5.58	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Gate Upper Edge, H _g =	5.58	feet
Overflow Weir Front Edge Length =	4.00	N/A	feet	Overflow Weir Slope Length =	4.00	feet
Overflow Weir Gate Slope =	0.00	N/A	H:V	Gate Open Area / 100-yr Orifice Area =	8.43	N/A
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Gate Open Area w/o Debris =	11.14	ft ²
Overflow Gate Type =	Type C Gate	N/A		Overflow Gate Open Area w/ Debris =	5.57	ft ²
Debris Clogging % =	50%	N/A	%			

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

Depth to Invert of Outlet Pipe =	0.83	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.32	ft ²
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.59	feet
Restrictor Plate Height Above Pipe Invert =	12.60		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.98	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	7.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth =	0.93	feet
Spillway Crest Length =	31.00	feet	Stage at Top of Freeboard =	8.93	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.71	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	8.83	acre-ft

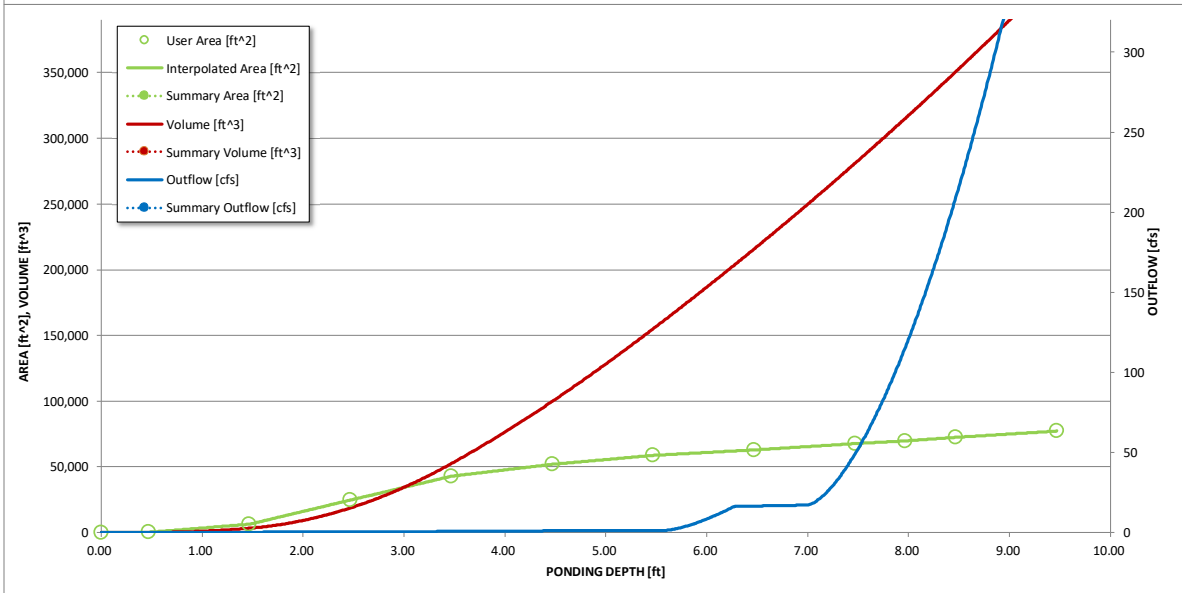
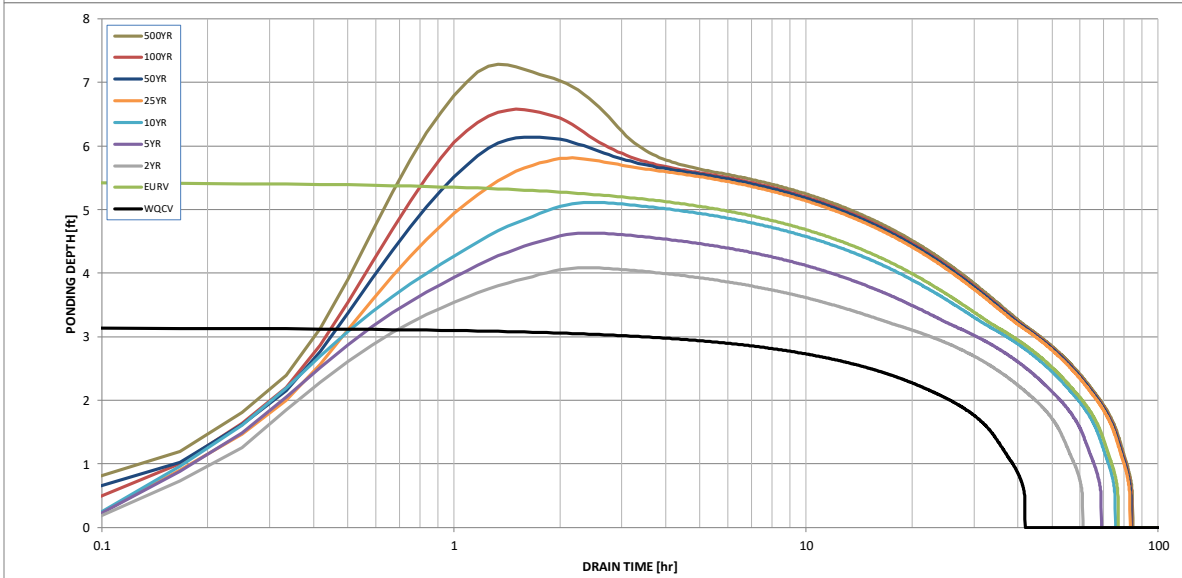
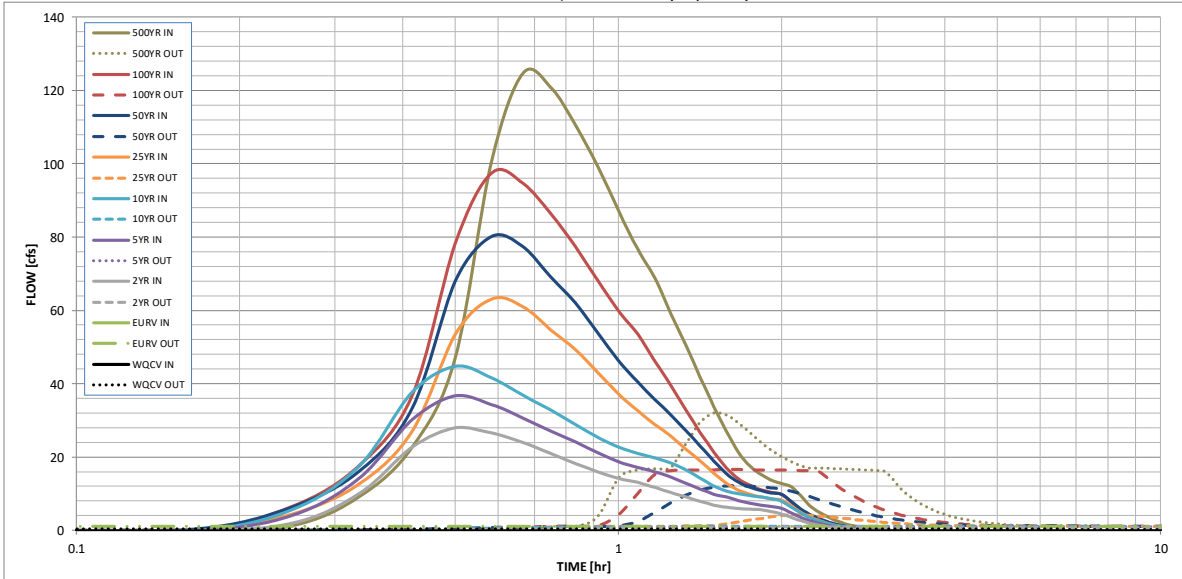
Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period									
One-Hour Rainfall Depth (in)	N/A	N/A	0.95	1.23	1.48	1.88	2.24	2.57	3.14
CUHP Runoff Volume (acre-ft)	0.905	3.513	1.992	2.661	3.287	4.380	5.457	6.531	8.333
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	1.992	2.661	3.287	4.380	5.457	6.531	8.333
