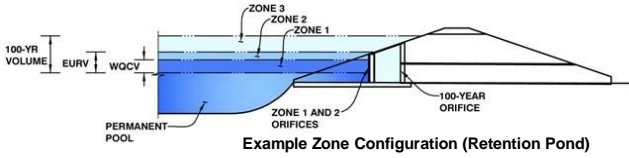


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: Winsome Filing 3
Basin ID: H5B (INSTALLED DURING EARLY GRADING PHASE)



| | Estimated Stage (ft) | Estimated Volume (ac-ft) | Outlet Type |
|-------------------|----------------------|--------------------------|----------------------|
| Zone 1 (WOCV) | 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 WOCV in a Filtration BMP)

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 BMP)

Invert 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 = inches

Calculated Parameters for Plate
WO 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 | 0.50 | | | | | | |
| 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)

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 Top)

Overflow Weir Front Edge Height, Ho
Overflow Weir Front Edge Length
Overflow Weir Grate Slope
Horiz. Length of Weir Sides
Overflow Grate Type
Debris Clogging %

- 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. The gravel pack will need to be removed and disposed of following construction to reclaim the basin 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 areas 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 Floating

Calculated Parameters for Overflow Weir

| Weir Height (ft) | Not Selected | Not Selected |
|------------------|--------------|--------------|
| 3.50 | N/A | N/A |
| 2.92 | N/A | N/A |
| 5.93 | N/A | N/A |
| 2.97 | N/A | N/A |

User Input: Outlet Pipe w/ Flow Restriction Plate

Depth to Invert of Outlet Pipe
Outlet Pipe Diameter
Restrictor Plate Height Above Pipe Invert

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

| Restrictor | Not Selected |
|------------|--------------|
| | N/A |
| | N/A |
| | N/A |

User Input: Emergency Spillway (Rectangular or Triangular)

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

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

Routed Hydrograph Results

The user can override the default CUHP

| | WOCV | EURV |
|---|-------|-------|
| Design Storm Return Period | N/A | N/A |
| One-Hour Rainfall Depth (in) | N/A | N/A |
| CUHP Runoff Volume (acre-ft) | 0.036 | 0.048 |
| Inflow Hydrograph Volume (acre-ft) | N/A | N/A |
| CUHP Predevelopment Peak Q (cfs) | N/A | N/A |
| OPTIONAL Override Predevelopment Peak Q (cfs) | N/A | N/A |
| Predevelopment Unit Peak Flow, q (cfs/acre) | N/A | N/A |
| Peak Inflow Q (cfs) | N/A | N/A |
| Peak Outflow Q (cfs) | 0.1 | 0.1 |
| Ratio Peak Outflow to Predevelopment Q | N/A | N/A |
| Structure Controlling Flow | Plate | Plate |
| Max Velocity through Grate 1 (fps) | N/A | N/A |
| Max Velocity through Grate 2 (fps) | N/A | N/A |
| Time to Drain 97% of Inflow Volume (hours) | 12 | 13 |
| Time to Drain 99% of Inflow Volume (hours) | 13 | 15 |
| Maximum Ponding Depth (ft) | 1.53 | 1.89 |
| Area at Maximum Ponding Depth (acres) | 0.03 | 0.03 |
| Maximum Volume Stored (acre-ft) | 0.036 | 0.048 |

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

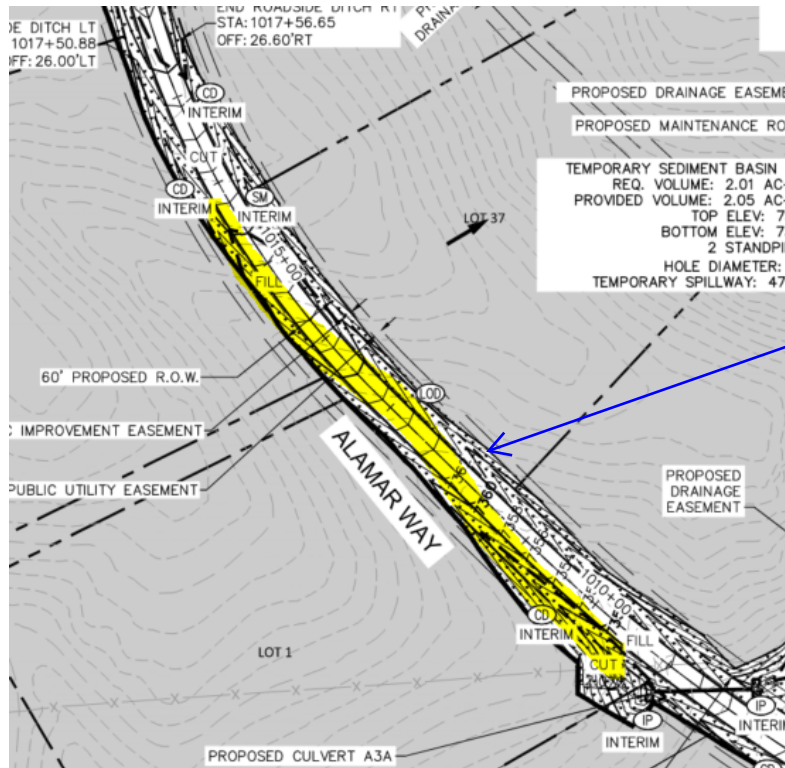
Additionally update the GEC plan to provide either a trash rack or packed gravel in front of the orifice. Unclear what on the current design will prevent the orifice holes from being blocked/clogged as sediment builds up.

Calculated Parameters for 100 Year Weir

| Parameter | 100 Year |
|--|----------|
| Peak Inflow Q (cfs) | 2.52 |
| Peak Outflow Q (cfs) | 1.344 |
| Ratio Peak Outflow to Predevelopment Q | 1.344 |
| Structure Controlling Flow | 20.0 |
| Max Velocity through Grate 1 (fps) | 1.91 |
| Max Velocity through Grate 2 (fps) | 20.4 |
| Time to Drain 97% of Inflow Volume (hours) | 19.6 |
| Time to Drain 99% of Inflow Volume (hours) | 1.0 |
| Maximum Ponding Depth (ft) | 0.0 |
| Area at Maximum Ponding Depth (acres) | N/A |
| Maximum Volume Stored (acre-ft) | 12 |
| | 17 |
| | 4.83 |
| | 0.07 |
| | 0.193 |

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.