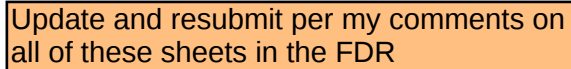


MHFD-Detention, Version 4.08 (April 2026)

Basin ID: Taxilane C Pond | Existing Conditions

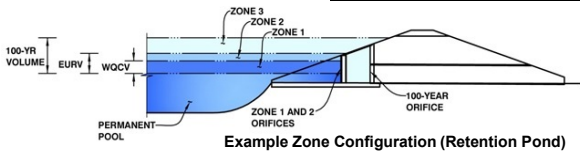
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DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.08 (April 2026)

Project: Meadow Lake Airport

Basin ID: Taxilane C Pond | Existing Conditions



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1			
Zone 2			
Zone 3			
Total (all zones)			

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

Underdrain Orifice Invert Depth = ft (distance below the filtration media surface)
Underdrain Orifice Diameter = inches

Calculated Parameters for Underdrain
Underdrain Orifice Area = ft²
Underdrain Orifice Centroid = feet

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

Centroid of Lowest Orifice = ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = inches
Orifice Plate: Orifice Area per Row = sq. inches

Calculated Parameters for Plate
WQ Orifice Area per Row = N/A ft²
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft²

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

	Row 1 (optional)	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)								
Orifice Area (sq. inches)								

	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 = Not Selected Not Selected ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice = ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter = inches

Calculated Parameters for Vertical Orifice
Vertical Orifice Area = Not Selected Not Selected ft²
Vertical Orifice Centroid = Not Selected Not Selected feet

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, H_o = Not Selected Not Selected ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = feet
Overflow Weir Gate Slope = H:V
Horiz. Length of Weir Sides = feet
Overflow Gate Type =
Debris Clogging % = %

Calculated Parameters for Overflow Weir
Height of Gate Upper Edge, H_u = Not Selected Not Selected feet
Overflow Weir Slope Length = feet
Gate Open Area / 100-yr Orifice Area =
Overflow Gate Open Area w/o Debris = ft²
Overflow Gate Open Area w/ Debris = ft²

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

Depth to Invert of Outlet Pipe = Not Selected Not Selected ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter = inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Outlet Orifice Area = Not Selected Not Selected ft²
Outlet Orifice Centroid = Not Selected Not Selected feet
Half-Central Angle of Restrictor Plate on Pipe = N/A N/A radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = feet
Spillway End Slopes = H:V
Freeboard above Max Water Surface = feet

Calculated Parameters for Spillway
Spillway Design Flow Depth = feet
Stage at Top of Freeboard = feet
Basin Area at Top of Freeboard = acres
Basin Volume at Top of Freeboard = acre-ft

