

**Falcon DBPS**

**Regional Ponds (Including Existing Detention Ponds)**

Pond Description					EURV/WQCV				
Modeling Order	Name	Pond Type <sup>1</sup>	Location	Inflow Hydrograph <sup>2</sup>	Drainage Area (Acres) <sup>3</sup>	% Impervious (Future) <sup>4</sup>	Stage (ft) <sup>5</sup>	Storage (AF) <sup>6</sup>	Release Rate (cfs) <sup>7</sup>
1	Paint Brush Hills Pond C	On-site	West Tributary	WT100	120	19%	7,197.2	2.18	2.93
1	Paint Brush Hills Pond A	On-site	West Tributary	WT130	65	30%	7,146.3	0.99	1.65
1	Paint Brush Hills Pond B1	On-site	West Tributary	Paint Brush Hills Pond B1	N/A Place EURV in d/s Paint Brush Hills Pond B2				
1	Paint Brush Hills Pond B2	On-site	West Tributary	Paint Brush Hills Pond B2	231	31%	7,146.1	7.46	17.37
1	The Meadows Pond #1	On-site	West Tributary	WT190	37	8%	7,011.0	0.19	0.12
2	Regional Pond WU	Regional	West Tributary	Regional Pond WU South	1,819	11%	6,827.2	15.87	33.64
<del>1</del>	<del>Woodmen Hills Pond H</del>	<del>Sub-Regional</del>	<del>Middle Tributary</del>	<del>Woodmen Hills Pond H</del>	<del>355</del>	<del>29%</del>	<del>N/A</del>	<del>10.62</del>	<del>N/A</del>
1	The Meadows Pond #2	On-site	Middle Tributary	MT010	186	11%	7,006.5	1.62	1.83
2	Regional pond MN	Regional	Middle Tributary	Regional Pond MN	<del>369</del>	<del>21%</del>	<del>N/A</del>	<del>7.57</del>	<del>N/A</del>
1	Woodmen Hills Pond #5	On-site	Middle Tributary	MT090	28	64%	6,852.5	1.99	2.25
3	Regional Pond R1	Regional	West Tributary @ N	JWT296	1,275	20%	6,761.3	24.64	57.92
<del>1</del>	<del>Paint Brush Hills Pond #4</del>	<del>On-site</del>	<del>East Tributary</del>	<del>ET010</del>	<del>93</del>	<del>29%</del>		<del>2.78</del>	
1	Woodmen Hills Pond #1 North	Sub Regional	East Tributary	Woodmen Hills Pond #1 North	456	29%	6,958.0	4.18	8.72
2	Woodmen Hills Pond #1 South	Sub Regional	East Tributary	Woodmen Hills Pond #1 South			6,952.0	5.12	8.63
3	Woodmen Hills Pond #2	Sub Regional	East Tributary	Woodmen Hills Pond #2	75	19%	6,927.6	3.01	3.92
4	Woodmen Hills Pond #3	Sub Regional	East Tributary	Woodmen Hills Pond #3	183	22%	6,900.7	2.26	1.17
5	Woodmen Hills Pond #4	Sub Regional	East Tributary	Woodmen Hills Pond #4	346	34%	6,857.6	5.65	7.42
6	Regional Pond R2	Regional	West Tributary d/s	JWT372	1,882	5%	6,639.3	3.13	5.69

Notes

- <sup>1</sup> On-site = located off of the main tributary, Sub-reional = located on the main tributary with a small drainage area, Regional = located on the main tributary with a large drainage area
- <sup>2</sup> From the Falcon\_DBPS HEC-HMS model
- <sup>3</sup> Only includes area draining directly to the pond. This does not include the area draining to an upstream detention pond if one exists. This column is for sizing the EURV/WQCV only.
- <sup>4</sup> Calculated in ArcMap using the existing impervious area coverage and average impervious area values for undeveloped land with known future land use
- <sup>5</sup> Corresponds to the stage within the existing pond grading given the required storage volume or the stage within the proposed pond with an assumed triangular pond grading
- <sup>6</sup> Calculated using UDFCD criteria. Watershed is primarily covered by HSG B soils in the developed condition.
- <sup>7</sup> Calculated using UDFCD EURV criteria for a 72-hr drain time or UDFCD WQCV criteria for a 40-hr drain time
- <sup>8</sup> Estimated based on the intersection of the 100-yr release rate with the descending portion of the Developed 100-yr hydrograph. For proposed ponds the maximum pond volume was set based on a maximum depth of 10ft within the approximated grading.
- <sup>9</sup> According to existing pond volume estimates calculated in this DBPS based on pond volume at the spillway elevation. See the Hydrology Section for assumptions on storage volume.
- <sup>10</sup> Developed flows account for existing and proposed upstream detention
- <sup>11</sup> Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estimate based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).
- <sup>12</sup> Corresponds to stage/storage at an elevation of 2ft above the 100-yr stage or where existing pond grading limits stage.
- <sup>13</sup> Set at the 100-yr release rate + the peak 100-yr inflow

Falcon DBPS

Regional Ponds (Including Existing Detention Ponds)

Pond Description					100-yr						Spillway Overtopping		
Modeling Order	Name	Pond Type <sup>1</sup>	Location	Inflow Hydrograph <sup>2</sup>	Stage (ft) <sup>5</sup>	Required Storage (AF) <sup>8</sup>	Constructed Storage (AF) <sup>9</sup>	Developed Q <sub>100</sub> (cfs) <sup>10</sup>	Historical Q <sub>100</sub> (cfs) <sup>2</sup>	Release Rate (cfs) <sup>11</sup>	Stage (ft) <sup>12</sup>	Storage (AF) <sup>12</sup>	Release Rate (cfs) <sup>13</sup>
1	Paint Brush Hills Pond C	On-site	West Tributary	WT100	7,200	6.77	6.77	303	200	145	7,202	10.80	448
1	Paint Brush Hills Pond A	On-site	West Tributary	WT130	7,148	2.62	2.62	173	97	155	7,150	4.89	328
1	Paint Brush Hills Pond B1	On-site	West Tributary	Paint Brush Hills Pond B1	Use existing SSD curve. Provide additional 100-yr control in Paint Brush Hills Pond B2.								
1	Paint Brush Hills Pond B2	On-site	West Tributary	Paint Brush Hills Pond B2	7,148	12.09	12.09	267	171	191	7150	17.28	458
1	The Meadows Pond #1	On-site	West Tributary	WT190	7,015	3.25	3.25	75	14	2.2	7,016	4.56	77
2	Regional Pond WU	Regional	West Tributary	Regional Pond WU South	6,832	39.54	39.54	1,340	1,057	1,170	6,834	50.38	2,510
1	Woodmen Hills Pond H	Sub-Regional	Middle Tributary	Woodmen Hills Pond H	N/A	18.652	2.66	748	288	288	N/A	N/A	1036.20
1	The Meadows Pond #2	On-site	Middle Tributary	MT010	7,011	7.94	7.94	206	57	100	7,012	9.88	306
2	Regional pond MN	Regional	Middle Tributary	Regional Pond MN	6,854	7.53	7.53	1,184	355	1,100	6,856	11.93	2,284
1	Woodmen Hills Pond #5	On-site	Middle Tributary	MT090	6,854	4.10	4.10	127	19	19	6,856	7.42	146
3	Regional Pond R1	Regional	West Tributary @	NJWT296	6,766	46.95	Proposed Pond	1,754	1,431	1,710	6,768	58.40	3,464
1	Paint Brush Hills Pond #4	On-site	East Tributary	ET010		5.914	1.34	198	86	86	N/A	N/A	284.30
1	Woodmen Hills Pond #1 North	Sub Regional	East Tributary	Woodmen Hills Pond #1 North	6,960	7.13	7.13	693	242	665	6,962	10.93	1,358
2	Woodmen Hills Pond #1 South	Sub Regional	East Tributary	Woodmen Hills Pond #1 South	6,954	8.78	8.78	669	242	625	6,958	17.50	1,294
3	Woodmen Hills Pond #2	Sub Regional	East Tributary	Woodmen Hills Pond #2	6,930	9.18	9.18	636	246	545	6,934	23.09	1,181
4	Woodmen Hills Pond #3	Sub Regional	East Tributary	Woodmen Hills Pond #3	6,902	8.35	8.35	568	255	510	6,904	20.46	1,078
5	Woodmen Hills Pond #4	Sub Regional	East Tributary	Woodmen Hills Pond #4	6,862	40.45	22.02	816	251	400	6,864	60.00	1,216
6	Regional Pond R2	Regional	West Tributary d/s	JWT372	6,644	7.90	Proposed Pond	2,371	1,674	2,454	6,646	16.00	4,825

Notes

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- <sup>2</sup> From the Falcon\_DBPS HEC-HMS model
- <sup>3</sup> Only includes area draining directly to the pond. This does not include the area draining to an upstream detention pond if one exists. This column is for sizing the EURV/WQCV only.
- <sup>4</sup> Calculated in ArcMap using the existing impervious area coverage and average impervious area values for undeveloped land with known future land use
- <sup>5</sup> Corresponds to the stage within the existing pond grading given the required storage volume or the stage within the proposed pond with an assumed triangular pond grading
- <sup>6</sup> Calculated using UDFCD criteria. Watershed is primarily covered by HSG B soils in the developed condition.
- <sup>7</sup> Calculated using UDFCD EURV criteria for a 72-hr drain time or UDFCD WQCV criteria for a 40-hr drain time
- <sup>8</sup> Estimated based on the intersection of the 100-yr release rate with the descending portion of the Developed 100-yr hydrograph. For proposed ponds the maximum pond volume was set based on a maximum depth of 10ft within the approximated grading.
- <sup>9</sup> According to existing pond volume estimates calculated in this DBPS based on pond volume at the spillway elevation. See the Hydrology Section for assumptions on storage volume.
- <sup>10</sup> Developed flows account for existing and proposed upstream detention
- Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estimate based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).
- <sup>11</sup> Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estimate based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).
- <sup>12</sup> Corresponds to stage/storage at an elevation of 2ft above the 100-yr stage or where existing pond grading limits stage.
- <sup>13</sup> Set at the 100-yr release rate + the peak 100-yr inflow

**Falcon DBPS**

**Regional Ponds (Including Existing Detention Ponds)**

Pond Description					Design Notes
Modeling Order	Name	Pond Type <sup>1</sup>	Location	Inflow Hydrograph <sup>2</sup>	
1	Paint Brush Hills Pond C	On-site	West Tributary	WT100	Enough room for EURV, release less than historical Q100 to maximize pond volume
1	Paint Brush Hills Pond A	On-site	West Tributary	WT130	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Release more than historical Q100 due to pond volume limitations.
1	Paint Brush Hills Pond B1	On-site	West Tributary	Paint Brush Hills Pond B1	Use existing SSD curve without modification. Provide additional 100-yr control and EURV in Pond B2 as the outlet structure in this pond will be easier to retrofit.
1	Paint Brush Hills Pond B2	On-site	West Tributary	Paint Brush Hills Pond B2	Enough room for EURV, released more than historical Q100 due to pond volume limitations
1	The Meadows Pond #1	On-site	West Tributary	WT190	Enough room for EURV, release less than historical Q100 to maximize pond volume
2	Regional Pond WU	Regional	West Tributary	Regional Pond WU South	Enough room for EURV, released more than historical Q100 due to pond volume limitations
1	Woodmen Hills Pond H	Sub-Regional	Middle Tributary	Woodmen Hills Pond H	<b>NO RETROFIT. Pond is grossly undersized. Can't do anything as there isn't enough pond volume to even control the 2-year. Recommend, but not design, on-site detention u/s of pond? Major problem - pond is off MT main stem and therefore overtopping deficiencies were not identified but this road crossing will likely overtop. Try and incorporate EURV in proposed Regional Pond R1 downstream.</b>
1	The Meadows Pond #2	On-site	Middle Tributary	MT010	Enough room for EURV, released more than historical Q100 due to pond volume limitations
2	Regional pond MN	Regional	Middle Tributary	Regional Pond MN	<b>EURV volme is greater than pond volume. Incorporate EURV in proposed Regional Pond R1 downstream. Released more than historical Q100 due to pond volume limitations</b>
1	Woodmen Hills Pond #5	On-site	Middle Tributary	MT090	Enough room for EURV, release less than historical Q100 to maximize pond volume
3	Regional Pond R1	Regional	West Tributary @ N	JWT296	Includes carryover DA for EURV from Regional Pond MN and Woodmen Hills Pond H
1	Paint Brush Hills Pond #4	On-site	East Tributary	ET010	<b>NO RETROFIT. Pond is grossly undersized. Can't do anything as there isn't enough pond volume to even control the 2-year. Recommend, but not design, on-site detention u/s of pond. Try and incorporate EURV in proposed Woodmen Hills Pond #1 downstream.</b>
1	Woodmen Hills Pond #1 North	Sub Regional	East Tributary	Woodmen Hills Pond #1 North	Split EURV control between u/s and d/s ponds since total EURV required is greater than individual pond volumes. EURV includes DA from Paint Brush Hills Pond #4. This is the max EURV that can be held while meeting the 6ft depth criteria. Released more than historical Q100 due to pond volume limitations
2	Woodmen Hills Pond #1 South	Sub Regional	East Tributary	Woodmen Hills Pond #1 South	Split EURV control between u/s and d/s ponds since total EURV required is greater than individual pond volumes. This is the max EURV that can be held while leaving some room for 100-yr storage (assume 2ft). Released more than historical Q100 due to pond volume limitations
3	Woodmen Hills Pond #2	Sub Regional	East Tributary	Woodmen Hills Pond #2	Carry over 145.1 acres @ 29% impervious from Woodmen Hills Pond #1 North & South. Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Release more than historical Q100 due to pond volume limitations.
4	Woodmen Hills Pond #3	Sub Regional	East Tributary	Woodmen Hills Pond #3	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Release more than historical Q100 due to pond volume limitations.
5	Woodmen Hills Pond #4	Sub Regional	East Tributary	Woodmen Hills Pond #4	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Added intermediate 2-yr point. Release more than historical Q100 due to pond volume limitations. Using assumed values for required spillway stage/storage. Existing embankment/spillway will need to be raised.
6	Regional Pond R2	Regional	West Tributary d/s	JWT372	Enough room for EURV. No room for 100-yr storage.

Notes

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- <sup>4</sup> Calculated in ArcMap using the existing impervious area coverage and average impervious area values for undeveloped land with known future land use
- <sup>5</sup> Corresponds to the stage within the existing pond grading given the required storage volume or the stage within the proposed pond with an assumed triangular pond grading
- <sup>6</sup> Calculated using UDFCD criteria. Watershed is primarily covered by HSG B soils in the developed condition.
- <sup>7</sup> Calculated using UDFCD EURV criteria for a 72-hr drain time or UDFCD WQCV criteria for a 40-hr drain time
- <sup>8</sup> Estimated based on the intersection of the 100-yr release rate with the descending portion of the Developed 100-yr hydrograph. For proposed ponds the maximum pond volume was set based on a maximum depth of 10ft within the approximated grading.
- <sup>9</sup> According to existing pond volume estimates calculated in this DBPS based on pond volume at the spillway elevation. See the Hydrology Section for assumptions on storage volume.
- <sup>10</sup> Developed flows account for existing and proposed upstream detention
- <sup>11</sup> Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estiamte based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).
- <sup>12</sup> Corresponds to stage/storage at an elevation of 2ft above the 100-yr stage or where existing pond grading limits stage.
- <sup>13</sup> Set at the 100-yr release rate + the peak 100-yr inflow

**Falcon DBPS**  
**Regional Pond Drainage & Impervious Area**

<b>Pond</b>	<b>DA (ft2)</b>	<b>Impervious Area (ft2)</b>	<b>% Impervious</b>
Paint Brush Hills Pond C	5,234,130	982,938	19%
Paint Brush Hills Pond A	2,811,615	832,760	30%
Paint Brush Hills Pond B1 & B2	10,050,309	3,095,805	31%
The Meadows Pond #1	1,601,777	127,495	8%
Regional Pond WU	79,252,412	8,852,056	11%
Woodmen Hills Pond H	15,479,390	4,492,233	29%
The Meadows Pond #2	8,081,680	902,796	11%
Regional pond MN	16,060,885	3,303,683	21%
Woodmen Hills Pond #5	1,212,993	773,858	64%
Regional Pond R1	24,006,049	3,448,795	14%
Paint Brush Hills Pond #4	4,045,968	1,167,110	29%
Woodmen Hills Pond #1 North & South	15,795,729	4,556,675	29%
Woodmen Hills Pond #2	3,267,140	623,185	19%
Woodmen Hills Pond #3	7,957,332	1,741,407	22%
Woodmen Hills Pond #4	15,092,968	5,150,148	34%
Regional Pond R2	81,961,120	3,807,830	5%

Notes

- 1) Areas calculated in ArcMap
- 2) These values are used for calculating the required EURV/WQCV only
- 3) Some values include the drainage areas contributing to upstream ponds where that pond was not able to provide an EURV/WQCV

Falcon DBPS

EURV/WQCV Elevation Within Existing Pond Grading (Regional Alternative)

Paint Brush Hills Pond C						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7194.0	0.0	3524	0.08	0.00	0.00
	7196.0	2.0	34432	0.79	0.87	0.87
EURV	7197.2	3.2	56977	1.31	1.31	2.18
	7198.0	4.0	70646	1.62	1.11	3.28
100-yr	7200.0	6.0	81277	1.87	3.49	6.77
Spillway	7202.0	8.0	94041	2.16	4.02	10.80

Paint Brush Hills Pond A						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7144.0	0.0	2301	0.05	0.00	0.00
	7146.0	2.0	32617	0.75	0.80	0.80
WQCV	7146.3	2.3	34366	0.79	0.19	0.99
100-yr	7148.0	4.0	46611	1.07	1.63	2.62
Spillway	7150.0	6.0	52403	1.20	2.27	4.89

Paint Brush Hills Pond B2						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7140.0	0.0	6171	0.14	0.00	0.00
	7142.0	2.0	33600	0.77	0.91	0.91
	7144.0	4.0	72649	1.67	2.44	3.35
	7146.0	6.0	99742	2.29	3.96	7.31
EURV	7146.1	6.1	100025	2.30	0.15	7.46
100-yr	7148.0	8.0	108583	2.49	4.64	12.09
Spillway	7150.0	10.0	117383	2.69	5.19	17.28
	7152.0	12.0	125020	2.87	5.56	22.84

The Meadows Pond #1						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7010.0	0.0	2872	0.07	0.00	0.00
EURV	7011.0	1.0	13523	0.31	0.19	0.19
	7012.0	2.0	23756	0.55	0.42	0.6113
	7014.0	4.0	43274	0.99	1.54	2.15
100-yr	7015.0	5.0	52520	1.21	1.10	3.25
Spillway	7016.0	6.0	61765	1.42	1.31	4.56

The Meadows Pond #2						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7004.0	0.0	1202	0.03	0.00	0.00
	7006.0	2.0	46729	1.07	1.10	1.10
EURV	7006.5	2.5	48770	1.12	0.52	1.62
	7008.0	4.0	55287	1.27	1.82	3.44
	7010.0	6.0	67516	1.55	2.82	6.2615
100-yr	7011.0	7.0	78848	1.81	1.68	7.94
Spillway	7012.0	8.0	90179	2.07	1.94	9.88

Regional Pond MN						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6850.0	0.0	72765	1.67	0.00	0.00
	6852.0	2.0	81967	1.88	3.55	3.55
100-yr	6854.0	4.0	91240	2.09	3.98	7.53
Spillway	6856.0	6.0	100323	2.30	4.40	11.93

No EURV in this pond

Woodmen Hills Pond #5						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6850.0	0.0	14889	0.34	0.00	0.00
	6852.0	2.0	48165	1.11	1.45	1.45
EURV	6852.5	2.5	52649	1.21	0.54	1.99
100-yr	6854.0	4.0	67245	1.54	2.11	4.10
Spillway	6856.0	6.0	77625	1.78	3.33	7.42

Woodmen Hills Pond #1 North						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6952.0	0.0	7633	0.18	0.00	0.00
	6954.0	2.0	23810	0.55	0.72	0.72
	6956.0	4.0	36215	0.83	1.38	2.10
EURV	6958.0	6.0	54552	1.25	2.08	4.18
100-yr	6960.0	8.0	73999	1.70	2.95	7.13
Spillway	6962.0	10.0	91244	2.09	3.79	10.93
	6964.0	12.0	115044	2.64	4.74	15.66

Woodmen Hills Pond #1 South						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6948.0	0.0	23810	0.55	0.00	0.00
	6950.0	2.0	61448	1.41	1.96	1.96
EURV	6952.0	4.0	76242	1.75	3.16	5.12
100-yr	6954.0	6.0	83106	1.91	3.66	8.78
Spillway	6956.0	8.0	89660	2.06	3.97	12.74
	6958.0	10.0	117602	2.70	4.76	17.50

Woodmen Hills Pond #2						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6926.0	0.0	68500	1.57	0.00	0.00
WQCV	6927.6	1.6	97847	2.25	3.01	3.01
	6928.0	2.0	105743	2.43	0.99	4.00
100-yr	6930.0	4.0	119783	2.75	5.18	9.18
Spillway	6932.0	6.0	147832	3.39	6.14	15.32
	6934.0	8.0	190507	4.37	7.77	23.09

Woodmen Hills Pond #3						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6900.0	0.0	125010	2.87	0.00	0.00
WQCV	6900.7	0.7	163665	3.76	2.26	2.26
100-yr	6902.0	2.0	238533	5.48	6.09	8.35
	6904.0	4.0	289267	6.64	12.12	20.46

Only 2.26 AF of WQCV required which results in a depth of 8.4", however, min depth allowed is 12". Assume 8.4" is ok for planning purposes.

Woodmen Hills Pond #4						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6856.0	0.0	95635	2.20	0.00	0.00
WQCV	6857.6	1.6	219692	5.04	5.65	5.65
	6858.0	2.0	254580	5.84	2.39	8.04
2-yr	6858.4	2.4	274779	6.31	2.46	10.50
	6860.0	4.0	354329	8.13	11.52	22.02
100-yr	6862.0	6.0	448586	10.30	18.43	40.45
Spillway	6864.0	--	--	--	--	60.00

Added 2-yr control because sub-regional results were greater than results with only existing detention in place  
Existing spillway elevation needs to be raised. Corresponding storage was assumed.

Regional Pond WU						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6822.0	0.0	21261	0.49	0.00	0.00
EURV	6827.2	5.2	199749	4.59	0.91	15.878
100-yr	6832.0	10.0	229251	5.26	1.05	39.54
Spillway	6834.0	12.0	242670	5.57	1.11	50.38

- Notes:
- 1) Elevation of the EURV/WQCV was interpolated based on the existing pond grading
  - 2) 100-yr WSE set at spillway elevation of existing pond
  - 3) Volume calculated using the average end method

Falcon DBPS

Sub Regional Ponds (Including Existing Detention Ponds)

Pond Description					EURV/WQCV				
Modeling Order	Name	Pond Type <sup>1</sup>	Location	Inflow Hydrograph <sup>2</sup>	Drainage Area (Acres) <sup>3</sup>	% Impervious (Future) <sup>4</sup>	Stage (ft) <sup>5</sup>	Storage (AF) <sup>6</sup>	Release Rate (cfs) <sup>7</sup>
1	Sub Regional Pond SR1	Sub Regional	West Tributary	JWT080	703	3%	7218.0	1.57	2.60
1	Paint Brush Hills Pond C	On-site	West Tributary	WT100	120	19%	7197.2	2.18	2.93
1	Paint Brush Hills Pond A	On-site	West Tributary	WT130	65	30%	7146.3	0.99	1.65
1	Paint Brush Hills Pond B1	On-site	West Tributary	Paint Brush Hills Pond B1	N/A Place EURV in d/s Paint Brush Hills Pond B2				
1	Paint Brush Hills Pond B2	On-site	West Tributary	Paint Brush Hills Pond B2	231	31%	7146.1	7.46	17.37
2	Sub Regional Pond SR2	Sub Regional	West Tributary	JWT174	394	8%	7080.8	2.05	2.88
1	The Meadows Pond #1	On-site	West Tributary	WT190	37	8%	7011.0	0.19	0.12
3	Sub Regional Pond SR3	Sub Regional	West Tributary	JWT200	256	7%	6941.3	1.03	1.48
4	Regional Pond WU	Regional	West Tributary	Regional Pond WU South	467	29%	6826.8	13.97	29.90
<del>4</del>	<del>Woodmen Hills Pond H</del>	<del>Sub Regional</del>	<del>Middle Tributary</del>	<del>Woodmen Hills Pond H</del>	<del>355</del>	<del>29%</del>	<del>N/A</del>	<del>10.62</del>	<del>N/A</del>
1	The Meadows Pond #2	On-site	Middle Tributary	MT010	186	11%	7006.5	1.62	1.83
2	Sub Regional Pond SR4	Sub Regional	Middle Tributary	JMT060	555	24%	6896.6	7.28	24.40
3	Regional pond MN	Regional	Middle Tributary	Regional Pond MN	169	28%	6851.4	2.45	3.25
1	Woodmen Hills Pond #5	On-site	Middle Tributary	MT090	28	64%	6852.5	1.99	2.25
5	Regional Pond R1	Regional	West Tributary @ N	JWT296	548	14%	6760.3	6.72	12.31
<del>4</del>	<del>Paint Brush Hills Pond #4</del>	<del>On-site</del>	<del>East Tributary</del>	<del>ET010</del>	<del>93</del>	<del>29%</del>		<del>2.78</del>	
1	Sub Regional Pond SR6	Sub Regional	East Tributary	<del>JET020</del>	229	31%	5.7	7.39	16.34
2	Woodmen Hills Pond #1 North	Sub Regional	East Tributary	Woodmen Hills Pond #1 North	N/A Place EURV in d/s Woodmen Hills Pond #1 South. Use Existing SSD curve up to 100-yr stage.				
3	Woodmen Hills Pond #1 South	Sub Regional	East Tributary	Woodmen Hills Pond #1 South	226	26%	6952.5	5.96	10.86
4	Woodmen Hills Pond #2	Sub Regional	East Tributary	Woodmen Hills Pond #2	75	19%	6926.8	1.36	0.67
5	Woodmen Hills Pond #3	Sub Regional	East Tributary	Woodmen Hills Pond #3	183	22%	6900.7	2.26	1.58
6	Woodmen Hills Pond #4	Sub Regional	East Tributary	Woodmen Hills Pond #4	346	34%	6857.6	5.65	7.42
<del>7</del>	<del>Sub Regional Pond SR5</del>	<del>Sub Regional</del>	<del>East Tributary</del>	<del>JET152</del>	<del>673</del>	<del>8%</del>			
8	Regional Pond R2	Regional	West Tributary d/s	JWT372	1,882	5%	6639.3	3.13	5.69

Notes

- <sup>1</sup> On-site = located off of the main tributary, Sub-reional = located on the main tributary with a small drainage area, Regional = located on the main tributary with a large drainage area
- <sup>2</sup> From the Falcon\_DBPS HEC-HMS model
- <sup>3</sup> Only includes area draining directly to the pond. This does not include the area draining to an upstream detention pond if one exists. This column is for sizing the EURV/WQCV only.
- <sup>4</sup> Calculated in ArcMap using the existing impervious area coverage and average impervious area values for undeveloped land with known future land use
- <sup>5</sup> Corresponds to the stage within the existing pond grading given the required storage volume or the stage within the proposed pond with an assumed triangular pond grading
- <sup>6</sup> Calculated using UDFCD criteria. Watershed is primarily covered by HSG B soils in the developed condition.
- <sup>7</sup> Calculated using UDFCD EURV criteria for a 72-hr drain time or UDFCD WQCV criteria for a 40-hr drain time
- <sup>8</sup> Estimated based on the intersection of the 100-yr release rate with the descending portion of the Developed 100-yr hydrograph. For proposed ponds the maximum pond volume was set based on a maximum depth of 10ft within the approximated grading.
- <sup>9</sup> According to existing pond volume estimates calculated in this DBPS based on pond volume at the spillway elevation. See the Hydrology Section for assumptions on storage volume.
- <sup>10</sup> Developed flows account for existing and proposed upstream detention
- <sup>11</sup> Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estiamte based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).
- <sup>12</sup> Corresponds to stage/storage at an elevation of 2ft above the 100-yr stage or where existing pond grading limits stage.
- <sup>13</sup> Set at the 100-yr release rate + the peak 100-yr inflow

Falcon DBPS

Sub Regional Ponds (Including Existing Detention Ponds)

Modeling Order	Pond Description				100-yr						Spillway Overtopping		
	Name	Pond Type <sup>1</sup>	Location	Inflow Hydrograph <sup>2</sup>	Stage (ft) <sup>5</sup>	Required Storage (AF) <sup>8</sup>	Constructed Storage (AF) <sup>9</sup>	Developed Q <sub>100</sub> (cfs) <sup>10</sup>	Historical Q <sub>100</sub> (cfs) <sup>2</sup>	Release Rate (cfs) <sup>11</sup>	Stage (ft) <sup>12</sup>	Storage (AF) <sup>12</sup>	Release Rate (cfs) <sup>13</sup>
1	Sub Regional Pond SR1	Sub Regional	West Tributary	JWT080	7224.8	11.03	Proposed Pond	610.6	509	509	7226.8	15.18	1,120
1	Paint Brush Hills Pond C	On-site	West Tributary	WT100	7,200	6.77	6.77	303	200	145	7202	10.80	448
1	Paint Brush Hills Pond A	On-site	West Tributary	WT130	7,148	2.62	2.62	173	97	155	7150	4.89	328
1	Paint Brush Hills Pond B1	On-site	West Tributary	Paint Brush Hills Pond B1	Use existing SSD curve. Provide additional 100-yr control in Paint Brush Hills Pond B2.								
1	Paint Brush Hills Pond B2	On-site	West Tributary	Paint Brush Hills Pond B2	7,148	12.09	12.09	267	171	191	7150	17.28	458
2	Sub Regional Pond SR2	Sub Regional	West Tributary	JWT174	N/A	N/A	Proposed Pond	842	952	N/A	7083	4.21	844
1	The Meadows Pond #1	On-site	West Tributary	WT190	7,015	3.25	3.25	75	14	2.2	7016	4.56	77
3	Sub Regional Pond SR3	Sub Regional	West Tributary	JWT200	N/A	N/A	Proposed Pond	908	988	N/A	6943.3	1.97	909
4	Regional Pond WU	Regional	West Tributary	Regional Pond WU South	6,832	39.54	39.54	1,069	1,057	935	6834	50.38	2,004
4	Woodmen Hills Pond H	Sub Regional	Middle Tributary	Woodmen Hills Pond H	N/A	18.65	2.66	748	288	288	N/A	N/A	1,036
1	The Meadows Pond #2	On-site	Middle Tributary	MT010	7,011	7.94	7.94	206	57	100	7012	9.88	306
2	Sub Regional Pond SR4	Sub Regional	Middle Tributary	JMT060	6,898	19.37	Proposed Pond	1,016	328	725	6900	43.33	1,741
3	Regional pond MN	Regional	Middle Tributary	Regional Pond MN	6,854	7.53	7.53	854	355	825	6856	11.93	1,679
1	Woodmen Hills Pond #5	On-site	Middle Tributary	MT090	6,854	4.10	4.10	127	19	19	6856	7.42	146
5	Regional Pond R1	Regional	West Tributary @ N	JWT296	6,766	25.00	Proposed Pond	1,560	1,431	1,505	6768	32.00	3,065
4	Paint Brush Hills Pond #4	On-site	East Tributary	ET010		5.94	1.34	198	86	86			284
1	Sub Regional Pond SR6	Sub Regional	East Tributary	JET020	8	11.82	Proposed Pond	385	198	198	10	16.44	583
2	Woodmen Hills Pond #1 North	Sub Regional	East Tributary	Woodmen Hills Pond #1 North	6,960	7.13	7.13	388	242	265	Use existing SSD after 100-yr stage.		
3	Woodmen Hills Pond #1 South	Sub Regional	East Tributary	Woodmen Hills Pond #1 South	6,954	8.78	8.78	264	242	264	6958	17.50	528
4	Woodmen Hills Pond #2	Sub Regional	East Tributary	Woodmen Hills Pond #2	6,930	9.18	9.18	270	246	250	6934	23.09	520
5	Woodmen Hills Pond #3	Sub Regional	East Tributary	Woodmen Hills Pond #3	6,902	8.35	8.35	530	255	360	6904	20.46	890
6	Woodmen Hills Pond #4	Sub Regional	East Tributary	Woodmen Hills Pond #4	6,862	40.45	22.02	789	251	258	6864	60.00	1,047
7	Sub Regional Pond SR5	Sub Regional	East Tributary	JET152									0
8	Regional Pond R2	Regional	West Tributary d/s	JWT372	6,644	7.90	Proposed Pond	2,116	1,674	2,265	6646	16.00	4,381

Notes

- <sup>1</sup> On-site = located off of the main tributary, Sub-reional = located on the main tributary with a small drainage area, Regional = located on the main tributary with a large drainage area
- <sup>2</sup> From the Falcon\_DBPS HEC-HMS model
- <sup>3</sup> Only includes area draining directly to the pond. This does not include the area draining to an upstream detention pond if one exists. This column is for sizing the EURV/WQCV only.
- <sup>4</sup> Calculated in ArcMap using the existing impervious area coverage and average impervious area values for undeveloped land with known future land use
- <sup>5</sup> Corresponds to the stage within the existing pond grading given the required storage volume or the stage within the proposed pond with an assumed triangular pond grading
- <sup>6</sup> Calculated using UDFCD criteria. Watershed is primarily covered by HSG B soils in the developed condition.
- <sup>7</sup> Calculated using UDFCD EURV criteria for a 72-hr drain time or UDFCD WQCV criteria for a 40-hr drain time
- <sup>8</sup> Estimated based on the intersection of the 100-yr release rate with the desending portion of the Developed 100-yr hydrograph. For proposed ponds the maximum pond volume was set based on a maximum depth of 10ft within the approximated grading.
- <sup>9</sup> According to existing pond volume estimates calculated in this DBPS based on pond volume at the spillway elevation. See the Hydrology Section for assumptions on storage volume.
- <sup>10</sup> Developed flows account for existing and proposed upstream detention
- <sup>11</sup> Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estiamte based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).
- <sup>12</sup> Corresponds to stage/storage at an elevation of 2ft above the 100-yr stage or where existing pond grading limits stage.
- <sup>13</sup> Set at the 100-yr release rate + the peak 100-yr inflow

Falcon DBPS

Sub Regional Ponds (Including Existing Detention Ponds)

Pond Description					Pond Type	Design Notes
Modeling Order	Name	Pond Type <sup>1</sup>	Location	Inflow Hydrograph <sup>2</sup>		
1	Sub Regional Pond SR1	Sub Regional	West Tributary	JWT080	WQCV+100-yr	No EURV required per UDFCD criteria. Used WQCV instead to control low flows.
1	Paint Brush Hills Pond C	On-site	West Tributary	WT100	EURV+100-yr	Enough room for EURV, release less than historical Q100 to maximize pond volume
1	Paint Brush Hills Pond A	On-site	West Tributary	WT130	WQCV+100-yr	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Release more than historical Q100 due to pond volume limitations.
1	Paint Brush Hills Pond B1	On-site	West Tributary	Paint Brush Hills Pond B1	Existing configuration	Use existing SSD curve without modification. Provide additional 100-yr control and EURV in Pond B2 as the outlet structure in this pond will be easier to retrofit.
1	Paint Brush Hills Pond B2	On-site	West Tributary	Paint Brush Hills Pond B2	EURV+100-yr	Enough room for EURV, released more than historical Q100 due to pond volume limitations
2	Sub Regional Pond SR2	Sub Regional	West Tributary	JWT174	EURV only	Only using EURV. 100-yr flow is already less than historic upstream of this location. Reducing the incoming hydrograph by 42cfs would require greater than an additional 8 AF of storage.
1	The Meadows Pond #1	On-site	West Tributary	WT190	EURV+100-yr	Enough room for EURV, release less than historical Q100 to maximize pond volume
3	Sub Regional Pond SR3	Sub Regional	West Tributary	JWT200	EURV only	Only using EURV. 100-yr flow is already less than historic upstream of this location. Reducing the incoming hydrograph by 42cfs would require greater than an additional 8 AF of storage.
4	Regional Pond WU	Regional	West Tributary	Regional Pond WU South	EURV+100-yr	Enough room for EURV, released less than historical to optimize pond volume
4	Woodmen Hills Pond H	Sub Regional	Middle Tributary	Woodmen Hills Pond H	Existing configuration	<b>NO RETROFIT. Pond is grossly undersized. Can't do anything as there isn't enough pond volume to even control the 2-year. Recommend, but not design, on-site detention u/s of pond? Major problem - pond is off MT main stem and therefore overtopping deficiencies were not identified but this road crossing will likely overtop. Try and incorporate EURV in proposed Regional Pond R1 downstream.</b>
1	The Meadows Pond #2	On-site	Middle Tributary	MT010	EURV+100-yr	Enough room for EURV, released more than historical Q100 due to pond volume limitations
2	Sub Regional Pond SR4	Sub Regional	Middle Tributary	JMT060	WQCV+100-yr	Included Woodmen Hills Pond H DA for EURV. Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Released more than historical Q100 due to pond volume limitations at the proposed pond site.
3	Regional pond MN	Regional	Middle Tributary	Regional Pond MN	WQCV+100-yr	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Release more than historical Q100 due to pond volume limitations.
1	Woodmen Hills Pond #5	On-site	Middle Tributary	MT090	EURV+100-yr	Enough room for EURV, release less than historical Q100 to maximize pond volume
5	Regional Pond R1	Regional	West Tributary @ N	JWT296	EURV+100-yr	Enough room for EURV, released more than historical Q100 due to pond volume limitations
4	Paint Brush Hills Pond #4	On-site	East Tributary	ET010	Existing configuration	<b>NO RETROFIT. Pond is grossly undersized. Can't do anything as there isn't enough pond volume to even control the 2-year. Recommend, but not design, on-site detention u/s of pond. Try and incorporate EURV in proposed Woodmen Hills Pond #1 downstream.</b>
1	Sub Regional Pond SR6	Sub Regional	East Tributary	JET020	EURV+100-yr	Included DA to Paint Brush Hills Pond #4 in EURV. Released at historical 100-yr.
2	Woodmen Hills Pond #1 North	Sub Regional	East Tributary	Woodmen Hills Pond #1 North	EURV+100-yr	Placing EURV in #1 south. Use #1 north as 100-yr attenuation. Reduce 100-yr as much as possible given storage constraints. Use existing SSD up to, and after, 100-yr stage.
3	Woodmen Hills Pond #1 South	Sub Regional	East Tributary	Woodmen Hills Pond #1 South	EURV only	Enough room for EURV. Pond only has enough volume to detain the EURV but not the 100-yr. This is acceptable since the 100-yr flow at this point is 264 cfs and the historical flow is 242 cfs.
4	Woodmen Hills Pond #2	Sub Regional	East Tributary	Woodmen Hills Pond #2	EURV+100-yr	Enough room for EURV. Pond also can be retrofit to release the ~ historical 100-yr flow. The depth of the EURV is 0.8ft. UDFCD criteria says 1ft is the minimum depth. Assume this is ok at this point.
5	Woodmen Hills Pond #3	Sub Regional	East Tributary	Woodmen Hills Pond #3	WQCV+100-yr	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Release more than historical Q100 due to pond volume limitations.
6	Woodmen Hills Pond #4	Sub Regional	East Tributary	Woodmen Hills Pond #4	WQCV+100-yr	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Added intermediate 2-yr point. Release more than historical Q100 due to pond volume limitations. Using assumed values for required spillway stage/storage. Existing embankment/spillway will need to be raised.
7	Sub Regional Pond SR5	Sub Regional	East Tributary	JET152	Not using pond	Not an effective location. Only ~1.5AF of storage available and ERUV required at this location is ~3.5AF.
8	Regional Pond R2	Regional	West Tributary d/s	JWT372	EURV only	Only using EURV. Included DA from Sub Regional Pond SR5 in EURV. Not enough available storage volume for 100-yr control.

Notes

- <sup>1</sup> On-site = located off of the main tributary, Sub-reional = located on the main tributary with a small drainage area, Regional = located on the main tributary with a large drainage area
- <sup>2</sup> From the Falcon\_DBPS HEC-HMS model
- <sup>3</sup> Only includes area draining directly to the pond. This does not include the area draining to an upstream detention pond if one exists. This column is for sizing the EURV/WQCV only.
- <sup>4</sup> Calculated in ArcMap using the existing impervious area coverage and average impervious area values for undeveloped land with known future land use
- <sup>5</sup> Corresponds to the stage within the existing pond grading given the required storage volume or the stage within the proposed pond with an assumed triangular pond grading
- <sup>6</sup> Calculated using UDFCD criteria. Watershed is primarily covered by HSG B soils in the developed condition.
- <sup>7</sup> Calculated using UDFCD EURV criteria for a 72-hr drain time or UDFCD WQCV criteria for a 40-hr drain time
- <sup>8</sup> Estimated based on the intersection of the 100-yr release rate with the desending portion of the Developed 100-yr hydrograph. For proposed ponds the maximum pond volume was set based on a maximum depth of 10ft within the approximated grading.
- <sup>9</sup> According to existing pond volume estimates calculated in this DBPS based on pond volume at the spillway elevation. See the Hydrology Section for assumptions on storage volume.
- <sup>10</sup> Developed flows account for existing and proposed upstream detention
- <sup>11</sup> Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estiamte based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).
- <sup>12</sup> Corresponds to stage/storage at an elevation of 2ft above the 100-yr stage or where existing pond grading limits stage.
- <sup>13</sup> Set at the 100-yr release rate + the peak 100-yr inflow



**Falcon DBPS**  
**Sub Regional Pond Drainage & Impervious Area**

<b>Pond</b>	<b>DA (ft2)</b>	<b>DA (Acres)</b>	<b>Impervious Area (ft2)</b>	<b>% Impervious</b>
Sub Regional Pond SR1	30,622,649	703	831,542	3%
Paint Brush Hills Pond C	5,234,130	120	982,938	19%
Paint Brush Hills Pond A	2,811,615	65	832,760	30%
Paint Brush Hills Pond B1 & B2	10,050,309	231	3,095,805	31%
Sub Regional Pond SR2	17,141,776	394	1,300,551	8%
The Meadows Pond #1	1,601,777	37	127,495	8%
Sub Regional Pond SR3	11,154,554	256	805,816	7%
Regional Pond WU	20,333,432	467	5,914,148	29%
Woodmen Hills Pond H	15,479,390	355	4,492,233	29%
The Meadows Pond #2	8,081,678	186	902,796	11%
Sub Regional Pond SR4	8,717,356	200	1,238,224	14%
Regional pond MN	7,343,530	169	2,065,458	28%
Woodmen Hills Pond #5	1,212,993	28	773,858	64%
Regional Pond R1	23,851,242	548	3,448,795	14%
Paint Brush Hills Pond #4	4,045,968	93	1,167,110	29%
Sub Regional Pond SR6	5,943,070	136	1,971,083	33%
Woodmen Hills Pond #1 North & South	9,842,788	226	2,585,592	26%
Woodmen Hills Pond #2	3,267,140	75	623,185	19%
Woodmen Hills Pond #3	7,957,332	183	1,741,407	22%
Woodmen Hills Pond #4	15,092,968	346	5,150,148	34%
Sub Regional Pond SR5	29,299,647	673	2,287,324	8%
Regional Pond R2	52,661,473	1,209	1,520,507	3%

Notes

- 1) Areas calculated in ArcMap
- 2) These values are used for calculating the required EURV/WQCV only
- 3) Some values include the drainage areas contributing to upstream ponds where that pond was not able to provide an EURV/WQCV

Falcon DBPS

EURV/WQCV Elevation Within Existing Pond Grading (Sub Regional Alternative)

Paint Brush Hills Pond C						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7194.0	0.0	3524	0.08	0.00	0.00
	7196.0	2.0	34432	0.79	0.87	0.87
EURV	7197.2	3.2	56977	1.31	1.31	2.18
	7198.0	4.0	70646	1.62	1.11	3.28
100-yr	7200.0	6.0	81277	1.87	3.49	6.77
Spillway	7202.0	8.0	94041	2.16	4.02	10.80

Paint Brush Hills Pond A						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7144.0	0.0	2301	0.05	0.00	0.00
	7146.0	2.0	32617	0.75	0.80	0.80
WQCV	7146.3	2.3	34366	0.79	0.19	0.99
100-yr	7148.0	4.0	46611	1.07	1.63	2.62
Spillway	7150.0	6.0	52403	1.20	2.27	4.89

Paint Brush Hills Pond B2						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7140.0	0.0	6171	0.14	0.00	0.00
	7142.0	2.0	33600	0.77	0.91	0.91
	7144.0	4.0	72649	1.67	2.44	3.35
	7146.0	6.0	99742	2.29	3.96	7.31
EURV	7146.1	6.1	100025	2.30	0.15	7.46
100-yr	7148.0	8.0	108583	2.49	4.64	12.09
Spillway	7150.0	10.0	117383	2.69	5.19	17.28
	7152.0	12.0	125020	2.87	5.56	22.84

The Meadows Pond #1						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7010.0	0.0	2872	0.07	0.00	0.00
EURV	7011.0	1.0	13523	0.31	0.19	0.19
	7012.0	2.0	23756	0.55	0.42	0.6113
	7014.0	4.0	43274	0.99	1.54	2.15
100-yr	7015.0	5.0	52520	1.21	1.10	3.25
Spillway	7016.0	6.0	61765	1.42	1.31	4.56

The Meadows Pond #2						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	7004.0	0.0	1202	0.03	0.00	0.00
	7006.0	2.0	46729	1.07	1.10	1.10
EURV	7006.5	2.5	48770	1.12	0.52	1.62
	7008.0	4.0	55287	1.27	1.82	3.44
	7010.0	6.0	67516	1.55	2.82	6.2615
100-yr	7011.0	7.0	78848	1.81	1.68	7.94
Spillway	7012.0	8.0	90179	2.07	1.94	9.88

Regional Pond MN						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6850.0	0.0	72765	1.67	0.00	0.00
WQCV	6851.4	1.4	79229	1.82	2.45	2.45
	6852.0	2.0	81967	1.88	1.10	3.55
100-yr	6854.0	4.0	91240	2.09	3.98	7.53
Spillway	6856.0	6.0	100323	2.30	4.40	11.93

Woodmen Hills Pond #5						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6850.0	0.0	14889	0.34	0.00	0.00
	6852.0	2.0	48165	1.11	1.45	1.45
EURV	6852.5	2.5	52649	1.21	0.54	1.99
100-yr	6854.0	4.0	67245	1.54	2.11	4.10
Spillway	6856.0	6.0	77625	1.78	3.33	7.42

Woodmen Hills Pond #1 North						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6952.0	0.0	7633	0.18	0.00	0.00
	6954.0	2.0	23810	0.55	0.72	0.72
100-yr	6960.0	8.0	73999	1.70	6.74	7.13
	6962.0	10.0	91244	2.09	3.79	10.92
	6964.0	12.0	115044	2.64	4.74	15.66

100-yr retrofit only at this pond

Woodmen Hills Pond #1 South						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6948.0	0.0	23810	0.55	0.00	0.00
	6950.0	2.0	61448	1.41	1.96	1.96
	6952.0	4.0	76242	1.75	3.16	5.12
EURV	6952.5	4.5	77872	1.79	0.84	5.96
100-yr	6954.0	6.0	83106	1.91	3.66	8.78
Spillway	6956.0	8.0	89660	2.06	3.97	12.74
	6958.0	10.0	117602	2.70	4.76	17.50

Woodmen Hills Pond #2						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6926.0	0.0	68500	1.57	0.00	0.00
EURV	6926.8	0.8	83025	1.91	1.36	1.36
	6928.0	2.0	105743	2.43	2.64	4.00
100-yr	6930.0	4.0	119783	2.75	5.18	9.18
Spillway	6932.0	6.0	147832	3.39	6.14	15.32
	6934.0	8.0	190507	4.37	7.77	23.09

Woodmen Hills Pond #3						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6900.0	0.0	125010	2.87	0.00	0.00
WQCV	6900.7	0.7	163665	3.76	2.26	2.26
100-yr	6902.0	2.0	238533	5.48	6.09	8.35
	6904.0	4.0	289267	6.64	12.12	20.46

Woodmen Hills Pond #4						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6856.0	0.0	95635	2.20	0.00	0.00
WQCV	6857.6	1.6	219692	5.04	5.65	5.65
	6858.0	2.0	254580	5.84	2.39	8.04
2-yr	6858.4	2.4	274779	6.31	2.46	10.50
	6860.0	4.0	354329	8.13	11.52	22.02
100-yr	6862.0	6.0	448586	10.30	18.43	40.45
Spillway	6864.0	--	--	--	--	60.00

Added 2-yr control because sub-regional results were greater than results with only existing detention in place  
Existing spillway elevation needs to be raised. Corresponding storage was assumed.

