

Detention Pond 1

MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN (100-Year Design)

Runoff Coefficient Cw = 0.50
 Drainage Area - A = 12.28 acres
 Time of Concentration - tc = 10.00 minutes
 Maximum Outflow Rate - Q = 42.08 cfs
 w/ 17.74 cfs (3.62 Ac.) bypass

| Duration (minutes) | Intensity (inches/hr) | Depth (inches) | Inflow Discharge Q=CIA | Inflow Volume Cu. Ft. | Outflow Duration (minutes) | Outflow Volume Cu. Ft. | Storage Volume Cu. Ft. |
|--------------------|-----------------------|----------------|-------------------------|-----------------------|----------------------------|------------------------|------------------------|
| 10 | 9.80 | 1.63 | 60.2 | 36,103 | 20 | 25,248 | 10,855 |
| 15 | 9.00 | 2.25 | 55.3 | 49,794 | 25 | 31,560 | 18,174 |
| 20 | 8.30 | 2.77 | 51.0 | 61,154 | 30 | 37,872 | 23,282 |
| 30 | 6.90 | 3.45 | 42.4 | 76,259 | 40 | 50,496 | 25,763 |
| 40 | 5.80 | 3.87 | 35.6 | 85,469 | 50 | 63,120 | 22,349 |
| 50 | 5.00 | 4.17 | 30.7 | 92,100 | 60 | 75,744 | 16,356 |
| 60 | 4.50 | 4.50 | 27.6 | 99,468 | 70 | 88,368 | 11,100 |
| 70 | 4.00 | 4.67 | 24.6 | 103,152 | 80 | 100,992 | 2,160 |
| 80 | 3.70 | 4.93 | 22.7 | 109,046 | 90 | 113,616 | (4,570) |
| 90 | 3.50 | 5.25 | 21.5 | 116,046 | 100 | 126,240 | (10,194) |
| | | | Required Storage Volume | | 25,763 cubic feet | | 0.59 acre-feet |

MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN (25-Year Design)

Runoff Coefficient C = 0.50
 Drainage Area - A = 12.28 acres
 Time of Concentration - tc = 10.00 minutes
 Maximum Outflow Rate - Q = 38.25 cfs
 w/ 16.29 cfs (3.62 Ac.) bypass

| Duration (minutes) | Intensity (inches/hr) | Depth (inches) | Inflow Discharge Q=CIA | Inflow Volume Cu. Ft. | Outflow Duration (minutes) | Outflow Volume Cu. Ft. | Storage Volume Cu. Ft. |
|--------------------|-----------------------|----------------|-------------------------|-----------------------|----------------------------|------------------------|------------------------|
| 10 | 9.00 | 1.50 | 55.3 | 33,156 | 20 | 22,950 | 10,206 |
| 15 | 8.10 | 2.03 | 49.7 | 44,761 | 25 | 28,688 | 16,073 |
| 20 | 7.50 | 2.50 | 46.1 | 55,260 | 30 | 34,425 | 20,835 |
| 30 | 6.10 | 3.05 | 37.5 | 67,417 | 40 | 45,900 | 21,517 |
| 40 | 5.20 | 3.47 | 31.9 | 76,627 | 50 | 57,375 | 19,252 |
| 50 | 4.50 | 3.75 | 27.6 | 82,890 | 60 | 68,850 | 14,040 |
| 60 | 3.90 | 3.90 | 23.9 | 86,206 | 70 | 80,325 | 5,881 |
| 70 | 3.70 | 4.32 | 22.7 | 95,416 | 80 | 91,800 | 3,616 |
| 80 | 3.50 | 4.67 | 21.5 | 103,152 | 90 | 103,275 | (1,123) |
| 90 | 3.30 | 4.95 | 20.3 | 109,415 | 100 | 114,750 | (5,335) |
| | | | Required Storage Volume | | 21,517 cubic feet | | 0.49 acre-feet |

MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN (10-Year Design)

