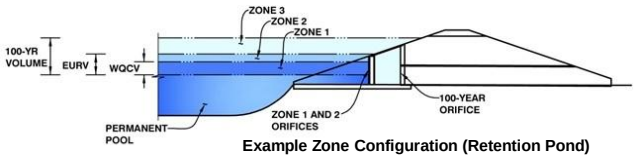
DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: Winsome Filing 3

Basin ID: H5B (INSTALLED DURING EARLY GRADING PHASE)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.52	0.036	Orifice Plate
Zone 2 (5-year)	3.50	0.080	Not Utilized
Zone 3 (100-year)	6.21	0.184	Weir&Pipe (Restrict)
Total (all zones)		0.300	

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

			Calculated Parameters for Underdrain		
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 WQCV and/or EURV in a sedimentation BMP)

			Calculated Parameters for Plate		
Invert 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 =	1.52	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	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	0.50						
Orifice Area (sq. inches)	1.00	1.00						

	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 Orific		
	Not Selected	Not Selected			Not Selected	Not Selected
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A
Vertical Orifice Diameter =	N/A	N/A	inches			

User Input: Overflow Weir (Dr

- **Outlet Works**: The outlet pipe shall extend through the embankment at a minimum slope of 0.5 percent. Outlet works can be designed using one of the following approaches:
  - **Riser Pipe (Simplified Detail):** Detail SB-1 provides a simplified design for basins treating no more than 15 acres.
  - **Orifice Plate or Riser Pipe**: Follow the design criteria for Full Spectrum Detention outlets in the EDB Fact Sheet provided in Chapter 4 of this manual for sizing of outlet perforations with an emptying time of approximately 72 hours. In lieu of the trash rack, pack uniformly sized 1½ - to 2-inch gravel in front of the plate or surrounding the riser pipe. This gravel will need to be cleaned out frequently during the construction period as sediment accumulates within it. T gravel pack will need to be removed and disposed of following construction to reclaim the for use as a permanent detention facility. If the basin will be used as a permanent extended detention basin for the site, a trash rack will need to be installed once contributing drainage have been stabilized and the gravel pack and accumulated sediment have been removed.
  - **Floating Skimmer**: If a floating skimmer is used, install it using manufacturer's recommendations. Illustration SB-1 provides an illustration of a Faircloth Skimmer Floati

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Calculated Parameters for Overflow Wei

	Zone 3 Weir	Not Selected
ge, H_t =	3.50	N/A
.ength =	2.92	N/A
e Area =		N/A
Debris =	5.93	N/A
Debris =	2.97	N/A

User Input: Outlet Pipe w/ Flow

Restriction Plat

Depth to Inve	t Selected
Outl	N/A
Restrictor Plate Height A	N/A
	N/A

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway

Spillway Invert Stage=	5.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	20.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

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drain time should be at or near 72hrs for a sediment basin

KHA RESPONSE: DESIGN HAS BEEN UPDATED TO SHOW WQCV BEING MET AND A TRASH RACK HAS BEEN PROVIDED TO PREVENT THE ORIFICE HOLES FROM BEING BLOCKED/CLOGGED.

Routed Hydrograph Results

The user can override the default CUHP ... olumns W through AF).