Regional Pond WU						
Stage			Storage			
Stage	Elevation (ft)	Height (ft)	Area		Volume	
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)
	6822.0	0.0	21261	0.49	0.00	0.00
EURV	6826.8	4.8	196910	4.52	0.81	13.97
100-yr	6832.0	10.0	229251	5.26	1.05	39.54
Spillway	6834.0	12.0	242670	5.57	1.11	50.38

Notes:

- 1) Elevation of the EURV/WQCV was interpolated based on the existing pond grading
- 2) 100-yr WSE set at spillway elevation of existing pond
- 3) Volume calculated using the average end method

Stage Storage Discharge

**Data for spillway and embankment: Woodmen Hills Pond #1 North 100-yr Retrofit - Sub Regional Alternative**

References: Topo, field survey, and FDR

Spillway Length (ft) =	20
Spillway Elevation (ft) =	6960.0
Spillway $C_d^1$ =	0.56
Embankment Length (ft) =	361
Embankment Elevation (ft) =	6962.0
Embankment $C_d^1$ =	0.56
Acceleration due to Gravity, $g$ (ft/s <sup>2</sup> ) =	32.2

**Data for outlet pipe and grate:**

	Type	Width (ft)	Height (ft)	Diameter (in)	$C_d^1$	Area (ft <sup>2</sup> )	Centerline Elevation (ft)	Bottom Elevation <sup>2</sup> (ft)	Top Elevation <sup>3</sup> (ft)
Orifice 1 :	Circular			72	0.6	28.27	6955.00	6952.00	6958.00
Orifice 2:	Circular			72	0.6	28.27	6955.00	6952.00	6958.00
Orifice 3:	None Selected					0.00		0.00	0.00
Orifice 4:	None Selected					0.00		0.00	0.00

**Check Dimen Check Dimensions !**

**Stand Pipe Dimensions:**

	Type	Width (ft)	Height (ft)	Diameter (ft)	$C_d^1$	Area (ft <sup>2</sup> )	Elevation (ft)	Perimeter (ft)
Grate :	None Selected				0.6	0.00		0.00

Stage			Storage				Discharge								Total Flow <sup>6</sup> (cfs)		
Stage	Elevation (ft)	Height (ft)	Area		Volume <sup>4</sup>		Spillway <sup>5</sup> (cfs)	Embankment <sup>5</sup> (cfs)	Orifice (max outflow cfs)				Grate (max outflow cfs)				
			(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)			1	2	3	4					
	6952.0	0.0	7633	0.18	0.00	0.00	-	-	-	-	-	-	-	-	-	Keep this point on the existing SSD curve	
	6954.0	2.0	23810	0.55	0.72	0.72	-	-	48.28	48.28	-	-	-	-	-	96.55	Keep this point on the existing SSD curve
	<del>6956.0</del>	<del>4.0</del>	<del>36215</del>	<del>0.83</del>	<del>1.38</del>	<del>2.10</del>	<del>-----</del>	<del>-----</del>	<del>136.14</del>	<del>136.14</del>	<del>-----</del>	<del>-----</del>	<del>-----</del>	<del>-----</del>	<del>-----</del>	<del>272.28</del>	Delete this stage from the existing SSD curve
	<del>6958.0</del>	<del>6.0</del>	<del>54552</del>	<del>1.25</del>	<del>2.08</del>	<del>4.18</del>	<del>-----</del>	<del>-----</del>	<del>235.80</del>	<del>235.80</del>	<del>-----</del>	<del>-----</del>	<del>-----</del>	<del>-----</del>	<del>-----</del>	<del>471.60</del>	Delete this stage from the existing SSD curve
	6960.0	8.0	73999	1.70	2.95	7.13	-	-	304.42	304.42	-	-	-	-	-	608.84	<b>Modify this point to release 265 cfs</b>
	6962.0	10.0	91244	2.09	3.79	10.93	169.48	-	360.19	360.19	-	-	-	-	-	889.87	Keep this point on the existing SSD curve
	6964.0	12.0	115044	2.64	4.74	15.66	479.36	3,059.09	408.42	408.42	-	-	-	-	-	4,355.29	Keep this point on the existing SSD curve

**Falcon BPS**  
**Detention Alternative Evaluation**

Evaluation Parameters	Existing Detention	Regional Detention	Sub Regional Detention	notes
Detention Pond Construction Cost	1	2	3	Based on number of additional ponds
Reach Construction Cost	3	2	1	Based on quantity NCD or Protect In Place reaches
Detention Pond O&M Costs	1	2	3	Based on number of additional ponds
Reach O&M Costs	3	2	1	Based on quantity NCD or Protect In Place reaches
Flood Damage Reduction	2	3	1	Based on overall 100-yr peak flow reduction
Channel Stability (Near-Term)	3	2	1	Based on 2-yr peak flow reduction
Channel Stability (Long-Term)	3	2	1	Based on 2-yr peak flow reduction
Impact Upon Known Environmental Resources	1	2	3	Based on additional footprint required
Impact Upon Existing Utilities	1	1	1	All ponds are sited on-line and it appears as though no utilities are in the area
Impact Upon Future Utilities	1	1	1	All ponds are sited on-line and it appears as though no utilities are in the area
Impact Upon Existing Thoroughfares	1	1	1	No impact
Impact Upon Future Thoroughfares	1	1	1	No impact
ROW & Property Acquisition	1	2	3	Based on number of additional ponds
Regulatory Issues	1	1	1	All ponds are below 10ft
Trails & Open Space	1	2	2	All ponds are sited on-line and do not impact any trails. Open space may be inundated for new ponds.
Stormwater Quality	3	2	1	Based on number of additional ponds to provide water quality
2-yr Flood Control	3	2	1	Based on 2-yr peak flow reduction
100-yr Flood Control	2	3	1	Based on overall 100-yr peak flow reduction
Flexibility for Development	1	1	1	All ponds are sited on-line and development can't occur in the creek
Lot Premium	3	2	1	Based on aesthetics
Habitat Improvements	3	2	1	Based on water quality and quantity of NCD or Protect In Place reaches that results in floodplain and corridor connectivity
Total	39	38	30	

Black Text = County Evaluation Parameters

Blue Text = Potential Additional Evaluation Parameters

Green Text = County Evaluation Parameters Expanded

Full spectrum detention will be used in both the regional and sub regional detention scenarios

1=best

2=neutral

3=worst

**Falcon DBPS**  
**Reach Alternatives Evaluation**

Evaluation Parameters	Preserve In Place	Natural Channel Design	Small Drop Structures	Large Drop Structures	Fully Lined Channel	notes
Reach Construction Cost	1	2	3	4	5	Based on costs/If developed in the Cottonwood Creek DBPS. It's assumed that the fully lined channel alternative will cost more than all others based on the large quantity of riprap that will be required.
Reach O&M Costs	1	3	3	3	5	No O&M for Preserve in Place; O&M is assumed to be the same for NCD, Small, and Large drops however the time spent per structure will vary, fully lined is assumed to require the most O&M because of the extent that will be covered and unstable nature of this alternative.
Flood Damage Reduction	1	1	3	4	5	Based on the effective and lowest energy conveyance of flood flows. Does not consider site specific advantages/disadvantages of how the floodplain is impacted.
Channel Stability (Near-Term)	1	2	3	4	5	Based on the effective and lowest energy conveyance of flood flows
Channel Stability (Long-Term)	1	2	3	4	5	Based on the effective and lowest energy conveyance of flood flows
Impact Upon Known Environmental Resources	1	2	3	4	5	Based on how invasive each alternative is
Impact Upon Existing Utilities	3	3	3	3	3	These reach alternatives do not have an advantage/disadvantage compared to eachother as it relates to how general utility conflicts will be addressed if they are encountered
Impact Upon Future Utilities	3	3	3	3	3	These reach alternatives do not have an advantage/disadvantage compared to eachother as it relates to how general utility conflicts will be addressed if they are encountered
Impact Upon Existing Thoroughfares	3	3	3	3	3	These reach alternatives do not have an advantage/disadvantage compared to eachother as it relates to thoroughfares. The impact at a road crossing largely depends on existing site conditions.
Impact Upon Future Thoroughfares	3	3	3	3	3	These reach alternatives do not have an advantage/disadvantage compared to eachother as it relates to thoroughfares. The impact at a road crossing largely depends on existing site conditions.
ROW & Property Acquisition	1	3	3	3	5	Preserve In Place does not require any ROW/Property acquisition. Others based on the amount of width AND extent that will be required to construct the alternative. NCD, Small, and Large Drop Structures are scored the same because both width and extent vary.
Regulatory Issues	1	3	3	3	5	Based on total structure footprint over an entire reach
Trails & Open Space	1	3	3	3	5	Based on open space that is required and potential to impact planned trails. No trails currently exist within the creek corridors. Preserve In Place does not require any ROW/Property acquisition. Others based on the amount of width AND extent that will be required to construct the alternative. NCD, Small, and Large Drop Structures are scored the same because both width and extent vary.
Stormwater Quality	1	2	3	4	5	Based on the effective and lowest energy conveyance of flood flows, floodplain connectivity, potential for wetland creation/preservation
2-yr Flood Control	1	2	3	4	5	Based on the effective and lowest energy conveyance of flood flows
100-yr Flood Control	1	2	3	4	5	Based on the effective and lowest energy conveyance of flood flows
Flexibility for Development	5	5	3	3	1	Based on how much land will be removed from the floodplain and be available for development
Lot Premium	1	2	3	4	5	Based on aesthetics
Habitat Improvements	1	2	3	4	5	Based on water quality and quantity of NCD or Protect In Place reaches that results in floodplain and corridor connectivity
Total	31	48	57	67	83	

Black Text = County Evaluation Parameters  
Blue Text = Potential Additional Evaluation Parameters  
Green Text = County Evaluation Parameters Expanded  
1=best  
3=neutral  
5=worst









**Falcon DBPS  
Peak Flow Results**

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs)					
		2-year	5-year	10-year	25-year	50-year	100-year
WT060	0.20	14	30	44	77	96	120
WT070	0.17	14	33	49	87	110	130
WT080	0.07	9	19	27	45	56	67
WT090	0.15	22	46	65	110	140	160
WT100	0.19	56	100	140	210	260	300
WT110	0.19	22	47	67	110	140	170
WT120	0.05	8	16	22	37	46	55
WT130	0.10	35	61	81	120	150	170
WT140	0.13	32	59	80	130	150	180
WT150	0.23	49	86	110	180	210	250
WT160	0.11	35	64	85	130	160	180
WT170	0.12	21	43	60	99	120	140
WT180	0.10	8	17	25	43	54	66
WT190	0.06	11	23	31	51	63	75
WT200	0.30	25	52	74	130	160	190
WT210	0.27	32	60	81	130	160	190
WT220	0.19	47	85	110	180	210	250
WT230	0.20	71	120	160	250	300	350
WT240	0.08	36	61	79	120	140	160
WT250	0.15	63	110	140	210	250	290
WT260	0.14	10	21	30	52	64	78
WT270	0.03	11	20	27	41	49	57
WT280	0.27	33	70	100	170	210	250
WT290	0.10	15	31	44	75	92	110
WT300	0.10	12	26	36	62	76	92
WT310	0.28	31	67	96	170	210	250
WT320	0.21	27	56	80	140	170	200
WT330	0.33	32	68	98	170	210	250
WT340	0.28	19	40	57	98	120	150
WT350	0.30	38	79	110	190	230	280
WT360	0.07	7	15	21	37	46	55
WT370	0.21	7	23	38	76	99	120

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
WT040	0.19	9	0	0	0	0	93
WT050	0.19	17	0	0	0	0	140
WT060	0.20	14	0	0	0	0	120
WT070	0.17	14	0	0	0	0	130
WT080	0.07	9	0	0	0	0	67
WT090	0.15	22	0	0	0	0	160
WT100	0.19	56	0	0	0	0	300
WT110	0.19	22	0	0	0	0	170
WT120	0.05	8	0	0	0	0	55
WT130	0.10	35	0	0	0	0	170
WT140	0.13	32	0	0	0	0	180
WT150	0.23	49	0	0	0	0	250
WT160	0.11	35	0	0	0	0	180
WT170	0.12	21	0	0	0	0	140
WT180	0.10	8	0	0	0	0	66
WT190	0.06	11	0	0	0	0	75
WT200	0.30	25	0	0	0	0	190
WT210	0.27	32	0	0	0	0	190
WT220	0.19	47	0	0	0	0	250
WT230	0.20	71	0	0	0	0	350
WT240	0.08	36	0	0	0	0	160
WT250	0.15	63	0	0	0	0	290
WT260	0.14	10	0	0	0	0	78
WT270	0.03	11	0	0	0	0	57
WT280	0.27	33	0	0	0	0	250
WT290	0.10	15	0	0	0	0	110
WT300	0.10	12	0	0	0	0	92
WT310	0.28	31	0	0	0	0	250
WT320	0.21	27	0	0	0	0	200
WT330	0.33	32	0	0	0	0	250
WT340	0.28	19	0	0	0	0	150
WT350	0.30	38	0	0	0	0	280
WT360	0.07	7	0	0	0	0	55
WT370	0.21	7	0	0	0	0	120

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
Woodmen Hills Pond #5	0.04	1	0	0	0	0	19
Woodmen Hills Pond H	0.56	110	0	0	0	0	750
WT010	0.14	9	0	0	0	0	89
WT020	0.07	4	0	0	0	0	42
WT030	0.08	9	0	0	0	0	75
WT040	0.19	9	0	0	0	0	93
WT050	0.19	17	0	0	0	0	140
WT060	0.20	14	0	0	0	0	120
WT070	0.17	14	0	0	0	0	130
WT080	0.07	9	0	0	0	0	67
WT090	0.15	22	0	0	0	0	160
WT100	0.19	56	0	0	0	0	300
WT110	0.19	22	0	0	0	0	170
WT120	0.05	8	0	0	0	0	55
WT130	0.10	35	0	0	0	0	170
WT140	0.13	32	0	0	0	0	180
WT150	0.23	49	0	0	0	0	250
WT160	0.11	35	0	0	0	0	180
WT170	0.12	21	0	0	0	0	140
WT180	0.10	8	0	0	0	0	66
WT190	0.06	11	0	0	0	0	75
WT200	0.30	25	0	0	0	0	190
WT210	0.27	32	0	0	0	0	190
WT220	0.19	47	0	0	0	0	250
WT230	0.20	71	0	0	0	0	350
WT240	0.12	21	0	0	0	0	140
WT250	0.15	63	0	0	0	0	290
WT260	0.14	10	0	0	0	0	78
WT270	0.03	11	0	0	0	0	57
WT280	0.27	33	0	0	0	0	250
WT290	0.10	15	0	0	0	0	110
WT300	0.10	12	0	0	0	0	92
WT310	0.28	31	0	0	0	0	250
WT320	0.21	27	0	0	0	0	200
WT330	0.33	32	0	0	0	0	250
WT340	0.28	19	0	0	0	0	150
WT350	0.30	38	0	0	0	0	280
WT360	0.07	7	0	0	0	0	55
WT370	0.21	7	0	0	0	0	120







**Falcon DBPS**  
Peak Flow Volume Results

Hydrologic Element	Area (sq mi)	Future Peak Flow Volume (ac ft)					
		2-year	5-year	10-year	25-year	50-year	100-year
WT060	0.20	2	5	6	10	13	15
WT070	0.17	2	3	5	8	10	12
WT080	0.07	1	2	2	4	5	6
WT090	0.15	2	4	6	9	11	13
WT100	0.19	4	7	9	14	17	19
WT110	0.19	3	5	7	11	14	16
WT120	0.05	1	1	2	3	3	4
WT130	0.10	2	4	5	8	10	11
WT140	0.13	3	5	6	10	12	14
WT150	0.23	6	10	14	20	24	28
WT160	0.11	2	4	5	8	9	11
WT170	0.12	2	3	5	7	9	11
WT180	0.10	1	2	3	5	6	8
WT190	0.06	1	2	2	4	4	5
WT200	0.30	4	8	11	18	22	26
WT210	0.27	6	10	13	20	24	28
WT220	0.19	5	8	10	16	18	21
WT230	0.20	5	9	11	17	20	23
WT240	0.08	2	3	5	7	8	9
WT250	0.15	4	6	8	13	15	17
WT260	0.14	2	4	5	8	10	12
WT270	0.03	1	1	2	3	3	4
WT280	0.27	4	7	10	15	19	22
WT290	0.10	1	3	4	6	7	9
WT300	0.10	1	3	4	6	7	8
WT310	0.28	4	7	10	15	19	22
WT320	0.21	3	5	7	12	15	17
WT330	0.33	5	9	12	19	23	27
WT340	0.28	4	7	10	16	20	23
WT350	0.30	5	8	11	18	22	26
WT360	0.07	1	2	2	4	5	5
WT370	0.21	1	3	4	7	9	12

Hydrologic Element	Area (sq mi)	Future Peak Flow Volume (ac ft) - Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
		WT040	0.19	2	0	0	0
WT050	0.19	2	0	0	0	0	15
WT060	0.20	2	0	0	0	0	15
WT070	0.17	2	0	0	0	0	12
WT080	0.07	1	0	0	0	0	6
WT090	0.15	2	0	0	0	0	13
WT100	0.19	4	0	0	0	0	19
WT110	0.19	3	0	0	0	0	16
WT120	0.05	1	0	0	0	0	4
WT130	0.10	2	0	0	0	0	11
WT140	0.13	3	0	0	0	0	14
WT150	0.23	6	0	0	0	0	28
WT160	0.11	2	0	0	0	0	11
WT170	0.12	2	0	0	0	0	11
WT180	0.10	1	0	0	0	0	8
WT190	0.06	1	0	0	0	0	5
WT200	0.30	4	0	0	0	0	26
WT210	0.27	6	0	0	0	0	28
WT220	0.19	5	0	0	0	0	21
WT230	0.20	5	0	0	0	0	23
WT240	0.08	2	0	0	0	0	9
WT250	0.15	4	0	0	0	0	17
WT260	0.14	2	0	0	0	0	12
WT270	0.03	1	0	0	0	0	4
WT280	0.27	4	0	0	0	0	22
WT290	0.10	1	0	0	0	0	9
WT300	0.10	1	0	0	0	0	8
WT310	0.28	4	0	0	0	0	22
WT320	0.21	3	0	0	0	0	17
WT330	0.33	5	0	0	0	0	27
WT340	0.28	4	0	0	0	0	23
WT350	0.30	5	0	0	0	0	26
WT360	0.07	1	0	0	0	0	5
WT370	0.21	1	0	0	0	0	12

Hydrologic Element	Area (sq mi)	Future Peak Flow Volume (ac ft) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
		Woodmen Hills Pond #5	0.04	2	0	0	0
Woodmen Hills Pond H	0.56	13	0	0	0	0	62
WT010	0.14	1	0	0	0	0	9
WT020	0.07	1	0	0	0	0	5
WT030	0.08	1	0	0	0	0	6
WT040	0.19	2	0	0	0	0	13
WT050	0.19	2	0	0	0	0	15
WT060	0.20	2	0	0	0	0	15
WT070	0.17	2	0	0	0	0	12
WT080	0.07	1	0	0	0	0	6
WT090	0.15	2	0	0	0	0	13
WT100	0.19	4	0	0	0	0	19
WT110	0.19	3	0	0	0	0	16
WT120	0.05	1	0	0	0	0	4
WT130	0.10	2	0	0	0	0	11
WT140	0.13	3	0	0	0	0	14
WT150	0.23	6	0	0	0	0	28
WT160	0.11	2	0	0	0	0	11
WT170	0.12	2	0	0	0	0	11
WT180	0.10	1	0	0	0	0	8
WT190	0.06	1	0	0	0	0	5
WT200	0.30	4	0	0	0	0	26
WT210	0.27	6	0	0	0	0	28
WT220	0.19	5	0	0	0	0	21
WT230	0.20	5	0	0	0	0	23
WT240	0.08	2	0	0	0	0	9
WT250	0.15	4	0	0	0	0	17
WT260	0.14	2	0	0	0	0	12
WT270	0.03	1	0	0	0	0	4
WT280	0.27	4	0	0	0	0	22
WT290	0.10	1	0	0	0	0	9
WT300	0.10	1	0	0	0	0	8
WT310	0.28	4	0	0	0	0	22
WT320	0.21	3	0	0	0	0	17
WT330	0.33	5	0	0	0	0	27
WT340	0.28	4	0	0	0	0	23
WT350	0.30	5	0	0	0	0	26
WT360	0.07	1	0	0	0	0	5
WT370	0.21	1	0	0	0	0	12

**Falcon DBPS**  
**Reach Flow Comparison**

Reach	Location	Comparison of Future 2-yr Flow Results vs. Historical (cfs)							Comparison of Future 100-yr Flow Results vs. Historical (cfs)						
		Historical (cfs)	Existing Detention	% Increase	Regional Detention	% Increase	Sub Regional Detention	% Increase	Historical (cfs)	Existing Detention	% Increase	Regional Detention	% Increase	Sub Regional Detention	% Increase
RET020	Main Tributary	10	29	190%	29	190%	29	190%	82	150	83%	150	83%	150	83%
RET030	Main Tributary	19	71	274%	71	274%	9	-53%	200	380	90%	380	90%	190	-5%
RET040	Main Tributary	19	95	400%	95	400%	45	137%	230	580	152%	580	152%	270	17%
RET050	Main Tributary	19	27	42%	14	-26%	10	-47%	240	570	138%	620	158%	260	8%
RET060	Main Tributary	19	11	-42%	10	-47%	10	-47%	250	530	112%	540	116%	250	0%
RET070	Main Tributary	19	13	-32%	14	-26%	13	-32%	250	430	72%	510	104%	360	44%
RET080	Main Tributary	17	65	282%	65	282%	65	282%	240	420	75%	560	133%	520	117%
RET090	Main Tributary	17	15	-12%	14	-18%	15	-12%	250	350	40%	400	60%	260	4%
RET100	Main Tributary	17	26	53%	30	76%	30	76%	260	390	50%	410	58%	300	15%
RET110	Main Tributary	17	27	59%	32	88%	32	88%	260	390	50%	410	58%	300	15%
RET120	Main Tributary	17	39	129%	42	147%	42	147%	260	430	65%	440	69%	350	35%
RET140	Side Tributary	0	11	#DIV/0!	11	#DIV/0!	11	#DIV/0!	12	85	608%	85	608%	85	608%
RET152	Main Tributary	17	49	188%	49	188%	49	188%	270	450	67%	470	74%	400	48%
RET154	Side Tributary	0	26	#DIV/0!	26	#DIV/0!	26	#DIV/0!	29	200	590%	200	590%	200	590%
RET156	Main Tributary	17	50	194%	55	224%	55	224%	290	650	124%	660	128%	560	93%
RET162	Main Tributary	17	59	247%	59	247%	59	247%	300	680	127%	690	130%	590	97%
RET164	Main Tributary	18	66	267%	66	267%	66	267%	300	710	137%	720	140%	630	110%
RMT030	Side Tributary	8	25	213%	25	213%	25	213%	82	140	71%	140	71%	140	71%
RMT040	Side Tributary	14	49	250%	49	250%	49	250%	160	290	81%	290	81%	290	81%
RMT050	Side Tributary	24	110	358%	110	358%	110	358%	290	750	159%	750	159%	750	159%
RMT062	Main Tributary	1	1	0%	5	400%	5	400%	57	160	181%	99	74%	99	74%
RMT064	Side Tributary	24	120	400%	120	400%	120	400%	300	850	183%	850	183%	850	183%
RMT070	Main Tributary	24	130	442%	130	442%	27	13%	330	1000	203%	1000	203%	730	121%
RMT080	Storm System	24	150	525%	150	525%	31	29%	350	1200	243%	1200	243%	840	140%
RMT090	Side Tributary/Storm System	0	9	#DIV/0!	1	#DIV/0!	1	#DIV/0!	19	32	68%	19	0%	19	0%
RMT102	Main Tributary	24	86	258%	140	483%	32	33%	350	1200	243%	1100	214%	820	134%
RMT104	Side Tributary	0	9	#DIV/0!	1	#DIV/0!	1	#DIV/0!	19	32	68%	19	0%	19	0%
RMT106	Main Tributary	24	91	279%	140	483%	33	38%	350	1200	243%	1100	214%	830	137%
RMT112	Main Tributary	22	92	318%	140	536%	33	50%	360	1200	233%	1100	206%	840	133%
RMT114	Main Tributary	22	94	327%	140	536%	34	55%	360	1200	233%	1100	206%	860	139%
RWT030	Side Tributary	3	4	33%	4	33%	4	33%	36	42	17%	42	17%	42	17%
RWT042	Side Tributary	6	9	50%	9	50%	9	50%	75	85	13%	85	13%	85	13%
RWT044	Main Tributary	7	9	29%	9	29%	9	29%	80	89	11%	89	11%	89	11%
RWT046	Main Tributary	12	15	25%	15	25%	15	25%	150	170	13%	170	13%	170	13%
RWT054	Main Tributary	18	24	33%	24	33%	24	33%	240	260	8%	260	8%	260	8%
RWT080	Side Tributary	10	14	40%	14	40%	14	40%	120	130	8%	130	8%	130	8%
RWT092	Main Tributary	33	43	30%	43	30%	43	30%	410	480	17%	480	17%	480	17%
RWT094	Main Tributary	40	54	35%	54	35%	42	5%	510	610	20%	610	20%	510	0%
RWT122	Main Tributary	48	68	42%	60	25%	47	-2%	610	730	20%	770	26%	620	2%
RWT124	Main Tributary	56	77	38%	68	21%	51	-9%	720	840	17%	880	22%	680	-6%
RWT150	Side Tributary	13	32	146%	32	146%	32	146%	110	180	64%	180	64%	180	64%
RWT160	Side Tributary	21	15	-29%	10	-52%	10	-52%	170	170	0%	180	6%	180	6%
RWT172	Main Tributary	58	85	47%	73	26%	54	-7%	750	920	23%	950	27%	710	-5%
RWT174	Side Tributary	23	35	52%	35	52%	35	52%	190	180	-5%	190	0%	190	0%
RWT176	Main Tributary	79	98	24%	79	0%	63	-20%	930	960	3%	980	5%	830	-11%
RWT180	Main Tributary	81	100	23%	81	0%	65	-20%	950	990	4%	1000	5%	840	-12%
RWT202	Main Tributary	80	100	25%	83	4%	66	-18%	960	1000	4%	1000	4%	850	-11%
RWT204	Side Tributary	0	4	#DIV/0!	0	#DIV/0!	0	#DIV/0!	14	43	207%	2	-86%	2	-86%
RWT210	Main Tributary	80	110	38%	89	11%	71	-11%	990	1200	21%	1200	21%	910	-8%
RWT232	Main Tributary	80	120	50%	97	21%	81	1%	1000	1300	30%	1300	30%	1000	0%
RWT234	Side Tributary	1	47	4600%	47	4600%	47	4600%	49	250	410%	250	410%	250	410%
RWT236	Main Tributary	81	120	48%	100	23%	85	5%	1000	1400	40%	1400	40%	1100	10%
RWT240	Main Tributary	82	130	59%	100	22%	86	5%	1100	1400	27%	1400	27%	1100	0%
RWT240_Diversion Reach	Side Tributary	82	30	-63%	28	-66%	24	-71%	1100	39	-96%	39	-96%	39	-96%
RWT250	Main Tributary	83	83	0%	50	-40%	42	-49%	1100	1100	0%	1200	9%	970	-12%
RWT260	Main Tributary	84	85	1%	62	-26%	62	-26%	1100	1100	0%	1200	9%	980	-11%

**Falcon DBPS**  
**Reach Flow Comparison**

Reach	Location	Comparison of Future 2-yr Flow Results vs. Historical (cfs)							Comparison of Future 100-yr Flow Results vs. Historical (cfs)						
		Historical (cfs)	Existing Detention	% Increase	Regional Detention	% Increase	Sub Regional Detention	% Increase	Historical (cfs)	Existing Detention	% Increase	Regional Detention	% Increase	Sub Regional Detention	% Increase
RWT291	Main Tributary	86	86	0%	70	-19%	70	-19%	1100	1100	0%	1200	9%	1000	-9%
RWT292	Side Tributary	0	11	#DIV/0!	11	#DIV/0!	11	#DIV/0!	15	57	280%	57	280%	57	280%
RWT294	Side Tributary	22	33	50%	33	50%	33	50%	190	250	32%	250	32%	250	32%
RWT295	Main Tributary	86	86	0%	73	-15%	73	-15%	1100	1100	0%	1200	9%	1000	-9%
RWT312	Side Tributary	6	12	100%	12	100%	12	100%	60	91	52%	91	52%	91	52%
RWT314	Main Tributary	110	160	45%	79	-28%	77	-30%	1400	1700	21%	1700	21%	1500	7%
RWT320	Main Tributary	110	160	45%	81	-26%	79	-28%	1500	1700	13%	1700	13%	1500	0%
RWT344	Side Tributary	0	32	#DIV/0!	32	#DIV/0!	32	#DIV/0!	47	250	432%	250	432%	250	432%
RWT352	Main Tributary	110	160	45%	82	-25%	80	-27%	1500	1700	13%	1700	13%	1500	0%
RWT354	Main Tributary	110	210	91%	110	0%	130	18%	1600	2400	50%	2300	44%	2100	31%
RWT372	Main Tributary	110	230	109%	140	27%	140	27%	1700	2500	47%	2400	41%	2100	24%
RWT374	Side Tributary	1	7	600%	7	600%	7	600%	20	55	175%	55	175%	55	175%
RWT376	Main Tributary	110	230	109%	140	27%	140	27%	1700	2500	47%	2400	41%	2100	24%

**Falcon DBPS**

**Do Nothing Detention Alternative<sup>1</sup>**

Pond	Q <sub>2</sub> In (cfs)	Q <sub>2</sub> Out (cfs)	Q <sub>100</sub> In (cfs)	Q <sub>100</sub> Out (cfs)	Required Volume (AF) <sup>2</sup>	Land Requirement (ac) <sup>3</sup>	Construction Cost <sup>4</sup>	Land Cost <sup>5</sup>	Improvement Cost <sup>6</sup>	Total Cost
Paint Brush Hills Pond #4	38	29	200	150	1.34	0	\$ -	\$ -	\$ -	\$ -
Paint Brush Hills Pond A	35	10	170	130	2.62	0	\$ -	\$ -	\$ -	\$ -
Paint Brush Hills Pond B1	80	51	420	270	9.17	0	\$ -	\$ -	\$ -	\$ -
Paint Brush Hills Pond B2	51	15	270	170	12.09	0	\$ -	\$ -	\$ -	\$ -
Paint Brush Hills Pond C	56	11	300	160	6.77	0	\$ -	\$ -	\$ -	\$ -
Regional Pond MN	150	86	1200	1200	7.53	0	\$ -	\$ -	\$ -	\$ -
Regional Pond WU South	83	55	1400	1000	39.54	0	\$ -	\$ -	\$ -	\$ -
The Meadows Pond #1	11	4	75	43	3.25	0	\$ -	\$ -	\$ -	\$ -
The Meadows Pond #2	28	1	210	160	7.94	0	\$ -	\$ -	\$ -	\$ -
Woodmen Hills Pond #1 North	100	88	690	570	7.13	0	\$ -	\$ -	\$ -	\$ -
Woodmen Hills Pond #1 South	88	27	570	570	8.78	0	\$ -	\$ -	\$ -	\$ -
Woodmen Hills Pond #2	37	11	580	530	9.18	0	\$ -	\$ -	\$ -	\$ -
Woodmen Hills Pond #3	110	13	560	430	8.35	0	\$ -	\$ -	\$ -	\$ -
Woodmen Hills Pond #4	110	15	700	350	22.02	0	\$ -	\$ -	\$ -	\$ -
Woodmen Hills Pond #5	40	9	130	32	4.1	0	\$ -	\$ -	\$ -	\$ -
Woodmen Hills Pond H	140	110	750	750	2.66	0	\$ -	\$ -	\$ -	\$ -

Subtotal	\$ -
Engineering (15%)	\$ -
Contingency (20%)	\$ -
<b>Total</b>	<b>\$ -</b>

Notes

<sup>1</sup> Represents future hydrology with no modifications to existing detention ponds and no new detention

<sup>2</sup> Required volume to highest WSE not including embankment

<sup>3</sup> Land requirement for proposed ponds is based on a (land area/pond volume) ratio of 0.285 Ac/AF as documented in the Jimmy Camp Creek DBPS - FSD Costs Memo.

<sup>4</sup> Based on \$24,500/AF as documented in the Jimmy Camp Creek DBPS - FSD Costs Memo. This includes engineering costs.

<sup>5</sup> Based on \$76,602/Ac per City of Colorado Springs code

<sup>6</sup> Includes costs to retrofit existing outlet structures for EURV/WQCV and 100-yr flood control. This costs assumes a plate can be placed over a low flow orifice and/or an opening be cut out of the existing drop structure. Not all existing ponds are retrofit.



**Falcon DBPS**  
**Regional Detention Alternative<sup>1</sup>**

Pond	Q <sub>2</sub> In (cfs)	Q <sub>2</sub> Out (cfs)	Q <sub>100</sub> In (cfs)	Q <sub>100</sub> Out (cfs)	Required Volume (AF) <sup>2</sup>	Land Requirement (ac) <sup>3</sup>	Construction Cost <sup>4</sup>	Land Cost <sup>5</sup>	Improvement Cost <sup>6</sup>	Total Cost
Paint Brush Hills Pond #4	38	29	200	150	1.34	0	\$ -	\$ -	\$ -	\$ -
Paint Brush Hills Pond A	35	7	170	140	2.62	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Paint Brush Hills Pond B1	80	51	420	270	9.17	0	\$ -	\$ -	\$ -	\$ -
Paint Brush Hills Pond B2	51	10	270	180	12.09	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Paint Brush Hills Pond C	56	3	300	140	6.77	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Regional Pond MN	150	140	1,200	1,100	7.53	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Regional Pond R1	180	79	1,800	1,700	46.95	13.38	\$ 1,150,275	\$ 3,596,464	\$ -	\$ 4,746,739
Regional Pond R2	140	140	2,400	2,400	7.90	2.25	\$ 193,550	\$ 605,156	\$ -	\$ 798,706
Regional Pond WU South	68	27	1,300	1,200	39.54	0	\$ -	\$ -	\$ 10,000	\$ 10,000
The Meadows Pond #1	11	0	75	2	3.25	0	\$ -	\$ -	\$ 10,000	\$ 10,000
The Meadows Pond #2	28	5	210	99	7.94	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #1 North	100	65	690	670	7.13	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #1 South	65	14	670	620	8.78	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #2	37	10	640	540	9.18	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #3	110	14	570	510	8.35	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #4	110	14	820	400	40.45	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #5	40	1	130	19	4.10	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond H	140	110	750	750	2.66	0	\$ -	\$ -	\$ -	\$ -

Subtotal	\$ 5,675,445
Engineering (15%)	\$ 851,317
Contingency (20%)	\$ 1,135,089
<b>Total</b>	<b>\$ 7,661,850</b>

Notes

<sup>1</sup> Represents future hydrology with retrofit existing detention ponds and 2 new regional detention ponds

<sup>2</sup> Required volume to highest WSE not including embankment

<sup>3</sup> Land requirement for proposed ponds is based on a (land area/pond volume) ratio of 0.285 Ac/AF as documented in the Jimmy Camp Creek DBPS - FSD Costs Memo.

<sup>4</sup> Based on \$24,500/AF as documented in the Jimmy Camp Creek DBPS - FSD Costs Memo. This includes engineering costs.

<sup>5</sup> Based on \$76,602/Ac per City of Colorado Springs code

<sup>6</sup> Includes costs to retrofit existing outlet structures for EURV/WQCV and 100-yr flood control. This costs assumes a plate can be placed over a low flow orifice and/or an opening be cut out of the existing drop structure OR 2 CDOT Type C inlets w/ 100LF of 48" RCP be used for the retrofit. Not all existing ponds are retrofit.

**Falcon DBPS**  
**Sub Regional Detention Alternative<sup>1</sup>**

Pond	Q <sub>2</sub> In (cfs)	Q <sub>2</sub> Out (cfs)	Q <sub>100</sub> In (cfs)	Q <sub>100</sub> Out (cfs)	Required Volume (AF) <sup>2</sup>	Land Requirement (ac) <sup>3</sup>	Construction Cost <sup>4</sup>	Land Cost <sup>5</sup>	Improvement Cost <sup>6</sup>	Total Cost
Paint Brush Hills Pond #4	38	29	200	150	1.34	0	\$ -	\$ -	\$ -	\$ -
Paint Brush Hills Pond A	35	7	170	140	2.62	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Paint Brush Hills Pond B1	80	51	420	270	9.17	0	\$ -	\$ -	\$ -	\$ -
Paint Brush Hills Pond B2	51	10	270	180	12.09	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Paint Brush Hills Pond C	56	3	300	140	6.77	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Regional Pond MN	65	32	850	820	7.53	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Regional Pond R1	110	77	1,600	1,500	25.00	7.13	\$ 612,500	\$ 1,915,050	\$ -	\$ 2,527,550
Regional Pond R2	140	140	2,100	2,100	7.90	2.25	\$ 193,550	\$ 605,156	\$ -	\$ 798,706
Regional Pond WU South	47	22	1,070	930	39.54	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Sub Regional Pond SR1	54	42	610	510	11.03	3.14	\$ 270,235	\$ 844,920	\$ -	\$ 1,115,155
Sub Regional Pond SR2	65	65	840	840	2.05	0.58	\$ 50,225	\$ 157,034	\$ -	\$ 207,259
Sub Regional Pond SR3	72	72	910	910	1.03	0.29	\$ 25,235	\$ 78,900	\$ -	\$ 104,135
Sub Regional Pond SR4	130	27	1,000	730	19.37	5.52	\$ 474,565	\$ 1,483,781	\$ -	\$ 1,958,346
Sub Regional Pond SR6	74	9	390	200	11.82	3.37	\$ 289,590	\$ 905,436	\$ -	\$ 1,195,026
The Meadows Pond #1	11	0	75	2	3.25	0	\$ -	\$ -	\$ 10,000	\$ 10,000
The Meadows Pond #2	28	5	210	99	7.94	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #1 North	65	61	390	260	7.13	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #1 South	61	10	260	260	8.78	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #2	37	10	270	250	9.18	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #3	105	13	530	360	8.35	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #4	110	15	790	260	40.45	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond #5	40	1	130	19	4.10	0	\$ -	\$ -	\$ 10,000	\$ 10,000
Woodmen Hills Pond H	140	110	750	750	2.66	0	\$ -	\$ -	\$ -	\$ -
Subtotal										\$ 8,036,176
Engineering (15%)										\$ 1,205,426
Contingency (20%)										\$ 1,607,235
Total										\$ 10,848,838

Notes

<sup>1</sup> Represents future hydrology with retrofit existing detention ponds and 7 new sub regional detention ponds

<sup>2</sup> Required volume to highest WSE not including embankment

<sup>3</sup> Land requirement for proposed ponds is based on a (land area/pond volume) ratio of 0.285 Ac/AF as documented in the Jimmy Camp Creek DBPS - FSD Costs Memo.

<sup>4</sup> Based on \$24,500/AF as documented in the Jimmy Camp Creek DBPS - FSD Costs Memo. This includes engineering costs.

<sup>5</sup> Based on \$76,602/Ac per City of Colorado Springs code

<sup>6</sup> Includes costs to retrofit existing outlet structures for EURV/WQCV and 100-yr flood control. This costs assumes a plate can be placed over a low flow orifice and/or an opening be cut out of the existing drop structure OR 2 CDOT Type C inlets w/ 100LF of 48" RCP be used for the retrofit. Not all existing ponds are retrofit.

**Falcon DBPS**  
**2-yr Flow Depths in Reaches<sup>1</sup>**

Reach	Do Nothing Detention Alternative	Regional Detention Alternative	Sub Regional Detention Alternative
RET020	0.90	0.90	0.90
RET030	1.30	1.30	0.64
RET040	2.18	2.18	1.62
RET050	1.44	1.09	0.93
RET060	0.69	0.64	0.66
RET070	0.53	0.53	0.51
RET080	1.25	1.25	1.25
RET090	0.64	0.62	0.65
RET100	1.21	1.28	1.28
RET110	1.39	1.46	1.46
RET120	0.73	0.76	0.76
RET140	0.73	0.73	0.73
RET152	0.62	0.62	0.62
RET154	0.31	0.31	0.31
RET156	0.91	0.94	0.94
RET162	1.56	1.56	1.56
RET164	1.52	1.52	1.52
RMT030	0.69	0.69	0.69
RMT040	1.47	1.47	1.47
RMT050	1.82	1.82	1.82
RMT062	0.15	0.26	0.26
RMT064	1.76	1.76	1.76
RMT070	0.91	0.91	0.39
RMT102	1.16	1.36	0.82
RMT104	0.74	0.26	0.26
RMT106	2.43	2.85	1.63
RMT112	1.16	1.28	0.82
RMT114	1.20	1.39	0.82
RWT030	0.51	0.51	0.51
RWT042	0.50	0.50	0.50
RWT044	0.71	0.71	0.71
RWT046	0.54	0.54	0.54
RWT054	1.31	1.31	1.31
RWT080	0.26	0.26	0.26
RWT092	1.46	1.46	1.46
RWT094	0.58	0.58	0.52
RWT122	1.45	1.41	1.32
RWT124	0.68	0.65	0.58
RWT150	1.06	1.06	1.06
RWT160	0.71	0.61	0.61
RWT172	1.13	1.06	0.94
RWT174	0.62	0.62	0.62

**Falcon DBPS**  
**2-yr Flow Depths in Reaches<sup>1</sup>**

Reach	Do Nothing Detention Alternative	Regional Detention Alternative	Sub Regional Detention Alternative
RWT176	1.16	1.05	0.96
RWT180	0.85	0.77	0.70
RWT202	0.55	0.51	0.48
RWT204	0.28	0.07	0.07
RWT210	1.16	1.07	0.98
RWT232	0.85	0.79	0.74
RWT234	0.74	0.74	0.74
RWT240	2.92	2.74	2.56
RWT240_DIVERSION REACH	1.33	1.30	1.20
RWT250	1.73	1.34	1.23
RWT260	1.51	1.42	1.42
RWT291	1.46	1.38	1.37
RWT292	0.33	0.33	0.33
RWT294	0.53	0.53	0.53
RWT295	1.12	1.07	1.07
RWT296	1.15	1.14	1.14
RWT312	0.54	0.54	0.54
RWT314	1.78	1.39	1.38
RWT320	2.78	2.13	2.11
RWT344	1.11	1.11	1.11
RWT352	2.33	1.77	1.75
RWT354	1.55	1.26	1.34
RWT372	2.81	2.28	2.29
RWT374	0.53	0.53	0.53
RWT376	3.32	2.66	2.66

Notes

<sup>1</sup> From HEC-HMS Models for each alternative. Depths used as a rough estimate only.