Runoff Coefficient C = 0.50
 Drainage Area - A = 12.28 acres
 Time of Concentration - tc = 10.00 minutes
 Maximum Outflow Rate - Q = 34.27 cfs
 w/ 15.02 cfs (3.62 Ac.) bypass

| Duration (minutes) | Intensity (inches/hr) | Depth (inches) | Inflow Discharge Q=CIA | Inflow Volume Cu. Ft. | Outflow Duration (minutes) | Outflow Volume Cu. Ft. | Storage Volume Cu. Ft. |
|--------------------|-----------------------|----------------|-------------------------|-----------------------|----------------------------|------------------------|------------------------|
| 10 | 8.30 | 1.38 | 51.0 | 30,577 | 20 | 20,562 | 10,015 |
| 15 | 7.50 | 1.88 | 46.1 | 41,445 | 25 | 25,703 | 15,743 |
| 20 | 6.60 | 2.20 | 40.5 | 48,629 | 30 | 30,843 | 17,786 |
| 30 | 5.50 | 2.75 | 33.8 | 60,786 | 40 | 41,124 | 19,662 |
| 40 | 4.60 | 3.07 | 28.2 | 67,786 | 50 | 51,405 | 16,381 |
| 50 | 4.00 | 3.33 | 24.6 | 73,680 | 60 | 61,686 | 11,994 |
| 60 | 3.50 | 3.50 | 21.5 | 77,364 | 70 | 71,967 | 5,397 |
| 70 | 3.30 | 3.85 | 20.3 | 85,100 | 80 | 82,248 | 2,852 |
| 80 | 3.10 | 4.13 | 19.0 | 91,363 | 90 | 92,529 | (1,166) |
| 90 | 2.90 | 4.35 | 17.8 | 96,152 | 100 | 102,810 | (6,658) |
| | | | Required Storage Volume | | 19,662 cubic feet | | 0.45 acre-feet |

MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN (5-Year Design)

Runoff Coefficient C = 0.50
 Drainage Area - A = 12.28 acres
 Time of Concentration - tc = 10.00 minutes
 Maximum Outflow Rate - Q = 30.13 cfs
 w/ 12.85 cfs (3.62 Ac.) bypass

| Duration (minutes) | Intensity (inches/hr) | Depth (inches) | Inflow Discharge Q=CIA | Inflow Volume Cu. Ft. | Outflow Duration (minutes) | Outflow Volume Cu. Ft. | Storage Volume Cu. Ft. |
|--------------------|-----------------------|----------------|-------------------------|-----------------------|----------------------------|------------------------|------------------------|
| 10 | 7.10 | 1.18 | 43.6 | 26,156 | 20 | 18,078 | 8,078 |
| 15 | 6.50 | 1.63 | 39.9 | 35,919 | 25 | 22,598 | 13,322 |
| 20 | 5.90 | 1.97 | 36.2 | 43,471 | 30 | 27,117 | 16,354 |
| 30 | 4.80 | 2.40 | 29.5 | 53,050 | 40 | 36,156 | 16,894 |
| 40 | 4.00 | 2.67 | 24.6 | 58,944 | 50 | 45,195 | 13,749 |
| 50 | 3.50 | 2.92 | 21.5 | 64,770 | 60 | 54,234 | 10,236 |
| 60 | 3.00 | 3.00 | 18.4 | 66,312 | 70 | 63,273 | 3,039 |
| 70 | 2.80 | 3.27 | 17.2 | 72,206 | 80 | 72,312 | (106) |
| 80 | 2.60 | 3.47 | 16.0 | 76,627 | 90 | 81,351 | (4,724) |
| 90 | 2.50 | 3.75 | 15.4 | 82,890 | 100 | 90,390 | (7,500) |
| | | | Required Storage Volume | | 16,894 cubic feet | | 0.39 acre-feet |

Detention Pond 2

MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN (100-Year Design)