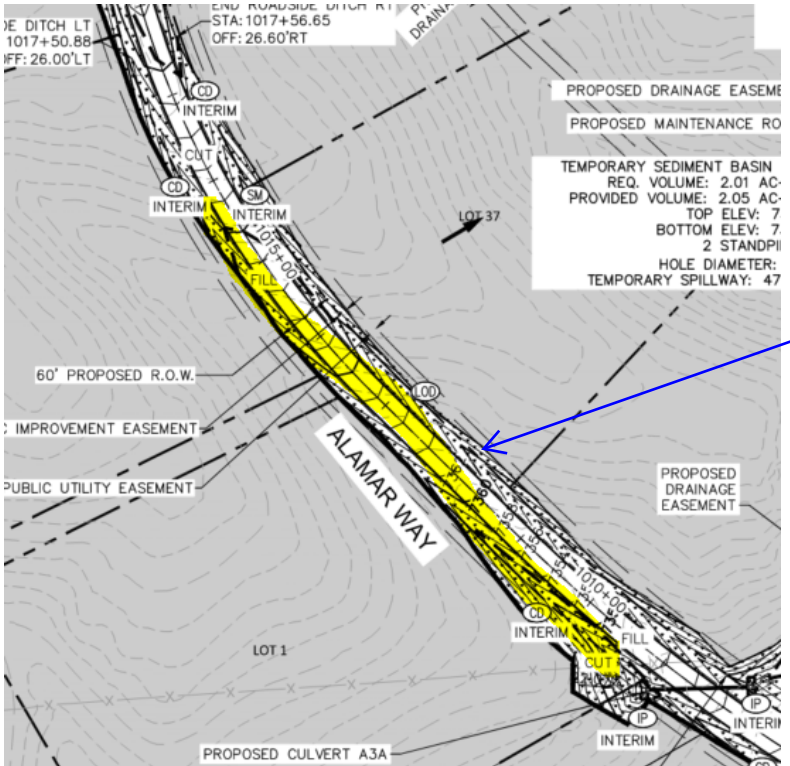
Design Storm Return Period =	WQCV	EURV	r	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A		2.52
CUHP Runoff Volume (acre-ft) =	0.036	0.048		1.344
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A		1.344
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A		20.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A		
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A		1.91
Peak Inflow Q (cfs) =	N/A	N/A		20.4
Peak Outflow Q (cfs) =	0.1	0.1		19.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A		1.0
Structure Controlling Flow =	Plate	Plate	eir 1	Overflow Weir 1
Max Velocity through Grate 1 (fps) =	N/A	N/A		0.0
Max Velocity through Grate 2 (fps) =	N/A	N/A		N/A
Time to Drain 97% of Inflow Volume (hours) =	12	13		12
Time to Drain 99% of Inflow Volume (hours) =	13	15		17
Maximum Ponding Depth (ft) =	1.53	1.89		4.83
Area at Maximum Ponding Depth (acres) =	0.03	0.03		0.07
Maximum Volume Stored (acre-ft) =	0.036	0.048		0.193

Unresolved. See snippet above for MHFD DCM vol 3 criteria regarding sediment basin drain time.

Additionally update the GEC plan to provide either a trash rack or packed gravel in front of the orifice. Unclear what on the current design will prevent the orifice holes from being blocked/clogged as sediment builds up.