**Falcon DBPS**  
**Do Nothing Reach Alternative**

Protect in Place  
Max Shear Stress 1 lb/ft<sup>2</sup>  
Target Slope 0.015 ft/ft  
Min 3ft Drop Spacing 100 ft

If the reach is currently in a stable condition and flows are at or below historical flow based on average calculated shear stress for existing reaches that are stable based on average slope for existing reaches that are stable from Cottonwood Creek DBPS

Reach	Stable Reach?	Reach Length	Reach Slope (ft/ft)	Q2 (cfs)	Historical Flows?	2-yr Depth (ft) <sup>2</sup>	Reach Shear Stress (psf)	Distance Between 3ft Drops	Reach Alternative
RET020		3,064	0.019	29	No	0.90	1.05	833	Small Drop Structures w/ Toe Protection
RET030		5,307	0.015	71	No	1.30	1.19	Drops Not Needed	Small Drop Structures w/ Toe Protection
RET040		1,951	0.019	95	No	2.18	2.65	670	Small Drop Structures w/ Toe Protection
RET050	Yes	1,877	0.021	27	No	1.44	1.86	520	Small Drop Structures w/ Toe Protection
RET060	Yes	1,866	0.012	11	Yes	0.69	0.51	Drops Not Needed	Protect In Place
RET070	Yes	2,209	0.019	13	Yes	0.53	0.61	843	Protect In Place
RET080	Yes	1,569	0.004	65	No	1.25	0.35	Drops Not Needed	Natural Channel Desigr
RET090	Yes	379	0.005	15	Yes	0.64	0.21	Drops Not Needed	Protect In Place
RET100		1,917	0.020	26	No	1.21	1.54	561	Small Drop Structures w/ Toe Protection
RET110		2,957	0.015	27	No	1.39	1.26	Drops Not Needed	Small Drop Structures w/ Toe Protection
RET120		1,475	0.005	39	No	0.73	0.22	Drops Not Needed	Natural Channel Desigr
RET140		4,053	0.013	11	No	0.73	0.61	Drops Not Needed	Natural Channel Desigr
RET152		2,217	0.018	49	No	0.62	0.68	1159	Small Drop Structures w/ Toe Protection
RET154	Yes	2,358	0.013	26	No	0.31	0.26	Drops Not Needed	Natural Channel Desigr
RET156		1,007	0.008	50	No	0.91	0.45	Drops Not Needed	Natural Channel Desigr
RET162		3,411	0.011	59	No	1.56	1.05	Drops Not Needed	Small Drop Structures w/ Toe Protection
RET164		2,095	0.012	66	No	1.52	1.18	Drops Not Needed	Small Drop Structures w/ Toe Protection
RMT030		3,636	0.020	25	No	0.69	0.87	568	Small Drop Structures w/ Toe Protection
RMT040		1,310	0.009	49	No	1.47	0.84	Drops Not Needed	Natural Channel Desigr
RMT050		1,568	0.019	110	No	1.82	2.18	725	Small Drop Structures w/ Toe Protection
RMT062	Yes	6,002	0.020	1	Yes	0.15	0.19	581	Protect In Place
RMT064		3,356	0.016	120	No	1.76	1.77	2749	Small Drop Structures w/ Toe Protection
RMT070	Yes	1,118	0.011	130	No	0.91	0.61	Drops Not Needed	Natural Channel Desigr
RMT102	Yes	1,101	0.021	86	No	1.16	1.51	510	Small Drop Structures w/ Toe Protection
RMT104	Yes	867	0.015	9	No	0.74	0.69	Drops Not Needed	Natural Channel Desigr
RMT106	Yes	235	0.004	91	No	2.43	0.65	Drops Not Needed	Natural Channel Desigr
RMT112	Yes	3,556	0.014	92	No	1.16	1.04	Drops Not Needed	Small Drop Structures w/ Toe Protection
RMT114	Yes	1,760	0.017	94	No	1.20	1.28	1468	Small Drop Structures w/ Toe Protection
RWT030		2,079	0.023	4	No	0.51	0.73	366	Small Drop Structures w/ Toe Protection
RWT042		1,561	0.026	9	No	0.50	0.82	264	Small Drop Structures w/ Toe Protection
RWT044		2,369	0.029	9	No	0.71	1.28	212	Small Drop Structures w/ Toe Protection
RWT046		2,588	0.021	15	No	0.54	0.72	480	Small Drop Structures w/ Toe Protection
RWT054		2,699	0.021	24	No	1.31	1.73	490	Small Drop Structures w/ Toe Protection
RWT080		3,462	0.027	14	No	0.26	0.44	247	Small Drop Structures w/ Toe Protection
RWT092		652	0.018	43	No	1.46	1.68	881	Small Drop Structures w/ Toe Protection
RWT094		2,358	0.011	54	No	0.58	0.41	Drops Not Needed	Natural Channel Desigr
RWT122		562	0.012	68	No	1.45	1.13	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT124		2,424	0.017	77	No	0.68	0.70	1997	Small Drop Structures w/ Toe Protection
RWT150		2,608	0.019	32	No	1.06	1.26	750	Small Drop Structures w/ Toe Protection
RWT160	Yes	1,566	0.020	15	Yes	0.71	0.90	552	Protect In Place
RWT172	Yes	3,102	0.019	85	No	1.13	1.34	746	Small Drop Structures w/ Toe Protection
RWT174	Yes	1,870	0.016	35	No	0.62	0.62	2867	Small Drop Structures w/ Toe Protection
RWT176	Yes	326	0.012	98	No	1.16	0.88	Drops Not Needed	Natural Channel Desigr
RWT180	Yes	3,728	0.020	100	No	0.85	1.09	556	Small Drop Structures w/ Toe Protection
RWT202	Yes	3,012	0.021	100	No	0.55	0.73	484	Small Drop Structures w/ Toe Protection
RWT204	Yes	3,538	0.022	4	No	0.28	0.38	441	Small Drop Structures w/ Toe Protection
RWT210		2,915	0.013	110	No	1.16	0.97	Drops Not Needed	Natural Channel Desigr
RWT232	Yes	2,180	0.018	120	No	0.85	0.95	1038	Small Drop Structures w/ Toe Protection
RWT234		2,126	0.020	47	No	0.74	0.92	587	Small Drop Structures w/ Toe Protection
RWT240		1,044	0.013	130	No	2.92	2.37	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT240_Diversion Reach		929	0.013	30	Yes	1.33	1.08	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT250		184	0.005	83	Yes	1.73	0.59	Drops Not Needed	Natural Channel Desigr
RWT260	Yes	2,371	0.015	85	No	1.51	1.43	16393	Small Drop Structures w/ Toe Protection
RWT291	Yes	987	0.022	86	Yes	1.46	2.03	411	Protect In Place
RWT292	Yes	733	0.017	11	No	0.33	0.34	2000	Small Drop Structures w/ Toe Protection
RWT294	Yes	536	0.015	33	No	0.53	0.49	Drops Not Needed	Natural Channel Desigr
RWT295	Yes	217	0.009	86	Yes	1.12	0.64	Drops Not Needed	Protect In Place
RWT296	Yes	1,203	0.009	94	No	1.15	0.66	Drops Not Needed	Natural Channel Desigr
RWT312	Yes	3,296	0.027	12	No	0.54	0.89	261	Small Drop Structures w/ Toe Protection
RWT314	Yes	2,429	0.015	160	No	1.78	1.65	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT320	Yes	2,460	0.009	160	No	2.78	1.62	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT344		1,381	0.011	32	No	1.11	0.76	Drops Not Needed	Natural Channel Desigr
RWT352		3,134	0.012	160	No	2.33	1.76	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT354		14	0.012	210	No	1.55	1.17	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT372		1,466	0.018	230	No	2.81	3.23	879	Small Drop Structures w/ Toe Protection
RWT374	Yes	2,310	0.016	7	No	0.53	0.53	3000	Small Drop Structures w/ Toe Protection
RWT376	Yes	2,602	0.010	230	No	3.32	2.15	Drops Not Needed	Small Drop Structures w/ Toe Protection

Reach Alternative	Total (ft)	Cost/LF <sup>3</sup>	Total Cost
Protect In Place	13,225	\$ -	\$ -
Natural Channel Desigr	22,893	\$ 400.00	\$ 9,157,255
Small Drop Structures w/ Toe Protection	103,118	\$ 900.00	\$ 92,806,542
Large Drop Structures w/ Toe Protection	0	\$ 2,600.00	\$ -
Subtotal			\$ 101,963,797
Engineering (15%)			\$ 15,294,570
Contingency (20%)			\$ 20,392,759
Total			\$ 137,651,126

Notes

- <sup>1</sup> Based on limited field observation and inspection of the aerial for reaches that are obviously stable. Entire reach has to be stable. For initial screening purposes only. Not all inclusive
- <sup>2</sup> From HEC-HMS
- <sup>3</sup> Average costs from the Cottonwood Creek DBPS

**Falcon DBPS  
Regional Reach Alternative**

Protect in Place  
Max Shear Stress 1 lb/ft<sup>2</sup>  
Target Slope 0.015 ft/ft  
Min 3ft Drop Spacing 100 ft

If the reach is currently in a stable condition and flows are at or below historical flow based on average calculated shear stress for existing reaches that are stable based on average slope for existing reaches that are stable from Cottonwood Creek DBPS

Reach	Stable Reach?	Reach Length	Reach Slope (ft/ft)	Q2 (cfs)	Historical Flows?	2-yr Depth (ft) <sup>1</sup>	Reach Shear Stress (psf)	Distance Between 3ft Drops	Reach Alternative
RET020		3,064	0.019	29	No	0.90	1.05	833	Small Drop Structures w/ Toe Protection
RET030		5,307	0.015	71	No	1.30	1.19	Drops Not Needed	Small Drop Structures w/ Toe Protection
RET040		1,951	0.019	95	No	2.18	2.65	670	Small Drop Structures w/ Toe Protection
RET050	Yes	1,877	0.021	14	Yes	1.09	1.41	520	Protect In Place
RET060	Yes	1,866	0.012	10	Yes	0.64	0.47	Drops Not Needed	Protect In Place
RET070	Yes	2,209	0.019	14	Yes	0.53	0.62	843	Protect In Place
RET080	Yes	1,569	0.004	65	No	1.25	0.35	Drops Not Needed	Natural Channel Desigr
RET090	Yes	379	0.005	14	Yes	0.62	0.20	Drops Not Needed	Protect In Place
RET100		1,917	0.020	30	No	1.28	1.63	561	Small Drop Structures w/ Toe Protection
RET110		2,957	0.015	32	No	1.46	1.33	Drops Not Needed	Small Drop Structures w/ Toe Protection
RET120		1,475	0.005	42	No	0.76	0.22	Drops Not Needed	Natural Channel Desigr
RET140		4,053	0.013	11	No	0.73	0.61	Drops Not Needed	Natural Channel Desigr
RET152		2,217	0.018	49	No	0.62	0.68	1159	Small Drop Structures w/ Toe Protection
RET154	Yes	2,358	0.013	26	No	0.31	0.26	Drops Not Needed	Natural Channel Desigr
RET156		1,007	0.008	55	No	0.94	0.47	Drops Not Needed	Natural Channel Desigr
RET162		3,411	0.011	59	No	1.56	1.06	Drops Not Needed	Small Drop Structures w/ Toe Protection
RET164		2,095	0.012	66	No	1.52	1.18	Drops Not Needed	Small Drop Structures w/ Toe Protection
RMT030		3,636	0.020	25	No	0.69	0.87	568	Small Drop Structures w/ Toe Protection
RMT040		1,310	0.009	49	No	1.47	0.84	Drops Not Needed	Natural Channel Desigr
RMT050		1,568	0.019	110	No	1.82	2.18	725	Small Drop Structures w/ Toe Protection
RMT062	Yes	6,002	0.020	5	No	0.26	0.32	581	Small Drop Structures w/ Toe Protection
RMT064		3,356	0.016	120	No	1.76	1.77	2749	Small Drop Structures w/ Toe Protection
RMT070	Yes	1,118	0.011	130	No	0.91	0.61	Drops Not Needed	Natural Channel Desigr
RMT102	Yes	1,101	0.021	140	No	1.36	1.78	510	Small Drop Structures w/ Toe Protection
RMT104	Yes	867	0.015	1	No	0.26	0.24	Drops Not Needed	Natural Channel Desigr
RMT106	Yes	235	0.004	140	No	2.85	0.76	Drops Not Needed	Natural Channel Desigr
RMT112	Yes	3,556	0.014	140	No	1.28	1.15	Drops Not Needed	Small Drop Structures w/ Toe Protection
RMT114	Yes	1,760	0.017	140	No	1.39	1.48	1468	Small Drop Structures w/ Toe Protection
RWT030		2,079	0.023	4	No	0.51	0.73	366	Small Drop Structures w/ Toe Protection
RWT042		1,561	0.026	9	No	0.50	0.82	264	Small Drop Structures w/ Toe Protection
RWT044		2,369	0.029	9	No	0.71	1.28	212	Small Drop Structures w/ Toe Protection
RWT046		2,588	0.021	15	No	0.54	0.72	480	Small Drop Structures w/ Toe Protection
RWT054		2,699	0.021	24	No	1.31	1.73	490	Small Drop Structures w/ Toe Protection
RWT080		3,462	0.027	14	No	0.26	0.44	247	Small Drop Structures w/ Toe Protection
RWT092		652	0.018	43	No	1.46	1.68	881	Small Drop Structures w/ Toe Protection
RWT094		2,358	0.011	54	No	0.58	0.41	Drops Not Needed	Natural Channel Desigr
RWT122		562	0.012	60	No	1.41	1.09	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT124		2,424	0.017	68	No	0.65	0.67	1997	Small Drop Structures w/ Toe Protection
RWT150		2,608	0.019	32	No	1.06	1.26	750	Small Drop Structures w/ Toe Protection
RWT160	Yes	1,566	0.020	10	Yes	0.61	0.77	552	Protect In Place
RWT172	Yes	3,102	0.019	73	No	1.06	1.26	746	Small Drop Structures w/ Toe Protection
RWT174	Yes	1,870	0.016	35	No	0.62	0.62	2867	Small Drop Structures w/ Toe Protection
RWT176	Yes	326	0.012	79	Yes	1.05	0.81	Drops Not Needed	Protect In Place
RWT180	Yes	3,728	0.020	81	Yes	0.77	0.98	556	Protect In Place
RWT202	Yes	3,012	0.021	83	No	0.51	0.68	484	Small Drop Structures w/ Toe Protection
RWT204	Yes	3,538	0.022	0	Yes	0.07	0.10	441	Protect In Place
RWT210		2,915	0.013	89	No	1.07	0.89	Drops Not Needed	Natural Channel Desigr
RWT232	Yes	2,180	0.018	97	No	0.79	0.88	1038	Small Drop Structures w/ Toe Protection
RWT234		2,126	0.020	47	No	0.74	0.92	587	Small Drop Structures w/ Toe Protection
RWT240		1,044	0.013	100	No	2.74	2.22	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT240_Diversion Reach		929	0.013	28	Yes	1.30	1.06	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT250		184	0.005	50	Yes	1.34	0.45	Drops Not Needed	Natural Channel Desigr
RWT260	Yes	2,371	0.015	62	Yes	1.42	1.35	16393	Protect In Place
RWT291	Yes	987	0.022	70	Yes	1.38	1.91	411	Protect In Place
RWT292	Yes	733	0.017	11	No	0.33	0.34	2000	Small Drop Structures w/ Toe Protection
RWT294	Yes	536	0.015	33	No	0.53	0.49	Drops Not Needed	Natural Channel Desigr
RWT295	Yes	217	0.009	73	Yes	1.07	0.61	Drops Not Needed	Protect In Place
RWT296	Yes	1,203	0.009	93	No	1.14	0.65	Drops Not Needed	Natural Channel Desigr
RWT312	Yes	3,296	0.027	12	No	0.54	0.89	261	Small Drop Structures w/ Toe Protection
RWT314	Yes	2,429	0.015	79	Yes	1.39	1.29	Drops Not Needed	Protect In Place
RWT320	Yes	2,460	0.009	81	Yes	2.13	1.24	Drops Not Needed	Protect In Place
RWT344		1,381	0.011	32	No	1.11	0.76	Drops Not Needed	Natural Channel Desigr
RWT352		3,134	0.012	82	Yes	1.77	1.33	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT354		14	0.012	110	Yes	1.26	0.95	Drops Not Needed	Natural Channel Desigr
RWT372		1,466	0.018	140	No	2.28	2.62	879	Small Drop Structures w/ Toe Protection
RWT374	Yes	2,310	0.016	7	No	0.53	0.53	3000	Small Drop Structures w/ Toe Protection
RWT376	Yes	2,602	0.010	140	No	2.66	1.72	Drops Not Needed	Small Drop Structures w/ Toe Protection

Reach Alternative	Total (ft)	Cost/LF <sup>3</sup>	Total Cost
Protect In Place	23,952	\$ -	\$ -
Natural Channel Desigr	22,581	\$ 400.00	\$ 9,032,344
Small Drop Structures w/ Toe Protection	92,704	\$ 900.00	\$ 83,433,171
Large Drop Structures w/ Toe Protection	0	\$ 2,600.00	\$ -
Subtotal			\$ 92,465,515
Engineering (15%)			\$ 13,869,827
Contingency (20%)			\$ 18,493,103
Total			\$ 124,828,446

Notes

- <sup>1</sup> Based on limited field observation and inspection of the aerial for reaches that are obviously stable. Entire reach has to be stable. For initial screening purposes only. Not all inclusive
- <sup>2</sup> From HEC-HMS
- <sup>3</sup> Average costs from the Cottonwood Creek DBPS

**Falcon DBPS**  
Sub Regional Reach Alternative

Protect in Place  
Max Shear Stress 1 lb/ft<sup>2</sup>  
Target Slope 0.015 ft/ft  
Min 3ft Drop Spacing 100 ft

If the reach is currently in a stable condition and flows are at or below historical flow based on average calculated shear stress for existing reaches that are stable based on average slope for existing reaches that are stable from Cottonwood Creek DBPS

Reach	Stable Reach?	Reach Length	Reach Slope (ft/ft)	Q2 (cfs)	Historical Flows?	2-yr Depth (ft) <sup>1</sup>	Reach Shear Stress (psf)	Distance Between 3ft Drops	Reach Alternative
RET020		3,064	0.019	29	No	0.90	1.05	833	Small Drop Structures w/ Toe Protection
RET030		5,307	0.015	9	Yes	0.64	0.58	Drops Not Needed	Natural Channel Desigr
RET040		1,951	0.019	45	No	1.62	1.97	670	Small Drop Structures w/ Toe Protection
RET050	Yes	1,877	0.021	10	Yes	0.93	1.20	520	Protect In Place
RET060	Yes	1,866	0.012	10	Yes	0.66	0.48	Drops Not Needed	Protect In Place
RET070	Yes	2,209	0.019	13	Yes	0.51	0.59	843	Protect In Place
RET080	Yes	1,569	0.004	65	No	1.25	0.35	Drops Not Needed	Natural Channel Desigr
RET090	Yes	379	0.005	15	Yes	0.65	0.21	Drops Not Needed	Protect In Place
RET100		1,917	0.020	30	No	1.28	1.63	561	Small Drop Structures w/ Toe Protection
RET110		2,957	0.015	32	No	1.46	1.33	Drops Not Needed	Small Drop Structures w/ Toe Protection
RET120		1,475	0.005	42	No	0.76	0.22	Drops Not Needed	Natural Channel Desigr
RET140		4,053	0.013	11	No	0.73	0.61	Drops Not Needed	Natural Channel Desigr
RET152		2,217	0.018	49	No	0.62	0.68	1159	Small Drop Structures w/ Toe Protection
RET154	Yes	2,358	0.013	26	No	0.31	0.26	Drops Not Needed	Natural Channel Desigr
RET156		1,007	0.008	55	No	0.94	0.47	Drops Not Needed	Natural Channel Desigr
RET162		3,411	0.011	59	No	1.56	1.06	Drops Not Needed	Small Drop Structures w/ Toe Protection
RET164		2,095	0.012	66	No	1.52	1.18	Drops Not Needed	Small Drop Structures w/ Toe Protection
RMT030		3,636	0.020	25	No	0.69	0.87	568	Small Drop Structures w/ Toe Protection
RMT040		1,310	0.009	49	No	1.47	0.84	Drops Not Needed	Natural Channel Desigr
RMT050		1,568	0.019	110	No	1.82	2.18	725	Small Drop Structures w/ Toe Protection
RMT062	Yes	6,002	0.020	5	No	0.26	0.32	581	Small Drop Structures w/ Toe Protection
RMT064		3,356	0.016	120	No	1.76	1.77	2749	Small Drop Structures w/ Toe Protection
RMT070	Yes	1,118	0.011	27	No	0.39	0.26	Drops Not Needed	Natural Channel Desigr
RMT102	Yes	1,101	0.021	32	No	0.82	1.07	510	Small Drop Structures w/ Toe Protection
RMT104	Yes	867	0.015	1	No	0.26	0.24	Drops Not Needed	Natural Channel Desigr
RMT106	Yes	235	0.004	33	No	1.63	0.43	Drops Not Needed	Natural Channel Desigr
RMT112	Yes	3,556	0.014	33	No	0.82	0.73	Drops Not Needed	Natural Channel Desigr
RMT114	Yes	1,760	0.017	34	No	0.82	0.88	1468	Small Drop Structures w/ Toe Protection
RWT030		2,079	0.023	4	No	0.51	0.73	366	Small Drop Structures w/ Toe Protection
RWT042		1,561	0.026	9	No	0.50	0.82	264	Small Drop Structures w/ Toe Protection
RWT044		2,369	0.029	9	No	0.71	1.28	212	Small Drop Structures w/ Toe Protection
RWT046		2,588	0.021	15	No	0.54	0.72	480	Small Drop Structures w/ Toe Protection
RWT054		2,699	0.021	24	No	1.31	1.73	490	Small Drop Structures w/ Toe Protection
RWT080		3,462	0.027	14	No	0.26	0.44	247	Small Drop Structures w/ Toe Protection
RWT092		652	0.018	43	No	1.46	1.68	881	Small Drop Structures w/ Toe Protection
RWT094		2,358	0.011	42	No	0.52	0.37	Drops Not Needed	Natural Channel Desigr
RWT122		562	0.012	47	Yes	1.32	1.03	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT124		2,424	0.017	51	Yes	0.58	0.60	1997	Small Drop Structures w/ Toe Protection
RWT150		2,608	0.019	32	No	1.06	1.26	750	Small Drop Structures w/ Toe Protection
RWT160	Yes	1,566	0.020	10	Yes	0.61	0.77	552	Protect In Place
RWT172	Yes	3,102	0.019	54	Yes	0.94	1.12	746	Protect In Place
RWT174	Yes	1,870	0.016	35	No	0.62	0.62	2867	Small Drop Structures w/ Toe Protection
RWT176	Yes	326	0.012	63	Yes	0.96	0.73	Drops Not Needed	Protect In Place
RWT180	Yes	3,728	0.020	65	Yes	0.70	0.89	556	Protect In Place
RWT202	Yes	3,012	0.021	66	Yes	0.48	0.63	484	Protect In Place
RWT204	Yes	3,538	0.022	0	Yes	0.07	0.10	441	Protect In Place
RWT210		2,915	0.013	71	Yes	0.98	0.82	Drops Not Needed	Natural Channel Desigr
RWT232	Yes	2,180	0.018	81	No	0.74	0.82	1038	Small Drop Structures w/ Toe Protection
RWT234		2,126	0.020	47	No	0.74	0.92	587	Small Drop Structures w/ Toe Protection
RWT240		1,044	0.013	86	No	2.56	2.08	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT240_Diversion Reach		929	0.013	24	Yes	1.20	0.97	Drops Not Needed	Natural Channel Desigr
RWT250		184	0.005	42	Yes	1.23	0.42	Drops Not Needed	Natural Channel Desigr
RWT260	Yes	2,371	0.015	62	Yes	1.42	1.35	16393	Protect In Place
RWT291	Yes	987	0.022	70	Yes	1.37	1.91	411	Protect In Place
RWT292	Yes	733	0.017	11	No	0.33	0.34	2000	Small Drop Structures w/ Toe Protection
RWT294	Yes	536	0.015	33	No	0.53	0.49	Drops Not Needed	Natural Channel Desigr
RWT295	Yes	217	0.009	73	Yes	1.07	0.61	Drops Not Needed	Protect In Place
RWT296	Yes	1,203	0.009	93	No	1.14	0.65	Drops Not Needed	Natural Channel Desigr
RWT312	Yes	3,296	0.027	12	No	0.54	0.89	261	Small Drop Structures w/ Toe Protection
RWT314	Yes	2,429	0.015	77	Yes	1.38	1.28	Drops Not Needed	Protect In Place
RWT320	Yes	2,460	0.009	79	Yes	2.11	1.23	Drops Not Needed	Protect In Place
RWT344		1,381	0.011	32	No	1.11	0.76	Drops Not Needed	Natural Channel Desigr
RWT352		3,134	0.012	80	Yes	1.75	1.32	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT354		14	0.012	130	No	1.34	1.01	Drops Not Needed	Small Drop Structures w/ Toe Protection
RWT372		1,466	0.018	140	No	2.29	2.63	879	Small Drop Structures w/ Toe Protection
RWT374	Yes	2,310	0.016	7	No	0.53	0.53	3000	Small Drop Structures w/ Toe Protection
RWT376	Yes	2,602	0.010	140	No	2.66	1.72	Drops Not Needed	Small Drop Structures w/ Toe Protection

Reach Alternative	Total (ft)	Cost/LF <sup>2</sup>	Total Cost
Protect In Place	30,066	\$ -	\$ -
Natural Channel Desigr	32,359	\$ 400.00	\$ 12,943,607
Small Drop Structures w/ Toe Protection	76,812	\$ 900.00	\$ 69,130,508
Large Drop Structures w/ Toe Protection	0	\$ 2,600.00	\$ -
Subtotal			\$ 82,074,115
Engineering (15%)			\$ 12,311,117
Contingency (20%)			\$ 16,414,823
Total			\$ 110,800,055

Notes

- <sup>1</sup> Based on limited field observation and inspection of the aerial for reaches that are obviously stable. Entire reach has to be stable. For initial screening purposes only. Not all inclusive
- <sup>2</sup> From HEC-HMS
- <sup>3</sup> Average costs from the Cottonwood Creek DBPS

**Falcon DBPS**  
**Alternative Cost Summary**

<b>Alternative</b>	<b>Reach Costs</b>	<b>Detention Costs</b>	<b>Total</b>
Do Nothing	\$138,000,000	\$0	\$138,000,000
Regional Alternative	\$125,000,000	\$7,660,000	\$133,000,000
Sub Regional Alternative	\$111,000,000	\$10,800,000	\$122,000,000



**Falcon DBPS**  
**Peak Flows at Points of Interest**

Location	HEC-HMS Element	Area (sq mi)	Historical Flows (cfs)		Regional Detention		Sub Regional	
			2-year	100-year	2-year	100-year	2-year	100-year
<b>West Tributary</b>								
Raygor Rd.	JWT030	0.14	6	75	9	85	9	85
Stapleton Rd.	JWT120	1.77	58	750	73	950	55	710
Woodmen Rd.	JWT210	3.09	80	1,000	97	1,300	81	1,000
HWY 24	JWT250	3.70	84	1,100	65	1,200	64	980
Falcon Hwy.	JWT260	3.84	86	1,100	70	1,200	70	1,000
Garrett Rd.	JWT320	6.46	110	1,500	82	1,700	80	1,500
East Blaney Rd.	JWT354	10.30	110	1,700	140	2,400	140	2,100
Upstream of Bennett Ranch Tributary	JWT374_Outlet	10.58	110	1,700	140	2,400	140	2,100
<b>Middle Tributary</b>								
Woodmen Hills Dr.	JMT010	0.29	1	57	5	99	5	99
Woodmen Rd.	JMT070	1.36	24	350	150	1,200	31	840
Hwy. 24	JMT106	1.52	24	360	140	1,100	33	840
Falcon Hwy.	JMT110	1.64	22	360	140	1,100	34	860
Confluence with West Tributary	RMT114	1.64	22	360	140	1,100	34	860
<b>East Tributary</b>								
Stapleton Dr.	JET020	0.36	20	200	74	390	9	200
Woodmen Hills Dr.	JET040	0.71	19	240	14	620	10	260
Eastonville Rd.	JET060	1.11	19	260	14	510	13	360
Hwy. 24	JET090	1.78	17	260	30	410	30	300
Pinto Pony Rd.	JET100	1.83	17	260	32	410	32	300
Falcon Hwy.	JET120	2.16	17	270	50	470	50	400
Garrett Rd.	JET160	2.93	18	300	67	720	67	640
Confluence with West Tributary	RET164	2.93	18	300	66	720	66	630

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: Falcon DBPS  
Basin ID: Paint Brush Hills Pond A

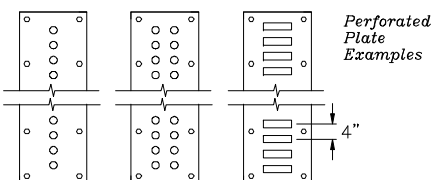
Project: Falcon DBPS  
Basin ID: Paint Brush Hills Pond A

WQCV Design Volume (Input):

Catchment Imperviousness,  $I_p$  = 30.0 percent  
 Catchment Area, A = 65,000 acres  
 Depth at WQCV outlet above lowest perforation, H = 28 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, N<sub>L</sub> = 7  
 Orifice discharge coefficient, C<sub>v</sub> = 0.65

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H = 2.00 in.  
 Width of slot, W = 3.30 in.

Time to Drain the Pond = 40 hours  
 Water Quality Capture Volume Method Selected (40-Hour Release)



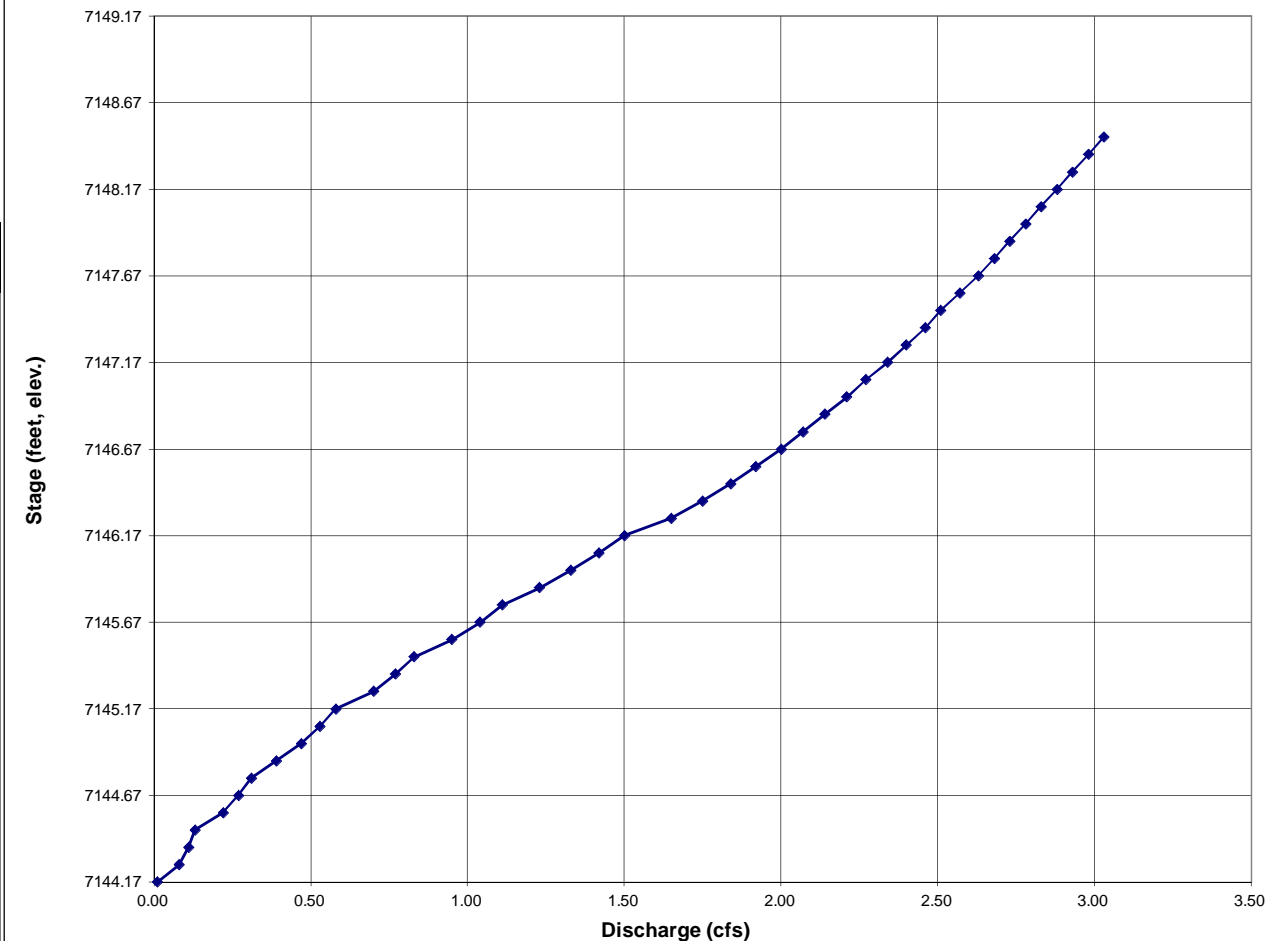
Outlet Design Information (Output):

Water Quality Capture Volume (1.0 \* (0.91 \* I<sub>p</sub><sup>3</sup> - 1.19 \* I<sub>p</sub><sup>2</sup> + 0.78 \* I<sub>p</sub>)), WQCV = 0.151 watershed inches  
 Water Quality Capture Volume (WQCV) = 0.820 acre-feet  
 Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 0.985 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> = 6.61 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 6.61 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 0.046 square feet

Calculation of Collection Capacity:

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	7144.17	7144.50	7144.83	7145.17	7145.50	7145.83	7146.17												
	Collection Capacity for Each Row of Holes in cfs																		
7144.17	0.013	0.000	0.000	0.000	0.000	0.000	0.000												0.01
7144.27	0.077	0.000	0.000	0.000	0.000	0.000	0.000												0.08
7144.37	0.108	0.000	0.000	0.000	0.000	0.000	0.000												0.11
7144.47	0.132	0.000	0.000	0.000	0.000	0.000	0.000												0.13
7144.57	0.152	0.063	0.000	0.000	0.000	0.000	0.000												0.22
7144.67	0.170	0.099	0.000	0.000	0.000	0.000	0.000												0.27
7144.77	0.186	0.124	0.000	0.000	0.000	0.000	0.000												0.31
7144.87	0.201	0.146	0.048	0.000	0.000	0.000	0.000												0.39
7144.97	0.214	0.164	0.090	0.000	0.000	0.000	0.000												0.47
7145.07	0.227	0.181	0.117	0.000	0.000	0.000	0.000												0.53
7145.17	0.240	0.196	0.140	0.000	0.000	0.000	0.000												0.58
7145.27	0.251	0.210	0.159	0.076	0.000	0.000	0.000												0.70
7145.37	0.262	0.223	0.176	0.107	0.000	0.000	0.000												0.77
7145.47	0.273	0.236	0.191	0.131	0.000	0.000	0.000												0.83
7145.57	0.283	0.248	0.206	0.151	0.063	0.000	0.000												0.95
7145.67	0.293	0.259	0.219	0.169	0.099	0.000	0.000												1.04
7145.77	0.303	0.270	0.232	0.185	0.124	0.000	0.000												1.11
7145.87	0.312	0.280	0.244	0.200	0.146	0.048	0.000												1.23
7145.97	0.321	0.290	0.255	0.214	0.164	0.090	0.000												1.33
7146.07	0.330	0.300	0.266	0.227	0.181	0.117	0.000												1.42
7146.17	0.339	0.309	0.277	0.239	0.196	0.140	0.000												1.50
7146.27	0.347	0.318	0.287	0.251	0.210	0.159	0.076												1.65
7146.37	0.355	0.327	0.297	0.262	0.223	0.176	0.107												1.75
7146.47	0.363	0.336	0.306	0.273	0.236	0.191	0.131												1.84
7146.57	0.371	0.344	0.316	0.283	0.248	0.206	0.151												1.92
7146.67	0.379	0.352	0.325	0.293	0.259	0.219	0.169												2.00
7146.77	0.386	0.361	0.333	0.303	0.270	0.232	0.185												2.07
7146.87	0.393	0.368	0.342	0.312	0.280	0.244	0.200												2.14
7146.97	0.401	0.376	0.350	0.321	0.290	0.255	0.214												2.21
7147.07	0.408	0.384	0.358	0.330	0.300	0.266	0.227												2.27
7147.17	0.415	0.391	0.366	0.338	0.309	0.277	0.239												2.34
7147.27	0.422	0.398	0.374	0.347	0.318	0.287	0.251												2.40
7147.37	0.428	0.405	0.381	0.355	0.327	0.297	0.262												2.46
7147.47	0.435	0.412	0.389	0.363	0.336	0.306	0.273												2.51
7147.57	0.441	0.419	0.396	0.371	0.344	0.316	0.283												2.57
7147.67	0.448	0.426	0.403	0.378	0.352	0.325	0.293												2.63
7147.77	0.454	0.433	0.410	0.386	0.361	0.333	0.303												2.68
7147.87	0.460	0.439	0.417	0.393	0.368	0.342	0.312												2.73
7147.97	0.467	0.446	0.424	0.400	0.376	0.350	0.321												2.78
7148.07	0.473	0.452	0.431	0.407	0.384	0.358	0.330												2.83
7148.17	0.479	0.458	0.437	0.414	0.391	0.366	0.338												2.88
7148.27	0.485	0.465	0.444	0.421	0.398	0.374	0.347												2.93
7148.37	0.491	0.471	0.450	0.428	0.405	0.381	0.355												2.98
7148.47	0.496	0.477	0.457	0.435	0.412	0.389	0.363												3.03

STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

**Project:** Falcon DBPS

**Basin ID:** Paint Brush Hills Pond B1 & B2

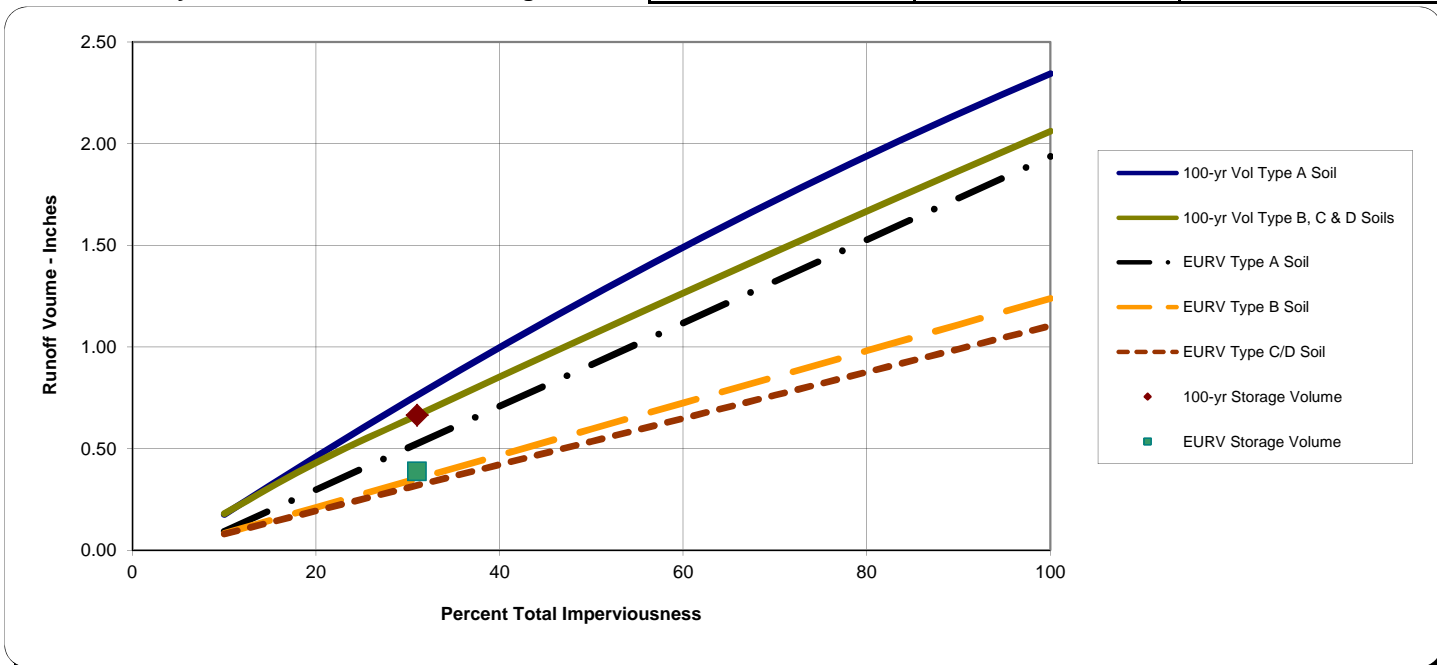
\* User input data shown in blue.

Area of Watershed (acres)	231.00
Subwatershed Imperviousness	31.0%
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0
Effective Imperviousness <sup>1</sup>	31.0%
Hydrologic Soil Type	Percentage of Area      Area (acres)
Type A	0.0
Type B	100.0%      231.0
Type C or D	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.39	7.4563	Design Outlet to Empty EURV in 72 Hours
0.66	12.79	196.35

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

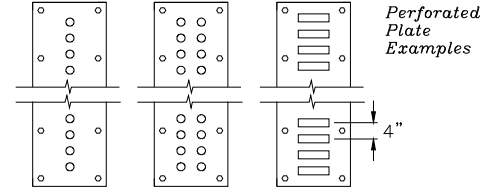
Project: Falcon DBPS
Basin ID: Paint Brush Hills Pond B2

WQCV Design Volume (Input):

Catchment Imperviousness, I\_p = 31.0 percent
Catchment Area, A = 231.000 acres
Depth at WQCV outlet above lowest perforation, H = 72 inches
Vertical distance between rows, h = 4.00 inches
Number of rows, NL = 18
Orifice discharge coefficient, C\_o = 0.65

Diameter of holes, D = in.
Number of holes per row, N = OR
Height of slot, H = 2.00 in.
Width of slot, W = 7.86 in.

Time to Drain the Pond = 72 hours
Excess Urban Runoff Volume Method Selected (72-Hour Release)



Outlet Design Information (Output):

Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.387 watershed inches
Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A\_o = 15.71 square inches
Total opening area at each row based on user-input above, A\_o = 15.71 square inches
Total opening area at each row based on user-input above, A\_o = 0.109 square feet

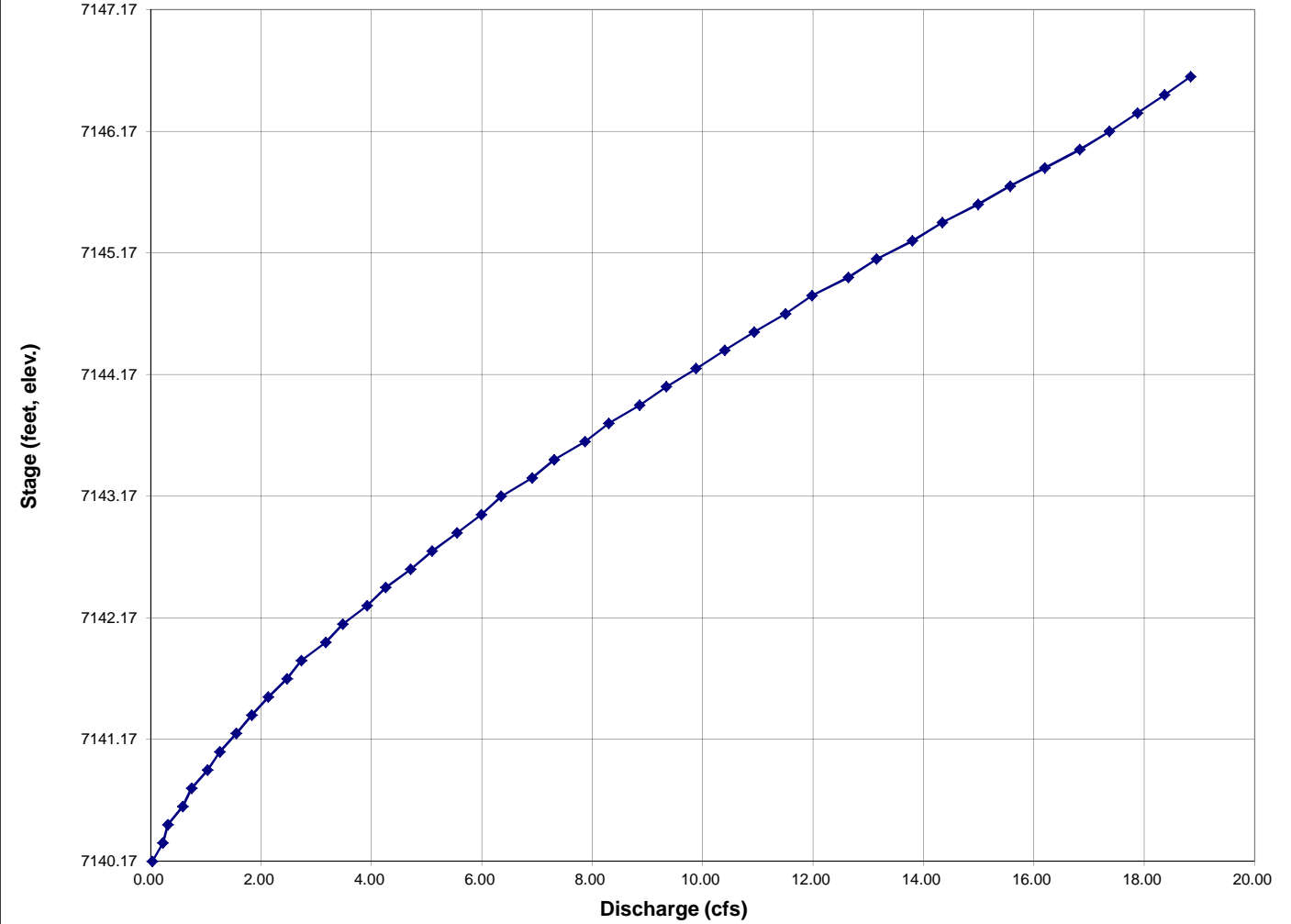
Calculation of Collection Capacity:

Table with 19 columns (Stage ft, Row 1-18, Σ Flow) and 40 rows of data. It includes 'Central Elevations of Rows of Holes in feet' and 'Collection Capacity for Each Row of Holes in cfs'.