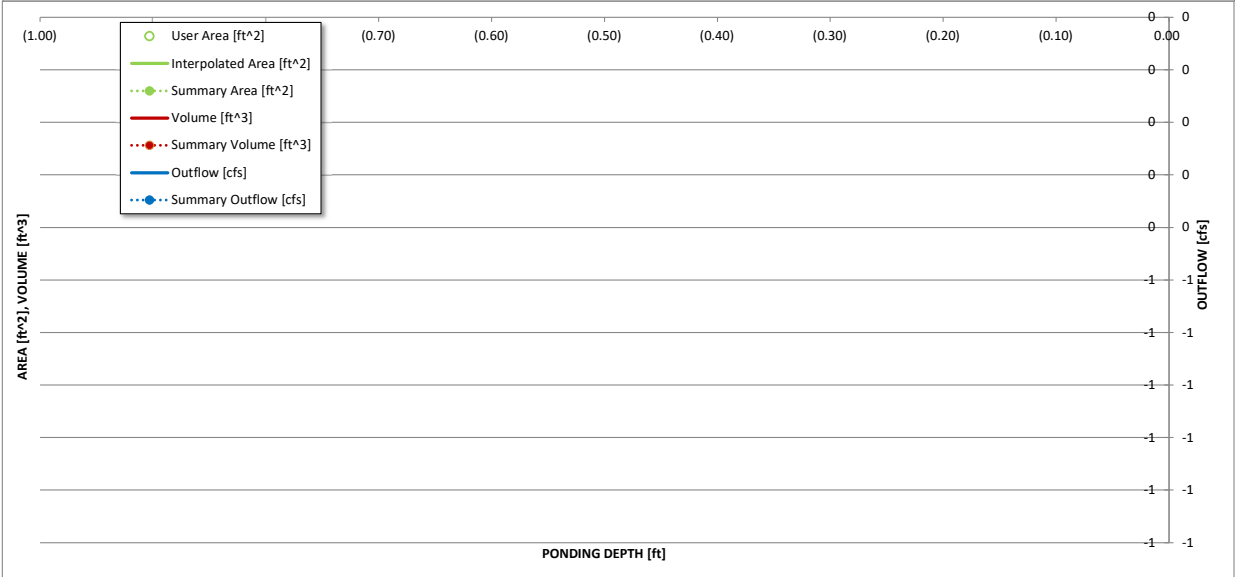
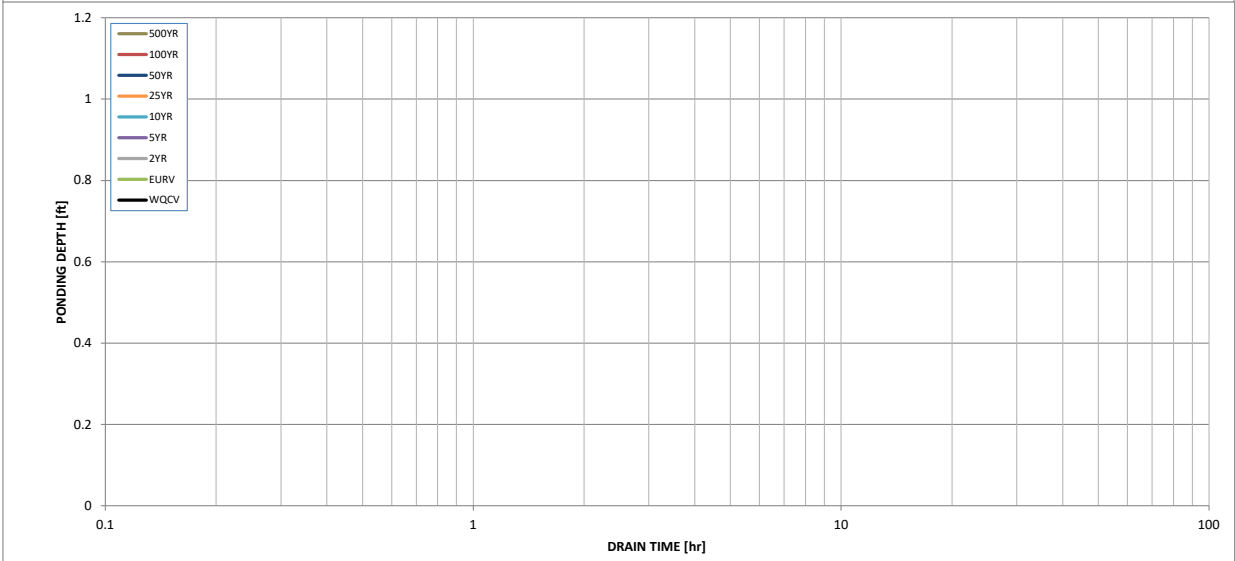
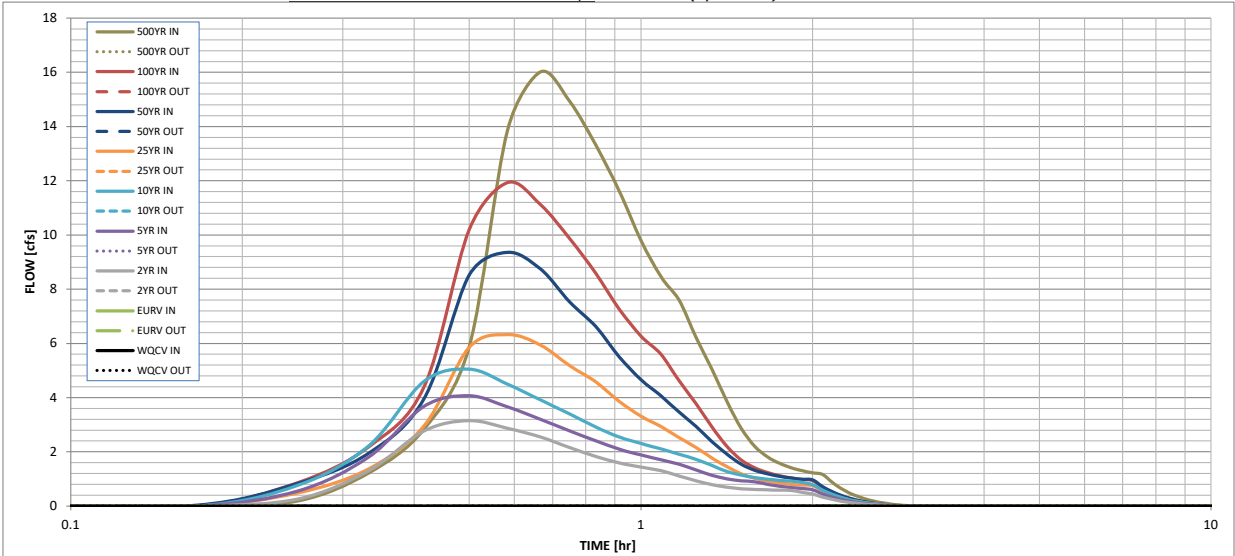
Routed Hydrograph Results