Runoff Coefficient Cw = 0.50
 Drainage Area - A = 34.42 acres
 Time of Concentration - tc = 10.00 minutes
 Maximum Outflow Rate - Q = 97.70 cfs
 w/ 12.9 cfs (2.64 Ac.) bypass

| Duration (minutes) | Intensity (inches/hr) | Depth (inches) | Inflow Discharge Q=CIA | Inflow Volume Cu. Ft. | Outflow Duration (minutes) | Outflow Volume Cu. Ft. | Storage Volume Cu. Ft. |
|--------------------|-----------------------|----------------|-------------------------|-----------------------|----------------------------|------------------------|------------------------|
| 10 | 9.80 | 1.63 | 168.7 | 101,195 | 20 | 58,620 | 42,575 |
| 15 | 9.00 | 2.25 | 154.9 | 139,401 | 25 | 73,275 | 66,126 |
| 20 | 8.30 | 2.77 | 142.8 | 171,412 | 30 | 87,930 | 83,482 |
| 30 | 6.90 | 3.45 | 118.7 | 213,748 | 40 | 117,240 | 96,508 |
| 40 | 5.80 | 3.87 | 99.8 | 239,563 | 50 | 146,550 | 93,013 |
| 50 | 5.00 | 4.17 | 86.1 | 258,150 | 60 | 175,860 | 82,290 |
| 60 | 4.50 | 4.50 | 77.4 | 278,802 | 70 | 205,170 | 73,632 |
| 70 | 4.00 | 4.67 | 68.8 | 289,128 | 80 | 234,480 | 54,648 |
| 80 | 3.70 | 4.93 | 63.7 | 305,650 | 90 | 263,790 | 41,860 |
| 90 | 3.50 | 5.25 | 60.2 | 325,269 | 100 | 293,100 | 32,169 |
| | | | Required Storage Volume | | 96,508 cubic feet | | 2.22 acre-feet |

MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN (25-Year Design)

Runoff Coefficient C = 0.50
 Drainage Area - A = 34.42 acres
 Time of Concentration - tc = 10.00 minutes
 Maximum Outflow Rate - Q = 88.14 cfs
 w/ 11.88 cfs (2.64 Ac.) bypass

| Duration (minutes) | Intensity (inches/hr) | Depth (inches) | Inflow Discharge Q=CIA | Inflow Volume Cu. Ft. | Outflow Duration (minutes) | Outflow Volume Cu. Ft. | Storage Volume Cu. Ft. |
|--------------------|-----------------------|----------------|-------------------------|-----------------------|----------------------------|------------------------|------------------------|
| 10 | 9.00 | 1.50 | 154.9 | 92,934 | 20 | 52,884 | 40,050 |
| 15 | 8.10 | 2.03 | 139.4 | 125,461 | 25 | 66,105 | 59,356 |
| 20 | 7.50 | 2.50 | 129.1 | 154,890 | 30 | 79,326 | 75,564 |
| 30 | 6.10 | 3.05 | 105.0 | 188,966 | 40 | 105,768 | 83,198 |
| 40 | 5.20 | 3.47 | 89.5 | 214,781 | 50 | 132,210 | 82,571 |
| 50 | 4.50 | 3.75 | 77.4 | 232,335 | 60 | 158,652 | 73,683 |
| 60 | 3.90 | 3.90 | 67.1 | 241,628 | 70 | 185,094 | 56,534 |
| 70 | 3.70 | 4.32 | 63.7 | 267,443 | 80 | 211,536 | 55,907 |
| 80 | 3.50 | 4.67 | 60.2 | 289,128 | 90 | 237,978 | 51,150 |
| 90 | 3.30 | 4.95 | 56.8 | 306,682 | 100 | 264,420 | 42,262 |
| | | | Required Storage Volume | | 83,198 cubic feet | | 1.91 acre-feet |

MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN (10-Year Design)