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: Falcon DBPS
Basin ID: Paint Brush Hills Pond B2

STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

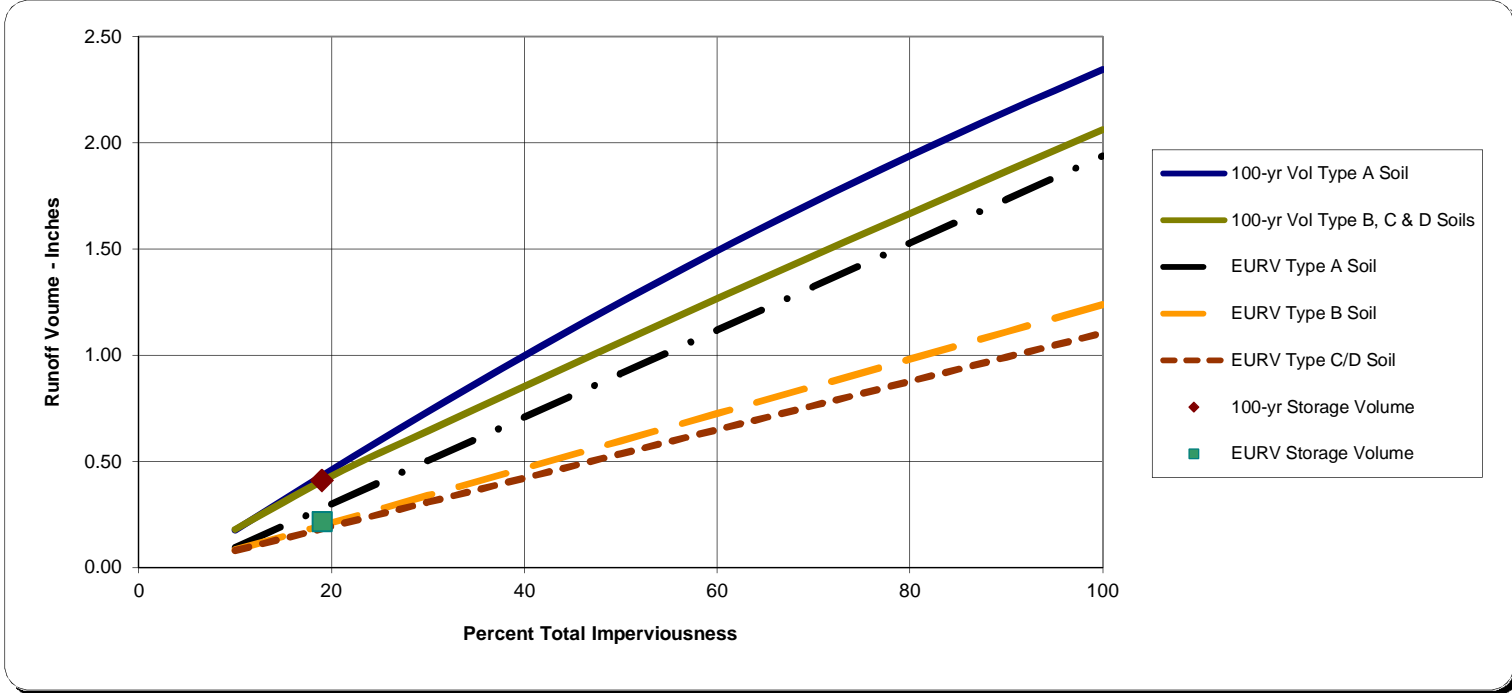
**Project:** Falcon DBPS  
**Basin ID:** Paint Brush Hills Pond C

\* User input data shown in blue.

Area of Watershed (acres)	120.00	
Subwatershed Imperviousness	19.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	19.0%	
Hydrologic Soil Type	<b>Percentage of Area</b>	<b>Area (acres)</b>
Type A	0.0	0.0
Type B	100.0%	120.0
Type C or D	0.0	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018
Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.22	2.1777	Design Outlet to Empty EURV in 72 Hours
0.41	4.10	102.00

**Excess Urban Runoff Volume<sup>4</sup>**  
**100-year Detention Volume Including WQCV<sup>5</sup>**



- Notes:**
- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
  - 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
  - 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
  - 4) EURV approximates the difference between developed and pre-developed runoff volume.
  - 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

**Project:** Falcon DBPS  
**Basin ID:** Regional Pond MN

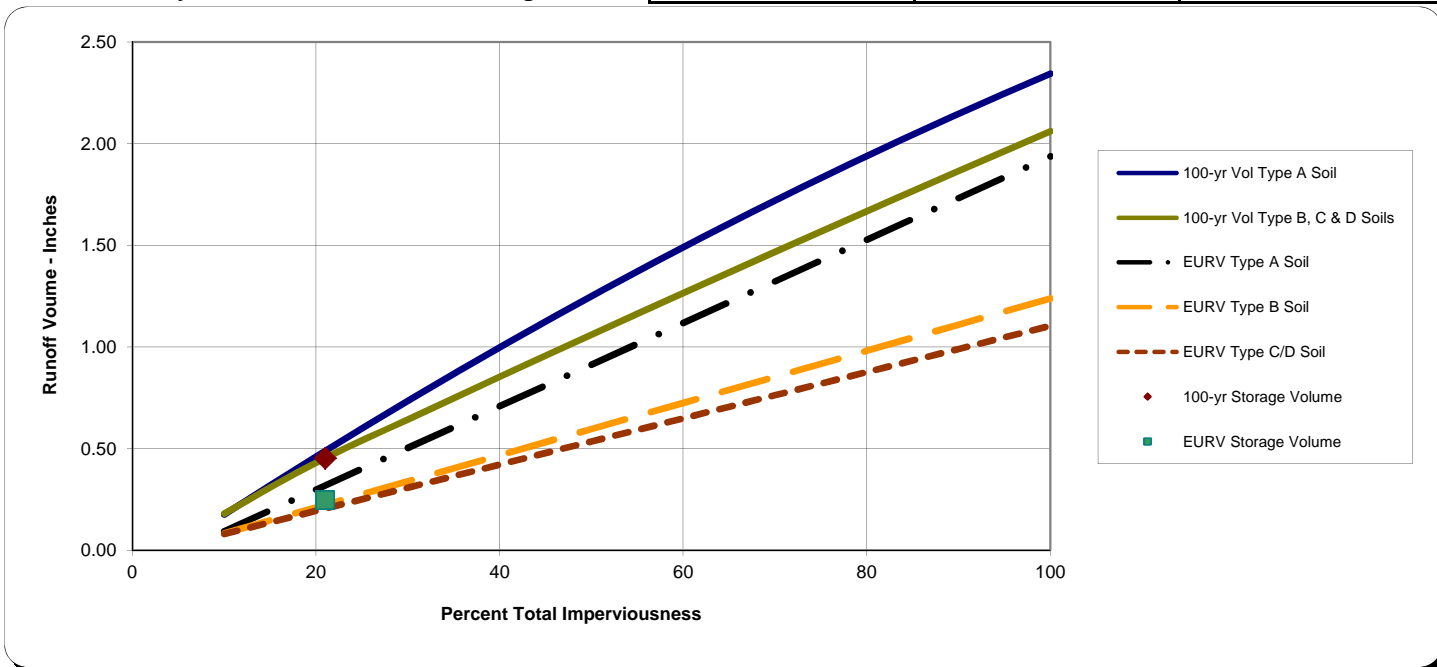
\* User input data shown in blue.

Area of Watershed (acres)	369.00
Subwatershed Imperviousness	21.0%
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0
Effective Imperviousness <sup>1</sup>	21.0%
Hydrologic Soil Type	Percentage of Area      Area (acres)
Type A	0.0
Type B	100.0%      369.0
Type C or D	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.25	7.5655	Design Outlet to Empty EURV in 72 Hours
0.45	13.92	313.65

Excess Urban Runoff Volume<sup>4</sup>  
 100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Regional Pond R1, Woodmen Hills Pond H, Regional Pond MN EURV

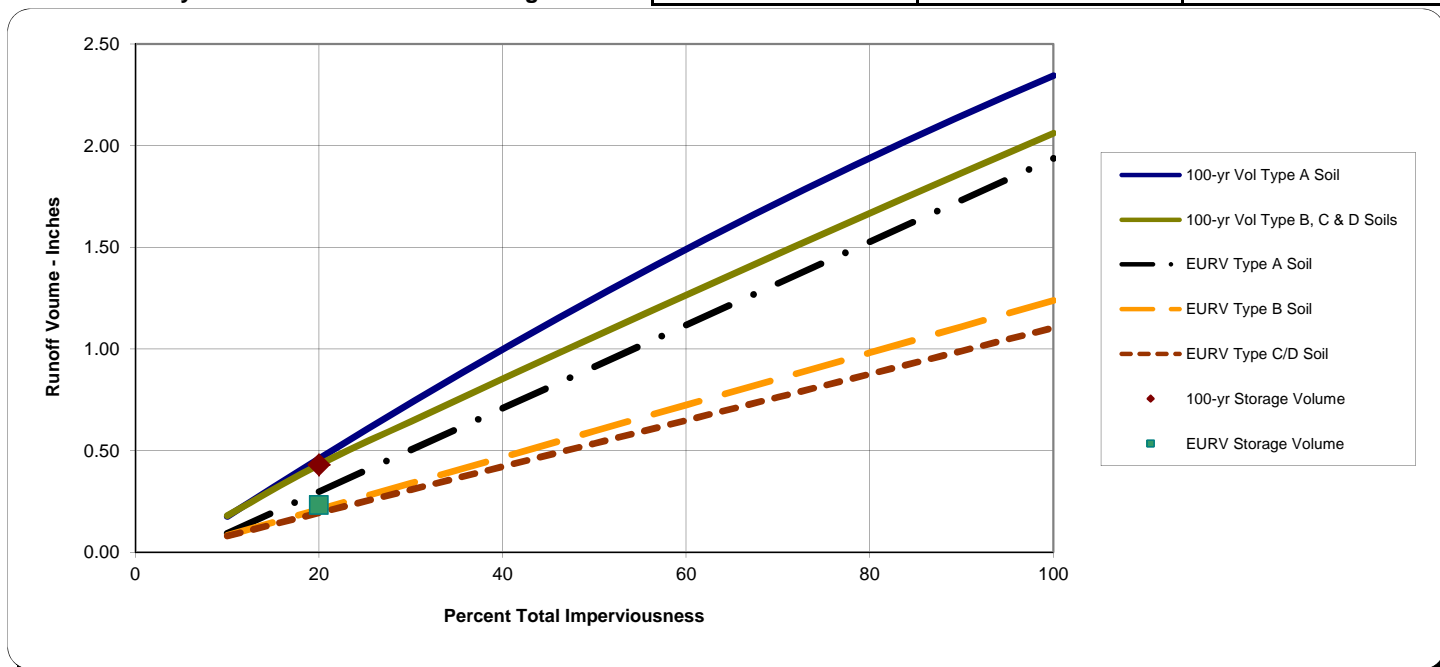
\* User input data shown in blue.

Area of Watershed (acres)	1275.00	
Subwatershed Imperviousness	20.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	20.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	1275.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.23	24.6396	Design Outlet to Empty EURV in 72 Hours
0.43	45.82	1083.75

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



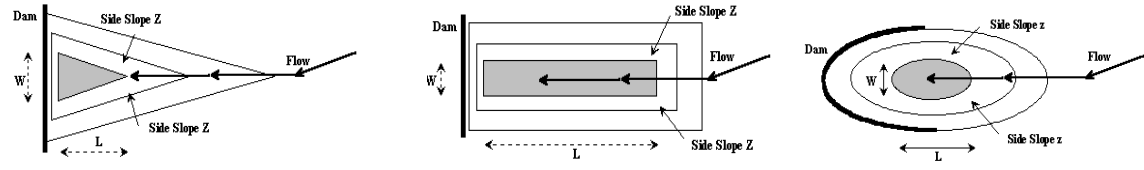


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Regional Pond R1

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 400.00 ft  
Length of Pond Bottom, L = 500.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 5.00 ft/ft

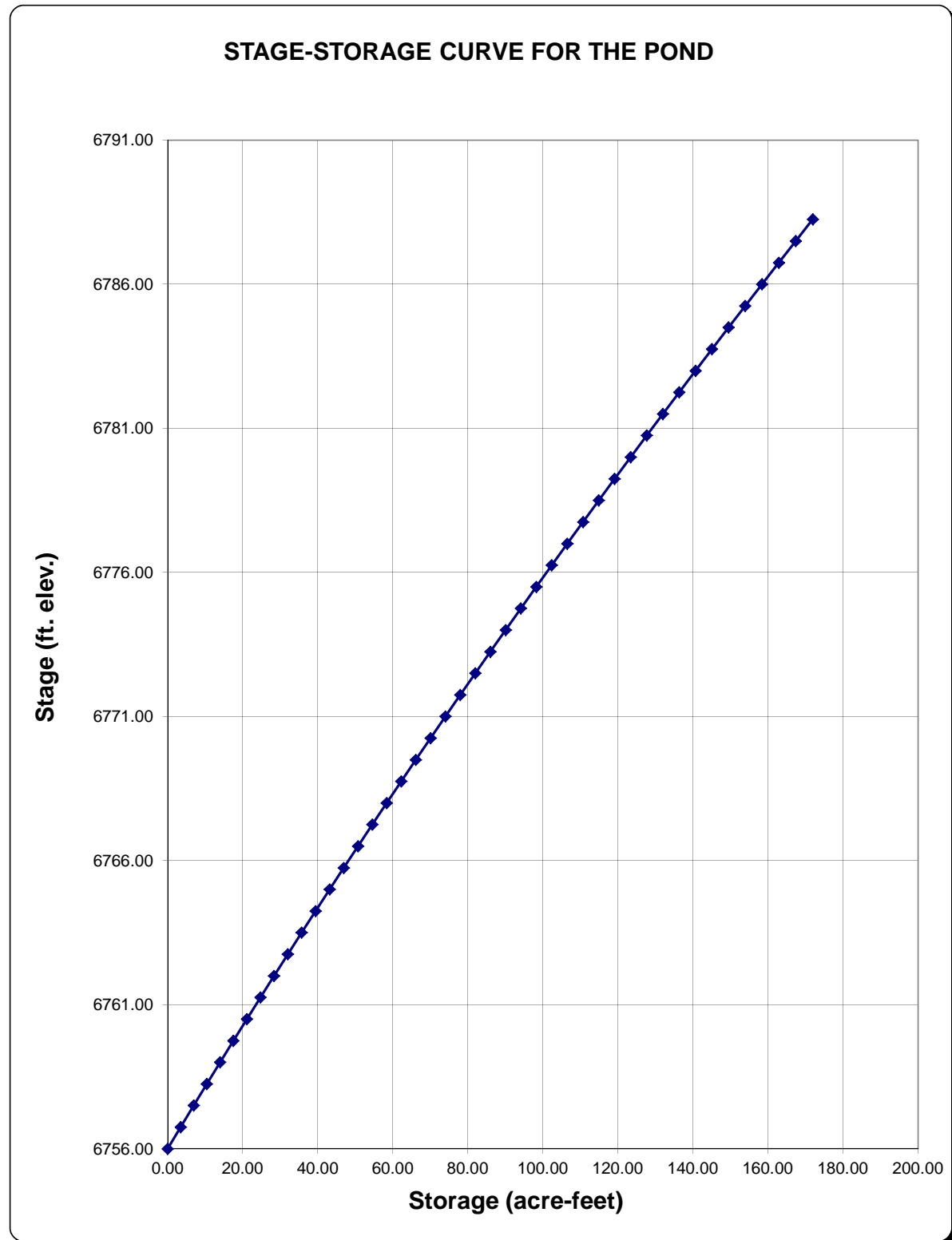
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 30.479 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 24.640 45.824 acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) Below El. (input) ft/ft	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage (output) acres	Volume Below Stage (output) acre-ft	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6756.00		400.00	500.00	200,000.0			4.591	0.000	
	6756.75		400.00	503.75	201,500.0		150,563	4.626	3.456	
	6757.50		400.00	507.50	203,000.0		302,250	4.660	6.939	
	6758.25		400.00	511.25	204,500.0		455,063	4.695	10.447	
	6759.00		400.00	515.00	206,000.0		609,000	4.729	13.981	
	6759.75		400.00	518.75	207,500.0		764,063	4.764	17.540	
	6760.50		400.00	522.50	209,000.0		920,250	4.798	21.126	
- elev of EURV	6761.25		400.00	526.25	210,500.0		1,077,563	4.832	24.737	
	6762.00		400.00	530.00	212,000.0		1,236,000	4.867	28.375	
	6762.75		400.00	533.75	213,500.0		1,395,563	4.901	32.038	
	6763.50		400.00	537.50	215,000.0		1,556,250	4.936	35.727	
	6764.25		400.00	541.25	216,500.0		1,718,063	4.970	39.441	
	6765.00		400.00	545.00	218,000.0		1,881,000	5.005	43.182	
-elev of 100-yr	6765.75		400.00	548.75	219,500.0		2,045,063	5.039	46.948	
	6766.50		400.00	552.50	221,000.0		2,210,250	5.073	50.740	
	6767.25		400.00	556.25	222,500.0		2,376,563	5.108	54.558	
	6768.00		400.00	560.00	224,000.0		2,544,000	5.142	58.402	
	6768.75		400.00	563.75	225,500.0		2,712,563	5.177	62.272	
	6769.50		400.00	567.50	227,000.0		2,882,250	5.211	66.167	
	6770.25		400.00	571.25	228,500.0		3,053,063	5.246	70.089	
	6771.00		400.00	575.00	230,000.0		3,225,000	5.280	74.036	
	6771.75		400.00	578.75	231,500.0		3,398,063	5.315	78.009	
	6772.50		400.00	582.50	233,000.0		3,572,250	5.349	82.008	
	6773.25		400.00	586.25	234,500.0		3,747,563	5.383	86.032	
	6774.00		400.00	590.00	236,000.0		3,924,000	5.418	90.083	
	6774.75		400.00	593.75	237,500.0		4,101,563	5.452	94.159	
	6775.50		400.00	597.50	239,000.0		4,280,250	5.487	98.261	
	6776.25		400.00	601.25	240,500.0		4,460,063	5.521	102.389	
	6777.00		400.00	605.00	242,000.0		4,641,000	5.556	106.543	
	6777.75		400.00	608.75	243,500.0		4,823,063	5.590	110.722	
	6778.50		400.00	612.50	245,000.0		5,006,250	5.624	114.928	
	6779.25		400.00	616.25	246,500.0		5,190,563	5.659	119.159	
	6780.00		400.00	620.00	248,000.0		5,376,000	5.693	123.416	
	6780.75		400.00	623.75	249,500.0		5,562,563	5.728	127.699	
	6781.50		400.00	627.50	251,000.0		5,750,250	5.762	132.008	
	6782.25		400.00	631.25	252,500.0		5,939,063	5.797	136.342	
	6783.00		400.00	635.00	254,000.0		6,129,000	5.831	140.702	
	6783.75		400.00	638.75	255,500.0		6,320,063	5.865	145.089	
	6784.50		400.00	642.50	257,000.0		6,512,250	5.900	149.501	
	6785.25		400.00	646.25	258,500.0		6,705,563	5.934	153.939	
	6786.00		400.00	650.00	260,000.0		6,900,000	5.969	158.402	
	6786.75		400.00	653.75	261,500.0		7,095,563	6.003	162.892	
	6787.50		400.00	657.50	263,000.0		7,292,250	6.038	167.407	
	6788.25		400.00	661.25	264,500.0		7,490,063	6.072	171.948	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

**Project:** Falcon DBPS  
**Basin ID:** Regional Pond R2

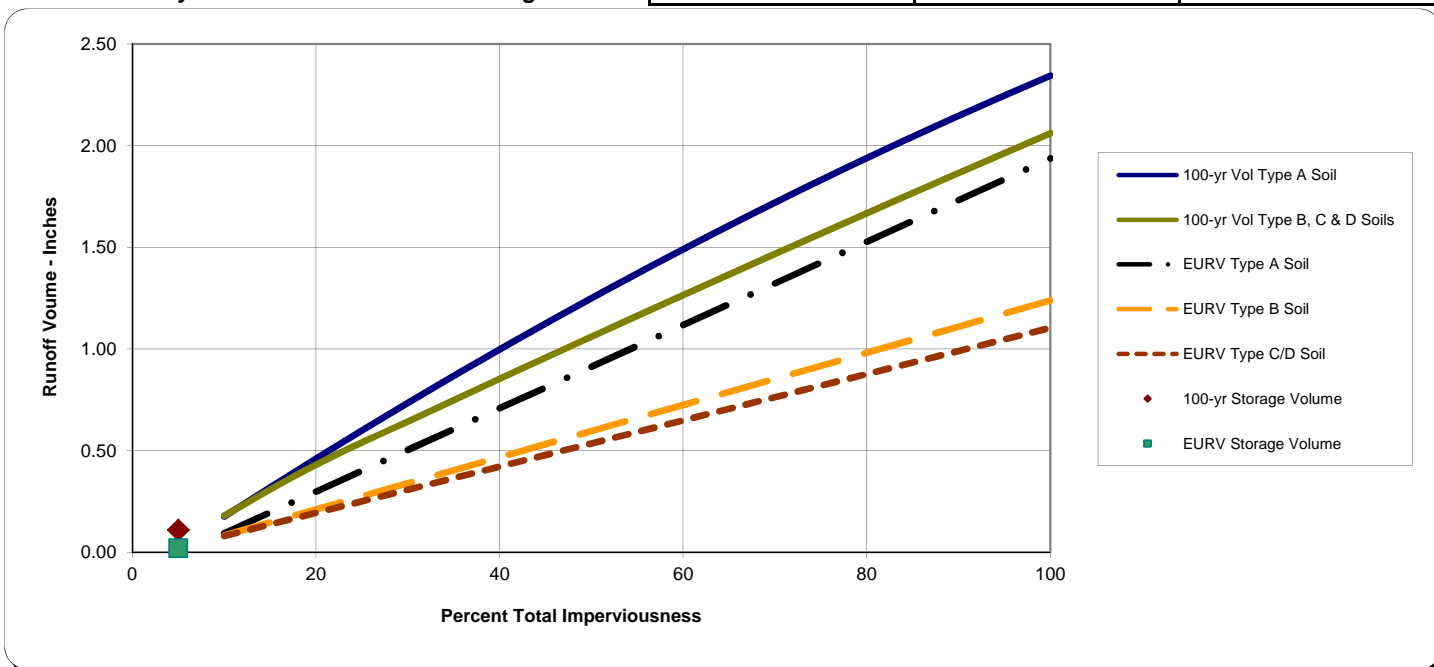
\* User input data shown in blue.

Area of Watershed (acres)	1882.00	
Subwatershed Imperviousness	5.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	5.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	1882.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.02	3.1277	Design Outlet to Empty EURV in 72 Hours
0.11	17.05	1599.70

Excess Urban Runoff Volume<sup>4</sup>  
 100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

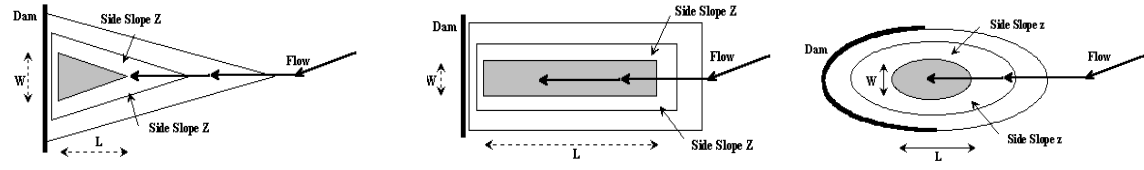


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Regional Pond R2

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 200.00 ft  
Length of Pond Bottom, L = 200.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

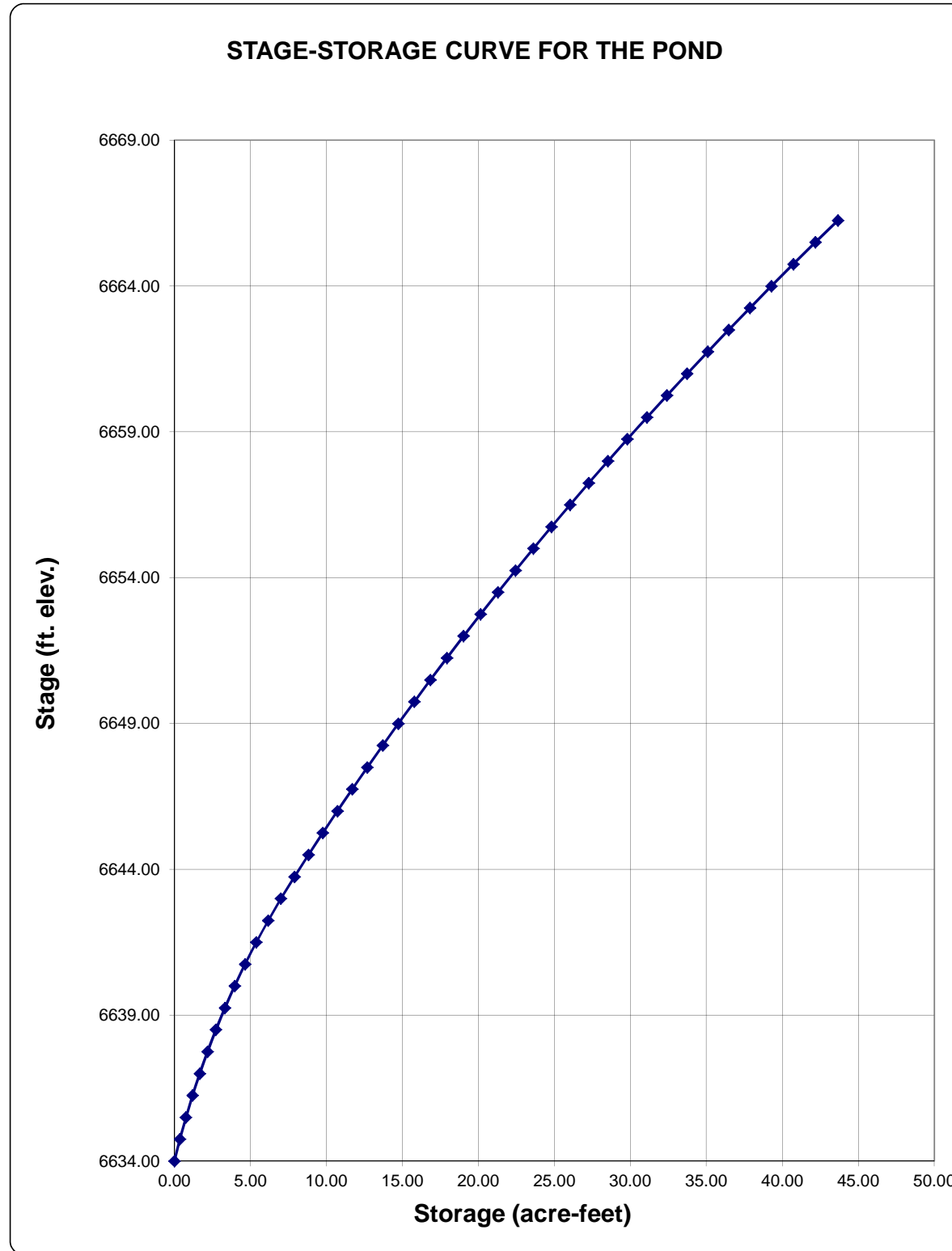
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 112.150 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 3.128 MINOR 17.049 MAJOR acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) ft/ft Below El. (input)	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6634.00		200.00	200.00	20,000.0			0.459	0.000	
	6634.75	4.00	209.71	209.71	21,988.8		15,746	0.505	0.361	
	6635.50	4.00	219.42	219.42	24,071.8		33,018	0.553	0.758	
	6636.25	4.00	229.12	229.12	26,249.0		51,889	0.603	1.191	
	6637.00	4.00	238.83	238.83	28,520.6		72,427	0.655	1.663	
	6637.75	4.00	248.54	248.54	30,886.3		94,705	0.709	2.174	
	6638.50	4.00	258.25	258.25	33,346.3		118,792	0.766	2.727	
-elev of EURV	6639.25	4.00	267.96	267.96	35,900.6		144,760	0.824	3.323	
	6640.00	4.00	277.67	277.67	38,549.1		172,678	0.885	3.964	
	6640.75	4.00	287.37	287.37	41,291.9		202,619	0.948	4.651	
	6641.50	4.00	297.08	297.08	44,128.9		234,652	1.013	5.387	
	6642.25	4.00	306.79	306.79	47,060.1		268,847	1.080	6.172	
	6643.00	4.00	316.50	316.50	50,085.6		305,277	1.150	7.008	
-elev of 100-yr	6643.75	4.00	326.21	326.21	53,205.4		344,011	1.221	7.897	
	6644.50		329.21	329.21	54,188.5		384,284	1.244	8.822	
	6645.25		332.21	332.21	55,180.6		425,297	1.267	9.763	
	6646.00		335.21	335.21	56,181.7		467,058	1.290	10.722	
	6646.75		338.21	338.21	57,191.9		509,573	1.313	11.698	
	6647.50		341.21	341.21	58,211.0		552,849	1.336	12.692	
	6648.25		344.21	344.21	59,239.1		596,893	1.360	13.703	
	6649.00		347.21	347.21	60,276.2		641,712	1.384	14.732	
	6649.75		350.21	350.21	61,322.3		687,311	1.408	15.778	
	6650.50		353.21	353.21	62,377.5		733,698	1.432	16.843	
	6651.25		356.21	356.21	63,441.6		780,881	1.456	17.927	
	6652.00		359.21	359.21	64,514.7		828,864	1.481	19.028	
	6652.75		362.21	362.21	65,596.8		877,656	1.506	20.148	
	6653.50		365.21	365.21	66,687.9		927,263	1.531	21.287	
	6654.25		368.21	368.21	67,788.1		977,691	1.556	22.445	
	6655.00		371.21	371.21	68,897.2		1,028,948	1.582	23.621	
	6655.75		374.21	374.21	70,015.3		1,081,040	1.607	24.817	
	6656.50		377.21	377.21	71,142.4		1,133,975	1.633	26.032	
	6657.25		380.21	380.21	72,278.5		1,187,757	1.659	27.267	
	6658.00		383.21	383.21	73,423.7		1,242,396	1.686	28.521	
	6658.75		386.21	386.21	74,577.8		1,297,896	1.712	29.796	
	6659.50		389.21	389.21	75,740.9		1,354,266	1.739	31.090	
	6660.25		392.21	392.21	76,913.0		1,411,511	1.766	32.404	
	6661.00		395.21	395.21	78,094.1		1,469,639	1.793	33.738	
	6661.75		398.21	398.21	79,284.3		1,528,656	1.820	35.093	
	6662.50		401.21	401.21	80,483.4		1,588,569	1.848	36.469	
	6663.25		404.21	404.21	81,691.5		1,649,384	1.875	37.865	
	6664.00		407.21	407.21	82,908.6		1,711,109	1.903	39.282	
	6664.75		410.21	410.21	84,134.7		1,773,750	1.931	40.720	
	6665.50		413.21	413.21	85,369.9		1,837,315	1.960	42.179	
	6666.25		416.21	416.21	86,614.0		1,901,809	1.988	43.660	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Regional Pond WU

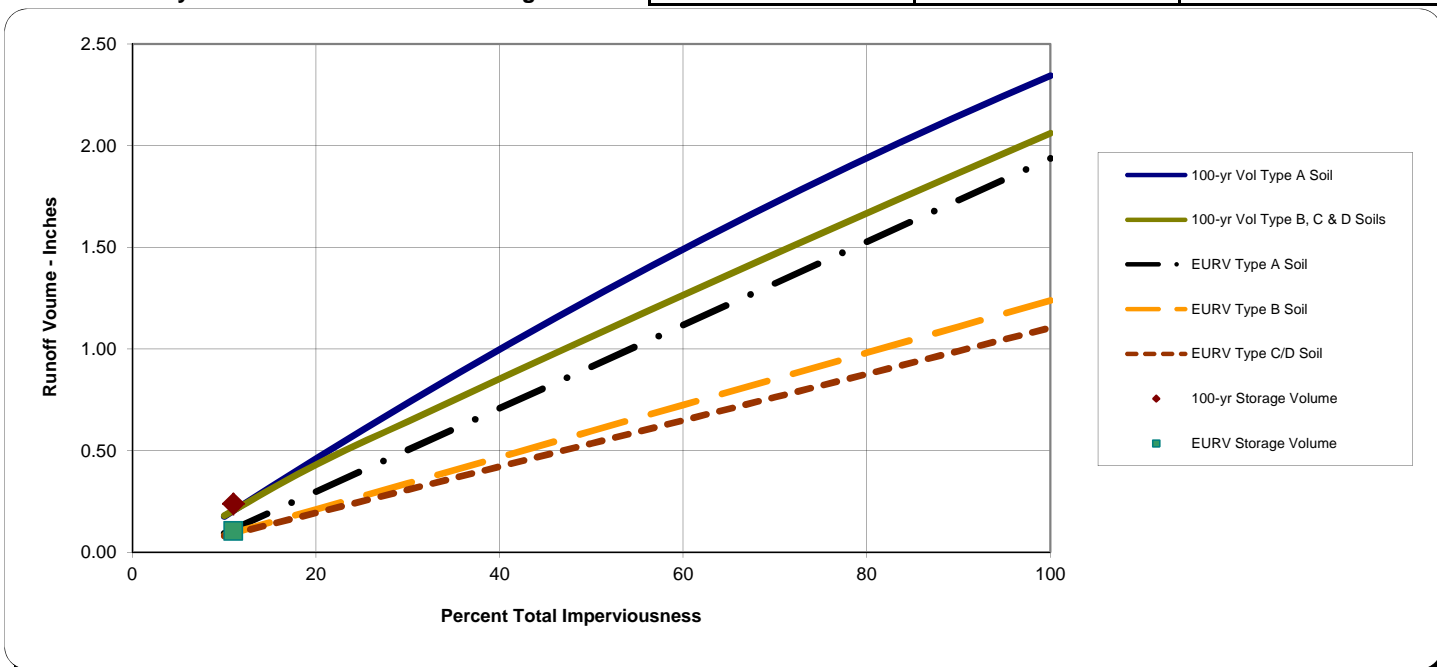
\* User input data shown in blue.

Area of Watershed (acres)	1819.00	
Subwatershed Imperviousness	11.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	▼
Effective Imperviousness <sup>1</sup>	11.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	1819.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.10	15.8748	Design Outlet to Empty EURV in 72 Hours
0.24	36.13	1546.15

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: The Meadows Pond #1

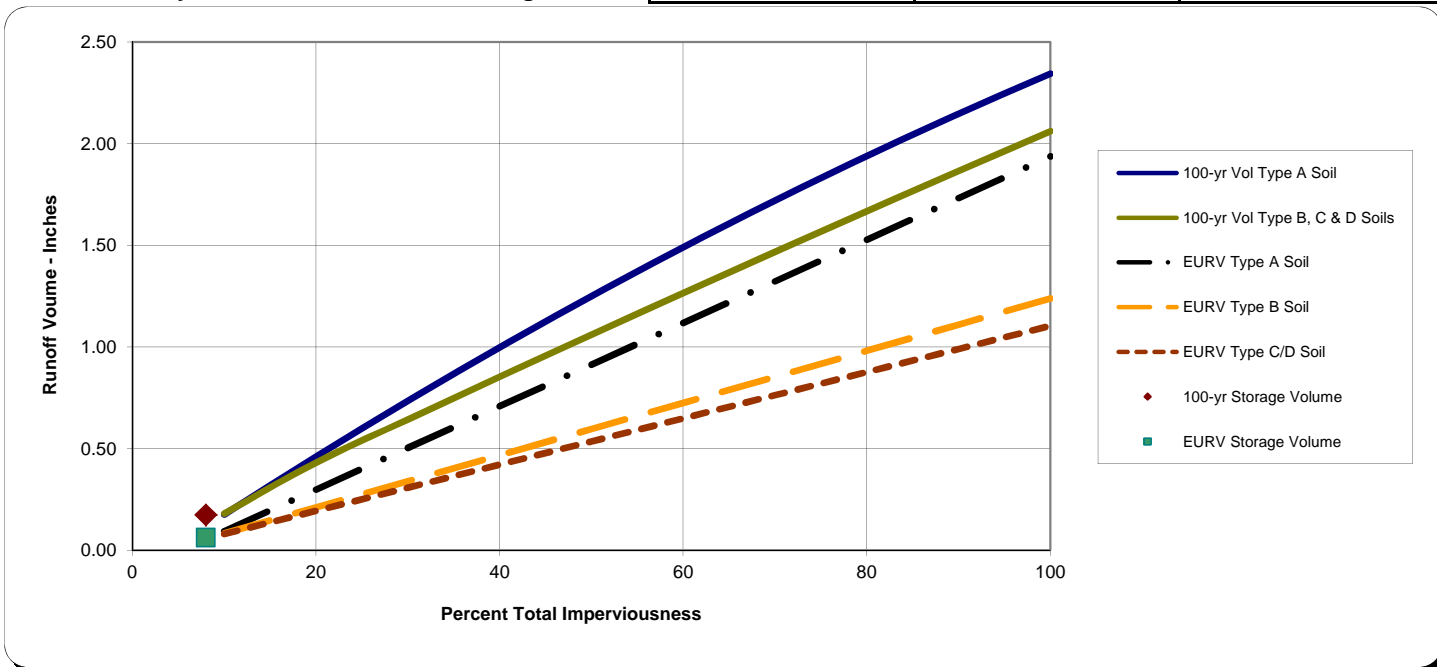
\* User input data shown in blue.

Area of Watershed (acres)	37.00	
Subwatershed Imperviousness	8.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	8.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B	100.0%	37.0
Type C or D		0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.06	0.1922	Design Outlet to Empty EURV in 72 Hours
0.17	0.54	31.45

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

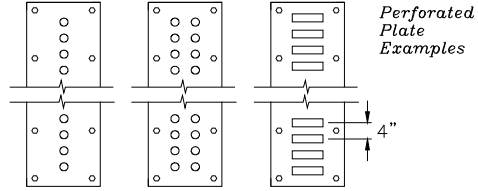
Project: **Falcon DBPS**  
 Basin ID: **The Meadows Pond #1**

Project: **Falcon DBPS**  
 Basin ID: **The Meadows Pond #1**

**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p$  = 8.0 percent  
 Catchment Area,  $A_c$  = 37.000 acres  
 Depth at WQCV outlet above lowest perforation,  $H$  = 12 inches  
 Vertical distance between rows,  $h$  = 4.00 inches  
 Number of rows,  $N_L$  = 3  
 Orifice discharge coefficient,  $C_o$  = 0.65

Diameter of holes,  $D$  = 1.431 in.  
 Number of holes per row,  $N$  = 1  
**OR**  
 Height of slot,  $H$  = in.  
 Width of slot,  $W$  = in.

Time to Drain the Pond = 72 hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**

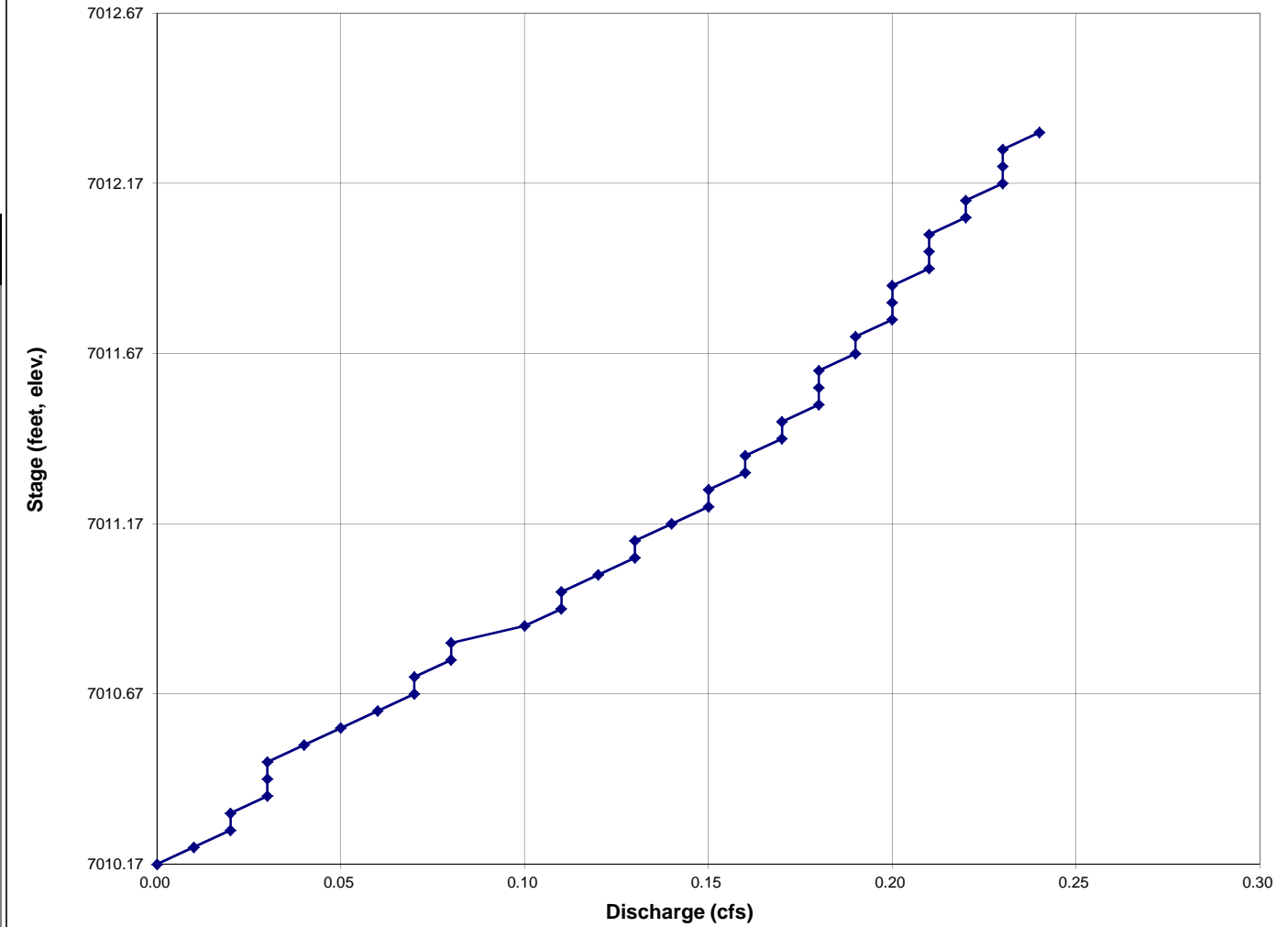


**Outlet Design Information (Output):**  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.062 watershed inches  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = N/A  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 1.61 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 1.61 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.011 square feet

**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow	
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18		
7010.17	7010.17	7010.50	7010.83																	
	Collection Capacity for Each Row of Holes in cfs																			
7010.17	0.003	0.000	0.000																	0.00
7010.22	0.013	0.000	0.000																	0.01
7010.27	0.019	0.000	0.000																	0.02
7010.32	0.023	0.000	0.000																	0.02
7010.37	0.026	0.000	0.000																	0.03
7010.42	0.029	0.000	0.000																	0.03
7010.47	0.032	0.000	0.000																	0.03
7010.52	0.035	0.008	0.000																	0.04
7010.57	0.037	0.015	0.000																	0.05
7010.62	0.039	0.020	0.000																	0.06
7010.67	0.041	0.024	0.000																	0.07
7010.72	0.043	0.027	0.000																	0.07
7010.77	0.045	0.030	0.000																	0.08
7010.82	0.047	0.033	0.000																	0.08
7010.87	0.049	0.035	0.012																	0.10
7010.92	0.051	0.038	0.017																	0.11
7010.97	0.052	0.040	0.022																	0.11
7011.02	0.054	0.042	0.025																	0.12
7011.07	0.055	0.044	0.029																	0.13
7011.12	0.057	0.046	0.031																	0.13
7011.17	0.058	0.048	0.034																	0.14
7011.22	0.060	0.049	0.036																	0.15
7011.27	0.061	0.051	0.039																	0.15
7011.32	0.063	0.053	0.041																	0.16
7011.37	0.064	0.054	0.043																	0.16
7011.42	0.065	0.056	0.045																	0.17
7011.47	0.067	0.057	0.047																	0.17
7011.52	0.068	0.059	0.048																	0.18
7011.57	0.069	0.060	0.050																	0.18
7011.62	0.070	0.062	0.052																	0.18
7011.67	0.071	0.063	0.053																	0.19
7011.72	0.073	0.064	0.055																	0.19
7011.77	0.074	0.066	0.056																	0.20
7011.82	0.075	0.067	0.058																	0.20
7011.87	0.076	0.068	0.059																	0.20
7011.92	0.077	0.069	0.061																	0.21
7011.97	0.078	0.071	0.062																	0.21
7012.02	0.079	0.072	0.064																	0.21
7012.07	0.080	0.073	0.065																	0.22
7012.12	0.081	0.074	0.066																	0.22
7012.17	0.082	0.075	0.067																	0.23
7012.22	0.083	0.076	0.069																	0.23
7012.27	0.084	0.078	0.070																	0.23
7012.32	0.085	0.079	0.071																	0.24

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**





## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS  
 Basin ID: The Meadows Pond #2

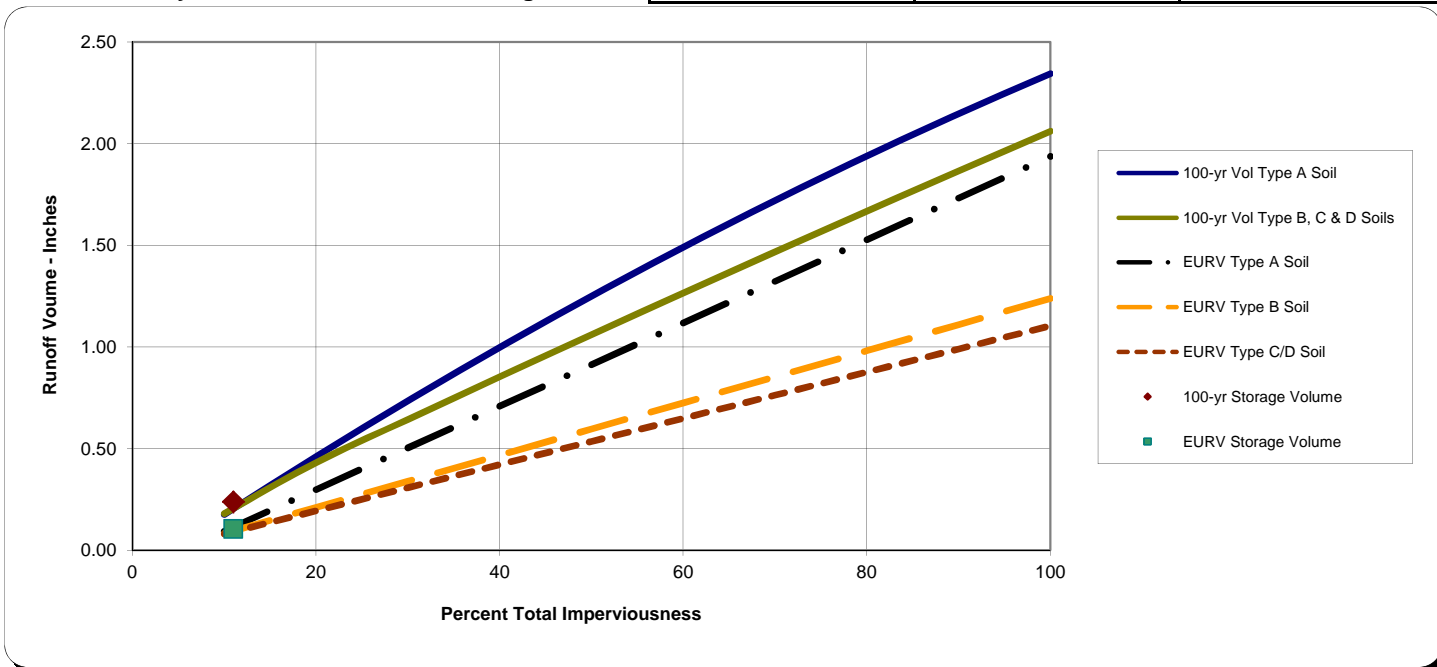
\* User input data shown in blue.