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 =	N/A	N/A	0.94	1.22	1.47	1.69	2.18	2.52	3.14
One-Hour Rainfall Depth (in) =	N/A	N/A	0.205	0.273	0.340	0.406	0.572	0.706	0.946
CUHP Runoff Volume (acre-ft) =	0.099	0.370	0.205	0.273	0.340	0.406	0.572	0.706	0.946
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.205	0.273	0.340	0.406	0.572	0.706	0.946
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.0	0.1	0.2	0.3	1.7	3.0	5.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.00	0.02	0.03	0.05	0.34	0.61	1.06
Peak Inflow Q (cfs) =	N/A	N/A	3.1	4.1	5.0	6.3	9.4	11.9	16.0
Peak Outflow Q (cfs) =									
Ratio Peak Outflow to Predevelopment Q =									
Structure Controlling Flow =									
Max Velocity through Gate 1 (fps) =									
Max Velocity through Gate 2 (fps) =									
Time to Drain 97% of Inflow Volume (hours) =									
Time to Drain 99% of Inflow Volume (hours) =									
Maximum Ponding Depth (ft) =									
Area at Maximum Ponding Depth (acres) =									
Maximum Volume Stored (acre-ft) =									

DETENTION BASIN OUTLET STRUCTURE DESIGN

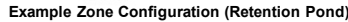
MHFD-Detention, Version 4.08 (April 2026)



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

MHFD-Detention, Version 4.07 (June 2025)

Basin ID: Taxilane C Pond | Interim Conditions

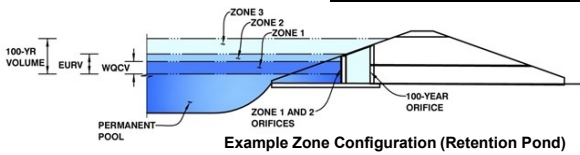


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: Meadow Lake Airport

Basin ID: Taxilane C Pond | Interim Conditions



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.53	0.118	Orifice Plate
Zone 2 (User)			Orifice Plate
Zone 3 (User)			Weir&Pipe (Restrict)
Total (all zones)		0.118	

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

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

Calculated Parameters for Underdrain

Underdrain Orifice Area = N/A ft²
Underdrain Orifice Centroid = N/A feet

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

Calculated Parameters for Plate

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 1.42 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = N/A inches
Orifice Plate: Orifice Area per Row = N/A sq. inches

WQ Orifice Area per Row = N/A ft²
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft²

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	0.60						
Orifice Area (sq. inches)	0.52	0.44						

	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)

Calculated Parameters for Vertical Orifice

Invert of Vertical Orifice = N/A ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice = N/A ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter = N/A inches

Vertical Orifice Area = N/A ft²
Vertical Orifice Centroid = N/A feet

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

Calculated Parameters for Overflow Weir

Overflow Weir Front Edge Height, H_o = 1.42 ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = 4.00 feet
Overflow Weir Gate Slope = 0.00 H:V
Horiz. Length of Weir Sides = 4.00 feet
Overflow Gate Type = Close Mesh Gate
Debris Clogging % = 0%

Height of Gate Upper Edge, H_u = 1.42 feet
Overflow Weir Slope Length = 4.00 feet
Gate Open Area / 100-yr Orifice Area = 16.11
Overflow Gate Open Area w/o Debris = 12.66 ft²
Overflow Gate Open Area w/ Debris = 12.66 ft²

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Depth to Invert of Outlet Pipe = 0.33 ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter = 12.00 inches
Restrictor Plate Height Above Pipe Invert = 12.00 inches