ROADSIDE DITCH SUMMARY TABLE

ROADWAY	FROM STA	TO STA	PROPOSED SLOPE (%)	SIDE	SIDE SLOPE	CHANNEL DEPTH (FT)	FRICTION FACTOR	BASIN	Q100 FLOW (CFS)	DITCH FLOW % OF BASIN	DITCH FLOW (CFS)	Q100 DEPTH (FT)	Q100 VELOCITY (FT/S)	DITCH LINING	CHANNEL XSECTION
ALAMAR WAY	1008+50	1010+50	5.38%	LEFT	4:1/3:1	3	0.04	G2B	9.6	50%	4.8	0.6	3.8	GRASS	
ALAMAR WAY	1008+50	1010+50	5.32%	RIGHT	4:1/3:1	3	0.04	A3A & A2B	46.1	100%	46.1	1.4	6.6	GRASS/TRM	SWALE A3A
ALAMAR WAY	1013+50	1014+50	4.45%	RIGHT	4:1/3:1	3	0.04	G2B	9.6	20%	1.9	0.4	2.8	GRASS	
ALAMAR WAY	1014+50	1017+00	5.45%	RIGHT	4:1/3:1	3	0.04	G2B	9.6	10%	1.0	0.3	2.6	GRASS	
ALAMAR WAY	1014+50	1017+00	5.16%	LEFT	4:1/3:1	3	0.04	A3A	25.8	25%	6.5	0.7	4.0	GRASS	
ALAMAR WAY	1018+50	1022+00	4.17%	LEFT	4:1/3:1	3	0.04	G1	40.1	25%	10.0	0.8	4.1	GRASS	
ALAMAR WAY	1022+00	1027+00	3.92%	RIGHT	4:1/3:1	3	0.04	H4	73.6	10%	7.4	0.8	3.7	GRASS	
ALAMAR WAY	1022+00	1027+00	3.71%	LEFT	4:1/3:1	3	0.04	G1	40.1	25%	10.0	0.9	3.9	GRASS	
ALAMAR WAY	1032+00	1035+00	2.04%	LEFT	4:1/3:1	3	0.04	H1	33.0	10%	3.3	0.6	2.4	GRASS	
ALAMAR WAY	1035+00	1045+00	5.88%	RIGHT	4:1/3:1	3	0.04	H6B	57.1	10%	5.7	0.6	4.1	GRASS	
ALAMAR WAY	1035+00	1045+00	5.79%	LEFT	4:1/3:1	3	0.04	H1 & H2	98.2	15%	14.7	0.9	5.1	GRASS	
ALAMAR WAY	1048+00	1051+00	3.45%	LEFT	4:1/3:1	3	0.04	H2	65.2	25%	16.3	0.9	5.3	GRASS	
ALAMAR WAY	1051+00	1054+00	7.02%	RIGHT	4:1/3:1	3	0.04	H6B	57.1	10%	5.7	0.6	4.4	GRASS	
ALAMAR WAY	1051+00	1054+00	6.27%	LEFT	4:1/3:1	3	0.04	H2	65.2	10%	6.5	0.7	4.3	GRASS	
ALAMAR WAY	1064+00	END	3.66%	RIGHT	4:1/3:1	3	0.04	H7A	27.1	10%	2.7	0.5	2.8	GRASS	
ALAMAR WAY	1064+00	END	3.36%	LEFT	4:1/3:1	3	0.04	I1 &H3B	27.2	44%	12.0	0.9	4.0	GRASS	SWALE H3B
TWINKLING STAR LANE	2000+00	2004+00	3.61%	RIGHT	4:1/3:1	3	0.04	E8	25.6	35%	9.0	0.8	3.8	GRASS	
TWINKLING STAR LANE	2000+00	2004+00	3.40%	LEFT	4:1/3:1	3	0.04	D6	28.1	25%	7.0	0.8	3.5	GRASS	
TWINKLING STAR LANE	2004+00	2007+00	6.14%	RIGHT	4:1/3:1	3	0.04	E8	25.6	35%	9.0	0.7	4.6	GRASS	
TWINKLING STAR LANE	2013+50	2023+00	7.84%	RIGHT	4:1/3:1	3	0.04	H8A & I1 &H3B	38.4	82%	31.5	1.1	7.0	GRASS/TRM	SWALE I1
TWINKLING STAR LANE	2013+50	2023+00	8.17%	LEFT	4:1/3:1	3	0.04	H7A	27.1	100%	27.1	1.1	6.8	GRASS/TRM	
TWINKLING STAR LANE	2023+00	2028+00	1.14%	LEFT	4:1/3:1	3	0.04	I1	20.3	50%	10.2	1.1	2.6	GRASS	



Update GEC plans to reflect the TRM installation. The road sections indicated in the table does not reflect installation of TRM.

Or per discussion with the design engineer the TRM is not being installed with early grading GEC. If so, update the drainage report to indicate the TRM will be installed with the final GEC.

KHA RESPONSE: DISCUSSION WITHIN THE NARRATIVE HAS BEEN ADDED TO THE HYDRAULIC CRITERIA SECTION.