Area of Watershed (acres)	186.00	
Subwatershed Imperviousness	11.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	11.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	186.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.10	1.6233	Design Outlet to Empty EURV in 72 Hours
0.24	3.69	158.10

Excess Urban Runoff Volume<sup>4</sup>  
 100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

**Project:** Falcon DBPS

**Basin ID:** Woodmen Hills Pond #1 North & South

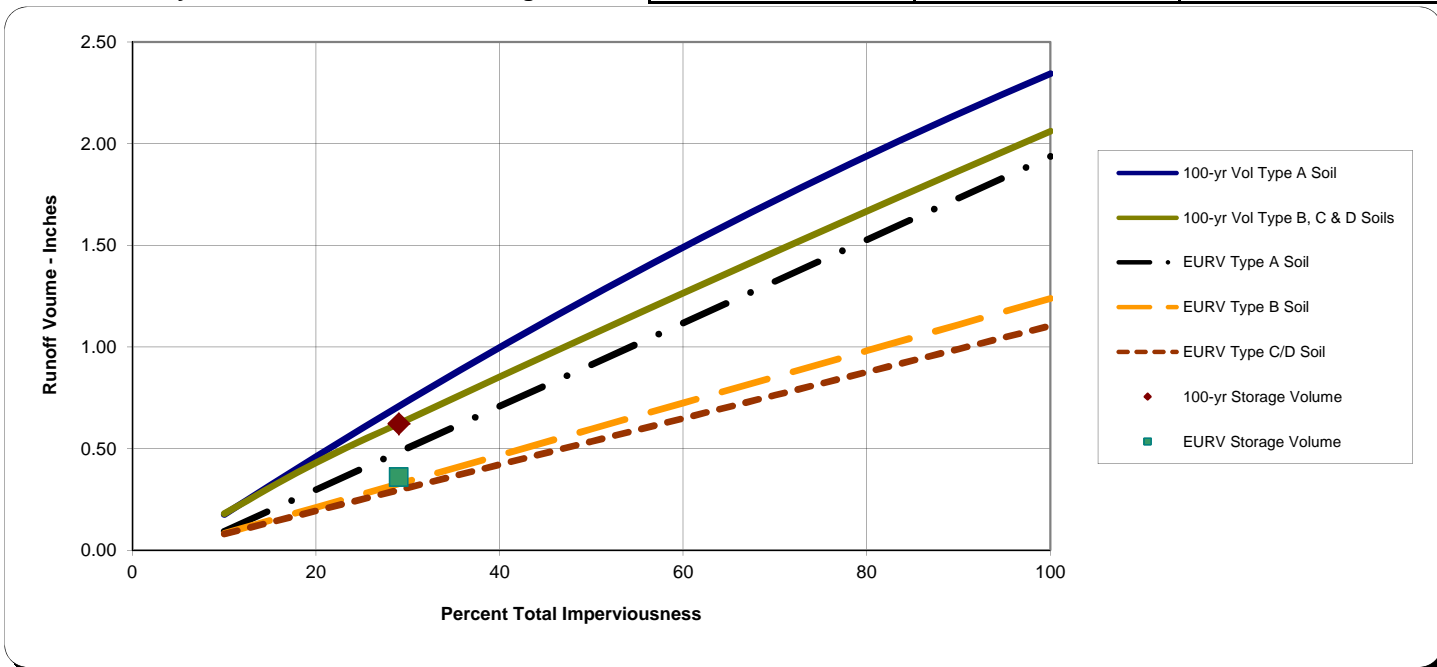
\* User input data shown in blue.

Area of Watershed (acres)	456.00								
Subwatershed Imperviousness	29.0%								
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0								
Effective Imperviousness <sup>1</sup>	29.0%								
Hydrologic Soil Type	<table border="1" style="width: 100%;"> <thead> <tr> <th>Percentage of Area</th> <th>Area (acres)</th> </tr> </thead> <tbody> <tr> <td>Type A</td> <td style="background-color: #e0f7fa;">0.0</td> </tr> <tr> <td>Type B</td> <td style="background-color: #e0f7fa;">100.0%</td> </tr> <tr> <td>Type C or D</td> <td style="background-color: #e0f7fa;">0.0</td> </tr> </tbody> </table>	Percentage of Area	Area (acres)	Type A	0.0	Type B	100.0%	Type C or D	0.0
Percentage of Area	Area (acres)								
Type A	0.0								
Type B	100.0%								
Type C or D	0.0								

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.36	13.6449	Design Outlet to Empty EURV in 72 Hours
0.62	23.65	387.60

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Woodmen Hills Pond #1 North

\* User input data shown in blue.

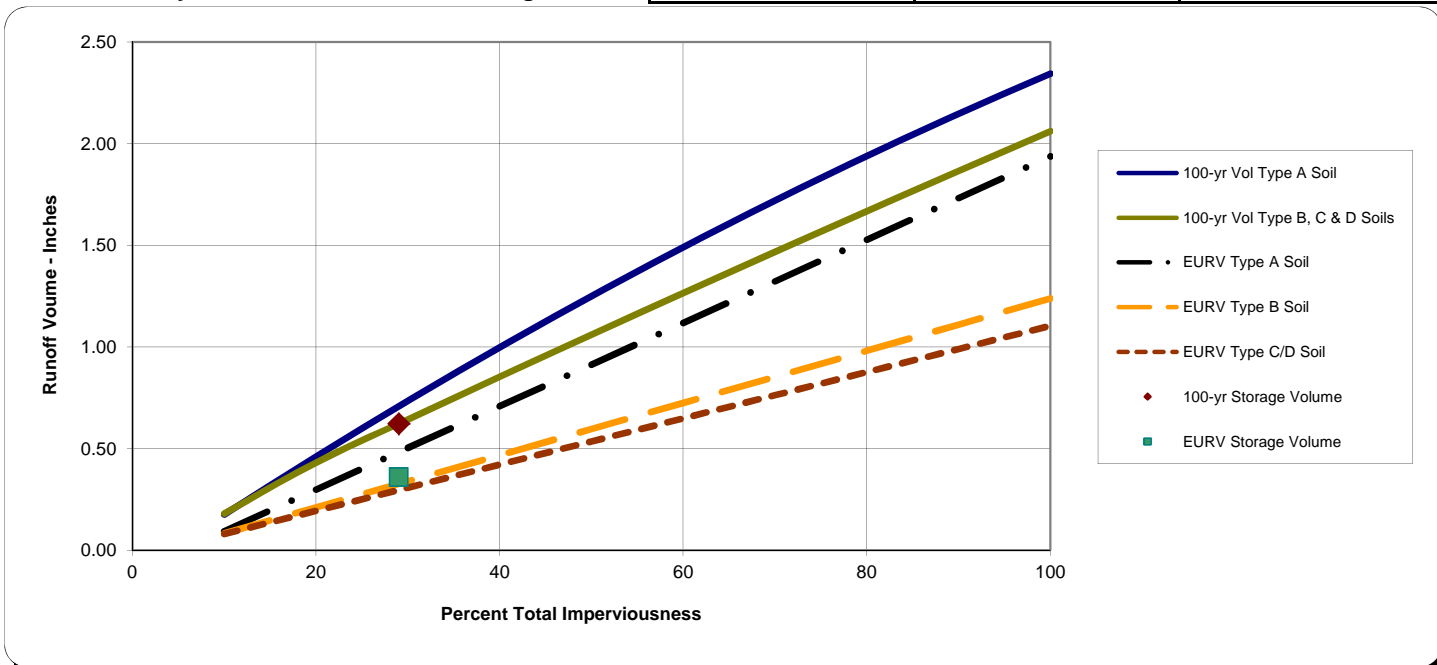
Area of Watershed (acres)	139.70	
Subwatershed Imperviousness	29.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	▼
Effective Imperviousness <sup>1</sup>	29.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	139.7
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.36	4.1803	Design Outlet to Empty EURV in 72 Hours
0.62	7.24	118.75

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Woodmen Hills Pond #1 South

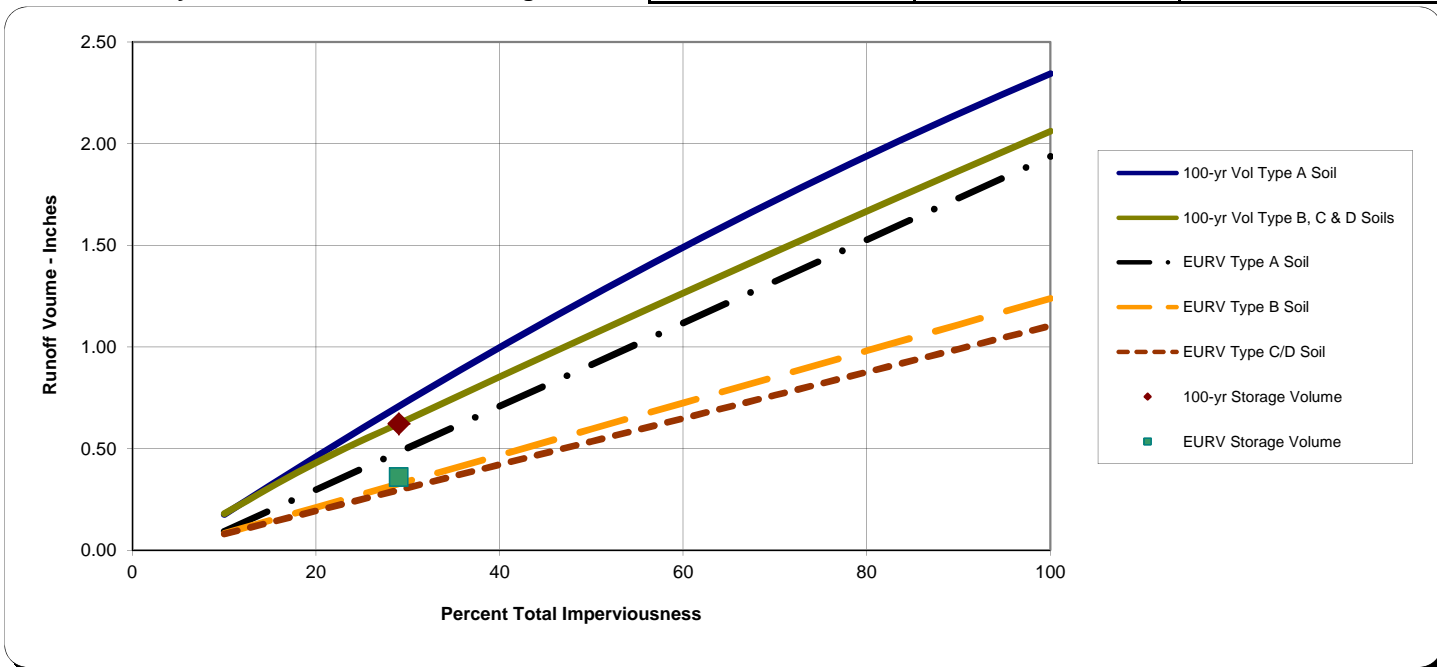
\* User input data shown in blue.

Area of Watershed (acres)	171.20
Subwatershed Imperviousness	29.0%
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0
Effective Imperviousness <sup>1</sup>	29.0%
Hydrologic Soil Type	Percentage of Area      Area (acres)
Type A	0.0
Type B	100.0%      171.2
Type C or D	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.36	5.1228	Design Outlet to Empty EURV in 72 Hours
0.62	8.88	145.52

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

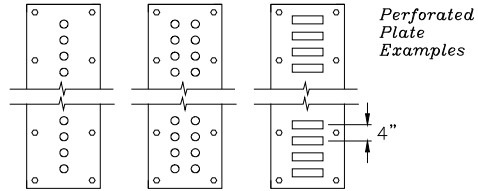
Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #1 South**

WQCV Design Volume (Input):

Catchment Imperviousness,  $I_p$  = 29.0 percent  
 Catchment Area,  $A_c$  = 171.200 acres  
 Depth at WQCV outlet above lowest perforation,  $H$  = 48 inches  
 Vertical distance between rows,  $h$  = 4.00 inches  
 Number of rows,  $N_L$  = 12  
 Orifice discharge coefficient,  $C_o$  = 0.65

Diameter of holes,  $D$  =  in.  
 Number of holes per row,  $N$  =  OR  
 Height of slot,  $H$  = 2.00 in.  
 Width of slot,  $W$  = 7.50 in.

Time to Drain the Pond = 72 hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**



Outlet Design Information (Output):

Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.359 watershed inches  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 15.01 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 15.01 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.104 square feet

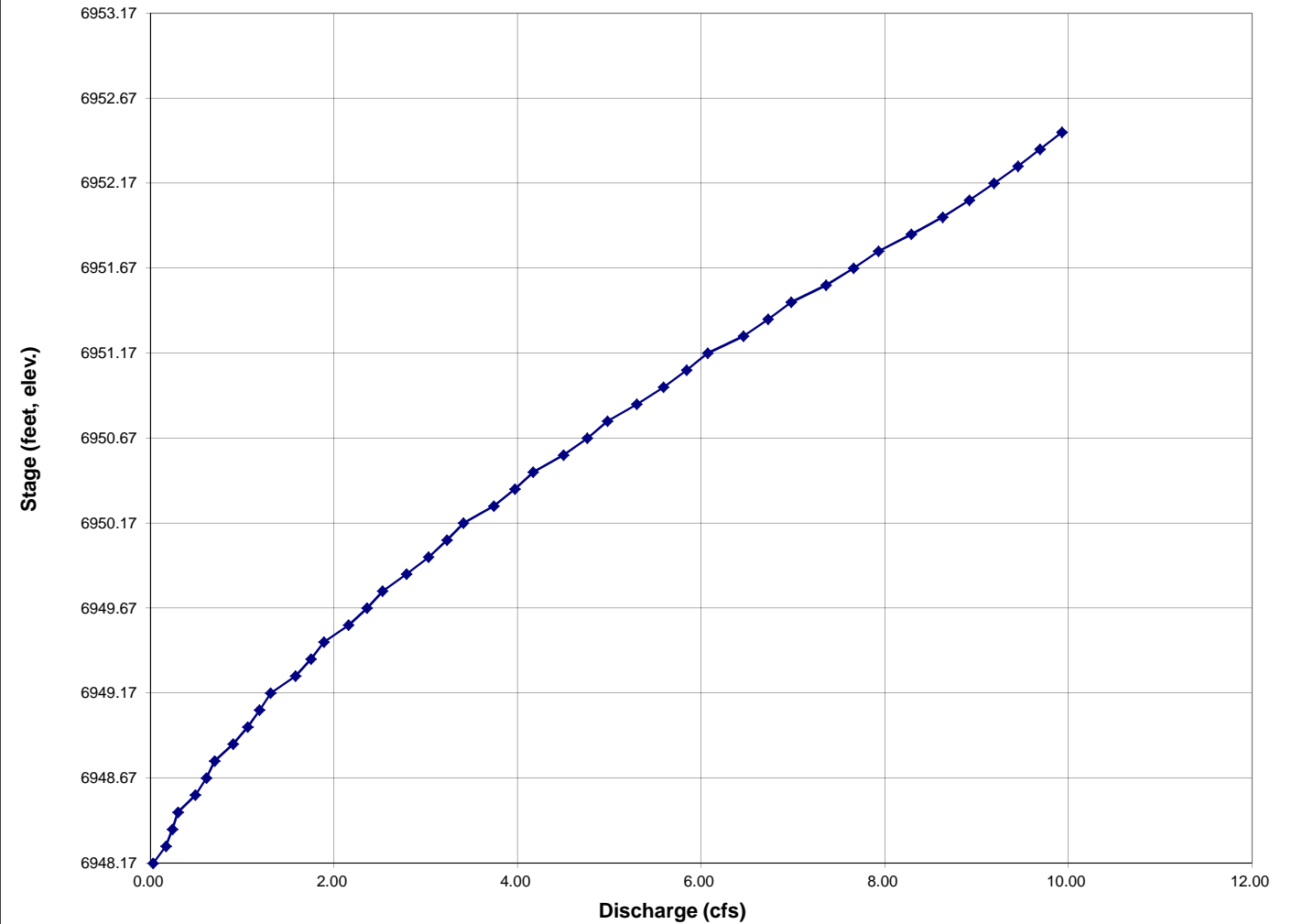
Calculation of Collection Capacity:

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
6948.17	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.03
6948.27	0.174	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.17
6948.37	0.245	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.24
6948.47	0.299	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.30
6948.57	0.345	0.144	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.49
6948.67	0.386	0.224	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.61
6948.77	0.422	0.283	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.70
6948.87	0.456	0.331	0.109	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.90
6948.97	0.487	0.373	0.203	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							1.06
6949.07	0.517	0.410	0.266	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							1.19
6949.17	0.545	0.445	0.317	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							1.31
6949.27	0.571	0.477	0.361	0.172	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							1.58
6949.37	0.596	0.507	0.400	0.243	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							1.75
6949.47	0.621	0.535	0.435	0.298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							1.89
6949.57	0.644	0.562	0.468	0.344	0.144	0.000	0.000	0.000	0.000	0.000	0.000	0.000							2.16
6949.67	0.667	0.588	0.498	0.384	0.224	0.000	0.000	0.000	0.000	0.000	0.000	0.000							2.36
6949.77	0.688	0.613	0.527	0.421	0.283	0.000	0.000	0.000	0.000	0.000	0.000	0.000							2.53
6949.87	0.710	0.636	0.554	0.455	0.331	0.109	0.000	0.000	0.000	0.000	0.000	0.000							2.79
6949.97	0.730	0.659	0.581	0.486	0.373	0.203	0.000	0.000	0.000	0.000	0.000	0.000							3.03
6950.07	0.750	0.681	0.605	0.516	0.410	0.266	0.000	0.000	0.000	0.000	0.000	0.000							3.23
6950.17	0.769	0.703	0.629	0.544	0.445	0.317	0.000	0.000	0.000	0.000	0.000	0.000							3.41
6950.27	0.788	0.723	0.652	0.570	0.477	0.361	0.172	0.000	0.000	0.000	0.000	0.000							3.74
6950.37	0.807	0.743	0.675	0.596	0.507	0.400	0.243	0.000	0.000	0.000	0.000	0.000							3.97
6950.47	0.825	0.763	0.696	0.620	0.535	0.435	0.298	0.000	0.000	0.000	0.000	0.000							4.17
6950.57	0.843	0.782	0.717	0.643	0.562	0.468	0.344	0.144	0.000	0.000	0.000	0.000							4.50
6950.67	0.860	0.801	0.738	0.666	0.588	0.498	0.384	0.224	0.000	0.000	0.000	0.000							4.76
6950.77	0.877	0.819	0.757	0.688	0.613	0.527	0.421	0.283	0.000	0.000	0.000	0.000							4.98
6950.87	0.894	0.837	0.777	0.709	0.636	0.554	0.455	0.331	0.109	0.000	0.000	0.000							5.30
6950.97	0.910	0.854	0.795	0.729	0.659	0.581	0.486	0.373	0.203	0.000	0.000	0.000							5.59
6951.07	0.926	0.872	0.814	0.749	0.681	0.605	0.516	0.410	0.266	0.000	0.000	0.000							5.84
6951.17	0.942	0.888	0.832	0.769	0.703	0.629	0.544	0.445	0.317	0.000	0.000	0.000							6.07
6951.27	0.958	0.905	0.849	0.788	0.723	0.652	0.570	0.477	0.361	0.172	0.000	0.000							6.46
6951.37	0.973	0.921	0.867	0.806	0.743	0.675	0.596	0.507	0.400	0.243	0.000	0.000							6.73
6951.47	0.988	0.937	0.883	0.825	0.763	0.696	0.620	0.535	0.435	0.298	0.000	0.000							6.98
6951.57	1.003	0.953	0.900	0.842	0.782	0.717	0.643	0.562	0.468	0.344	0.144	0.000							7.36
6951.67	1.018	0.968	0.916	0.860	0.801	0.738	0.666	0.588	0.498	0.384	0.224	0.000							7.66
6951.77	1.032	0.983	0.932	0.877	0.819	0.757	0.688	0.613	0.527	0.421	0.283	0.000							7.93
6951.87	1.046	0.998	0.948	0.893	0.837	0.777	0.709	0.636	0.554	0.455	0.331	0.109							8.29
6951.97	1.060	1.013	0.963	0.910	0.854	0.795	0.729	0.659	0.581	0.486	0.373	0.203							8.63
6952.07	1.074	1.027	0.979	0.926	0.872	0.814	0.749	0.681	0.605	0.516	0.410	0.266							8.92
6952.17	1.088	1.042	0.994	0.942	0.888	0.832	0.769	0.703	0.629	0.544	0.445	0.317							9.19
6952.27	1.101	1.056	1.008	0.957	0.905	0.849	0.788	0.723	0.652	0.570	0.477	0.361							9.45
6952.37	1.115	1.070	1.023	0.973	0.921	0.867	0.806	0.743	0.675	0.596	0.507	0.400							9.69
6952.47	1.128	1.083	1.037	0.988	0.937	0.883	0.825	0.763	0.696	0.620	0.535	0.435							9.93

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #1 South**

STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: Falcon DBPS

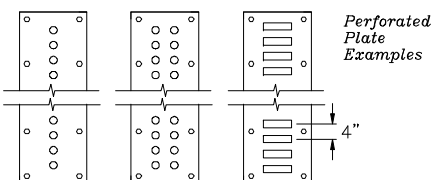
Basin ID: Woodmen Hills Pond #2 and part of Woodmen Hills Pond #1 WQCV

WQCV Design Volume (Input):

Catchment Imperviousness, I<sub>p</sub> = 25.6 percent  
 Catchment Area, A = 220,100 acres  
 Depth at WQCV outlet above lowest perforation, H = 20 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, N<sub>L</sub> = 5  
 Orifice discharge coefficient, C<sub>d</sub> = 0.65

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H = 2.00 in.  
 Width of slot, W = 13.61 in.

Time to Drain the Pond = 40 hours  
 Water Quality Capture Volume Method Selected (40-Hour Release)



Outlet Design Information (Output):

Water Quality Capture Volume (1.0 \* (0.91 \* I<sub>p</sub><sup>3</sup> - 1.19 \* I<sub>p</sub><sup>2</sup> + 0.78 \* I<sub>p</sub>)), WQCV = 0.137 watershed inches  
 Water Quality Capture Volume (WQCV) = 2.512 acre-feet  
 Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 3.014 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> = 27.22 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 27.22 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 0.189 square feet

Calculation of Collection Capacity:

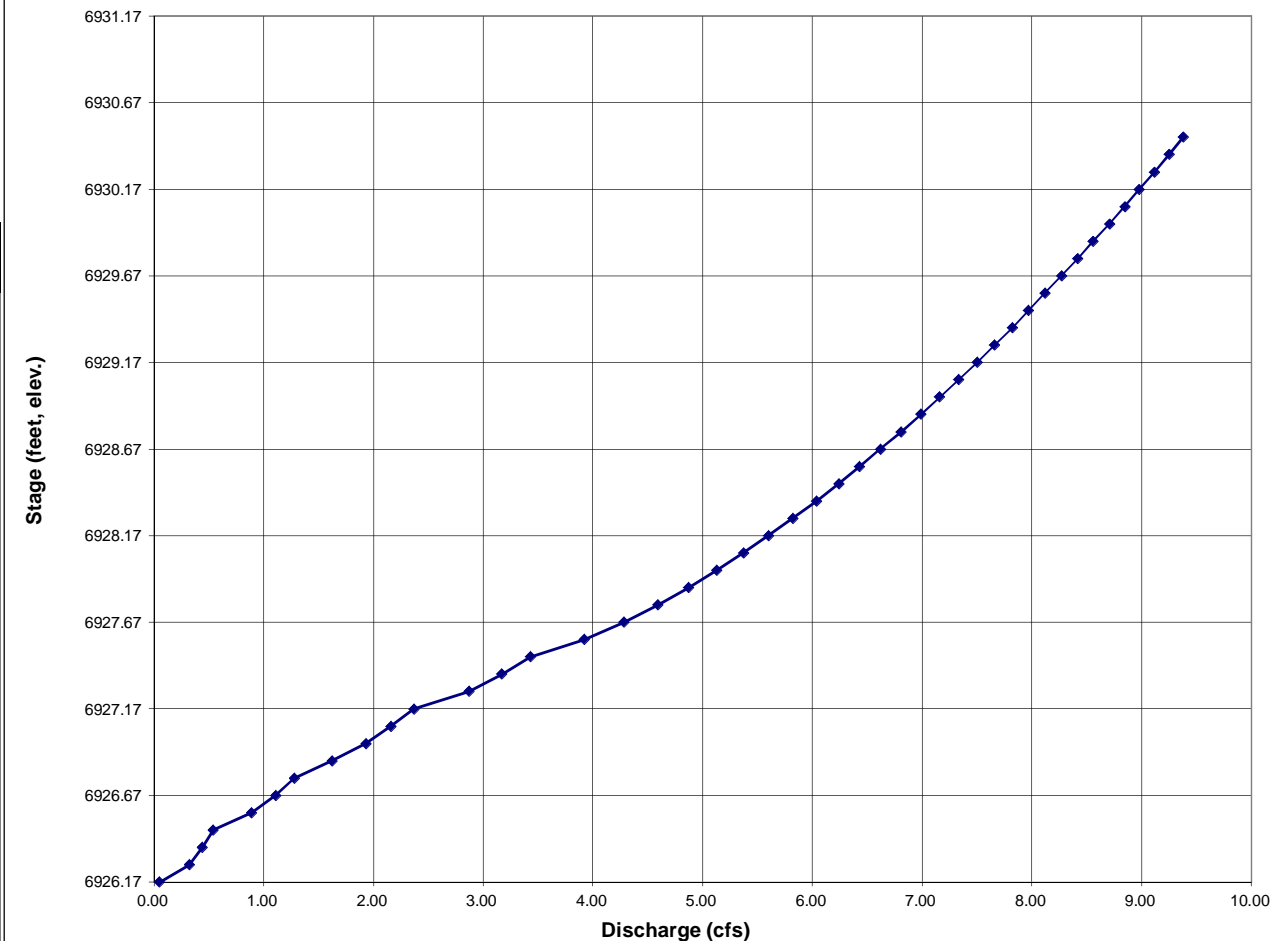
Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6926.17	6926.50	6926.83	6927.17	6927.50														
	Collection Capacity for Each Row of Holes in cfs																		
6926.17	0.054	0.000	0.000	0.000	0.000														
6926.27	0.316	0.000	0.000	0.000	0.000														
6926.37	0.444	0.000	0.000	0.000	0.000														
6926.47	0.543	0.000	0.000	0.000	0.000														
6926.57	0.626	0.261	0.000	0.000	0.000														
6926.67	0.699	0.407	0.000	0.000	0.000														
6926.77	0.766	0.512	0.000	0.000	0.000														
6926.87	0.827	0.600	0.197	0.000	0.000														
6926.97	0.884	0.676	0.369	0.000	0.000														
6927.07	0.937	0.744	0.483	0.000	0.000														
6927.17	0.987	0.807	0.575	0.000	0.000														
6927.27	1.036	0.865	0.654	0.312	0.000														
6927.37	1.081	0.920	0.725	0.441	0.000														
6927.47	1.125	0.971	0.789	0.540	0.000														
6927.57	1.168	1.020	0.848	0.624	0.261														
6927.67	1.209	1.066	0.904	0.697	0.407														
6927.77	1.248	1.111	0.956	0.764	0.512														
6927.87	1.287	1.154	1.006	0.825	0.600														
6927.97	1.324	1.195	1.053	0.882	0.676														
6928.07	1.360	1.235	1.098	0.935	0.744														
6928.17	1.395	1.274	1.141	0.986	0.807														
6928.27	1.430	1.312	1.183	1.034	0.865														
6928.37	1.463	1.348	1.224	1.080	0.920														
6928.47	1.496	1.384	1.263	1.124	0.971														
6928.57	1.528	1.419	1.301	1.167	1.020														
6928.67	1.560	1.452	1.337	1.208	1.066														
6928.77	1.591	1.486	1.373	1.247	1.111														
6928.87	1.621	1.518	1.408	1.286	1.154														
6928.97	1.651	1.550	1.442	1.323	1.195														
6929.07	1.680	1.581	1.476	1.359	1.235														
6929.17	1.709	1.611	1.508	1.394	1.274														
6929.27	1.737	1.641	1.540	1.429	1.312														
6929.37	1.765	1.670	1.571	1.462	1.348														
6929.47	1.792	1.699	1.602	1.495	1.384														
6929.57	1.819	1.728	1.632	1.527	1.419														
6929.67	1.845	1.755	1.662	1.559	1.452														
6929.77	1.872	1.783	1.691	1.590	1.486														
6929.87	1.897	1.810	1.719	1.620	1.518														
6929.97	1.923	1.837	1.747	1.650	1.550														
6930.07	1.948	1.863	1.775	1.679	1.581														
6930.17	1.973	1.889	1.802	1.708	1.611														
6930.27	1.997	1.914	1.829	1.736	1.641														
6930.37	2.021	1.940	1.855	1.764	1.670														
6930.47	2.045	1.965	1.881	1.791	1.699														

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: Falcon DBPS

Basin ID: Woodmen Hills Pond #2 and part of Woodmen Hills Pond #1 WQCV

STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE





**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

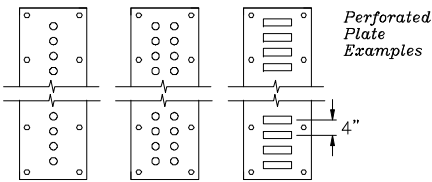
Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #3**

**WQCV Design Volume (Input):**

Catchment Imperviousness,  $I_p$  = 22.0 percent  
 Catchment Area, A = 183,000 acres  
 Depth at WQCV outlet above lowest perforation, H = 12 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, N<sub>L</sub> = 3  
 Orifice discharge coefficient, C<sub>d</sub> = 0.65

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H = 2.00 in.  
 Width of slot, W = 14.44 in.

Time to Drain the Pond = 40 hours  
**Water Quality Capture Volume Method Selected (40-Hour Release)**



**Outlet Design Information (Output):**

Water Quality Capture Volume (1.0 \* (0.91 \* I<sub>p</sub><sup>3</sup> - 1.19 \* I<sub>p</sub><sup>2</sup> + 0.78 \* I<sub>p</sub>)), WQCV = 0.124 watershed inches  
 Water Quality Capture Volume (WQCV) = 1.886 acre-feet  
**Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 2.264 acre-feet**  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> = 28.88 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 28.88 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 0.201 square feet

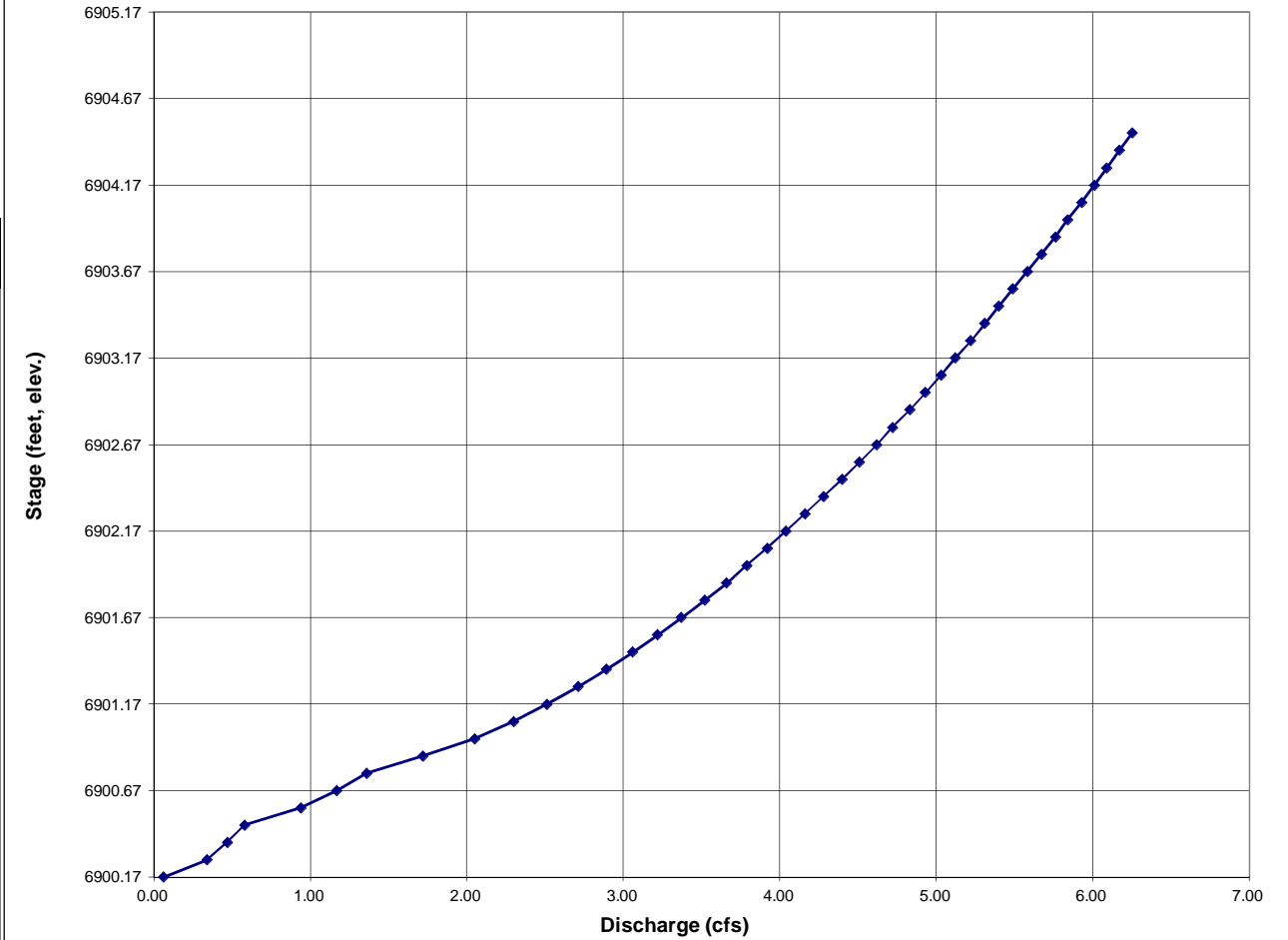
**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6900.17	6900.50	6900.83																
	Collection Capacity for Each Row of Holes in cfs																		
6900.17	0.057	0.000	0.000																0.06
6900.27	0.336	0.000	0.000																0.34
6900.37	0.471	0.000	0.000																0.47
6900.47	0.576	0.000	0.000																0.58
6900.57	0.664	0.277	0.000																0.94
6900.67	0.742	0.431	0.000																1.17
6900.77	0.812	0.544	0.000																1.36
6900.87	0.877	0.636	0.209																1.72
6900.97	0.938	0.717	0.391																2.05
6901.07	0.994	0.790	0.513																2.30
6901.17	1.048	0.856	0.610																2.51
6901.27	1.099	0.918	0.694																2.71
6901.37	1.148	0.976	0.769																2.89
6901.47	1.194	1.030	0.837																3.06
6901.57	1.239	1.082	0.900																3.22
6901.67	1.283	1.132	0.959																3.37
6901.77	1.325	1.179	1.014																3.52
6901.87	1.365	1.225	1.067																3.66
6901.97	1.405	1.268	1.117																3.79
6902.07	1.443	1.311	1.165																3.92
6902.17	1.481	1.352	1.211																4.04
6902.27	1.517	1.392	1.255																4.16
6902.37	1.553	1.431	1.298																4.28
6902.47	1.588	1.468	1.340																4.40
6902.57	1.622	1.505	1.380																4.51
6902.67	1.655	1.541	1.419																4.62
6902.77	1.688	1.576	1.457																4.72
6902.87	1.720	1.611	1.494																4.83
6902.97	1.752	1.644	1.530																4.93
6903.07	1.783	1.677	1.566																5.03
6903.17	1.813	1.710	1.600																5.12
6903.27	1.843	1.741	1.634																5.22
6903.37	1.872	1.772	1.667																5.31
6903.47	1.901	1.803	1.700																5.40
6903.57	1.930	1.833	1.732																5.49
6903.67	1.958	1.863	1.763																5.58
6903.77	1.986	1.892	1.794																5.67
6903.87	2.013	1.921	1.824																5.76
6903.97	2.040	1.949	1.854																5.84
6904.07	2.067	1.977	1.883																5.93
6904.17	2.093	2.004	1.912																6.01
6904.27	2.119	2.031	1.940																6.09
6904.37	2.145	2.058	1.968																6.17
6904.47	2.170	2.085	1.996																6.25

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #3**

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

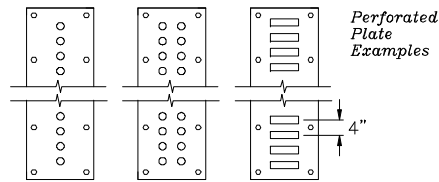
Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #4**

**WQCV Design Volume (Input):**

Catchment Imperviousness,  $I_p$  = 34.0 percent  
 Catchment Area, A = 346,000 acres  
 Depth at WQCV outlet above lowest perforation, H = 20 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, N<sub>L</sub> = 5  
 Orifice discharge coefficient, C<sub>o</sub> = 0.65

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H = 2.00 in.  
 Width of slot, W = 25.77 in.

Time to Drain the Pond = 40 hours  
**Water Quality Capture Volume Method Selected (40-Hour Release)**



**Outlet Design Information (Output):**

Water Quality Capture Volume (1.0 \* (0.91 \* I<sub>p</sub><sup>3</sup> - 1.19 \* I<sub>p</sub><sup>2</sup> + 0.78 \* I<sub>p</sub>)), WQCV = 0.163 watershed inches  
 Water Quality Capture Volume (WQCV) = 4.711 acre-feet  
**Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 5.654 acre-feet**  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> = 51.54 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 51.54 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 0.358 square feet

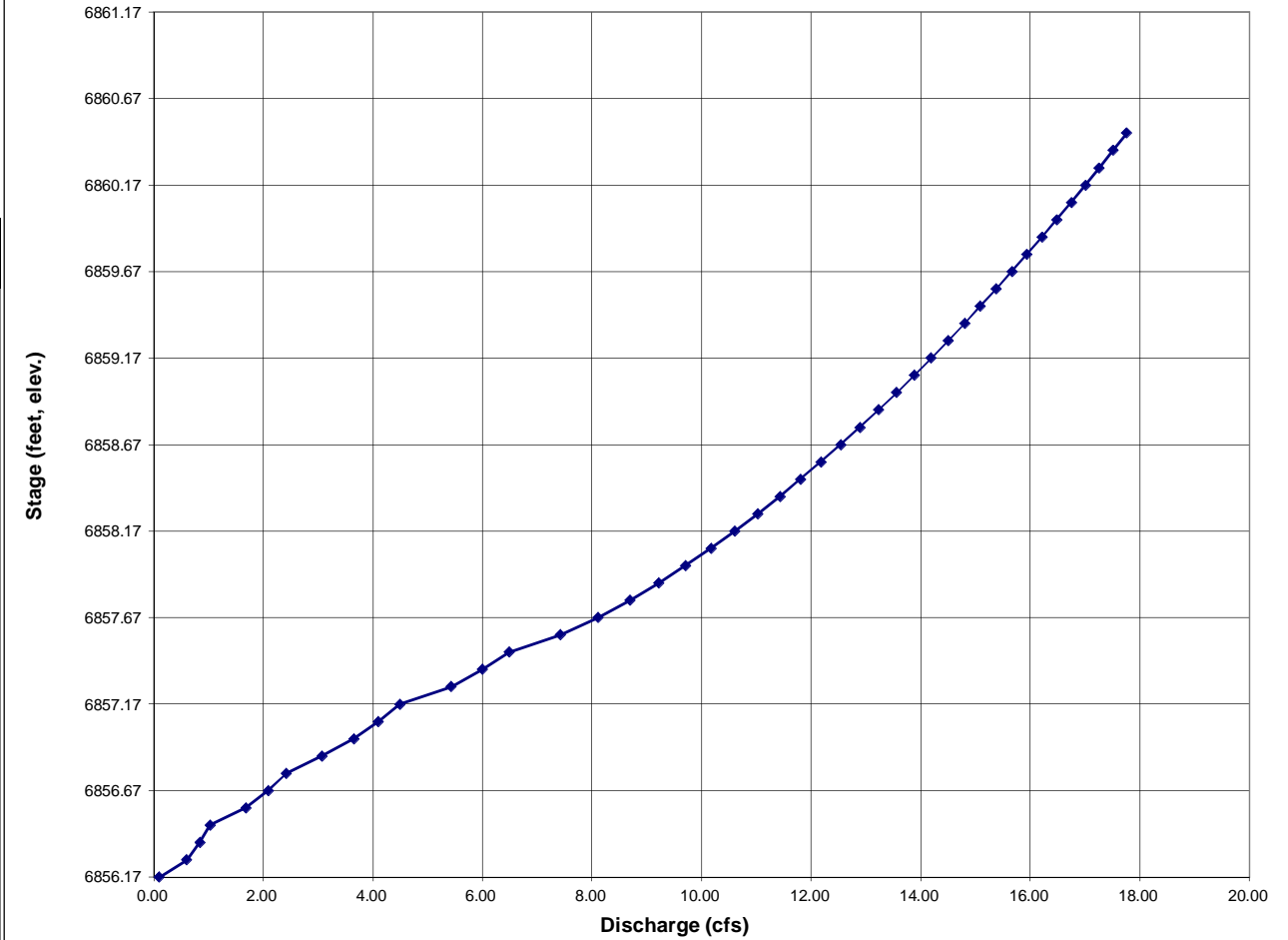
**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6856.17	6856.50	6856.83	6857.17	6857.50														
	Collection Capacity for Each Row of Holes in cfs																		
6856.17	0.102	0.000	0.000	0.000	0.000														
6856.27	0.599	0.000	0.000	0.000	0.000														
6856.37	0.841	0.000	0.000	0.000	0.000														
6856.47	1.028	0.000	0.000	0.000	0.000														
6856.57	1.185	0.494	0.000	0.000	0.000														
6856.67	1.324	0.770	0.000	0.000	0.000														
6856.77	1.450	0.970	0.000	0.000	0.000														
6856.87	1.565	1.136	0.373	0.000	0.000														
6856.97	1.673	1.280	0.698	0.000	0.000														
6857.07	1.774	1.409	0.915	0.000	0.000														
6857.17	1.870	1.528	1.089	0.000	0.000														
6857.27	1.961	1.638	1.238	0.590	0.000														
6857.37	2.048	1.741	1.372	0.835	0.000														
6857.47	2.131	1.839	1.493	1.022	0.000														
6857.57	2.211	1.931	1.606	1.181	0.494														
6857.67	2.289	2.019	1.711	1.320	0.770														
6857.77	2.364	2.104	1.810	1.446	0.970														
6857.87	2.436	2.185	1.904	1.562	1.136														
6857.97	2.507	2.263	1.993	1.670	1.280														
6858.07	2.575	2.339	2.079	1.771	1.409														
6858.17	2.642	2.412	2.161	1.867	1.528														
6858.27	2.707	2.484	2.240	1.958	1.638														
6858.37	2.771	2.553	2.317	2.045	1.741														
6858.47	2.833	2.620	2.391	2.128	1.839														
6858.57	2.894	2.686	2.462	2.209	1.931														
6858.67	2.953	2.750	2.532	2.286	2.019														
6858.77	3.012	2.813	2.600	2.361	2.104														
6858.87	3.069	2.874	2.666	2.434	2.185														
6858.97	3.125	2.934	2.731	2.505	2.263														
6859.07	3.181	2.993	2.794	2.573	2.339														
6859.17	3.235	3.050	2.856	2.640	2.412														
6859.27	3.288	3.107	2.916	2.705	2.484														
6859.37	3.341	3.163	2.975	2.769	2.553														
6859.47	3.393	3.217	3.033	2.831	2.620														
6859.57	3.444	3.271	3.090	2.892	2.686														
6859.67	3.494	3.324	3.146	2.952	2.750														
6859.77	3.544	3.376	3.201	3.010	2.813														
6859.87	3.592	3.427	3.255	3.067	2.874														
6859.97	3.641	3.477	3.308	3.124	2.934														
6860.07	3.688	3.527	3.360	3.179	2.993														
6860.17	3.735	3.576	3.412	3.233	3.050														
6860.27	3.781	3.625	3.462	3.287	3.107														
6860.37	3.827	3.672	3.512	3.339	3.163														
6860.47	3.872	3.720	3.562	3.391	3.217														

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #4**

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

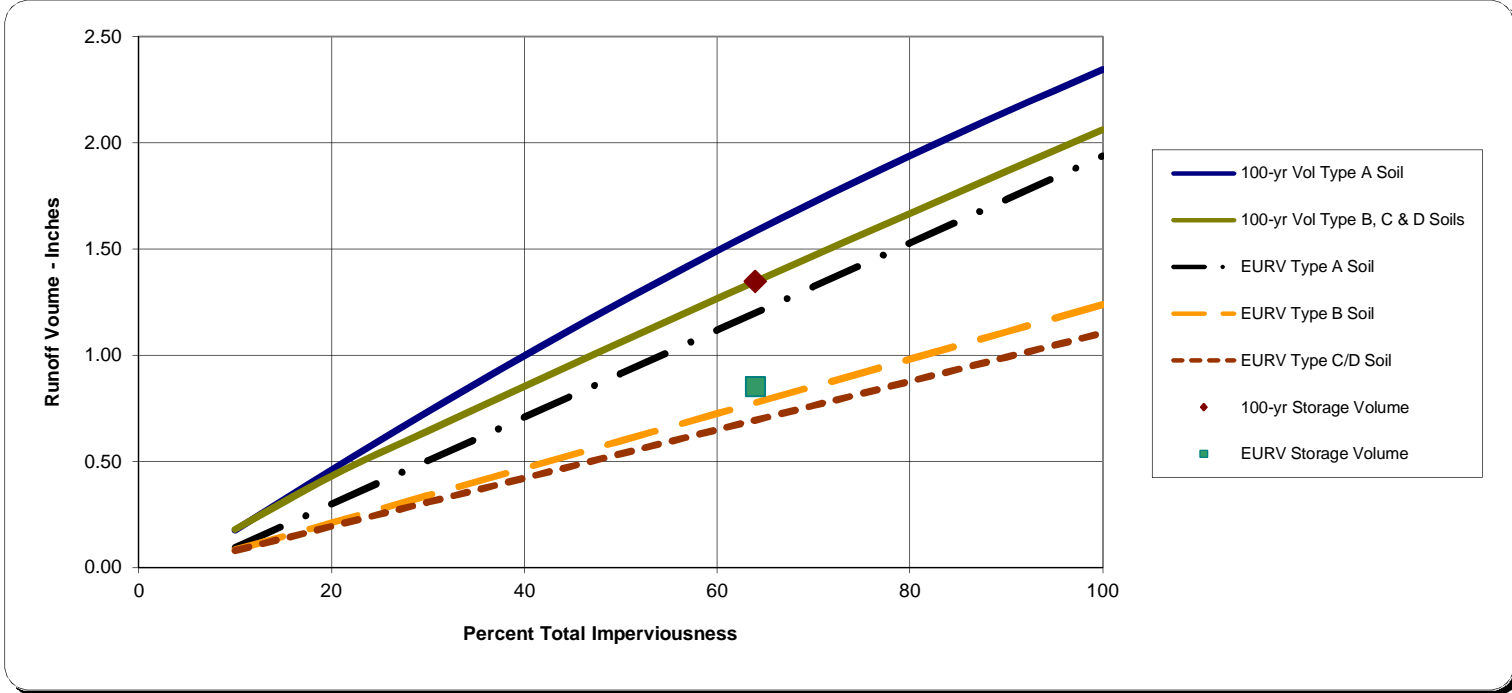
**Project:** Falcon DBPS  
**Basin ID:** Woodmen Hills Pond #5

\* User input data shown in blue.