Outlet Orifice Area = 0.79 ft²
Outlet Orifice Centroid = 0.50 feet
Half-Central Angle of Restrictor Plate on Pipe = 3.14 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage = 2.00 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 4.00 feet
Spillway End Slopes = 4.00 H:V
Freeboard above Max Water Surface = 0.00 feet

Spillway Design Flow Depth = 0.65 feet
Stage at Top of Freeboard = 2.65 feet
Basin Area at Top of Freeboard = 0.32 acres
Basin Volume at Top of Freeboard = 0.31 acre-ft

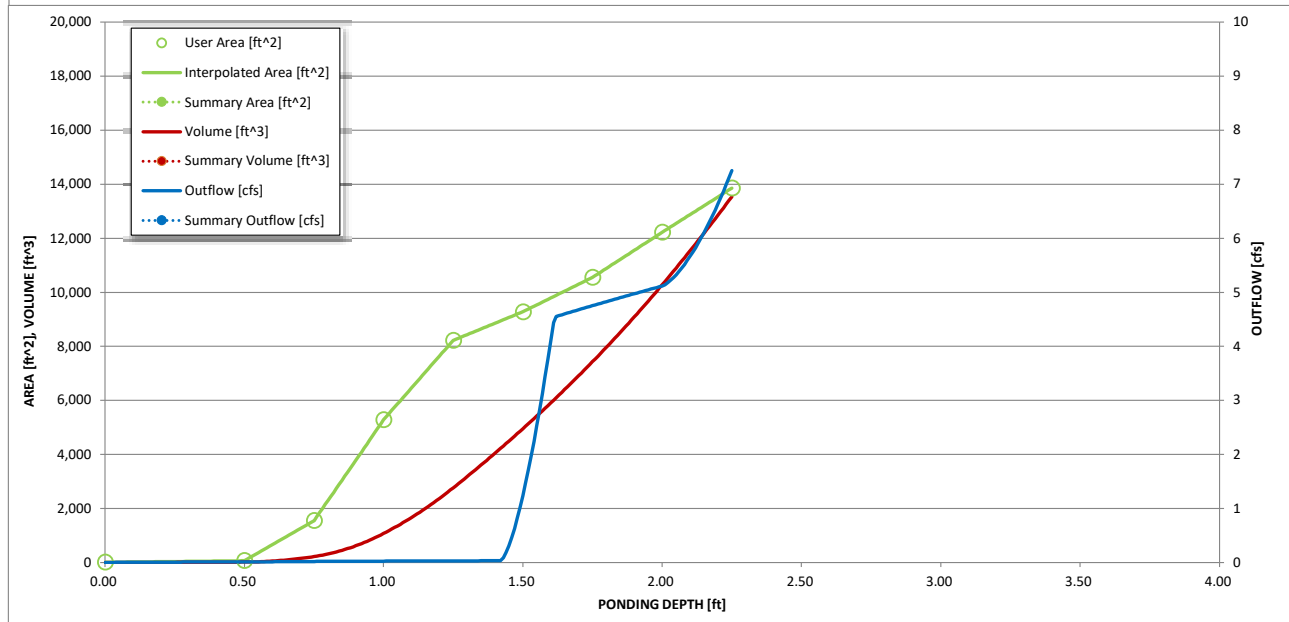
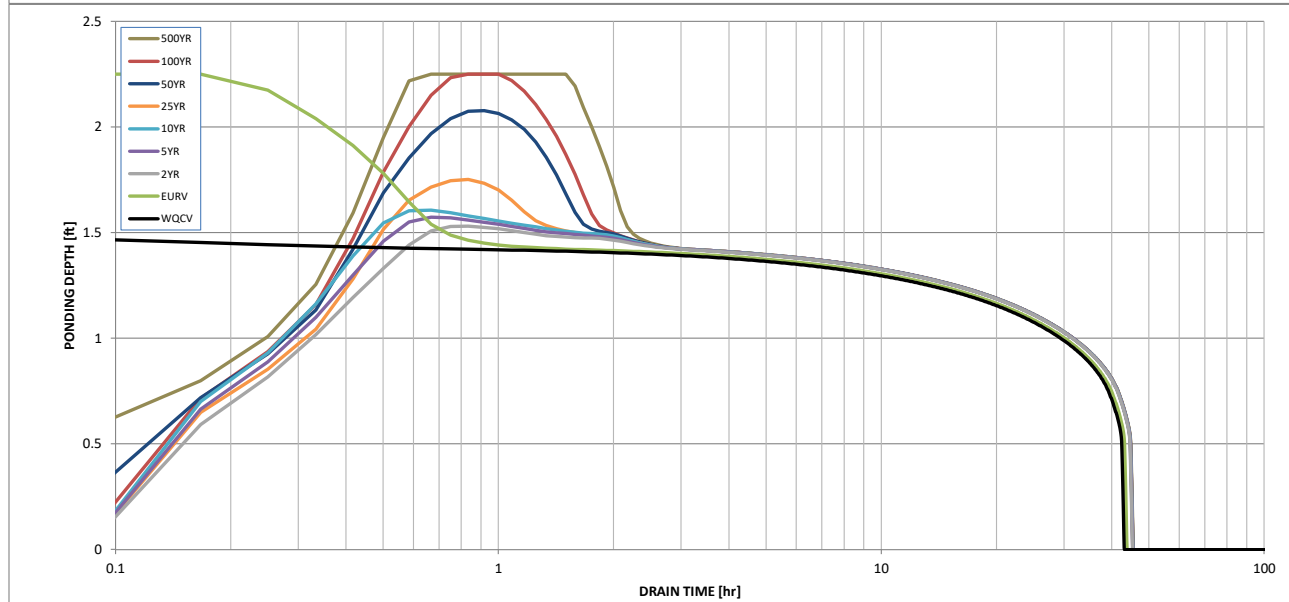
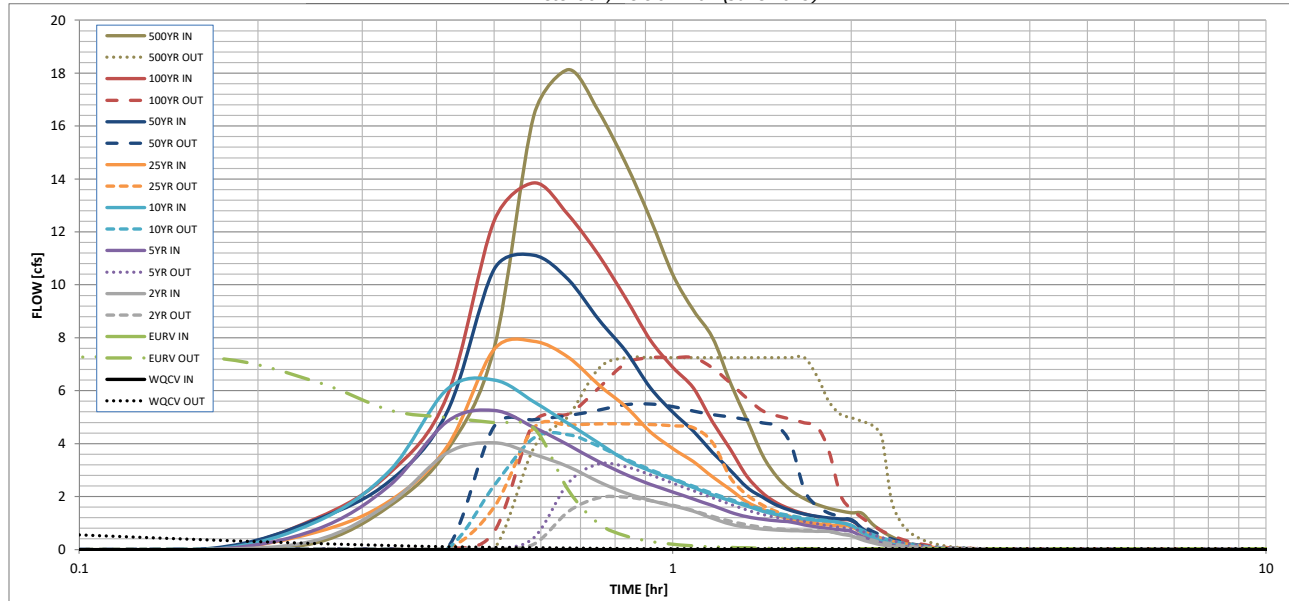
Routed Hydrograph Results