Runoff Coefficient C = 0.50
 Drainage Area - A = 34.42 acres
 Time of Concentration - tc = 10.00 minutes
 Maximum Outflow Rate - Q = 77.38 cfs
 w/10.96 cfs (2.64 Ac.) bypass

| Duration (minutes) | Intensity (inches/hr) | Depth (inches) | Inflow Discharge Q=CIA | Inflow Volume Cu. Ft. | Outflow Duration (minutes) | Outflow Volume Cu. Ft. | Storage Volume Cu. Ft. |
|--------------------|-----------------------|----------------|-------------------------|-----------------------|----------------------------|------------------------|------------------------|
| 10 | 8.30 | 1.38 | 142.8 | 85,706 | 20 | 46,428 | 39,278 |
| 15 | 7.50 | 1.88 | 129.1 | 116,168 | 25 | 58,035 | 58,133 |
| 20 | 6.60 | 2.20 | 113.6 | 136,303 | 30 | 69,642 | 66,661 |
| 30 | 5.50 | 2.75 | 94.7 | 170,279 | 40 | 92,856 | 77,423 |
| 40 | 4.60 | 3.07 | 79.2 | 189,998 | 50 | 116,070 | 73,928 |
| 50 | 4.00 | 3.33 | 68.8 | 206,520 | 60 | 139,284 | 67,236 |
| 60 | 3.50 | 3.50 | 60.2 | 216,846 | 70 | 162,498 | 54,348 |
| 70 | 3.30 | 3.85 | 56.8 | 238,531 | 80 | 185,712 | 52,819 |
| 80 | 3.10 | 4.13 | 53.4 | 256,085 | 90 | 208,926 | 47,159 |
| 90 | 2.90 | 4.35 | 49.9 | 269,509 | 100 | 232,140 | 37,369 |
| | | | Required Storage Volume | | 77,523 cubic feet | | 1.78 acre-feet |

MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN (5-Year Design)

Runoff Coefficient C = 0.50
 Drainage Area - A = 34.42 acres
 Time of Concentration - tc = 10.00 minutes
 Maximum Outflow Rate - Q = 69.32 cfs
 w/ 9.37 cfs (2.64 Ac.) bypass

| Duration (minutes) | Intensity (inches/hr) | Depth (inches) | Inflow Discharge Q=CIA | Inflow Volume Cu. Ft. | Outflow Duration (minutes) | Outflow Volume Cu. Ft. | Storage Volume Cu. Ft. |
|--------------------|-----------------------|----------------|-------------------------|-----------------------|----------------------------|------------------------|------------------------|
| 10 | 7.10 | 1.18 | 122.2 | 73,315 | 20 | 41,592 | 31,723 |
| 15 | 6.50 | 1.63 | 111.9 | 100,679 | 25 | 51,990 | 48,689 |
| 20 | 5.90 | 1.97 | 101.5 | 121,847 | 30 | 62,388 | 59,459 |
| 30 | 4.80 | 2.40 | 82.6 | 148,694 | 40 | 83,184 | 65,510 |
| 40 | 4.00 | 2.67 | 68.8 | 165,216 | 50 | 103,980 | 61,236 |
| 50 | 3.50 | 2.92 | 60.2 | 180,705 | 60 | 124,776 | 55,929 |
| 60 | 3.00 | 3.00 | 51.6 | 185,868 | 70 | 145,572 | 40,296 |
| 70 | 2.80 | 3.27 | 48.2 | 202,390 | 80 | 166,368 | 36,022 |
| 80 | 2.60 | 3.47 | 44.7 | 214,781 | 90 | 187,164 | 27,617 |
| 90 | 2.50 | 3.75 | 43.0 | 232,335 | 100 | 207,960 | 24,375 |
| | | | Required Storage Volume | | 65,510 cubic feet | | 1.50 acre-feet |