Area of Watershed (acres)	28.00	
Subwatershed Imperviousness	64.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	64.0%	
Hydrologic Soil Type	<b>Percentage of Area</b>	<b>Area (acres)</b>
Type A	0.0	0.0
Type B	100.0%	28.0
Type C or D	0.0	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018
Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.85	1.9918	Design Outlet to Empty EURV in 72 Hours
1.35	3.14	23.80

**Excess Urban Runoff Volume<sup>4</sup>**  
**100-year Detention Volume Including WQCV<sup>5</sup>**



- Notes:**
- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
  - 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
  - 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
  - 4) EURV approximates the difference between developed and pre-developed runoff volume.
  - 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

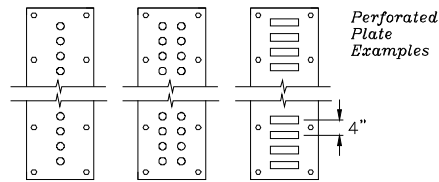
Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #5**

**WQCV Design Volume (Input):**

Catchment Imperviousness,  $I_p$  =  percent  
 Catchment Area, A =  acres  
 Depth at WQCV outlet above lowest perforation, H =  inches  
 Vertical distance between rows, h =  inches  
 Number of rows, N<sub>L</sub> =   
 Orifice discharge coefficient, C<sub>d</sub> =

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H =  in.  
 Width of slot, W =  in.

Time to Drain the Pond =  hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**



**Outlet Design Information (Output):**

Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') =  watershed inches  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') =  acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> =  square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> =  square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> =  square feet

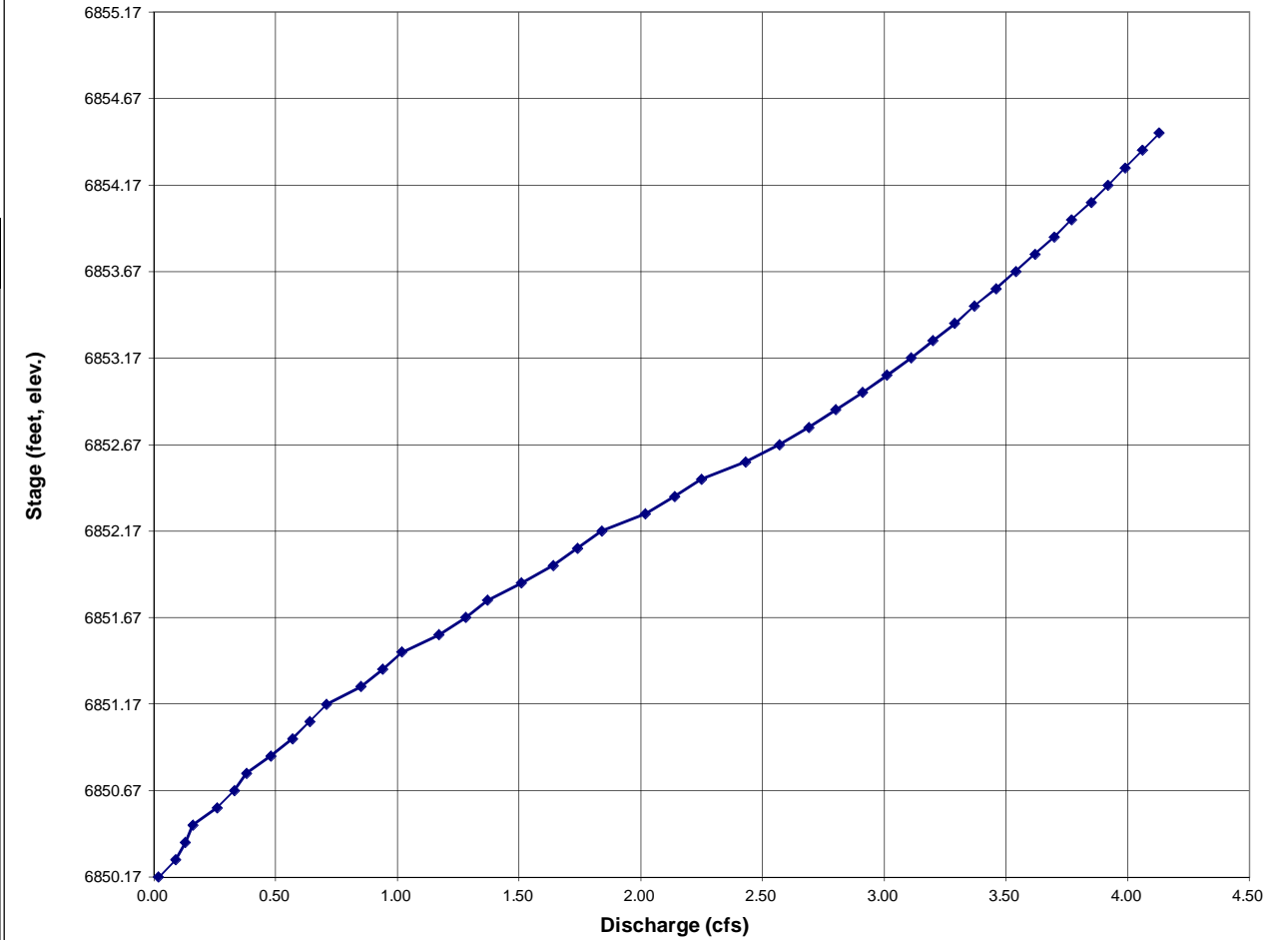
**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6850.17	6850.50	6850.83	6851.17	6851.50	6851.83	6852.17	6852.50											
	Collection Capacity for Each Row of Holes in cfs																		
6850.17	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.02
6850.27	0.094	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.09
6850.37	0.132	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.13
6850.47	0.162	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.16
6850.57	0.186	0.078	0.000	0.000	0.000	0.000	0.000	0.000											0.26
6850.67	0.208	0.121	0.000	0.000	0.000	0.000	0.000	0.000											0.33
6850.77	0.228	0.153	0.000	0.000	0.000	0.000	0.000	0.000											0.38
6850.87	0.246	0.179	0.059	0.000	0.000	0.000	0.000	0.000											0.48
6850.97	0.263	0.201	0.110	0.000	0.000	0.000	0.000	0.000											0.57
6851.07	0.279	0.222	0.144	0.000	0.000	0.000	0.000	0.000											0.64
6851.17	0.294	0.240	0.171	0.000	0.000	0.000	0.000	0.000											0.71
6851.27	0.308	0.258	0.195	0.093	0.000	0.000	0.000	0.000											0.85
6851.37	0.322	0.274	0.216	0.131	0.000	0.000	0.000	0.000											0.94
6851.47	0.335	0.289	0.235	0.161	0.000	0.000	0.000	0.000											1.02
6851.57	0.348	0.304	0.253	0.186	0.078	0.000	0.000	0.000											1.17
6851.67	0.360	0.318	0.269	0.208	0.121	0.000	0.000	0.000											1.28
6851.77	0.372	0.331	0.285	0.227	0.153	0.000	0.000	0.000											1.37
6851.87	0.383	0.344	0.299	0.246	0.179	0.059	0.000	0.000											1.51
6851.97	0.394	0.356	0.314	0.263	0.201	0.110	0.000	0.000											1.64
6852.07	0.405	0.368	0.327	0.279	0.222	0.144	0.000	0.000											1.74
6852.17	0.416	0.379	0.340	0.294	0.240	0.171	0.000	0.000											1.84
6852.27	0.426	0.391	0.352	0.308	0.258	0.195	0.093	0.000											2.02
6852.37	0.436	0.402	0.364	0.322	0.274	0.216	0.131	0.000											2.14
6852.47	0.446	0.412	0.376	0.335	0.289	0.235	0.161	0.000											2.25
6852.57	0.455	0.422	0.387	0.347	0.304	0.253	0.186	0.078											2.43
6852.67	0.465	0.433	0.398	0.360	0.318	0.269	0.208	0.121											2.57
6852.77	0.474	0.442	0.409	0.371	0.331	0.285	0.227	0.153											2.69
6852.87	0.483	0.452	0.419	0.383	0.344	0.299	0.246	0.179											2.80
6852.97	0.492	0.461	0.430	0.394	0.356	0.314	0.263	0.201											2.91
6853.07	0.500	0.471	0.439	0.405	0.368	0.327	0.279	0.222											3.01
6853.17	0.509	0.480	0.449	0.415	0.379	0.340	0.294	0.240											3.11
6853.27	0.517	0.489	0.459	0.426	0.391	0.352	0.308	0.258											3.20
6853.37	0.526	0.497	0.468	0.436	0.402	0.364	0.322	0.274											3.29
6853.47	0.534	0.506	0.477	0.445	0.412	0.376	0.335	0.289											3.37
6853.57	0.542	0.514	0.486	0.455	0.422	0.387	0.347	0.304											3.46
6853.67	0.550	0.523	0.495	0.464	0.433	0.398	0.360	0.318											3.54
6853.77	0.557	0.531	0.503	0.473	0.442	0.409	0.371	0.331											3.62
6853.87	0.565	0.539	0.512	0.482	0.452	0.419	0.383	0.344											3.70
6853.97	0.573	0.547	0.520	0.491	0.461	0.430	0.394	0.356											3.77
6854.07	0.580	0.555	0.529	0.500	0.471	0.439	0.405	0.368											3.85
6854.17	0.587	0.563	0.537	0.509	0.480	0.449	0.415	0.379											3.92
6854.27	0.595	0.570	0.545	0.517	0.489	0.459	0.426	0.391											3.99
6854.37	0.602	0.578	0.552	0.525	0.497	0.468	0.436	0.402											4.06
6854.47	0.609	0.585	0.560	0.533	0.506	0.477	0.445	0.412											4.13

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #5**

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Paint Brush Hills Pond A

\* User input data shown in blue.

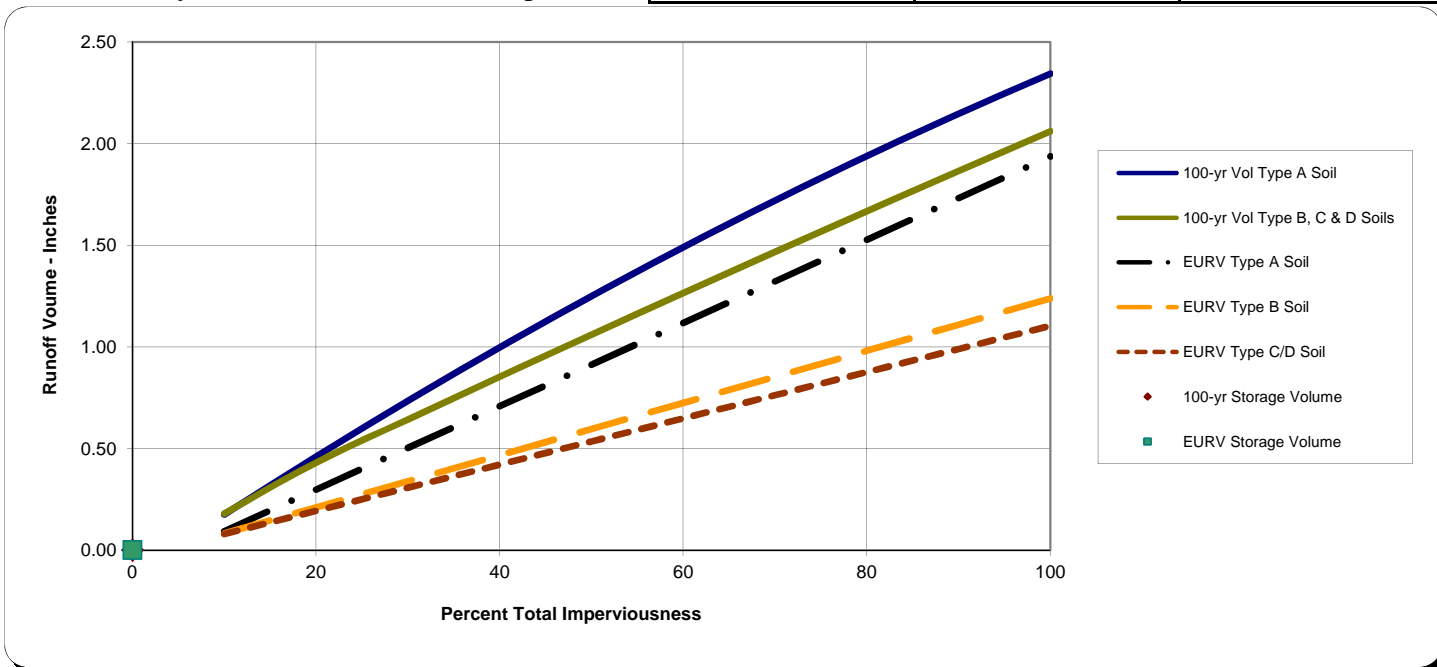
Area of Watershed (acres)		
Subwatershed Imperviousness		
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>		
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B		0.0
Type C or D		0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
0	0.0	0.0000

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.00	0.0000	Design Outlet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV <sup>5</sup>	0.00	0.00

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

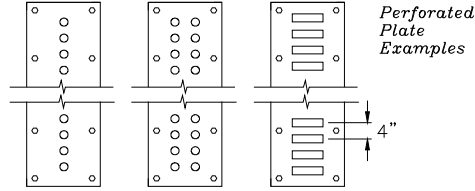
Project: **Falcon DBPS**  
 Basin ID: **Paint Brush Hills Pond A**

Project: **Falcon DBPS**  
 Basin ID: **Paint Brush Hills Pond A**

**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p$  = 30.0 percent  
 Catchment Area,  $A$  = 65.000 acres  
 Depth at WQCV outlet above lowest perforation,  $H$  = 28 inches  
 Vertical distance between rows,  $h$  = 4.00 inches  
 Number of rows,  $N_L$  = 7  
 Orifice discharge coefficient,  $C_o$  = 0.65

Diameter of holes,  $D$  = [ ] in.  
 Number of holes per row,  $N$  = [ ]  
**OR**  
 Height of slot,  $H_s$  = 2.00 in.  
 Width of slot,  $W$  = 3.30 in.

Time to Drain the Pond = 40 hours  
**Water Quality Capture Volume Method Selected (40-Hour Release)**

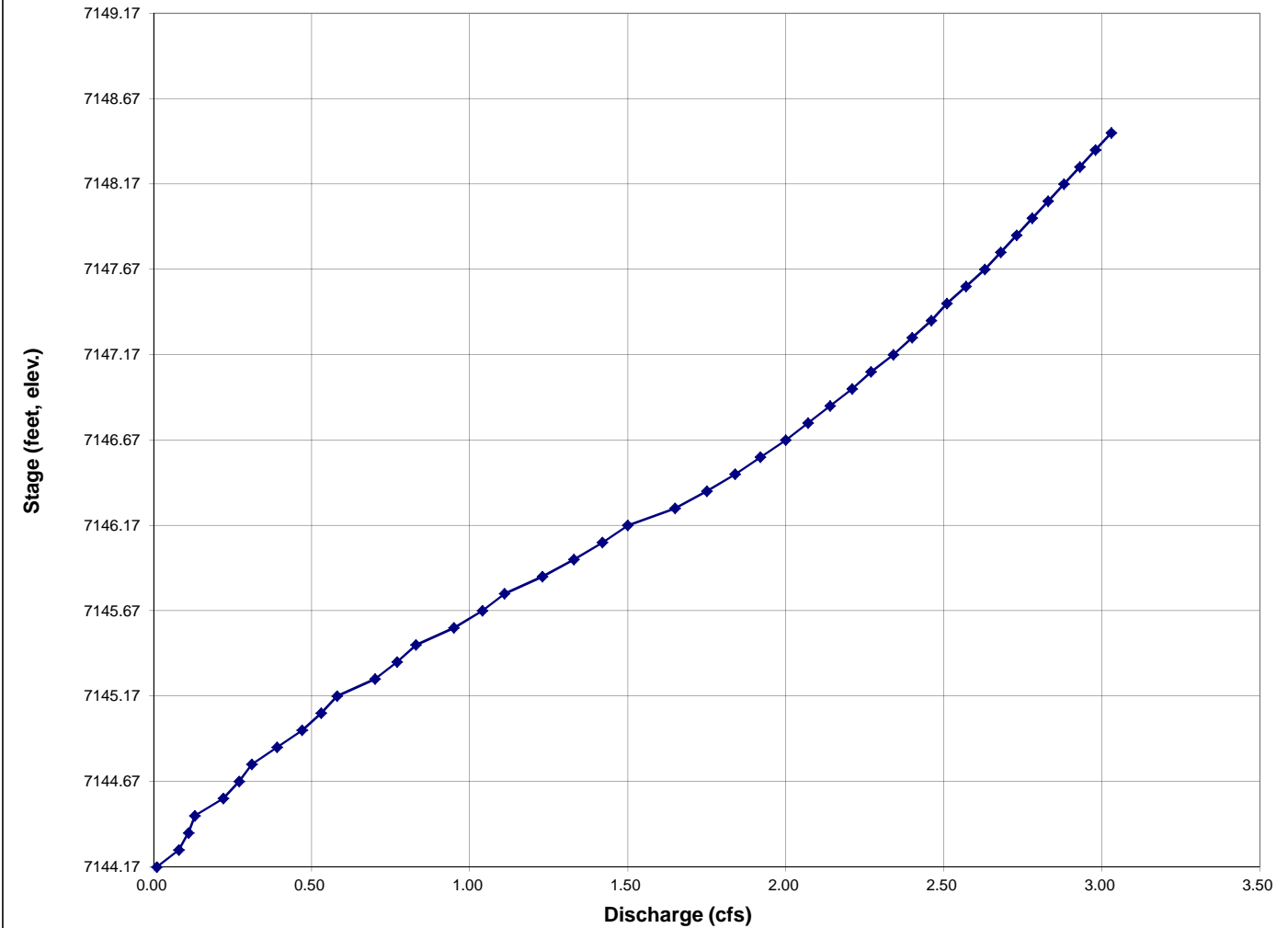


**Outlet Design Information (Output):**  
 Water Quality Capture Volume ( $1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I)$ ), WQCV = 0.151 watershed inches  
 Water Quality Capture Volume (WQCV) = 0.820 acre-feet  
**Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 0.985 acre-feet**  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 6.61 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 6.61 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.046 square feet

**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	7144.17	7144.50	7144.83	7145.17	7145.50	7145.83	7146.17												
	Collection Capacity for Each Row of Holes in cfs																		
7144.17	0.013	0.000	0.000	0.000	0.000	0.000	0.000												0.01
7144.27	0.077	0.000	0.000	0.000	0.000	0.000	0.000												0.08
7144.37	0.108	0.000	0.000	0.000	0.000	0.000	0.000												0.11
7144.47	0.132	0.000	0.000	0.000	0.000	0.000	0.000												0.13
7144.57	0.152	0.063	0.000	0.000	0.000	0.000	0.000												0.22
7144.67	0.170	0.099	0.000	0.000	0.000	0.000	0.000												0.27
7144.77	0.186	0.124	0.000	0.000	0.000	0.000	0.000												0.31
7144.87	0.201	0.146	0.048	0.000	0.000	0.000	0.000												0.39
7144.97	0.214	0.164	0.090	0.000	0.000	0.000	0.000												0.47
7145.07	0.227	0.181	0.117	0.000	0.000	0.000	0.000												0.53
7145.17	0.240	0.196	0.140	0.000	0.000	0.000	0.000												0.58
7145.27	0.251	0.210	0.159	0.076	0.000	0.000	0.000												0.70
7145.37	0.262	0.223	0.176	0.107	0.000	0.000	0.000												0.77
7145.47	0.273	0.236	0.191	0.131	0.000	0.000	0.000												0.83
7145.57	0.283	0.248	0.206	0.151	0.063	0.000	0.000												0.95
7145.67	0.293	0.259	0.219	0.169	0.099	0.000	0.000												1.04
7145.77	0.303	0.270	0.232	0.185	0.124	0.000	0.000												1.11
7145.87	0.312	0.280	0.244	0.200	0.146	0.048	0.000												1.23
7145.97	0.321	0.290	0.255	0.214	0.164	0.090	0.000												1.33
7146.07	0.330	0.300	0.266	0.227	0.181	0.117	0.000												1.42
7146.17	0.339	0.309	0.277	0.239	0.196	0.140	0.000												1.50
7146.27	0.347	0.318	0.287	0.251	0.210	0.159	0.076												1.65
7146.37	0.355	0.327	0.297	0.262	0.223	0.176	0.107												1.75
7146.47	0.363	0.336	0.306	0.273	0.236	0.191	0.131												1.84
7146.57	0.371	0.344	0.316	0.283	0.248	0.206	0.151												1.92
7146.67	0.379	0.352	0.325	0.293	0.259	0.219	0.169												2.00
7146.77	0.386	0.361	0.333	0.303	0.270	0.232	0.185												2.07
7146.87	0.393	0.368	0.342	0.312	0.280	0.244	0.200												2.14
7146.97	0.401	0.376	0.350	0.321	0.290	0.255	0.214												2.21
7147.07	0.408	0.384	0.358	0.330	0.300	0.266	0.227												2.27
7147.17	0.415	0.391	0.366	0.338	0.309	0.277	0.239												2.34
7147.27	0.422	0.398	0.374	0.347	0.318	0.287	0.251												2.40
7147.37	0.428	0.405	0.381	0.355	0.327	0.297	0.262												2.46
7147.47	0.435	0.412	0.389	0.363	0.336	0.306	0.273												2.51
7147.57	0.441	0.419	0.396	0.371	0.344	0.316	0.283												2.57
7147.67	0.448	0.426	0.403	0.378	0.352	0.325	0.293												2.63
7147.77	0.454	0.433	0.410	0.386	0.361	0.333	0.303												2.68
7147.87	0.460	0.439	0.417	0.393	0.368	0.342	0.312												2.73
7147.97	0.467	0.446	0.424	0.400	0.376	0.350	0.321												2.78
7148.07	0.473	0.452	0.431	0.407	0.384	0.358	0.330												2.83
7148.17	0.479	0.458	0.437	0.414	0.391	0.366	0.338												2.88
7148.27	0.485	0.465	0.444	0.421	0.398	0.374	0.347												2.93
7148.37	0.491	0.471	0.450	0.428	0.405	0.381	0.355												2.98
7148.47	0.496	0.477	0.457	0.435	0.412	0.389	0.363												3.03

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Paint Brush Hills Pond B1 & B2

\* User input data shown in blue.

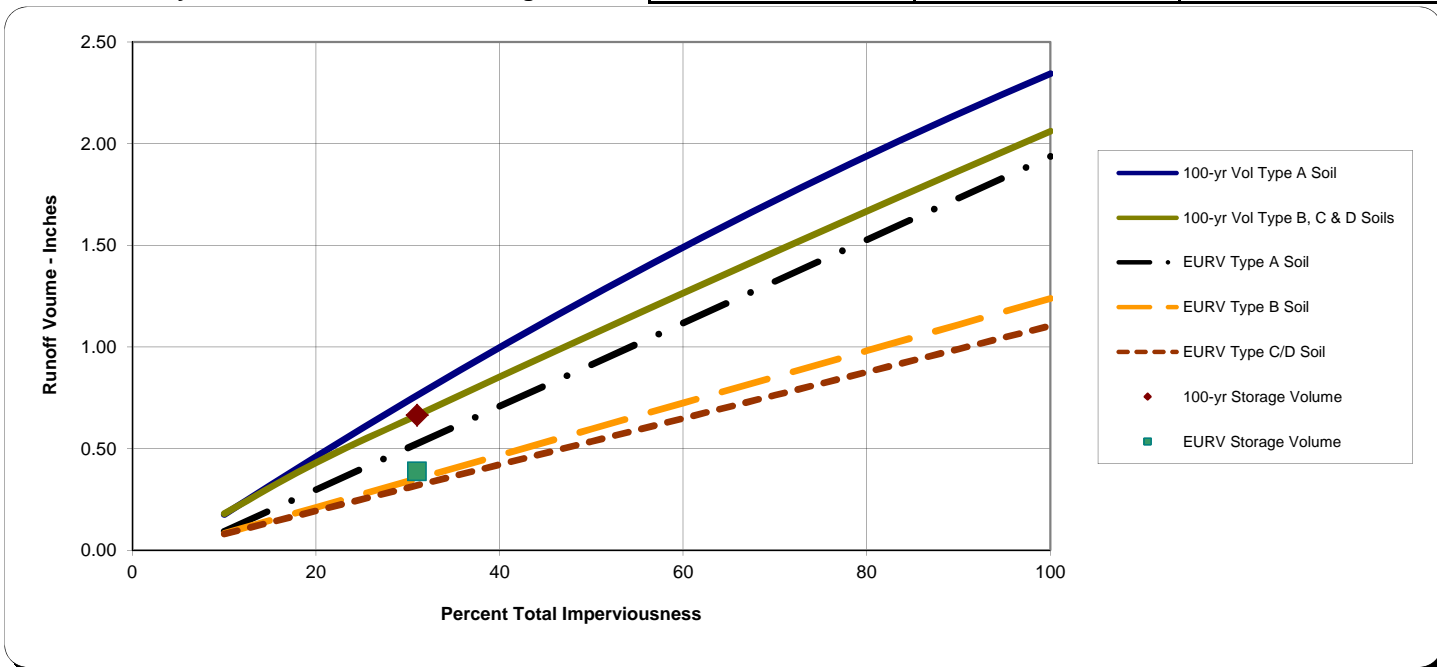
Area of Watershed (acres)	231.00	
Subwatershed Imperviousness	31.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	31.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	231.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.39	7.4563	Design Outlet to Empty EURV in 72 Hours
0.66	12.79	196.35

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV





## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Paint Brush Hills Pond C

\* User input data shown in blue.

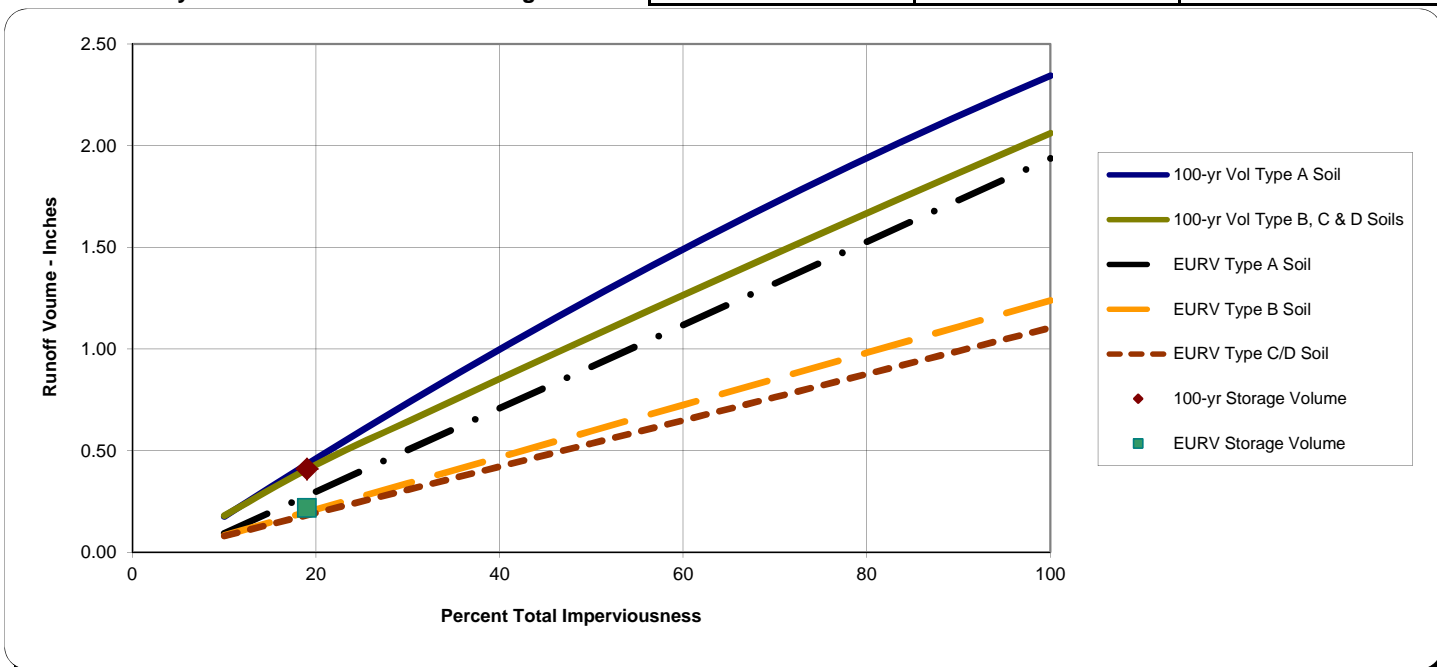
Area of Watershed (acres)	120.00	
Subwatershed Imperviousness	19.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	19.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	120.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.22	2.1777	Design Outlet to Empty EURV in 72 Hours
0.41	4.10	102.00

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

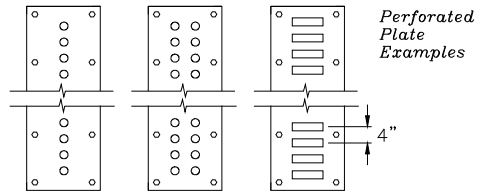
**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
Basin ID: **Paint Brush Hills Pond C**

Project: **Falcon DBPS**  
Basin ID: **Paint Brush Hills Pond C**

**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p$  =  percent  
 Catchment Area, A =  acres  
 Depth at WQCV outlet above lowest perforation, H =  inches  
 Vertical distance between rows, h =  inches  
 Number of rows, NL =   
 Orifice discharge coefficient,  $C_o$  =   
 Diameter of holes, D =  in.  
 Number of holes per row, N =  **OR**  **Perforated Plate Examples**  
 Time to Drain the Pond =  hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**  
 Height of slot, H =  in.  
 Width of slot, W =  in.

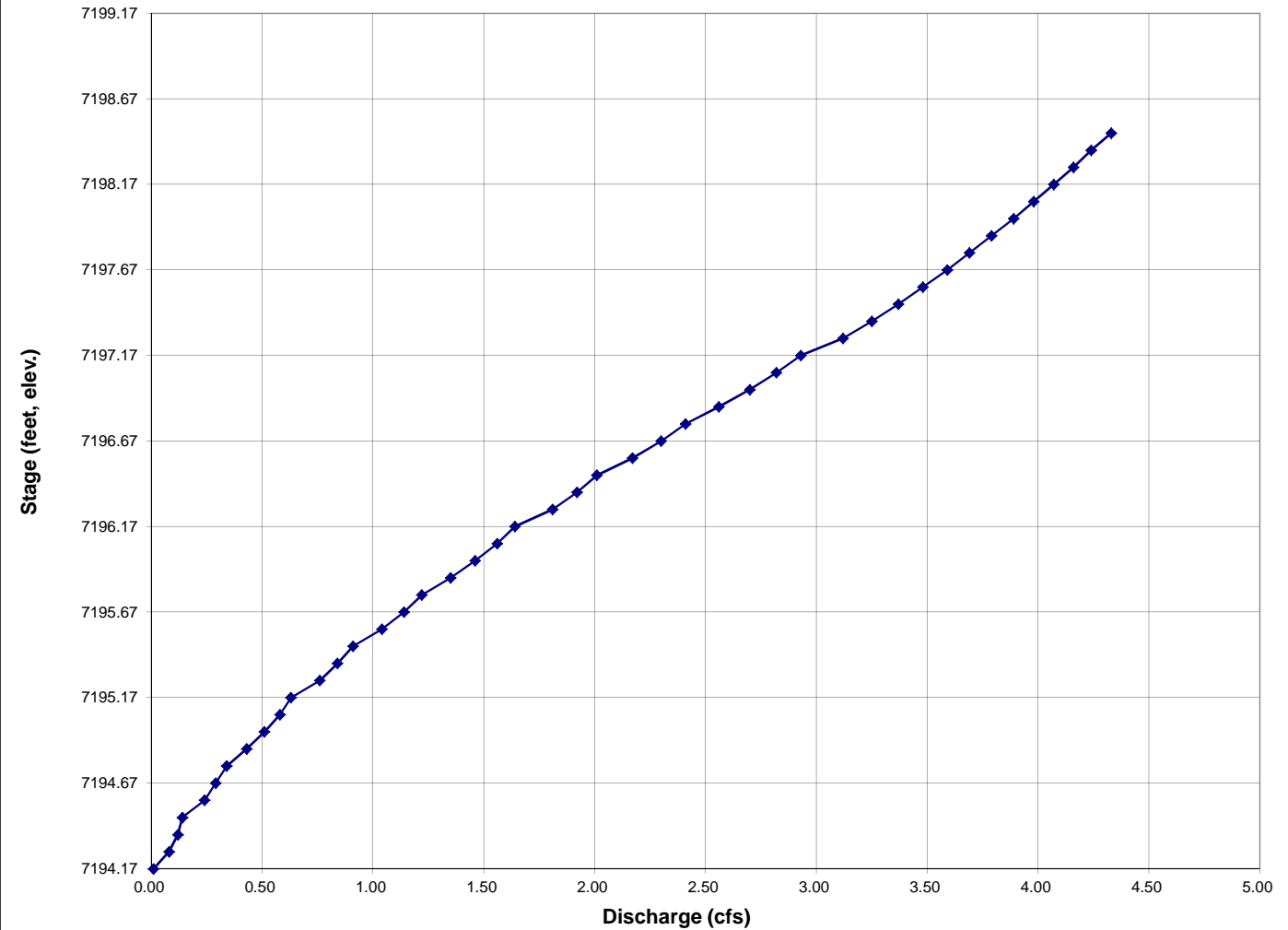


**Outlet Design Information (Output):**  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.218 watershed inches  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 2.178 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 7.24 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 7.24 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.050 square feet

**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	7194.17	7194.50	7194.83	7195.17	7195.50	7195.83	7196.17	7196.50	7196.83	7197.17									
	Collection Capacity for Each Row of Holes in cfs																		
7194.17	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7194.27	0.084	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7194.37	0.118	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7194.47	0.144	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7194.57	0.167	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7194.67	0.186	0.108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7194.77	0.204	0.136	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7194.87	0.220	0.160	0.052	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7194.97	0.235	0.180	0.098	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7195.07	0.249	0.198	0.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7195.17	0.263	0.215	0.153	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
7195.27	0.276	0.230	0.174	0.083	0.000	0.000	0.000	0.000	0.000	0.000									
7195.37	0.288	0.245	0.193	0.117	0.000	0.000	0.000	0.000	0.000	0.000									
7195.47	0.300	0.258	0.210	0.144	0.000	0.000	0.000	0.000	0.000	0.000									
7195.57	0.311	0.271	0.226	0.166	0.069	0.000	0.000	0.000	0.000	0.000									
7195.67	0.322	0.284	0.241	0.186	0.108	0.000	0.000	0.000	0.000	0.000									
7195.77	0.332	0.296	0.254	0.203	0.136	0.000	0.000	0.000	0.000	0.000									
7195.87	0.342	0.307	0.268	0.220	0.160	0.052	0.000	0.000	0.000	0.000									
7195.97	0.352	0.318	0.280	0.235	0.180	0.098	0.000	0.000	0.000	0.000									
7196.07	0.362	0.329	0.292	0.249	0.198	0.129	0.000	0.000	0.000	0.000									
7196.17	0.371	0.339	0.304	0.262	0.215	0.153	0.000	0.000	0.000	0.000									
7196.27	0.381	0.349	0.315	0.275	0.230	0.174	0.083	0.000	0.000	0.000									
7196.37	0.390	0.359	0.326	0.287	0.245	0.193	0.117	0.000	0.000	0.000									
7196.47	0.398	0.368	0.336	0.299	0.258	0.210	0.144	0.000	0.000	0.000									
7196.57	0.407	0.378	0.346	0.311	0.271	0.226	0.166	0.069	0.000	0.000									
7196.67	0.415	0.387	0.356	0.321	0.284	0.241	0.186	0.108	0.000	0.000									
7196.77	0.423	0.395	0.366	0.332	0.296	0.254	0.203	0.136	0.000	0.000									
7196.87	0.431	0.404	0.375	0.342	0.307	0.268	0.220	0.160	0.052	0.000									
7196.97	0.439	0.412	0.384	0.352	0.318	0.280	0.235	0.180	0.098	0.000									
7197.07	0.447	0.421	0.393	0.362	0.329	0.292	0.249	0.198	0.129	0.000									
7197.17	0.455	0.429	0.401	0.371	0.339	0.304	0.262	0.215	0.153	0.000									
7197.27	0.462	0.437	0.410	0.380	0.349	0.315	0.275	0.230	0.174	0.083									
7197.37	0.470	0.445	0.418	0.389	0.359	0.326	0.287	0.245	0.193	0.117									
7197.47	0.477	0.452	0.426	0.398	0.368	0.336	0.299	0.258	0.210	0.144									
7197.57	0.484	0.460	0.434	0.407	0.378	0.346	0.311	0.271	0.226	0.166									
7197.67	0.491	0.467	0.442	0.415	0.387	0.356	0.321	0.284	0.241	0.186									
7197.77	0.498	0.475	0.450	0.423	0.395	0.366	0.332	0.296	0.254	0.203									
7197.87	0.505	0.482	0.458	0.431	0.404	0.375	0.342	0.307	0.268	0.220									
7197.97	0.512	0.489	0.465	0.439	0.412	0.384	0.352	0.318	0.280	0.235									
7198.07	0.518	0.496	0.472	0.447	0.421	0.393	0.362	0.329	0.292	0.249									
7198.17	0.525	0.503	0.480	0.455	0.429	0.401	0.371	0.339	0.304	0.262									
7198.27	0.532	0.510	0.487	0.462	0.437	0.410	0.380	0.349	0.315	0.275									
7198.37	0.538	0.516	0.494	0.469	0.445	0.418	0.389	0.359	0.326	0.287									
7198.47	0.544	0.523	0.501	0.477	0.452	0.426	0.398	0.368	0.336	0.299									

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

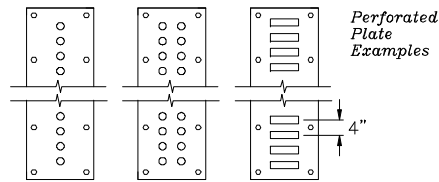
Project: **Falcon DBPS**  
 Basin ID: **Regional Pond MN**

**WQCV Design Volume (Input):**

Catchment Imperviousness,  $I_p$  = 28.0 percent  
 Catchment Area, A = 169,000 acres  
 Depth at WQCV outlet above lowest perforation, H = 16 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, N<sub>L</sub> = 4  
 Orifice discharge coefficient, C<sub>o</sub> = 0.65

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H = 2.00 in.  
 Width of slot, W = 12.98 in.