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 =	N/A	N/A	0.94	1.22	1.47	1.69	2.18	2.52	3.14
One-Hour Rainfall Depth (in) =	N/A	N/A	0.246	0.329	0.407	0.481	0.658	0.796	1.041
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.246	0.329	0.407	0.481	0.658	0.796	1.041
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.0	0.1	0.2	0.3	1.7	3.0	5.2
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	3.1	4.1	5.0	6.3	9.4	11.9	16.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A	0.63	0.83	1.01	1.28	1.90	2.41	3.24
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	4.0	5.3	6.4	7.9	11.1	13.9	18.1
Peak Inflow Q (cfs) =	1.2	7.3	2.0	3.2	4.3	4.8	5.5	7.3	7.3
Peak Outflow Q (cfs) =	N/A	N/A	N/A	0.8	0.9	0.8	0.6	0.6	0.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.8	0.9	0.8	0.6	0.6	0.5
Structure Controlling Flow =	Overflow Weir 1	N/A	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway	N/A	N/A
Max Velocity through Gate 1 (fps) =	0.15	0.43	0.15	0.2	0.3	0.4	0.4	0.4	0.4
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) =	40	36	40	39	38	37	34	32	29
Time to Drain 99% of Inflow Volume (hours) =	42	40	43	43	42	42	41	40	39
Maximum Ponding Depth (ft) =	1.53	2.25	1.53	1.57	1.61	1.75	2.08	2.25	2.25
Area at Maximum Ponding Depth (acres) =	0.22	0.32	0.22	0.22	0.22	0.24	0.29	0.32	0.32
Maximum Volume Stored (acre-ft) =	0.120	0.311	0.120	0.129	0.136	0.171	0.256	0.311	0.311