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	0.0	0.2	0.4	2.7	10.1	18.2	31.2
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.00	0.01	0.01	0.07	0.27	0.49	0.83
Peak Inflow Q (cfs)	N/A	N/A	28.0	36.7	44.8	63.2	80.3	97.6	124.8
Peak Outflow Q (cfs)	0.4	1.2	0.9	1.1	1.2	4.3	12.2	16.6	32.0
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	5.1	3.2	1.6	1.2	0.9	1.0
Structure Controlling Flow	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Gate 1 (fps)	N/A	N/A	N/A	N/A	N/A	0.3	1.0	1.4	1.4
Max Velocity through Gate 2 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours)	38	67	54	61	66	72	70	69	66
Time to Drain 99% of Inflow Volume (hours)	40	72	58	65	71	78	77	77	76
Maximum Ponding Depth (ft)	3.15	5.44	4.09	4.64	5.11	5.81	6.14	6.58	7.28
Area at Maximum Ponding Depth (acres)	0.85	1.34	1.11	1.22	1.29	1.38	1.41	1.45	1.53
Maximum Volume Stored (acre-ft)	0.911	3.521	1.843	2.485	3.086	4.025	4.486	5.116	6.161

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.15	1.39
	0:15:00	0.00	0.00	1.96	4.13	5.67	4.54	6.47	6.55	9.28
	0:20:00	0.00	0.00	10.17	14.41	17.82	12.83	16.29	17.90	22.85
	0:25:00	0.00	0.00	22.73	30.27	37.75	27.19	33.38	36.88	47.13
	0:30:00	0.00	0.00	27.98	36.69	44.83	53.49	68.05	78.35	100.82
	0:35:00	0.00	0.00	26.57	34.40	41.58	63.21	80.34	97.56	124.83
	0:40:00	0.00	0.00	24.02	30.64	36.92	61.10	77.42	94.72	120.98
	0:45:00	0.00	0.00	21.02	27.15	32.85	54.83	69.22	86.46	110.57
	0:50:00	0.00	0.00	18.32	24.16	28.92	49.33	62.03	77.42	99.29