Time to Drain the Pond = 40 hours  
**Water Quality Capture Volume Method Selected (40-Hour Release)**



**Outlet Design Information (Output):**

Water Quality Capture Volume (1.0 \* (0.91 \* I<sub>p</sub><sup>3</sup> - 1.19 \* I<sub>p</sub><sup>2</sup> + 0.78 \* I<sub>p</sub>)), WQCV = 0.145 watershed inches  
 Water Quality Capture Volume (WQCV) = 2.043 acre-feet  
**Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 2.452 acre-feet**  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> = 25.95 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 25.95 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 0.180 square feet

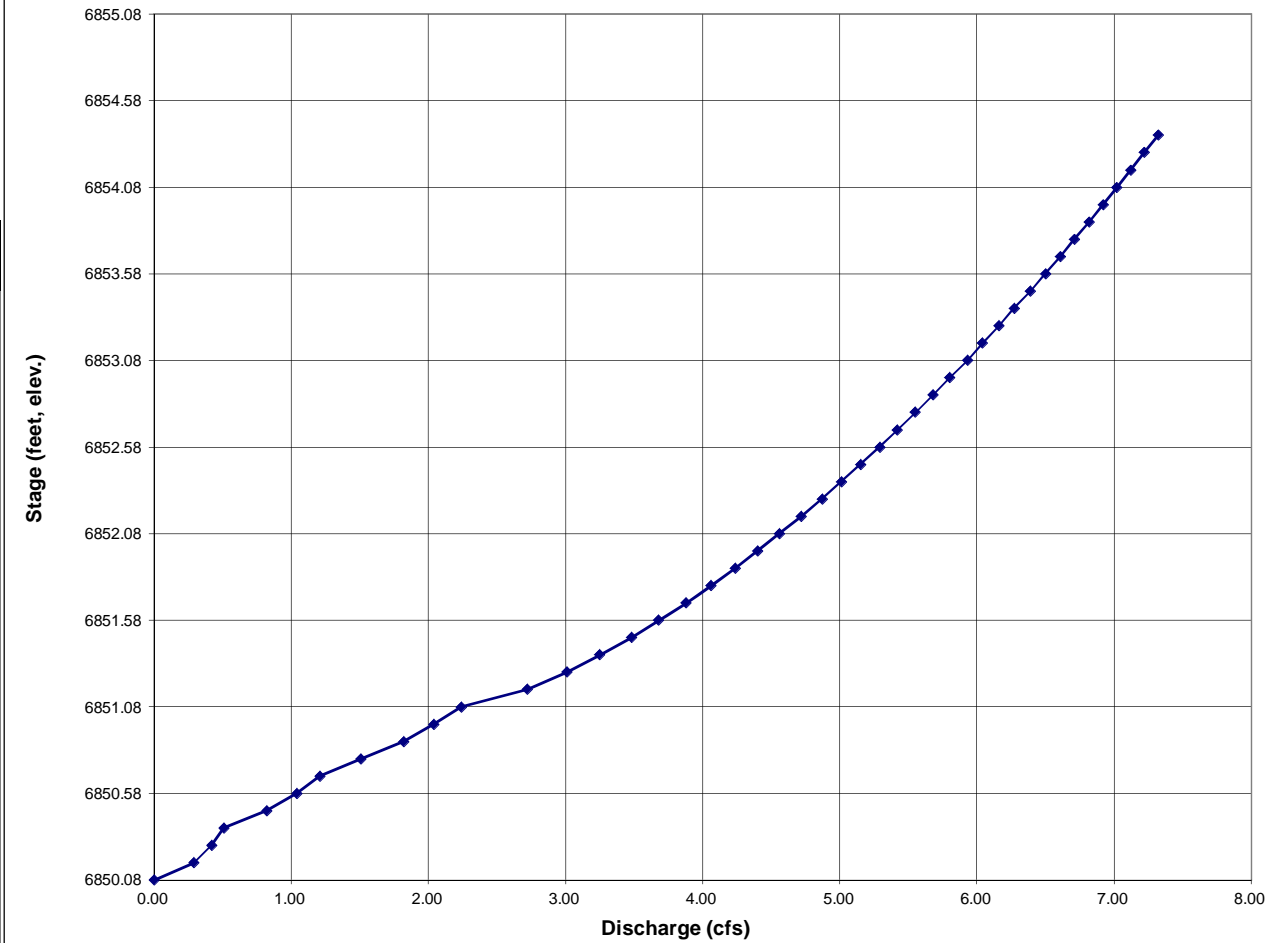
**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6850.08	6850.42	6850.75	6851.08															
	Collection Capacity for Each Row of Holes in cfs																		
6850.08	0.000	0.000	0.000	0.000															
6850.18	0.293	0.000	0.000	0.000															
6850.28	0.417	0.000	0.000	0.000															
6850.38	0.512	0.000	0.000	0.000															
6850.48	0.592	0.230	0.000	0.000															
6850.58	0.663	0.376	0.000	0.000															
6850.68	0.726	0.479	0.000	0.000															
6850.78	0.785	0.564	0.163	0.000															
6850.88	0.839	0.638	0.339	0.000															
6850.98	0.890	0.704	0.451	0.000															
6851.08	0.939	0.764	0.540	0.000															
6851.18	0.985	0.820	0.616	0.297															
6851.28	1.029	0.872	0.684	0.420															
6851.38	1.071	0.921	0.746	0.515															
6851.48	1.111	0.968	0.803	0.595															
6851.58	1.150	1.013	0.856	0.665															
6851.68	1.188	1.055	0.907	0.728															
6851.78	1.225	1.096	0.954	0.787															
6851.88	1.260	1.136	0.999	0.841															
6851.98	1.295	1.174	1.043	0.892															
6852.08	1.329	1.211	1.084	0.940															
6852.18	1.361	1.247	1.124	0.986															
6852.28	1.393	1.282	1.163	1.030															
6852.38	1.425	1.316	1.200	1.072															
6852.48	1.456	1.349	1.237	1.112															
6852.58	1.486	1.382	1.272	1.151															
6852.68	1.515	1.413	1.306	1.189															
6852.78	1.544	1.444	1.339	1.226															
6852.88	1.572	1.475	1.372	1.261															
6852.98	1.600	1.504	1.404	1.296															
6853.08	1.628	1.533	1.435	1.330															
6853.18	1.654	1.562	1.465	1.362															
6853.28	1.681	1.590	1.495	1.394															
6853.38	1.707	1.617	1.525	1.426															
6853.48	1.733	1.645	1.553	1.456															
6853.58	1.758	1.671	1.582	1.486															
6853.68	1.783	1.697	1.609	1.516															
6853.78	1.808	1.723	1.636	1.545															
6853.88	1.832	1.749	1.663	1.573															
6853.98	1.856	1.774	1.690	1.601															
6854.08	1.880	1.799	1.716	1.628															
6854.18	1.903	1.823	1.741	1.655															
6854.28	1.926	1.847	1.766	1.682															
6854.38	1.949	1.871	1.791	1.708															

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **Regional Pond MN**

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS  
 Basin ID: Regional Pond R1

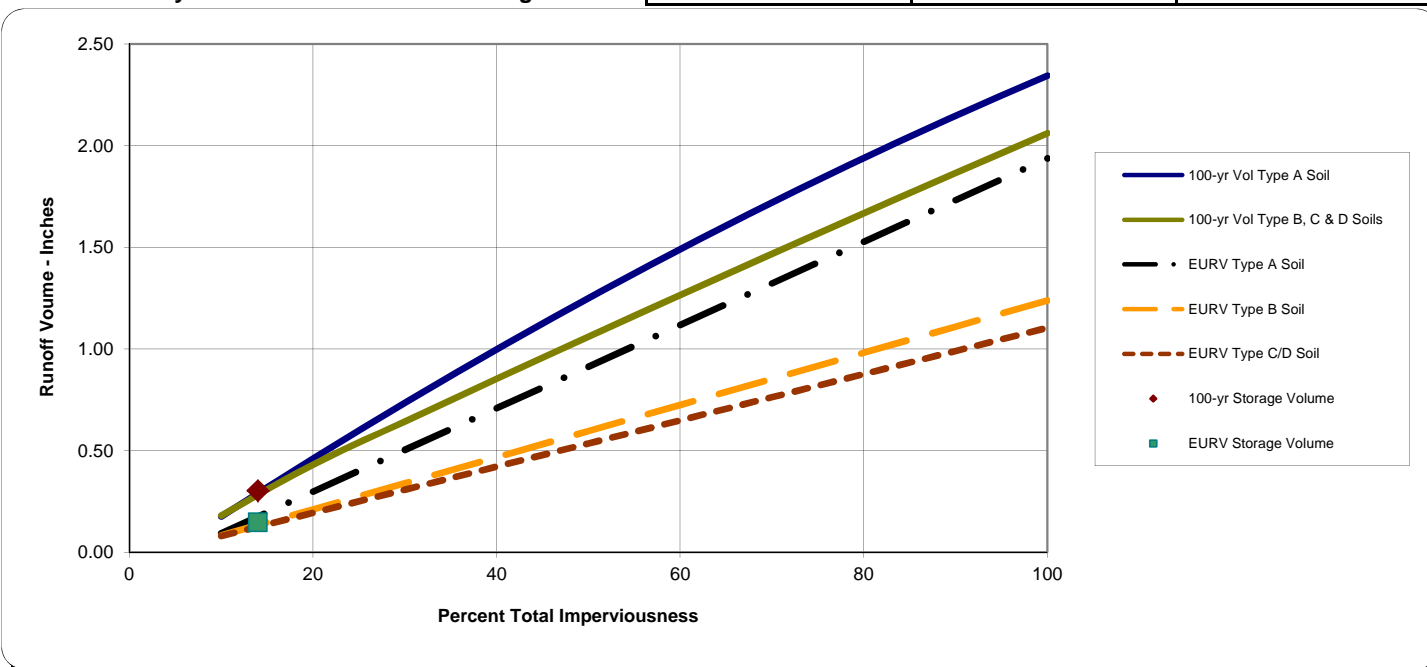
\* User input data shown in blue.

Area of Watershed (acres)	548.00	
Subwatershed Imperviousness	14.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	14.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	548.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.15	6.7184	Design Outlet to Empty EURV in 72 Hours
0.30	13.83	465.80

Excess Urban Runoff Volume<sup>4</sup>  
 100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

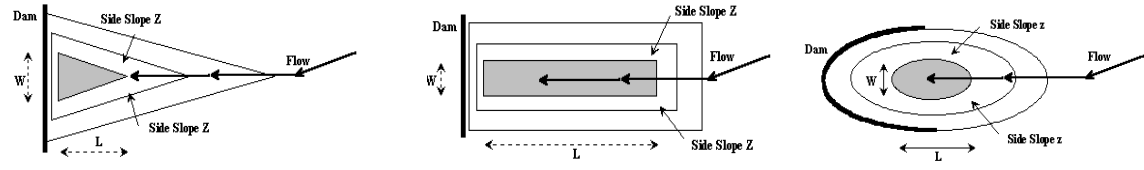


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Regional Pond R1

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 280.00 ft  
Length of Pond Bottom, L = 340.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

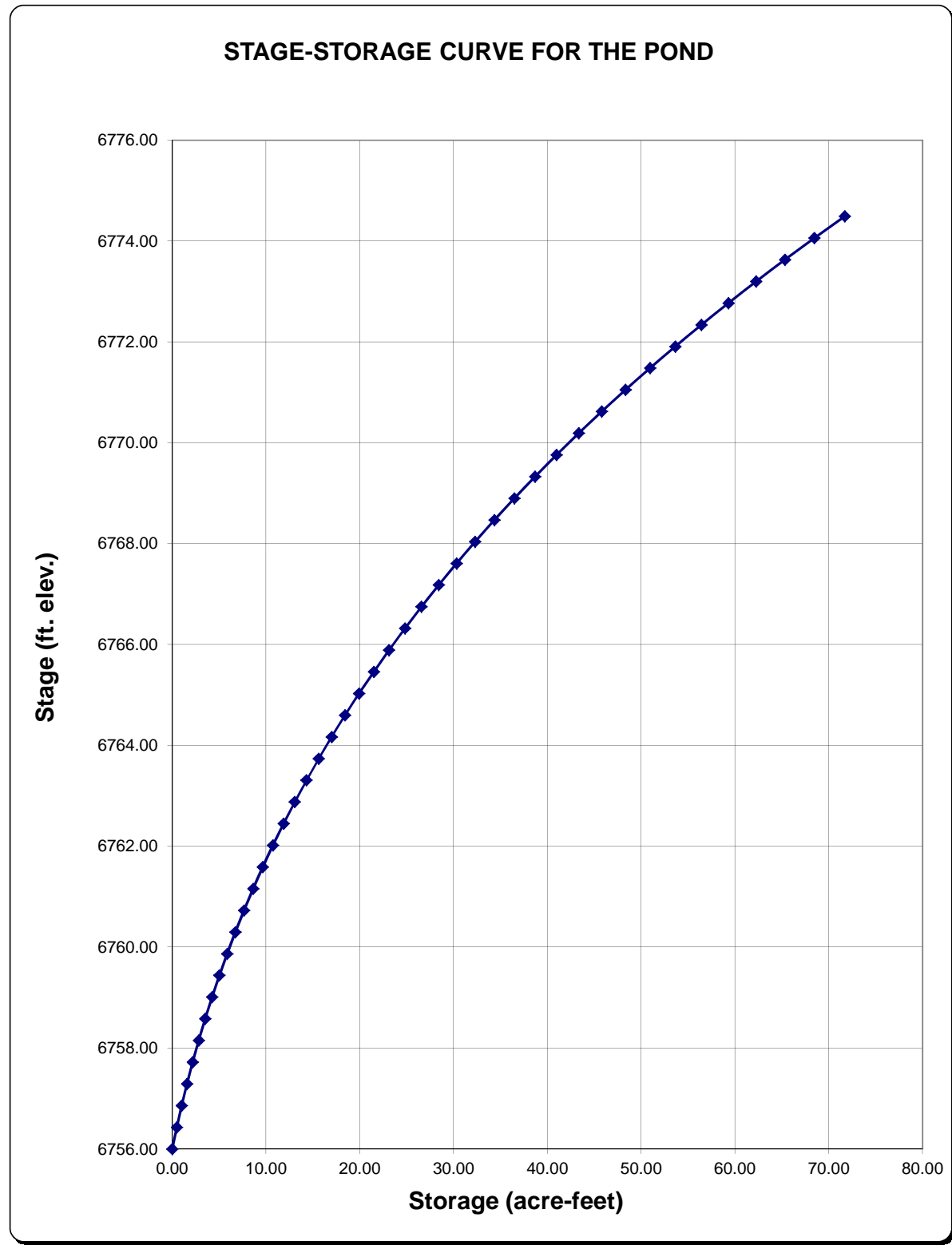
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA':		acre-ft.
Storage Requirement from Sheet 'Hydrograph':	11.343	acre-ft.
Storage Requirement from Sheet 'Full-Spectrum':	6.718	acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (ft) (input)	Side Slope (H:V) Below El. (input)	Pond Width at Stage (ft) (output)	Pond Length at Stage (ft) (output)	Surface Area at Stage (ft <sup>2</sup> ) (output)	Surface Area at Stage ft <sup>2</sup> User Override (output)	Volume Below Stage (ft <sup>3</sup> ) (output)	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6756.00		280.00	340.00	47,600.0			1.093	0.000	
	6756.43	10.00	290.72	353.01	51,313.5		21,266	1.178	0.488	
	6756.86	10.00	301.43	366.03	55,166.5		44,160	1.266	1.014	
	6757.29	10.00	312.15	379.04	59,158.9		68,740	1.358	1.578	
	6757.72	10.00	322.87	392.05	63,290.9		95,066	1.453	2.182	
	6758.15	10.00	333.59	405.07	67,562.2		123,200	1.551	2.828	
	6758.58	10.00	344.30	418.08	71,973.1		153,200	1.652	3.517	
	6759.01	10.00	355.02	431.09	76,523.4		185,127	1.757	4.250	
	6759.44	10.00	365.74	444.11	81,213.2		219,040	1.864	5.028	
	6759.87	10.00	376.45	457.12	86,042.4		255,000	1.975	5.854	
EURV	6760.30	10.00	387.17	470.14	91,011.1		293,066	2.089	6.728	
	6760.73	10.00	397.89	483.15	96,119.3		333,299	2.207	7.652	
	6761.16	10.00	408.60	496.16	101,366.9		375,759	2.327	8.626	
	6761.59	10.00	419.32	509.18	106,754.0		420,505	2.451	9.653	
	6762.02	10.00	430.04	522.19	112,280.6		467,597	2.578	10.735	
	6762.45	10.00	440.76	535.20	117,946.6		517,096	2.708	11.871	
	6762.88	10.00	451.47	548.22	123,752.1		569,061	2.841	13.064	
	6763.31	10.00	462.19	561.23	129,697.1		623,553	2.977	14.315	
	6763.74	10.00	472.91	574.24	135,781.5		680,631	3.117	15.625	
	6764.17	10.00	483.62	587.26	142,005.4		740,355	3.260	16.996	
	6764.60	10.00	494.34	600.27	148,368.8		802,786	3.406	18.429	
	6765.03	10.00	505.06	613.28	154,871.6		867,982	3.555	19.926	
	6765.46	10.00	515.77	626.30	161,513.9		936,005	3.708	21.488	
	6765.89	10.00	526.49	639.31	168,295.7		1,006,914	3.864	23.116	
100-yr	6766.32	10.00	537.21	652.32	175,216.9		1,080,769	4.022	24.811	
	6766.75	10.00	547.93	665.34	182,277.6		1,157,631	4.185	26.576	
	6767.18	10.00	558.64	678.35	189,477.8		1,237,558	4.350	28.410	
	6767.61	10.00	569.36	691.36	196,817.4		1,320,612	4.518	30.317	
Spillway	6768.04	10.00	580.08	704.38	204,296.5		1,406,851	4.690	32.297	
	6768.47	10.00	590.79	717.39	211,915.0		1,496,337	4.865	34.351	
	6768.90	10.00	601.51	730.41	219,673.1		1,589,128	5.043	36.481	
	6769.33	10.00	612.23	743.42	227,570.5		1,685,285	5.224	38.689	
	6769.76	10.00	622.94	756.43	235,607.5		1,784,869	5.409	40.975	
	6770.19	10.00	633.66	769.45	243,783.9		1,887,938	5.597	43.341	
	6770.62	10.00	644.38	782.46	252,099.8		1,994,553	5.787	45.789	
	6771.05	10.00	655.10	795.47	260,555.2		2,104,774	5.982	48.319	
	6771.48	10.00	665.81	808.49	269,150.0		2,218,660	6.179	50.933	
	6771.91	10.00	676.53	821.50	277,884.3		2,336,273	6.379	53.633	
	6772.34	10.00	687.25	834.51	286,758.0		2,457,671	6.583	56.420	
	6772.77	10.00	697.96	847.53	295,771.2		2,582,914	6.790	59.296	
	6773.20	10.00	708.68	860.54	304,923.9		2,712,064	7.000	62.260	
	6773.63	10.00	719.40	873.55	314,216.0		2,845,179	7.213	65.316	
	6774.06	10.00	730.11	886.57	323,647.7		2,982,320	7.430	68.465	
	6774.49	10.00	740.83	899.58	333,218.7		3,123,546	7.650	71.707	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS  
 Basin ID: Regional Pond R2

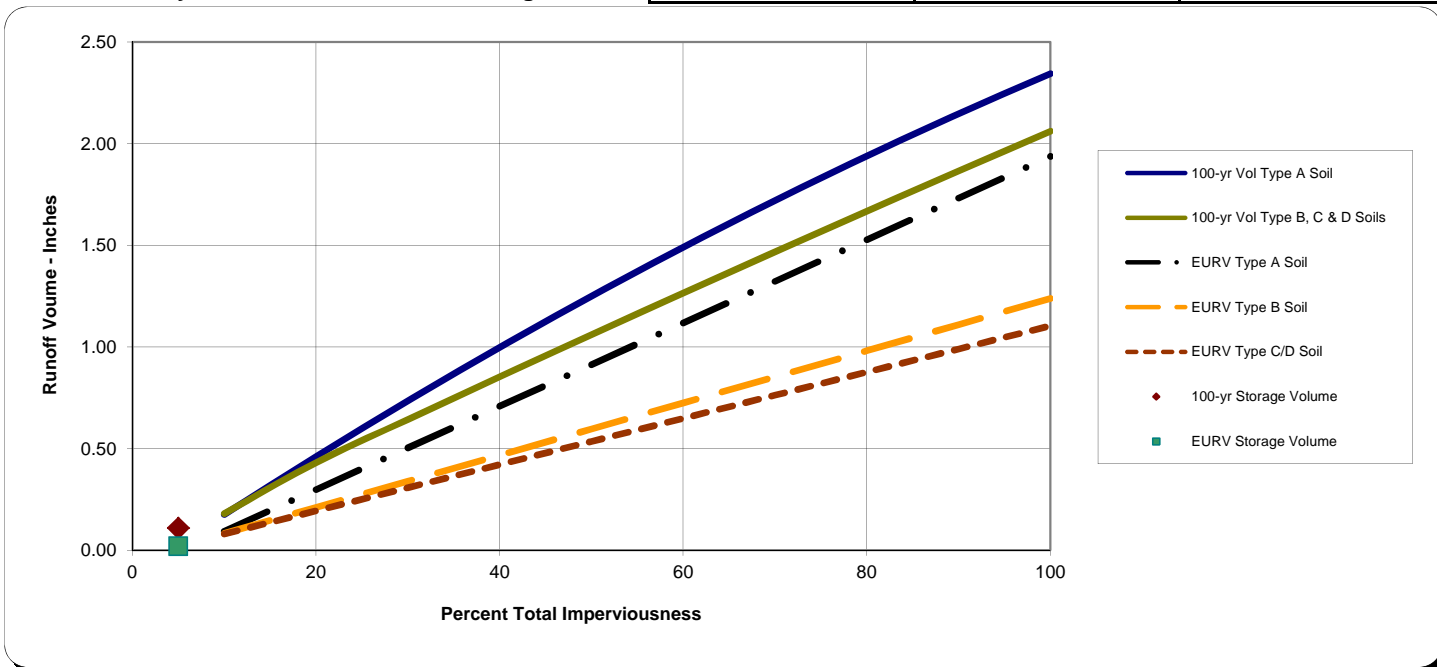
\* User input data shown in blue.

Area of Watershed (acres)	1882.00	
Subwatershed Imperviousness	5.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	5.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	1882.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.02	3.1277	Design Outlet to Empty EURV in 72 Hours
0.11	17.05	1599.70

Excess Urban Runoff Volume<sup>4</sup>  
 100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



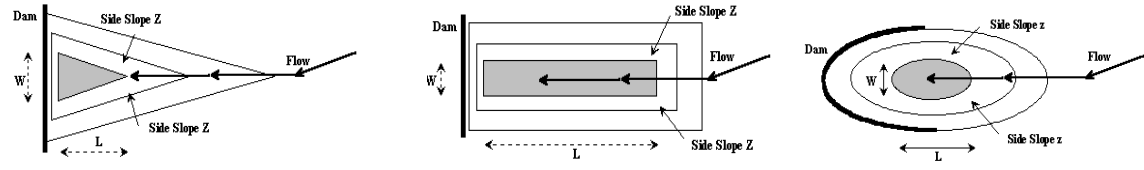


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Regional Pond R2

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 200.00 ft  
Length of Pond Bottom, L = 200.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

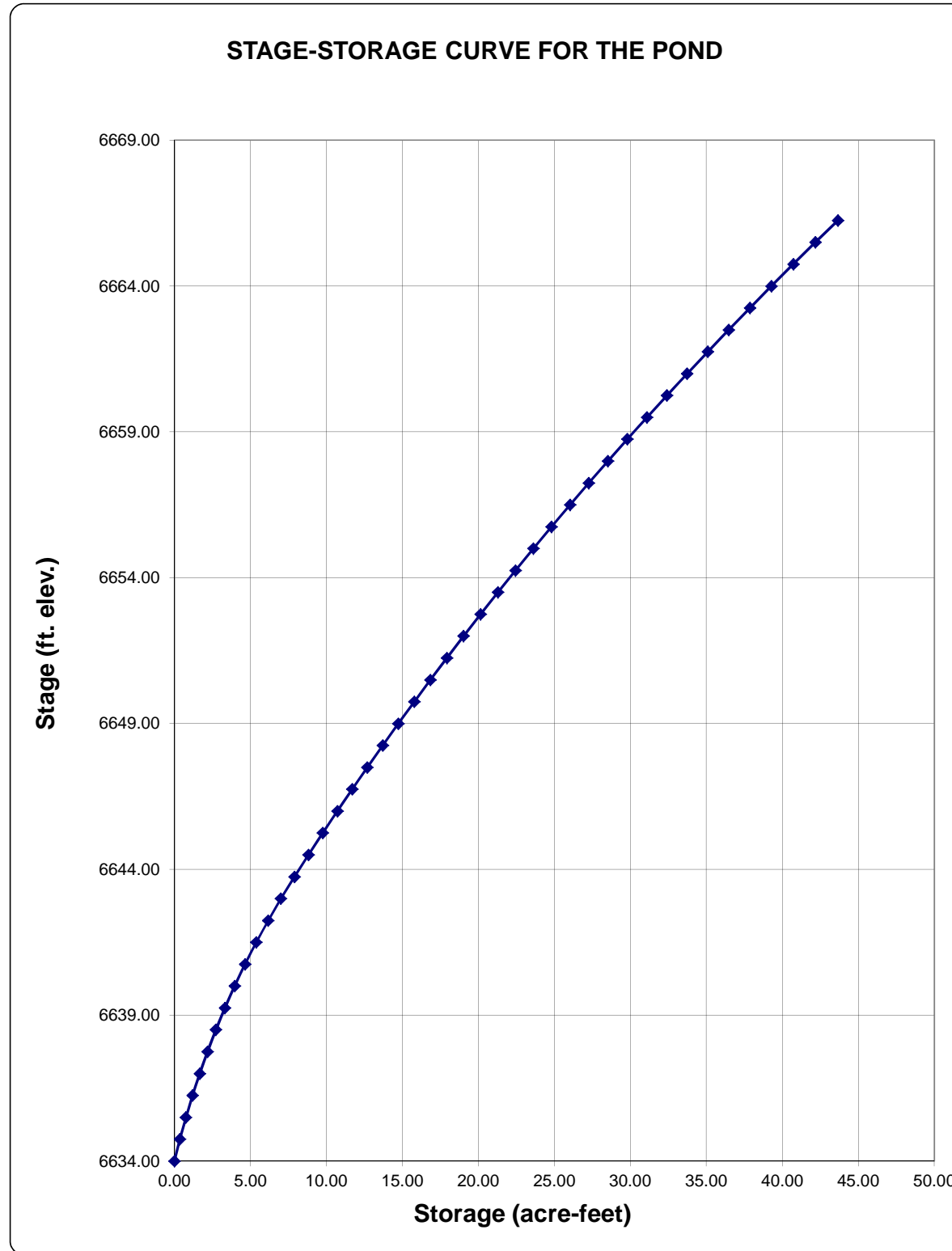
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 80.962 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 3.128 MINOR 17.049 MAJOR acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (ft) (input)	Side Slope (H:V) Below El. (input)	Pond Width at Stage (ft) (output)	Pond Length at Stage (ft) (output)	Surface Area at Stage (ft <sup>2</sup> ) (output)	Surface Area at Stage (ft <sup>2</sup> ) User Override (output)	Volume Below Stage (ft <sup>3</sup> ) (output)	Surface Area at Stage (acres) (output)	Volume Below Stage (acre-ft) (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6634.00		200.00	200.00	20,000.0		0.459	0.000		
	6634.75	4.00	209.71	209.71	21,988.8		15,746	0.505	0.361	
	6635.50	4.00	219.42	219.42	24,071.8		33,018	0.553	0.758	
	6636.25	4.00	229.12	229.12	26,249.0		51,889	0.603	1.191	
	6637.00	4.00	238.83	238.83	28,520.6		72,427	0.655	1.663	
	6637.75	4.00	248.54	248.54	30,886.3		94,705	0.709	2.174	
	6638.50	4.00	258.25	258.25	33,346.3		118,792	0.766	2.727	
-elev of EURV	6639.25	4.00	267.96	267.96	35,900.6		144,760	0.824	3.323	
	6640.00	4.00	277.67	277.67	38,549.1		172,678	0.885	3.964	
	6640.75	4.00	287.37	287.37	41,291.9		202,619	0.948	4.651	
	6641.50	4.00	297.08	297.08	44,128.9		234,652	1.013	5.387	
	6642.25	4.00	306.79	306.79	47,060.1		268,847	1.080	6.172	
	6643.00	4.00	316.50	316.50	50,085.6		305,277	1.150	7.008	
-elev of 100-yr	6643.75	4.00	326.21	326.21	53,205.4		344,011	1.221	7.897	
	6644.50		329.21	329.21	54,188.5		384,284	1.244	8.822	
	6645.25		332.21	332.21	55,180.6		425,297	1.267	9.763	
	6646.00		335.21	335.21	56,181.7		467,058	1.290	10.722	
	6646.75		338.21	338.21	57,191.9		509,573	1.313	11.698	
	6647.50		341.21	341.21	58,211.0		552,849	1.336	12.692	
	6648.25		344.21	344.21	59,239.1		596,893	1.360	13.703	
	6649.00		347.21	347.21	60,276.2		641,712	1.384	14.732	
	6649.75		350.21	350.21	61,322.3		687,311	1.408	15.778	
	6650.50		353.21	353.21	62,377.5		733,698	1.432	16.843	
	6651.25		356.21	356.21	63,441.6		780,881	1.456	17.927	
	6652.00		359.21	359.21	64,514.7		828,864	1.481	19.028	
	6652.75		362.21	362.21	65,596.8		877,656	1.506	20.148	
	6653.50		365.21	365.21	66,687.9		927,263	1.531	21.287	
	6654.25		368.21	368.21	67,788.1		977,691	1.556	22.445	
	6655.00		371.21	371.21	68,897.2		1,028,948	1.582	23.621	
	6655.75		374.21	374.21	70,015.3		1,081,040	1.607	24.817	
	6656.50		377.21	377.21	71,142.4		1,133,975	1.633	26.032	
	6657.25		380.21	380.21	72,278.5		1,187,757	1.659	27.267	
	6658.00		383.21	383.21	73,423.7		1,242,396	1.686	28.521	
	6658.75		386.21	386.21	74,577.8		1,297,896	1.712	29.796	
	6659.50		389.21	389.21	75,740.9		1,354,266	1.739	31.090	
	6660.25		392.21	392.21	76,913.0		1,411,511	1.766	32.404	
	6661.00		395.21	395.21	78,094.1		1,469,639	1.793	33.738	
	6661.75		398.21	398.21	79,284.3		1,528,656	1.820	35.093	
	6662.50		401.21	401.21	80,483.4		1,588,569	1.848	36.469	
	6663.25		404.21	404.21	81,691.5		1,649,384	1.875	37.865	
	6664.00		407.21	407.21	82,908.6		1,711,109	1.903	39.282	
	6664.75		410.21	410.21	84,134.7		1,773,750	1.931	40.720	
	6665.50		413.21	413.21	85,369.9		1,837,315	1.960	42.179	
	6666.25		416.21	416.21	86,614.0		1,901,809	1.988	43.660	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS  
 Basin ID: Regional Pond WU

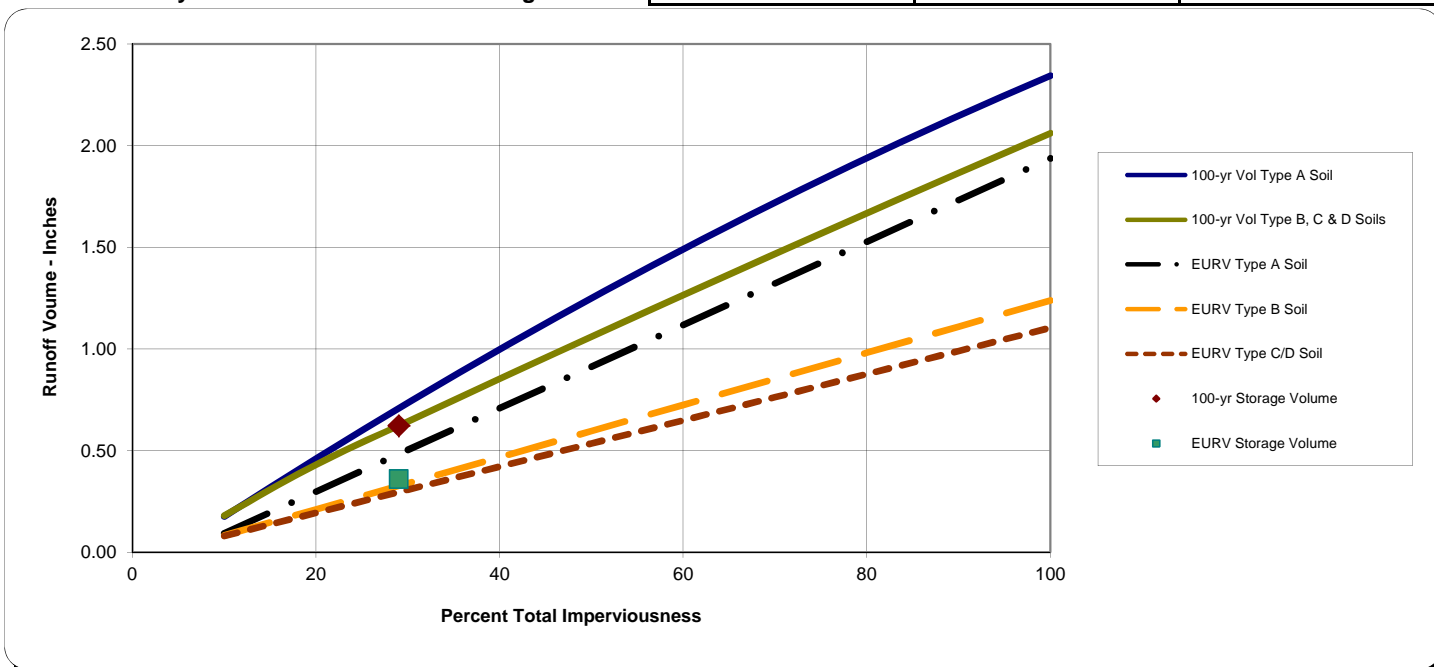
\* User input data shown in blue.

Area of Watershed (acres)	467.00	
Subwatershed Imperviousness	29.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	29.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	467.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.36	13.9741	Design Outlet to Empty EURV in 72 Hours
0.62	24.22	396.95

Excess Urban Runoff Volume<sup>4</sup>  
 100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

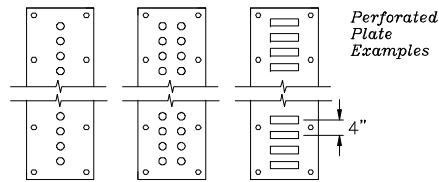
Project: **Falcon DBPS**  
 Basin ID: **Sub Regional Pond SR1**

**WQCV Design Volume (Input):**

Catchment Imperviousness,  $I_p$  =  percent  
 Catchment Area, A =  acres  
 Depth at WQCV outlet above lowest perforation, H =  inches  
 Vertical distance between rows, h =  inches  
 Number of rows, N<sub>L</sub> =   
 Orifice discharge coefficient, C<sub>d</sub> =

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H =  in.  
 Width of slot, W =  in.

Time to Drain the Pond =  hours  
**Water Quality Capture Volume Method Selected (40-Hour Release)**



**Outlet Design Information (Output):**

Water Quality Capture Volume (1.0 \* (0.91 \* I<sub>p</sub><sup>3</sup> - 1.19 \* I<sub>p</sub><sup>2</sup> + 0.78 \* I<sub>p</sub>)), WQCV =  watershed inches  
 Water Quality Capture Volume (WQCV) =  acre-feet  
**Design Volume (WQCV / 12 \* Area \* 1.2) Vol =  acre-feet**  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> =  square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> =  square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> =  square feet

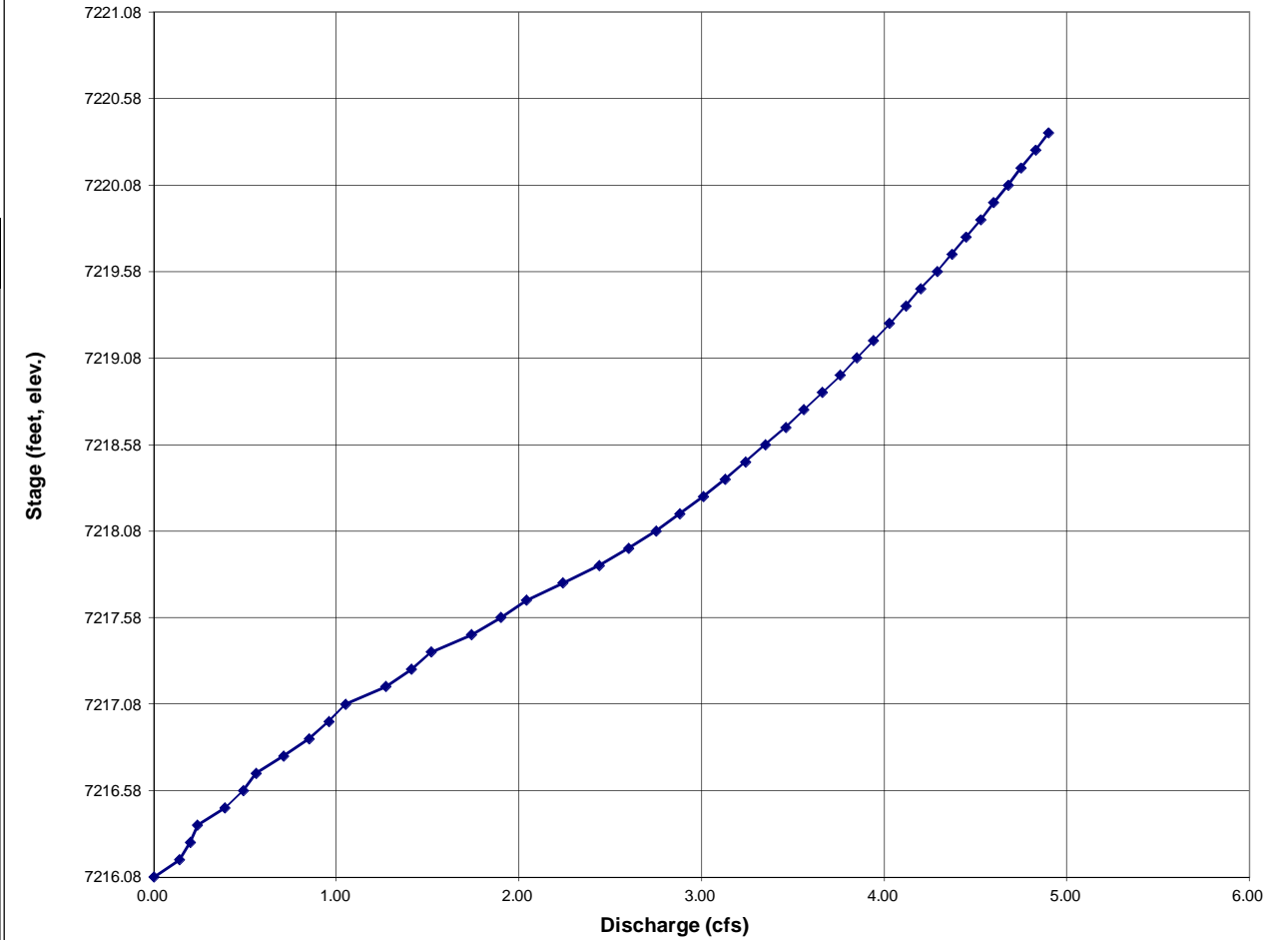
**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	7216.08	7216.42	7216.75	7217.08	7217.42	7217.75													
	Collection Capacity for Each Row of Holes in cfs																		
7216.08	0.000	0.000	0.000	0.000	0.000	0.000													
7216.18	0.137	0.000	0.000	0.000	0.000	0.000													
7216.28	0.195	0.000	0.000	0.000	0.000	0.000													
7216.38	0.240	0.000	0.000	0.000	0.000	0.000													
7216.48	0.277	0.108	0.000	0.000	0.000	0.000													
7216.58	0.310	0.176	0.000	0.000	0.000	0.000													
7216.68	0.340	0.224	0.000	0.000	0.000	0.000													
7216.78	0.368	0.264	0.076	0.000	0.000	0.000													
7216.88	0.393	0.299	0.159	0.000	0.000	0.000													
7216.98	0.417	0.329	0.211	0.000	0.000	0.000													
7217.08	0.440	0.358	0.253	0.000	0.000	0.000													
7217.18	0.461	0.384	0.289	0.139	0.000	0.000													
7217.28	0.482	0.408	0.320	0.197	0.000	0.000													
7217.38	0.501	0.431	0.349	0.241	0.000	0.000													
7217.48	0.520	0.453	0.376	0.278	0.108	0.000													
7217.58	0.539	0.474	0.401	0.311	0.176	0.000													
7217.68	0.556	0.494	0.425	0.341	0.224	0.000													
7217.78	0.573	0.513	0.447	0.368	0.264	0.076													
7217.88	0.590	0.532	0.468	0.394	0.299	0.159													
7217.98	0.606	0.550	0.488	0.418	0.329	0.211													
7218.08	0.622	0.567	0.508	0.440	0.358	0.253													
7218.18	0.637	0.584	0.526	0.462	0.384	0.289													
7218.28	0.653	0.600	0.545	0.482	0.408	0.320													
7218.38	0.667	0.616	0.562	0.502	0.431	0.349													
7218.48	0.682	0.632	0.579	0.521	0.453	0.376													
7218.58	0.696	0.647	0.596	0.539	0.474	0.401													
7218.68	0.709	0.662	0.612	0.557	0.494	0.425													
7218.78	0.723	0.676	0.627	0.574	0.513	0.447													
7218.88	0.736	0.690	0.642	0.591	0.532	0.468													
7218.98	0.749	0.704	0.657	0.607	0.550	0.488													
7219.08	0.762	0.718	0.672	0.623	0.567	0.508													
7219.18	0.775	0.731	0.686	0.638	0.584	0.526													
7219.28	0.787	0.744	0.700	0.653	0.600	0.545													
7219.38	0.799	0.757	0.714	0.668	0.616	0.562													
7219.48	0.811	0.770	0.727	0.682	0.632	0.579													
7219.58	0.823	0.783	0.741	0.696	0.647	0.596													
7219.68	0.835	0.795	0.754	0.710	0.662	0.612													
7219.78	0.846	0.807	0.766	0.723	0.676	0.627													
7219.88	0.858	0.819	0.779	0.737	0.690	0.642													
7219.98	0.869	0.831	0.791	0.750	0.704	0.657													
7220.08	0.880	0.842	0.803	0.763	0.718	0.672													
7220.18	0.891	0.854	0.815	0.775	0.731	0.686													
7220.28	0.902	0.865	0.827	0.788	0.744	0.700													
7220.38	0.913	0.876	0.839	0.800	0.757	0.714													

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **Sub Regional Pond SR1**

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**

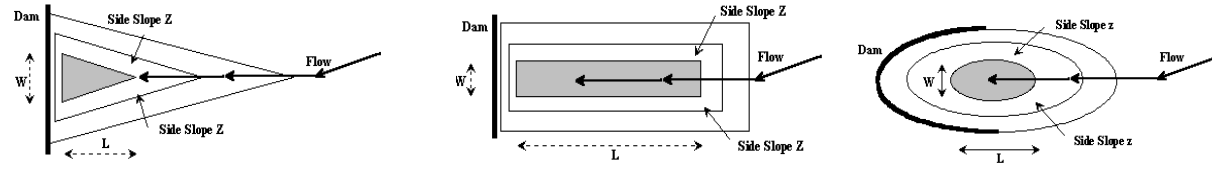


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR1

Project:  
Basin ID:



Design Information (Input):

Width of Pond Bottom, W = 175.00 ft  
Length of Pond Bottom, L = 350.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 5.00 ft/ft

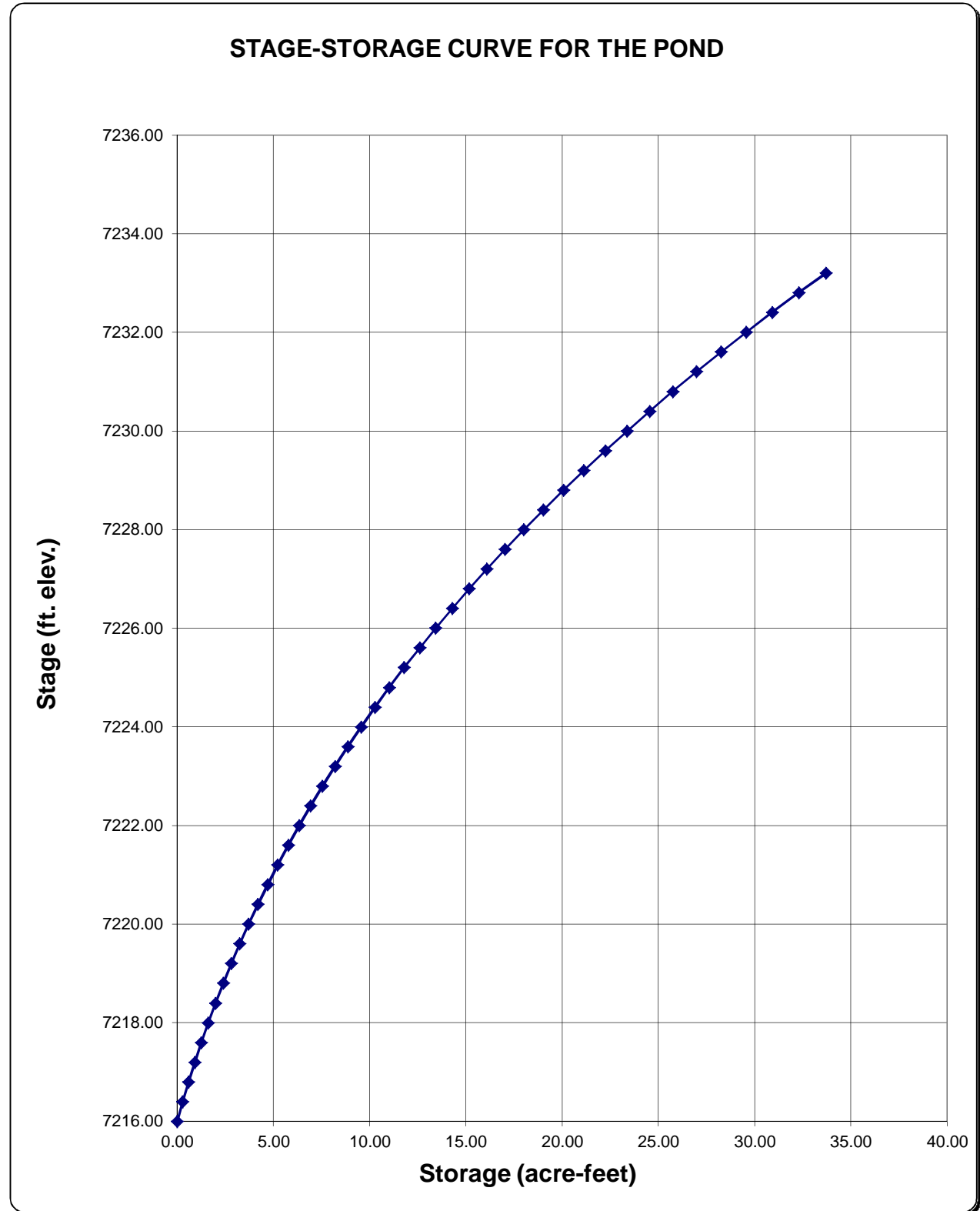
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA':  MINOR acre-ft.  
Storage Requirement from Sheet 'Hydrograph':  MAJOR 3.640 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum':  acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage ft (input)	Side Slope (H:V) ft/ft Below El. (input)	Pond Width at Stage ft (output)	Pond Length at Stage ft (output)	Surface Area at Stage ft <sup>2</sup> (output)	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage ft <sup>3</sup> (output)	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	7216.00		175.00	350.00	30,625.0		0.703	0.000		
	7216.40	5.00	180.12	360.25	32,444.3		12,614	0.745	0.290	
	7216.80	5.00	185.25	370.49	34,316.2		25,966	0.788	0.596	
	7217.20	5.00	190.37	380.74	36,240.5		40,077	0.832	0.920	
	7217.60	5.00	195.49	390.98	38,217.3		54,969	0.877	1.262	
WQCV	7218.00	5.00	200.62	401.23	40,246.6		70,662	0.924	1.622	
	7218.40	5.00	205.74	411.48	42,328.4		87,177	0.972	2.001	
	7218.80	5.00	210.86	421.72	44,462.7		104,535	1.021	2.400	
	7219.20	5.00	215.98	431.97	46,649.5		122,757	1.071	2.818	
	7219.60	5.00	221.11	442.22	48,888.7		141,865	1.122	3.257	
	7220.00	5.00	226.23	452.46	51,180.5		161,879	1.175	3.716	
	7220.40	5.00	231.35	462.71	53,524.7		182,820	1.229	4.197	
	7220.80	5.00	236.48	472.95	55,921.5		204,709	1.284	4.699	
	7221.20	5.00	241.60	483.20	58,370.7		227,567	1.340	5.224	
	7221.60	5.00	246.72	493.45	60,872.5		251,416	1.397	5.772	
	7222.00	5.00	251.85	503.69	63,426.7		276,276	1.456	6.342	
	7222.40	5.00	256.97	513.94	66,033.4		302,168	1.516	6.937	
	7222.80	5.00	262.09	524.19	68,692.6		329,113	1.577	7.555	
	7223.20	5.00	267.22	534.43	71,404.3		357,133	1.639	8.199	
	7223.60	5.00	272.34	544.68	74,168.5		386,247	1.703	8.867	
	7224.00	5.00	277.46	554.92	76,985.2		416,478	1.767	9.561	
	7224.40	5.00	282.59	565.17	79,854.4		447,846	1.833	10.281	
	7224.80	5.00	287.71	575.42	82,776.1		480,372	1.900	11.028	
	7225.20	5.00	292.83	585.66	85,750.2		514,077	1.969	11.802	
	7225.60	5.00	297.95	595.91	88,776.9		548,983	2.038	12.603	
	7226.00	5.00	303.08	606.16	91,856.1		585,109	2.109	13.432	
	7226.40	5.00	308.20	616.40	94,987.7		622,478	2.181	14.290	
	7226.80	5.00	313.32	626.65	98,171.8		661,110	2.254	15.177	
	7227.20	5.00	318.45	636.89	101,408.5		701,026	2.328	16.093	
	7227.60	5.00	323.57	647.14	104,697.6		742,247	2.404	17.040	
	7228.00	5.00	328.69	657.39	108,039.2		784,795	2.480	18.016	
	7228.40	5.00	333.82	667.63	111,433.3		828,689	2.558	19.024	
	7228.80	5.00	338.94	677.88	114,879.9		873,952	2.637	20.063	
	7229.20	5.00	344.06	688.12	118,379.0		920,603	2.718	21.134	
	7229.60	5.00	349.19	698.37	121,930.6		968,665	2.799	22.237	
	7230.00	5.00	354.31	708.62	125,534.7		1,018,158	2.882	23.374	
	7230.40	5.00	359.43	718.86	129,191.2		1,069,104	2.966	24.543	
	7230.80	5.00	364.55	729.11	132,900.3		1,121,522	3.051	25.747	
	7231.20	5.00	369.68	739.36	136,661.8		1,175,434	3.137	26.984	
	7231.60	5.00	374.80	749.60	140,475.9		1,230,862	3.225	28.257	
	7232.00	5.00	379.92	759.85	144,342.4		1,287,825	3.314	29.564	
	7232.40	5.00	385.05	770.09	148,261.4		1,346,346	3.404	30.908	
	7232.80	5.00	390.17	780.34	152,233.0		1,406,445	3.495	32.288	
	7233.20	5.00	395.29	790.59	156,257.0		1,468,143	3.587	33.704	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Sub Regional Pond SR2

\* User input data shown in blue.