DETENTION BASIN OUTLET STRUCTURE DESIGN

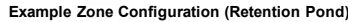
MHFD-Detention, Version 4.07 (June 2025)



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

MHFD-Detention, Version 4.07 (June 2025)

Basin ID: Taxilane C Pond | Ultimate Conditions

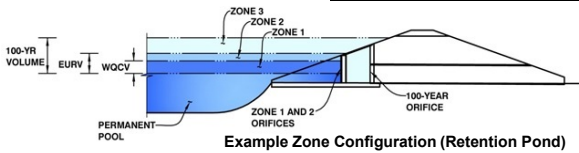


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: Meadow Lake Airport

Basin ID: Taxilane C Pond | Ultimate Conditions



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.42	0.095	Orifice Plate
Zone 2 (User)	1.42	0.000	Orifice Plate
Zone 3 (User)	1.42	0.000	Weir&Pipe (Restrict)
Total (all zones)		0.095	

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

Underdrain Orifice Invert Depth = ft (distance below the filtration media surface)
Underdrain Orifice Diameter = inches

Calculated Parameters for Underdrain
Underdrain Orifice Area = ft²
Underdrain Orifice Centroid = 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 SCM)

Centroid of Lowest Orifice = ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = inches
Orifice Plate: Orifice Area per Row = sq. inches

Calculated Parameters for Plate
WQ Orifice Area per Row = ft²
Elliptical Half-Width = feet
Elliptical Slot Centroid = feet
Elliptical Slot Area = ft²

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	0.60						
Orifice Area (sq. inches)	0.52	0.44						

	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 = ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice = ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter = inches

Calculated Parameters for Vertical Orifice
Vertical Orifice Area = ft²
Vertical Orifice Centroid = feet

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, H_o = ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = feet
Overflow Weir Gate Slope = H:V
Horiz. Length of Weir Sides = feet
Overflow Gate Type =
Debris Clogging % = %

Calculated Parameters for Overflow Weir
Height of Gate Upper Edge, H_u = feet
Overflow Weir Slope Length = feet
Gate Open Area / 100-yr Orifice Area =
Overflow Gate Open Area w/o Debris = ft²
Overflow Gate Open Area w/ Debris = ft²

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

Depth to Invert of Outlet Pipe = ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter = inches
Restrictor Plate Height Above Pipe Invert = inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Outlet Orifice Area = ft²
Outlet Orifice Centroid = feet
Half-Central Angle of Restrictor Plate on Pipe = radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = feet
Spillway End Slopes = H:V
Freeboard above Max Water Surface = feet

Calculated Parameters for Spillway
Spillway Design Flow Depth = feet
Stage at Top of Freeboard = feet
Basin Area at Top of Freeboard = acres
Basin Volume at Top of Freeboard = acre-ft