	0:55:00	0.00	0.00	16.01	21.20	25.46	43.07	53.91	68.17	87.37
	1:00:00	0.00	0.00	14.26	18.82	22.81	37.28	46.41	60.01	76.85
	1:05:00	0.00	0.00	13.13	17.28	21.14	32.83	40.67	53.68	68.84
	1:10:00	0.00	0.00	11.73	16.08	19.81	28.99	35.78	46.27	59.18
	1:15:00	0.00	0.00	10.36	14.59	18.49	25.69	31.56	39.58	50.38
	1:20:00	0.00	0.00	9.12	12.88	16.59	22.18	27.13	32.81	41.62
	1:25:00	0.00	0.00	7.94	11.28	14.22	18.89	23.00	26.69	33.73
	1:30:00	0.00	0.00	6.96	9.97	12.19	15.65	18.95	21.43	26.95
	1:35:00	0.00	0.00	6.31	9.11	10.82	12.87	15.47	17.03	21.29
	1:40:00	0.00	0.00	5.98	8.20	10.03	11.00	13.15	14.05	17.50
	1:45:00	0.00	0.00	5.82	7.45	9.51	9.88	11.79	12.31	15.27
	1:50:00	0.00	0.00	5.71	6.92	9.13	9.15	10.91	11.17	13.79
	1:55:00	0.00	0.00	5.13	6.52	8.71	8.66	10.32	10.38	12.77
	2:00:00	0.00	0.00	4.54	6.07	8.02	8.31	9.90	9.82	12.04
	2:05:00	0.00	0.00	3.59	4.83	6.37	6.66	7.93	7.74	9.47
	2:10:00	0.00	0.00	2.72	3.65	4.81	5.00	5.95	5.74	7.00
	2:15:00	0.00	0.00	2.07	2.76	3.63	3.77	4.48	4.31	5.25
	2:20:00	0.00	0.00	1.55	2.07	2.71	2.83	3.36	3.24	3.95
	2:25:00	0.00	0.00	1.16	1.53	2.01	2.10	2.49	2.42	2.95
	2:30:00	0.00	0.00	0.85	1.11	1.47	1.53	1.82	1.78	2.16
	2:35:00	0.00	0.00	0.61	0.79	1.07	1.12	1.32	1.30	1.58
	2:40:00	0.00	0.00	0.43	0.56	0.77	0.82	0.97	0.95	1.15
	2:45:00	0.00	0.00	0.28	0.38	0.52	0.56	0.67	0.65	0.79
	2:50:00	0.00	0.00	0.16	0.24	0.32	0.36	0.42	0.41	0.50
	2:55:00	0.00	0.00	0.08	0.13	0.17	0.20	0.23	0.23	0.27
	3:00:00	0.00	0.00	0.03	0.06	0.07	0.09	0.10	0.10	0.11
	3:05:00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