Detention Pond 1

Detention Storage Staging

| Elevation | Incremental Area (ft ²) | Average Area (ft ²) | Incremental Depth (ft) | Incremental Volume (ft ³) | Cumulative Volume (ft ³) |
|-----------|-------------------------------------|---------------------------------|------------------------|---------------------------------------|--------------------------------------|
| 504.50 | 0 | 878 | 0.00 | 0 | 0.00 |
| 505.00 | 1,756 | 6,748 | 0.50 | 878 | 878 |
| 506.00 | 11,741 | 11,741 | 1.00 | 6,748 | 7,626 |
| 506.79 | 11,741 | 11,741 | 0.79 | 9,276 | 16,902 |
| 507.00 | 11,741 | 11,741 | 0.21 | 2,466 | 19,368 |
| 507.03 | 11,741 | 11,741 | 0.03 | 352 | 19,720 |
| 507.18 | 11,741 | 11,741 | 0.15 | 1,761 | 21,481 |
| 507.54 | 11,741 | 11,944 | 0.36 | 4,227 | 25,708 |
| 508.00 | 11,741 | 11,741 | 0.46 | 5,494 | 31,202 |
| 509.00 | 11,741 | 11,944 | 1.00 | 11,741 | 42,943 |
| 510.00 | 12,146 | 11,944 | 1.00 | 11,944 | 54,887 |

Flow Rate Summary

| Event | Intensity (in/hr) | Q Allowable (cfs) | Actual Release (cfs) |
|--------|-------------------|-------------------|----------------------|
| 100 yr | 9.8 | 42.08 | 31.63 |
| 25 yr | 9.0 | 38.25 | 28.27 |
| 10 yr | 8.3 | 34.27 | 26.75 |
| 5 yr | 7.1 | 30.13 | 24.11 |

AS-BUILT DRAWINGS

THIS DRAWING HAS BEEN REVISED TO CONFORM TO THE CONSTRUCTION RECORDS PROVIDED BY THE CONTRACTOR. ALIGNMENT AND GRADES SHOWN ON THIS DRAWING WERE NOT FIELD VERIFIED BY THE ENGINEER.

Greg T. Helsel, P.E.
 DATE 11/29/16

Q⁵ allow = 30.13cfs W.S. Elev.=506.79
 Q¹⁰ allow = 34.27cfs W.S. Elev.=507.03
 Q²⁵ allow = 38.25cfs W.S. Elev.=507.18
 Q¹⁰⁰ allow = 42.08cfs W.S. Elev.=507.54

Detention Pond 2

Detention Storage Staging

| Elevation | Incremental Area (ft ²) | Average Area (ft ²) | Incremental Depth (ft) | Incremental Volume (ft ³) | Cumulative Volume (ft ³) |
|-----------|-------------------------------------|---------------------------------|------------------------|---------------------------------------|--------------------------------------|
| 497.92 | 0 | 31 | 0.00 | 0 | 0.00 |
| 498.00 | 62 | 5,830 | 0.08 | 5 | 5 |
| 499.00 | 11,597 | 24,355 | 1.00 | 5,830 | 5,834 |
| 500.00 | 37,113 | 37,113 | 1.00 | 24,355 | 30,189 |
| 500.95 | 37,113 | 37,113 | 0.95 | 35,257 | 65,447 |
| 501.00 | 37,113 | 37,113 | 0.05 | 1,856 | 67,302 |
| 501.28 | 37,113 | 37,113 | 0.28 | 10,392 | 77,694 |
| 501.43 | 37,113 | 37,113 | 0.15 | 5,567 | 83,261 |
| 501.79 | 37,113 | 37,113 | 0.36 | 13,361 | 96,622 |
| 502.00 | 37,113 | 37,113 | 0.21 | 7,794 | 104,415 |
| 503.00 | 37,113 | 37,113 | 1.00 | 37,113 | 141,528 |

FLOW RATE SUMMARY

| Event | Intensity (in/hr) | Q Allowable (cfs) | Actual Release (cfs) |
|--------|-------------------|-------------------|----------------------|
| 100 yr | 9.8 | 97.70 | 83.40 |
| 25 yr | 9.0 | 88.14 | 77.28 |
| 1 | | | |