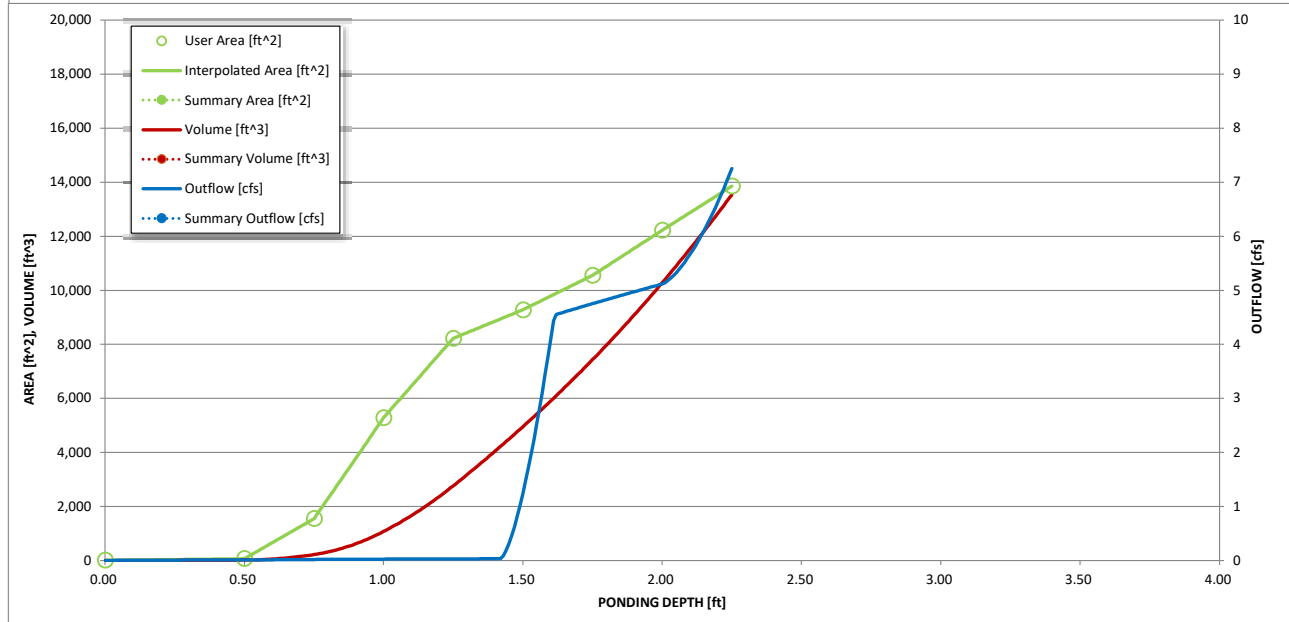
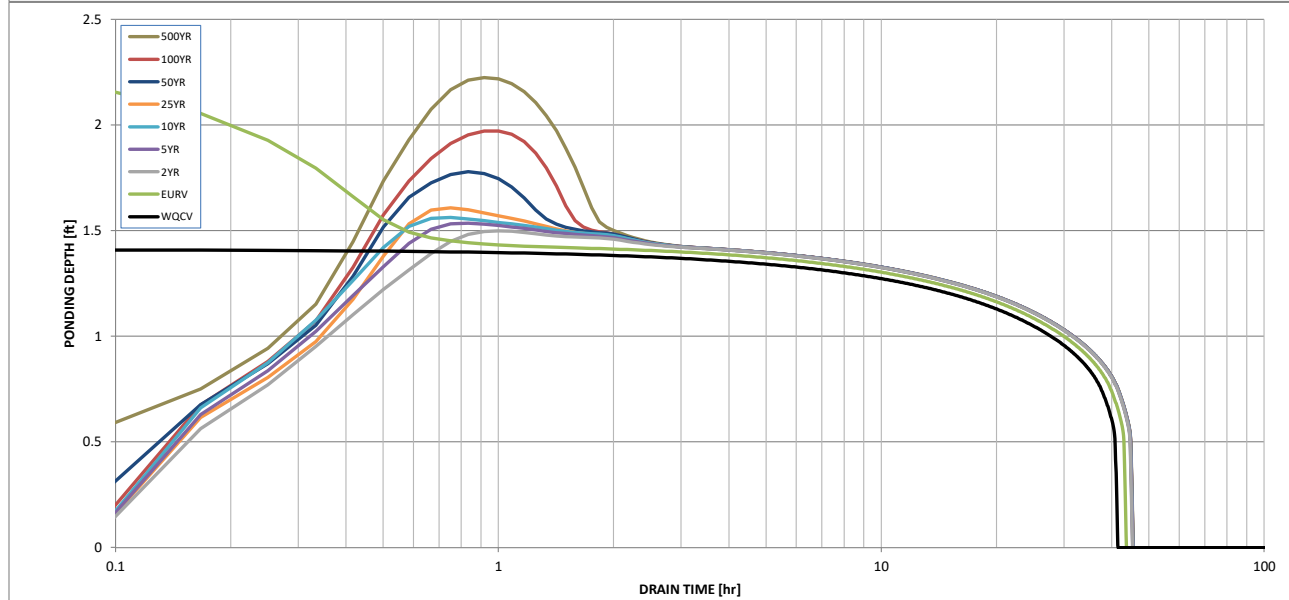
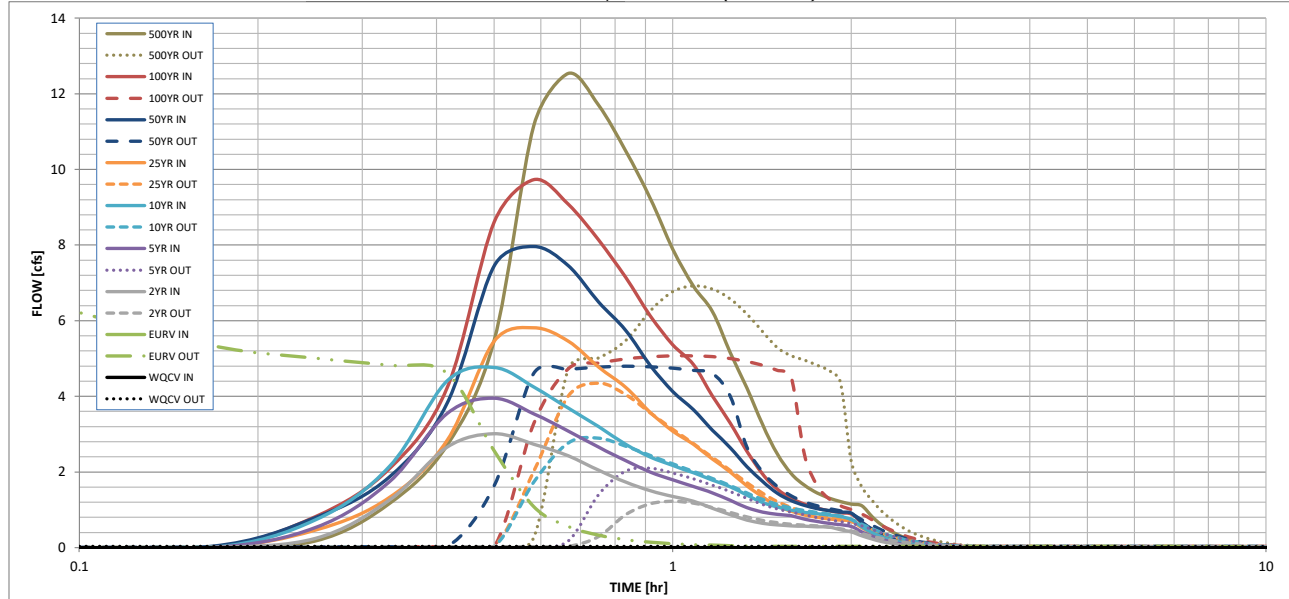
Routed Hydrograph Results

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 =	N/A	N/A	0.94	1.22	1.47	1.69	2.18	2.52	3.14
One-Hour Rainfall Depth (in) =	N/A	N/A	0.095	0.365	0.195	0.261	0.321	0.378	0.782
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.095	0.365	0.195	0.261	0.321	0.378	0.782
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.0	0.1	0.1	0.2	1.0	1.8	3.2
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	3.1	4.1	5.0	6.3	9.4	11.9	16.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A	0.91	1.20	1.47	1.85	2.76	3.49	4.69
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	3.0	4.0	4.8	5.8	8.0	9.7	12.5
Peak Inflow Q (cfs) =	0.0	14.6	1.2	2.1	2.9	4.4	4.8	5.1	8.5
Peak Outflow Q (cfs) =	N/A	N/A	N/A	0.5	0.6	0.7	0.5	0.4	0.5
Ratio Peak Outflow to Predevelopment Q =	Overflow Weir 1	Spillway	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Structure Controlling Flow =	N/A	0.40	0.10	0.2	0.2	0.3	0.4	0.4	0.4
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Gate 2 (fps) =	39	37	41	40	39	38	36	35	32
Time to Drain 97% of Inflow Volume (hours) =	40	41	43	43	43	42	42	41	40
Maximum Ponding Depth (ft) =	1.42	2.03	1.50	1.53	1.56	1.61	1.78	1.97	2.13
Area at Maximum Ponding Depth (acres) =	0.21	0.29	0.21	0.22	0.22	0.22	0.25	0.28	0.30
Maximum Volume Stored (acre-ft) =	0.097	0.244	0.112	0.120	0.127	0.136	0.175	0.228	0.271

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)



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