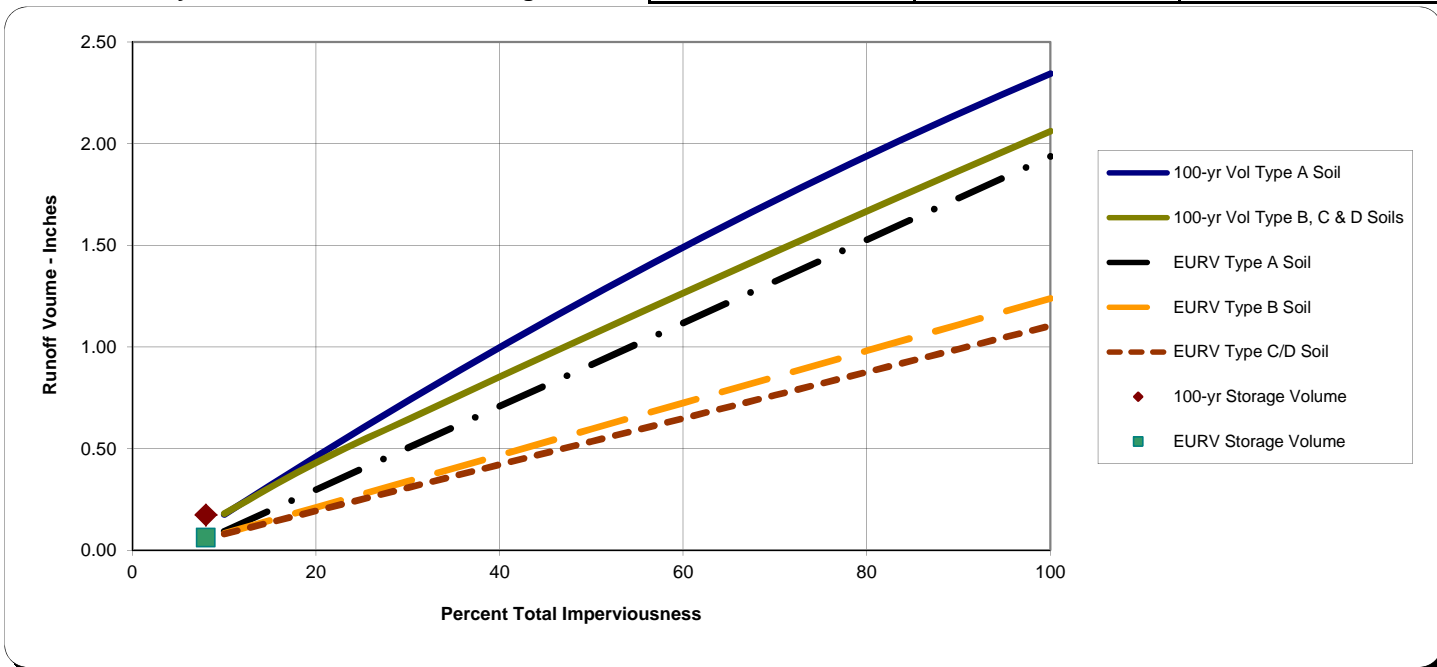
Area of Watershed (acres)	394.00	
Subwatershed Imperviousness	8.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	▼
Effective Imperviousness <sup>1</sup>	8.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	394.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.06	2.0467	Design Outlet to Empty EURV in 72 Hours
0.17	5.70	334.90

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

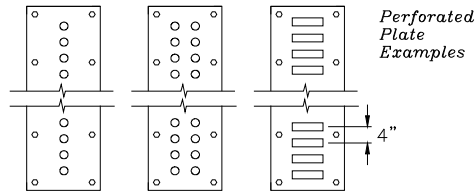
**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
Basin ID: **Sub Regional Pond SR2**

Project: **Falcon DBPS**  
Basin ID: **Sub Regional Pond SR2**

**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p$  = 8.0 percent  
 Catchment Area, A = 394.000 acres  
 Depth at WQCV outlet above lowest perforation, H = 32 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, NL = 8  
 Orifice discharge coefficient,  $C_o$  = 0.65  
 Diameter of holes, D = [ ] in.  
 Number of holes per row, N = [ ]  
 OR  
 Height of slot, H = 2.00 in.  
 Width of slot, W = 4.17 in.  
 Time to Drain the Pond = 72 hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**

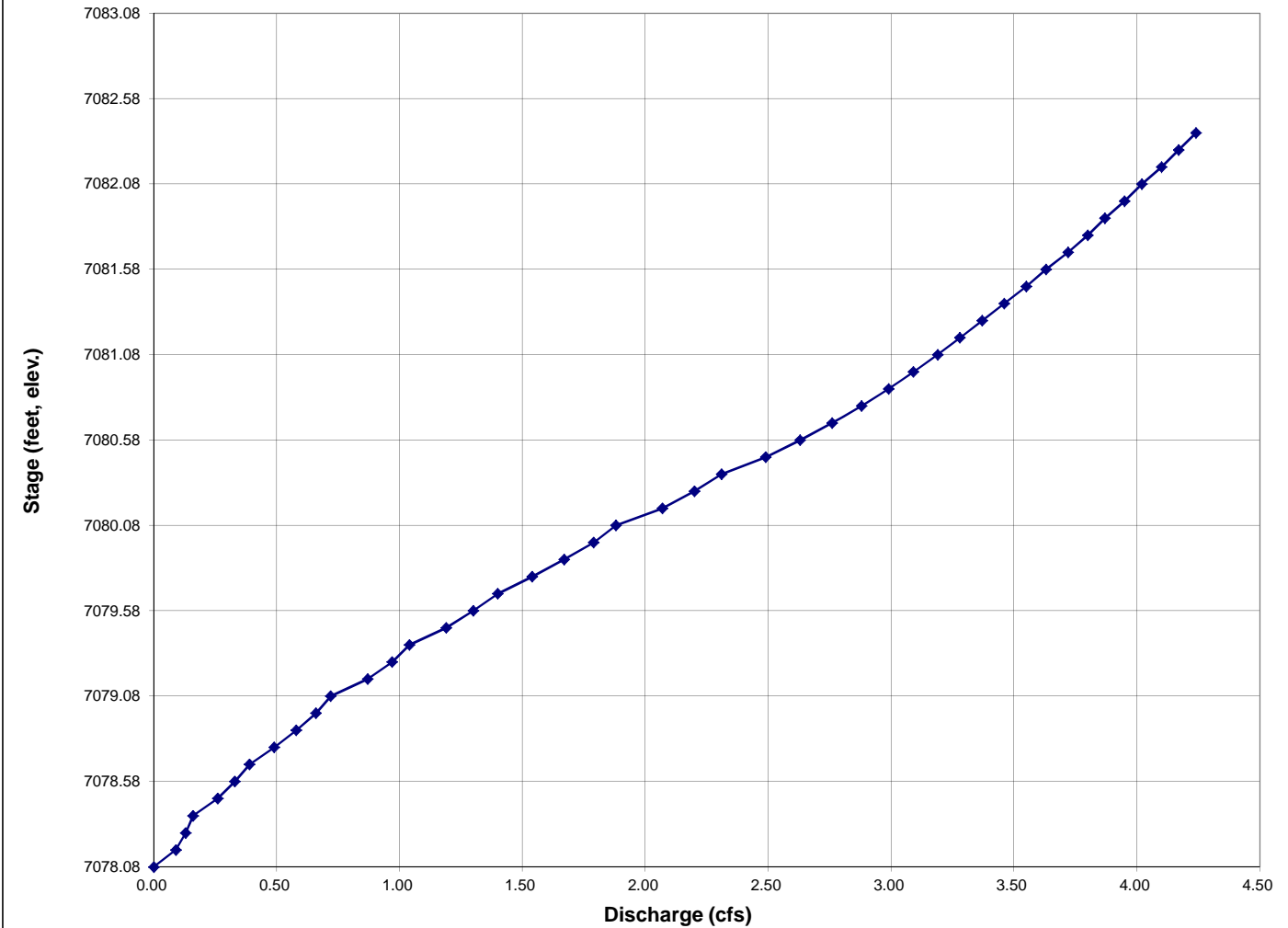


**Outlet Design Information (Output):**  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.062 watershed inches  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 2.047 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 8.34 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 8.34 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.058 square feet

**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		$\Sigma$ Flow
	Row 1 7078.08	Row 2 7078.42	Row 3 7078.75	Row 4 7079.08	Row 5 7079.42	Row 6 7079.75	Row 7 7080.08	Row 8 7080.42	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	Collection Capacity for Each Row of Holes in cfs																		
7078.08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.00
7078.18	0.094	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.09
7078.28	0.134	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.13
7078.38	0.165	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.16
7078.48	0.190	0.074	0.000	0.000	0.000	0.000	0.000	0.000											0.26
7078.58	0.213	0.121	0.000	0.000	0.000	0.000	0.000	0.000											0.33
7078.68	0.233	0.154	0.000	0.000	0.000	0.000	0.000	0.000											0.39
7078.78	0.252	0.181	0.052	0.000	0.000	0.000	0.000	0.000											0.49
7078.88	0.270	0.205	0.109	0.000	0.000	0.000	0.000	0.000											0.58
7078.98	0.286	0.226	0.145	0.000	0.000	0.000	0.000	0.000											0.66
7079.08	0.302	0.245	0.173	0.000	0.000	0.000	0.000	0.000											0.72
7079.18	0.316	0.263	0.198	0.095	0.000	0.000	0.000	0.000											0.87
7079.28	0.330	0.280	0.220	0.135	0.000	0.000	0.000	0.000											0.97
7079.38	0.344	0.296	0.240	0.165	0.000	0.000	0.000	0.000											1.04
7079.48	0.357	0.311	0.258	0.191	0.074	0.000	0.000	0.000											1.19
7079.58	0.369	0.325	0.275	0.214	0.121	0.000	0.000	0.000											1.30
7079.68	0.382	0.339	0.291	0.234	0.154	0.000	0.000	0.000											1.40
7079.78	0.393	0.352	0.306	0.253	0.181	0.052	0.000	0.000											1.54
7079.88	0.405	0.365	0.321	0.270	0.205	0.109	0.000	0.000											1.67
7079.98	0.416	0.377	0.335	0.286	0.226	0.145	0.000	0.000											1.79
7080.08	0.427	0.389	0.348	0.302	0.245	0.173	0.000	0.000											1.88
7080.18	0.437	0.401	0.361	0.317	0.263	0.198	0.095	0.000											2.07
7080.28	0.448	0.412	0.374	0.331	0.280	0.220	0.135	0.000											2.20
7080.38	0.458	0.423	0.386	0.344	0.296	0.240	0.165	0.000											2.31
7080.48	0.468	0.433	0.397	0.357	0.311	0.258	0.191	0.074											2.49
7080.58	0.477	0.444	0.408	0.370	0.325	0.275	0.214	0.121											2.63
7080.68	0.487	0.454	0.419	0.382	0.339	0.291	0.234	0.154											2.76
7080.78	0.496	0.464	0.430	0.394	0.352	0.306	0.253	0.181											2.88
7080.88	0.505	0.474	0.441	0.405	0.365	0.321	0.270	0.205											2.99
7080.98	0.514	0.483	0.451	0.416	0.377	0.335	0.286	0.226											3.09
7081.08	0.523	0.492	0.461	0.427	0.389	0.348	0.302	0.245											3.19
7081.18	0.531	0.502	0.471	0.438	0.401	0.361	0.317	0.263											3.28
7081.28	0.540	0.511	0.480	0.448	0.412	0.374	0.331	0.280											3.37
7081.38	0.548	0.520	0.490	0.458	0.423	0.386	0.344	0.296											3.46
7081.48	0.557	0.528	0.499	0.468	0.433	0.397	0.357	0.311											3.55
7081.58	0.565	0.537	0.508	0.477	0.444	0.408	0.370	0.325											3.63
7081.68	0.573	0.545	0.517	0.487	0.454	0.419	0.382	0.339											3.72
7081.78	0.581	0.554	0.526	0.496	0.464	0.430	0.394	0.352											3.80
7081.88	0.588	0.562	0.534	0.505	0.474	0.441	0.405	0.365											3.87
7081.98	0.596	0.570	0.543	0.514	0.483	0.451	0.416	0.377											3.95
7082.08	0.604	0.578	0.551	0.523	0.492	0.461	0.427	0.389											4.02
7082.18	0.611	0.586	0.559	0.532	0.502	0.471	0.438	0.401											4.10
7082.28	0.619	0.593	0.567	0.540	0.511	0.480	0.448	0.412											4.17
7082.38	0.626	0.601	0.575	0.549	0.520	0.490	0.458	0.423											4.24

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**

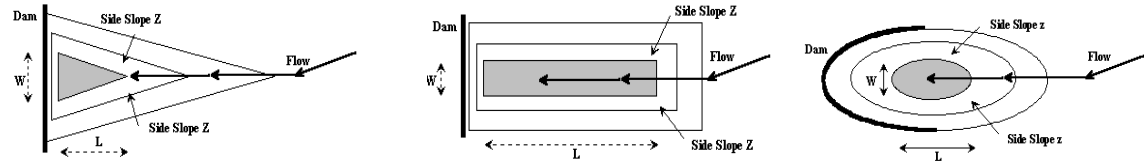


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR2

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 200.00 ft  
Length of Pond Bottom, L = 280.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

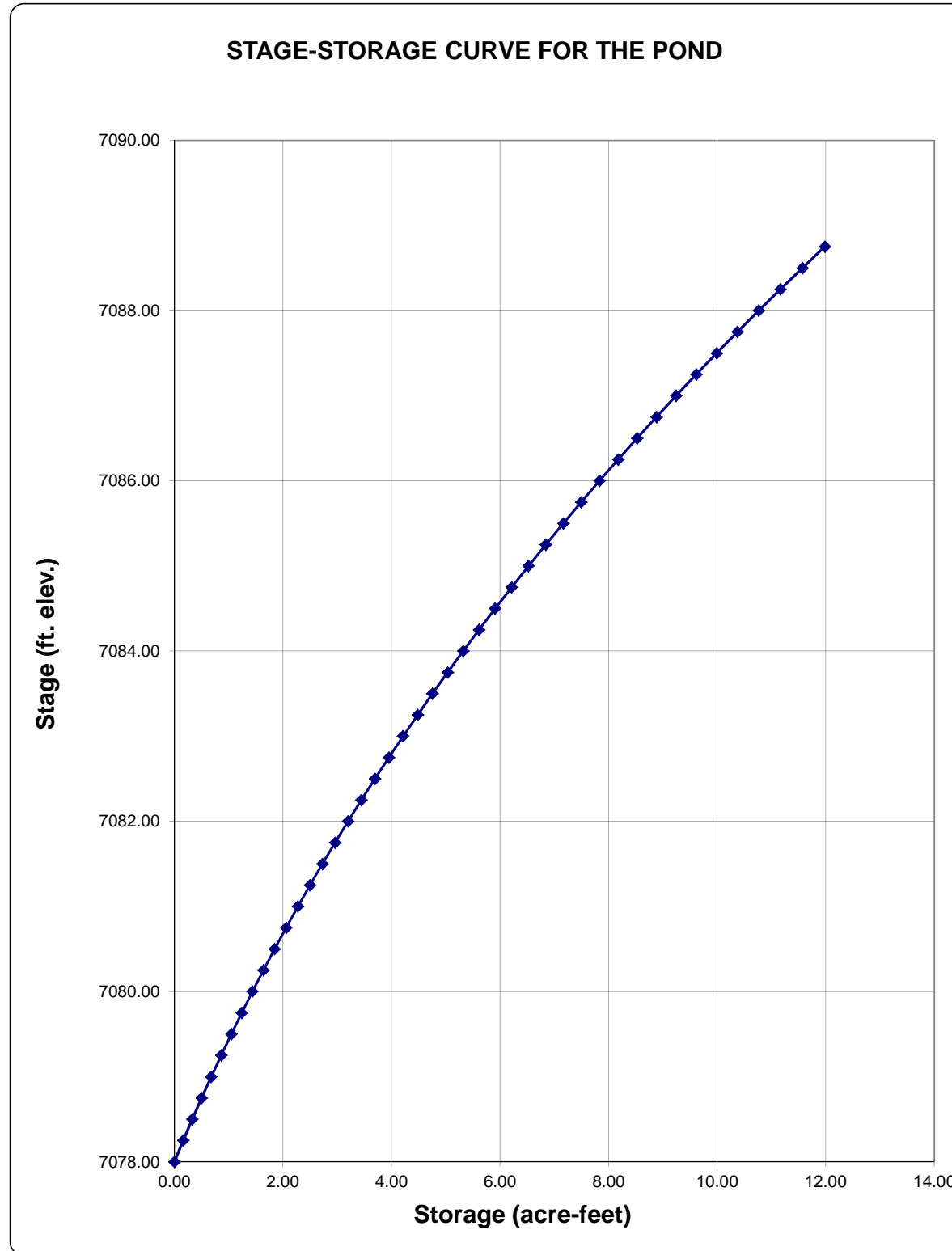
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 2.047 5.701 acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) Below El. (input) ft/ft	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	7078.00	4.00	200.00	280.00	28,000.0		7,100	0.643	0.000	
	7078.25	4.00	202.84	283.97	28,800.3		14,402	0.661	0.163	
	7078.50	4.00	205.68	287.95	29,611.8		21,907	0.680	0.331	
	7078.75	4.00	208.51	291.92	30,434.7		29,620	0.699	0.503	
	7079.00	4.00	211.35	295.89	31,268.8		37,543	0.718	0.680	
	7079.25	4.00	214.19	299.87	32,114.2		45,679	0.737	0.862	
	7079.50	4.00	217.03	303.84	32,970.8		54,030	0.757	1.049	
	7079.75	4.00	219.87	307.81	33,838.8		62,600	0.777	1.240	
	7080.00	4.00	222.70	311.79	34,718.0		71,390	0.797	1.437	
	7080.25	4.00	225.54	315.76	35,608.5		80,405	0.817	1.639	
	7080.50	4.00	228.38	319.73	36,510.2		89,647	0.838	1.846	
EURV	7080.75	4.00	231.22	323.71	37,423.3		99,118	0.859	2.058	
	7081.00	4.00	234.06	327.68	38,347.6		108,822	0.880	2.275	
	7081.25	4.00	236.89	331.65	39,283.2		118,761	0.902	2.498	
	7081.50	4.00	239.73	335.62	40,230.0		128,939	0.924	2.726	
	7081.75	4.00	242.57	339.60	41,188.2		139,357	0.946	2.960	
	7082.00	4.00	245.41	343.57	42,157.6		150,019	0.968	3.199	
	7082.25	4.00	248.25	347.54	43,138.3		160,927	0.990	3.444	
	7082.50	4.00	251.08	351.52	44,130.3		172,085	1.013	3.694	
	7082.75	4.00	253.92	355.49	45,133.5		183,496	1.036	3.951	
	7083.00	4.00	256.76	359.46	46,148.1		195,161	1.059	4.212	
	7083.25	4.00	259.60	363.44	47,173.9		207,084	1.083	4.480	
	7083.50	4.00	262.44	367.41	48,210.9		219,268	1.107	4.754	
	7083.75	4.00	265.27	371.38	49,259.3		231,715	1.131	5.034	
	7084.00	4.00	268.11	375.36	50,318.9		244,428	1.155	5.319	
	7084.25	4.00	270.95	379.33	51,389.8		257,411	1.180	5.611	
	7084.50	4.00	273.79	383.30	52,472.0		270,666	1.205	5.909	
	7084.75	4.00	276.63	387.28	53,565.5		284,195	1.230	6.214	
	7085.00	4.00	279.46	391.25	54,670.2		298,002	1.255	6.524	
	7085.25	4.00	282.30	395.22	55,786.2		312,090	1.281	6.841	
	7085.50	4.00	285.14	399.20	56,913.5		326,461	1.307	7.165	
	7085.75	4.00	287.98	403.17	58,052.1		341,117	1.333	7.495	
	7086.00	4.00	290.82	407.14	59,201.9		356,063	1.359	7.831	
	7086.25	4.00	293.65	411.12	60,363.0		371,300	1.386	8.174	
	7086.50	4.00	296.49	415.09	61,535.4		386,832	1.413	8.524	
	7086.75	4.00	299.33	419.06	62,719.1		402,661	1.440	8.880	
	7087.00	4.00	302.17	423.04	63,914.0		418,790	1.467	9.244	
	7087.25	4.00	305.01	427.01	65,120.2		435,223	1.495	9.614	
	7087.50	4.00	307.84	430.98	66,337.7		451,961	1.523	9.991	
	7087.75	4.00	310.68	434.96	67,566.5		469,007	1.551	10.376	
	7088.00	4.00	313.52	438.93	68,806.5		486,365	1.580	10.767	
	7088.25	4.00	316.36	442.90	70,057.8		504,038	1.608	11.165	
	7088.50	4.00	319.20	446.87	71,320.4		522,027	1.637	11.571	
	7088.75	4.00	322.03	450.85	72,594.3			1.667	11.984	





## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Sub Regional Pond SR3

\* User input data shown in blue.

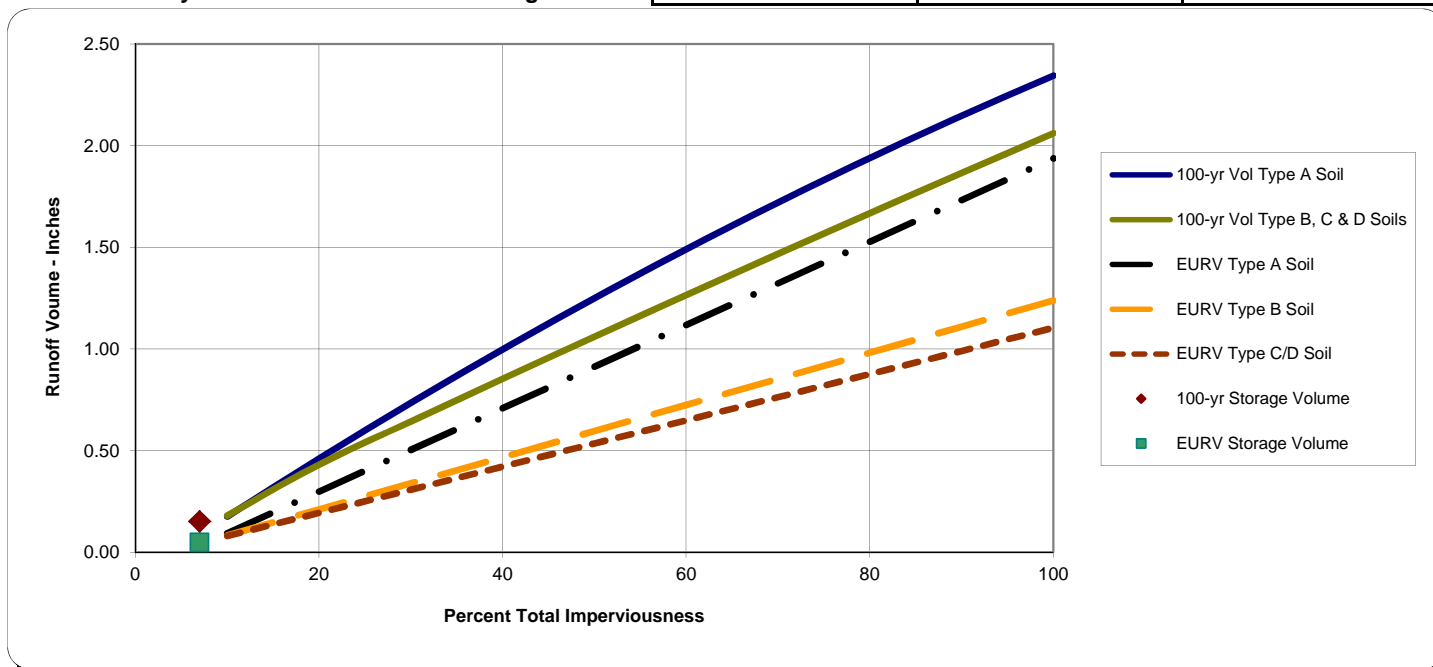
Area of Watershed (acres)	256.00	
Subwatershed Imperviousness	7.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	7.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	256.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.05	1.0284	Design Outlet to Empty EURV in 72 Hours
0.15	3.24	217.60

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

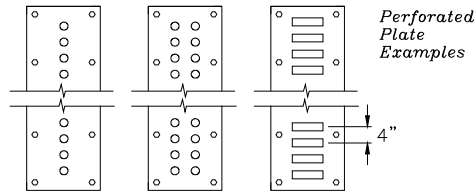
**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
Basin ID: **Sub Regional Pond SR3**

Project: **Falcon DBPS**  
Basin ID: **Sub Regional Pond SR3**

**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p$  =  percent  
 Catchment Area, A =  acres  
 Diameter of holes, D =  in.  
 Number of holes per row, N =  **OR**  **Excess Urban Runoff Volume Method Selected (72-Hour Release)**  
 Depth at WQCV outlet above lowest perforation, H =  inches  
 Vertical distance between rows, h =  inches  
 Time to Drain the Pond =  hours  
 Height of slot, H =  in.  
 Width of slot, W =  in.  
 Number of rows, NL =   
 Orifice discharge coefficient,  $C_o$  =

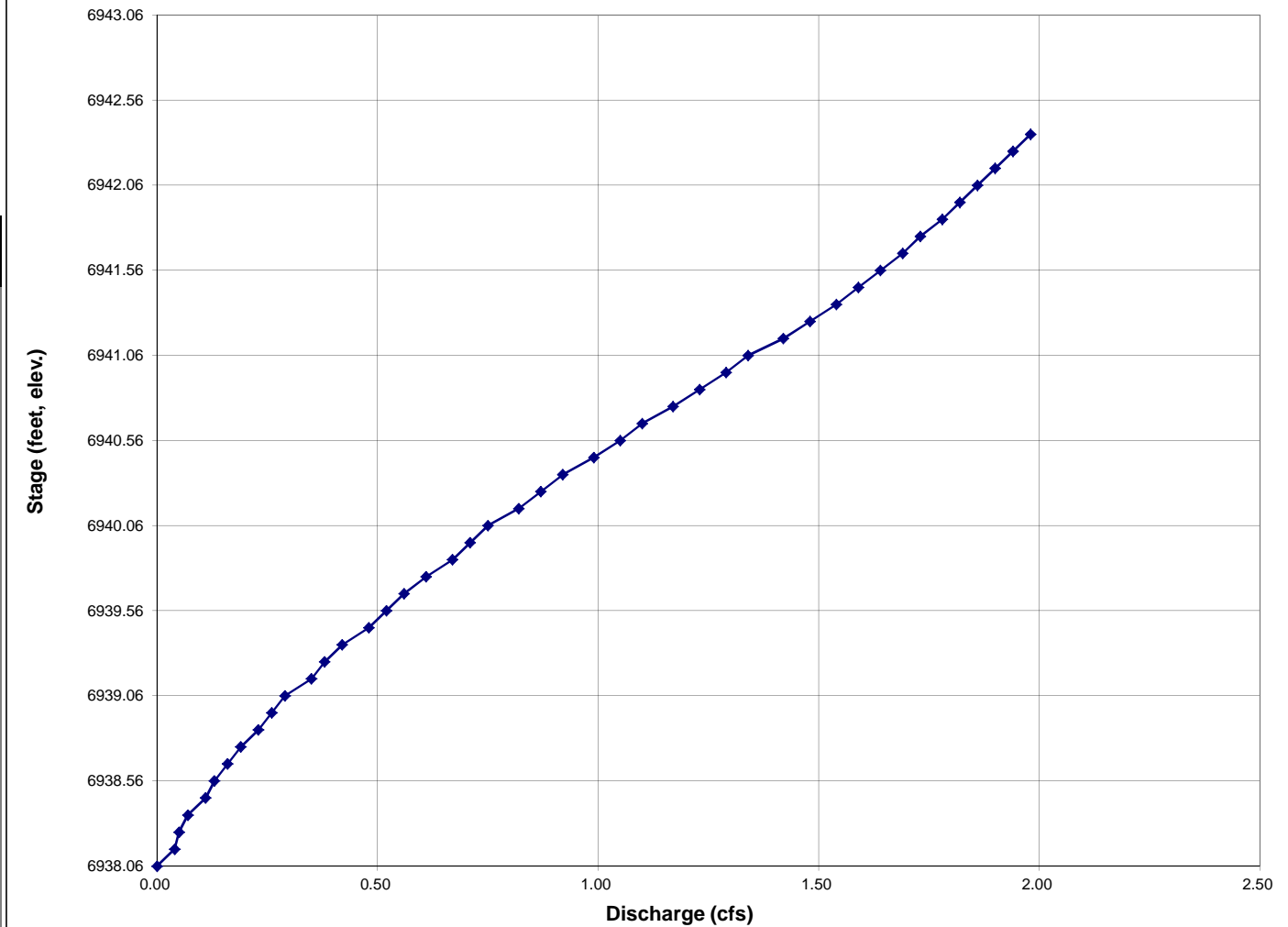


**Outlet Design Information (Output):**  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.048 watershed inches  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 1.028 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 3.31 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 3.31 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.023 square feet

**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		$\Sigma$ Flow
	Row 1 6938.06	Row 2 6938.39	Row 3 6938.73	Row 4 6939.06	Row 5 6939.39	Row 6 6939.73	Row 7 6940.06	Row 8 6940.39	Row 9 6940.73	Row 10 6941.06	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	Collection Capacity for Each Row of Holes in cfs																		
6938.06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.00
6938.16	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.04
6938.26	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.05
6938.36	0.066	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.07
6938.46	0.076	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.11
6938.56	0.085	0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.13
6938.66	0.093	0.062	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.16
6938.76	0.100	0.073	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.19
6938.86	0.107	0.082	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.23
6938.96	0.114	0.091	0.058	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.26
6939.06	0.120	0.098	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.000									0.29
6939.16	0.126	0.105	0.079	0.038	0.000	0.000	0.000	0.000	0.000	0.000									0.35
6939.26	0.131	0.112	0.087	0.054	0.000	0.000	0.000	0.000	0.000	0.000									0.38
6939.36	0.137	0.118	0.095	0.066	0.000	0.000	0.000	0.000	0.000	0.000									0.42
6939.46	0.142	0.124	0.103	0.076	0.032	0.000	0.000	0.000	0.000	0.000									0.48
6939.56	0.147	0.130	0.109	0.085	0.049	0.000	0.000	0.000	0.000	0.000									0.52
6939.66	0.152	0.135	0.116	0.093	0.062	0.000	0.000	0.000	0.000	0.000									0.56
6939.76	0.156	0.140	0.122	0.100	0.073	0.021	0.000	0.000	0.000	0.000									0.61
6939.86	0.161	0.145	0.128	0.107	0.082	0.043	0.000	0.000	0.000	0.000									0.67
6939.96	0.165	0.150	0.133	0.114	0.091	0.058	0.000	0.000	0.000	0.000									0.71
6940.06	0.170	0.155	0.138	0.120	0.098	0.069	0.000	0.000	0.000	0.000									0.75
6940.16	0.174	0.160	0.143	0.126	0.105	0.079	0.038	0.000	0.000	0.000									0.82
6940.26	0.178	0.164	0.148	0.131	0.112	0.087	0.054	0.000	0.000	0.000									0.87
6940.36	0.182	0.168	0.153	0.137	0.118	0.095	0.066	0.000	0.000	0.000									0.92
6940.46	0.186	0.173	0.158	0.142	0.124	0.103	0.076	0.032	0.000	0.000									0.99
6940.56	0.190	0.177	0.162	0.147	0.130	0.109	0.085	0.049	0.000	0.000									1.05
6940.66	0.193	0.181	0.167	0.152	0.135	0.116	0.093	0.062	0.000	0.000									1.10
6940.76	0.197	0.185	0.171	0.156	0.140	0.122	0.100	0.073	0.021	0.000									1.17
6940.86	0.201	0.189	0.175	0.161	0.145	0.128	0.107	0.082	0.043	0.000									1.23
6940.96	0.204	0.192	0.179	0.165	0.150	0.133	0.114	0.091	0.058	0.000									1.29
6941.06	0.208	0.196	0.183	0.170	0.155	0.138	0.120	0.098	0.069	0.000									1.34
6941.16	0.211	0.200	0.187	0.174	0.160	0.143	0.126	0.105	0.079	0.038									1.42
6941.26	0.215	0.203	0.191	0.178	0.164	0.148	0.131	0.112	0.087	0.054									1.48
6941.36	0.218	0.207	0.195	0.182	0.168	0.153	0.137	0.118	0.095	0.066									1.54
6941.46	0.221	0.210	0.198	0.186	0.173	0.158	0.142	0.124	0.103	0.076									1.59
6941.56	0.224	0.214	0.202	0.190	0.177	0.162	0.147	0.130	0.109	0.085									1.64
6941.66	0.228	0.217	0.205	0.193	0.181	0.167	0.152	0.135	0.116	0.093									1.69
6941.76	0.231	0.220	0.209	0.197	0.185	0.171	0.156	0.140	0.122	0.100									1.73
6941.86	0.234	0.224	0.212	0.201	0.189	0.175	0.161	0.145	0.128	0.107									1.78
6941.96	0.237	0.227	0.216	0.204	0.192	0.179	0.165	0.150	0.133	0.114									1.82
6942.06	0.240	0.230	0.219	0.208	0.196	0.183	0.170	0.155	0.138	0.120									1.86
6942.16	0.243	0.233	0.222	0.211	0.200	0.187	0.174	0.160	0.143	0.126									1.90
6942.26	0.246	0.236	0.225	0.215	0.203	0.191	0.178	0.164	0.148	0.131									1.94
6942.36	0.249	0.239	0.229	0.218	0.207	0.195	0.182	0.168	0.153	0.137									1.98

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**

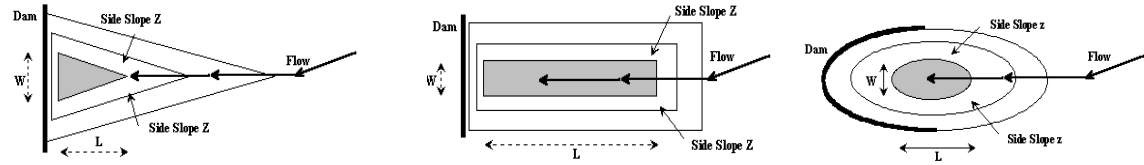


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR3

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 100.00 ft  
Length of Pond Bottom, L = 200.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

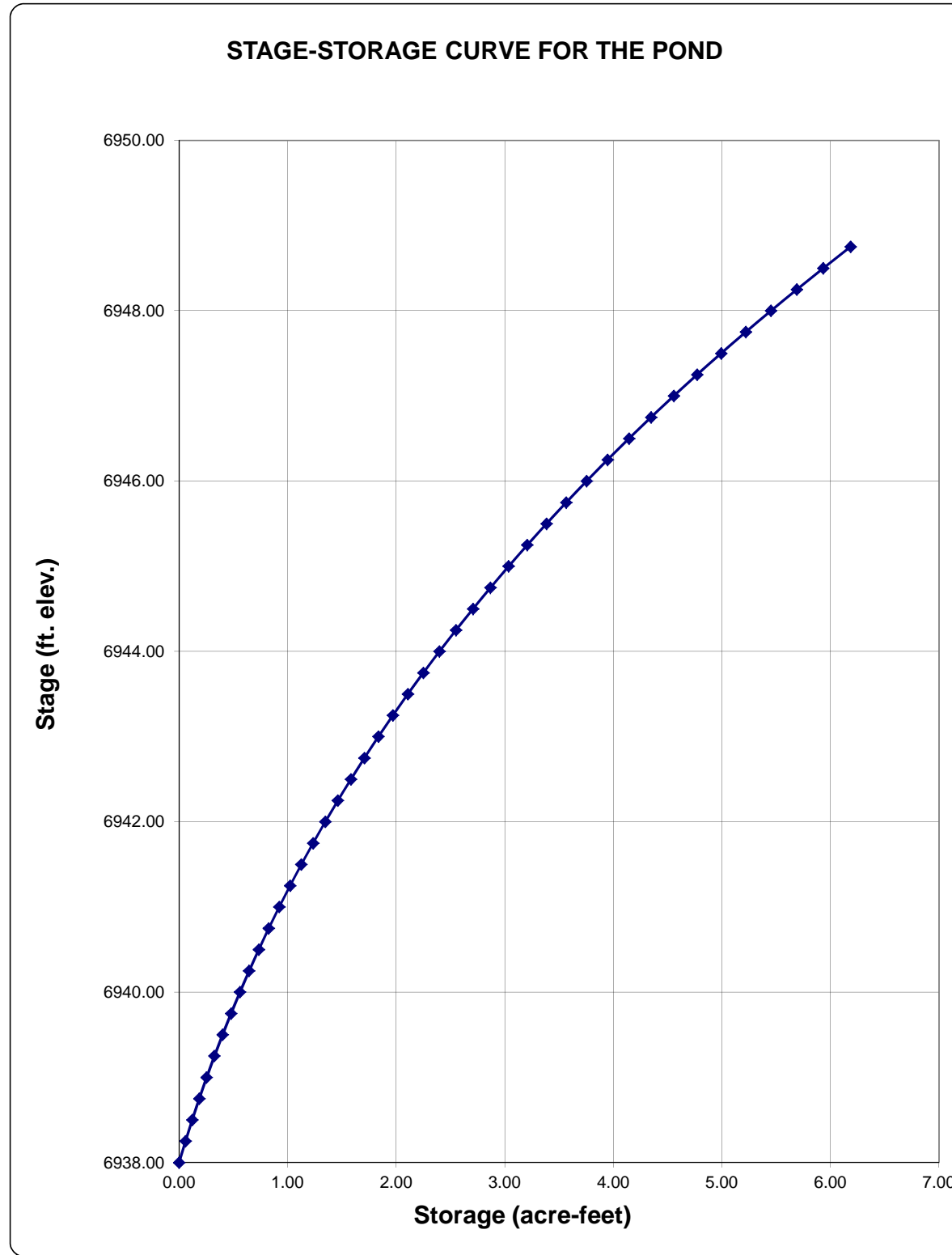
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 1.028 3.243 acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) Below El. (input) ft/ft	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6938.00	4.00	100.00	200.00	10,000.0		0.230	0.000		
	6938.25	4.00	102.56	205.12	10,518.9		2,565	0.241	0.059	
	6938.50	4.00	105.12	210.25	11,050.9		5,261	0.254	0.121	
	6938.75	4.00	107.68	215.37	11,596.0		8,092	0.266	0.186	
	6939.00	4.00	110.25	220.49	12,154.2		11,061	0.279	0.254	
	6939.25	4.00	112.81	225.62	12,725.6		14,171	0.292	0.325	
	6939.50	4.00	115.37	230.74	13,310.1		17,425	0.306	0.400	
	6939.75	4.00	117.93	235.86	13,907.7		20,827	0.319	0.478	
	6940.00	4.00	120.49	240.98	14,518.4		24,381	0.333	0.560	
	6940.25	4.00	123.05	246.11	15,142.3		28,088	0.348	0.645	
	6940.50	4.00	125.62	251.23	15,779.3		31,953	0.362	0.734	
	6940.75	4.00	128.18	256.35	16,429.4		35,979	0.377	0.826	
	6941.00	4.00	130.74	261.48	17,092.6		40,170	0.392	0.922	
EURV	6941.25	4.00	133.30	266.60	17,768.9		44,527	0.408	1.022	
	6941.50	4.00	135.86	271.72	18,458.4		49,056	0.424	1.126	
	6941.75	4.00	138.42	276.85	19,161.0		53,758	0.440	1.234	
	6942.00	4.00	140.98	281.97	19,876.7		58,638	0.456	1.346	
	6942.25	4.00	143.55	287.09	20,605.6		63,698	0.473	1.462	
	6942.50	4.00	146.11	292.22	21,347.5		68,942	0.490	1.583	
	6942.75	4.00	148.67	297.34	22,102.6		74,374	0.507	1.707	
	6943.00	4.00	151.23	302.46	22,870.8		79,995	0.525	1.836	
	6943.25	4.00	153.79	307.59	23,652.2		85,811	0.543	1.970	
	6943.50	4.00	156.35	312.71	24,446.6		91,823	0.561	2.108	
	6943.75	4.00	158.92	317.83	25,254.2		98,036	0.580	2.251	
	6944.00	4.00	161.48	322.95	26,074.9		104,452	0.599	2.398	
	6944.25	4.00	164.04	328.08	26,908.7		111,075	0.618	2.550	
	6944.50	4.00	166.60	333.20	27,755.7		117,908	0.637	2.707	
	6944.75	4.00	169.16	338.32	28,615.8		124,954	0.657	2.869	
	6945.00	4.00	171.72	343.45	29,489.0		132,217	0.677	3.035	
	6945.25	4.00	174.29	348.57	30,375.3		139,700	0.697	3.207	
	6945.50	4.00	176.85	353.69	31,274.7		147,407	0.718	3.384	
	6945.75	4.00	179.41	358.82	32,187.3		155,339	0.739	3.566	
	6946.00	4.00	181.97	363.94	33,113.0		163,502	0.760	3.753	
	6946.25	4.00	184.53	369.06	34,051.8		171,898	0.782	3.946	
	6946.50	4.00	187.09	374.19	35,003.7		180,529	0.804	4.144	
	6946.75	4.00	189.65	379.31	35,968.8		189,401	0.826	4.348	
	6947.00	4.00	192.22	384.43	36,947.0		198,515	0.848	4.557	
	6947.25	4.00	194.78	389.55	37,938.3		207,876	0.871	4.772	
	6947.50	4.00	197.34	394.68	38,942.7		217,486	0.894	4.993	
	6947.75	4.00	199.90	399.80	39,960.2		227,349	0.917	5.219	
	6948.00	4.00	202.46	404.92	40,990.9		237,468	0.941	5.452	
	6948.25	4.00	205.02	410.05	42,034.7		247,846	0.965	5.690	
	6948.50	4.00	207.59	415.17	43,091.6		258,487	0.989	5.934	
	6948.75	4.00	210.15	420.29	44,161.7		269,394	1.014	6.184	



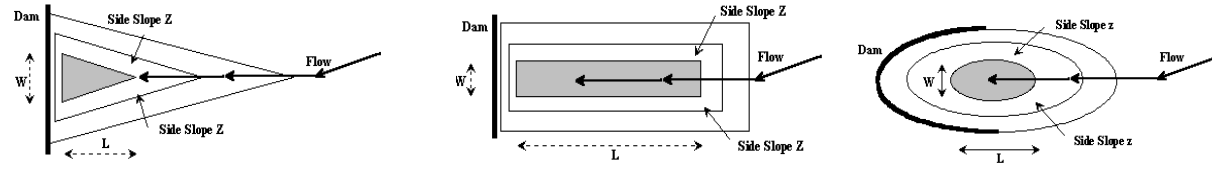


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR4

Project:  
Basin ID:



Design Information (Input):

Width of Pond Bottom, W = 40.00 ft  
Length of Pond Bottom, L = 240.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 5.00 ft/ft

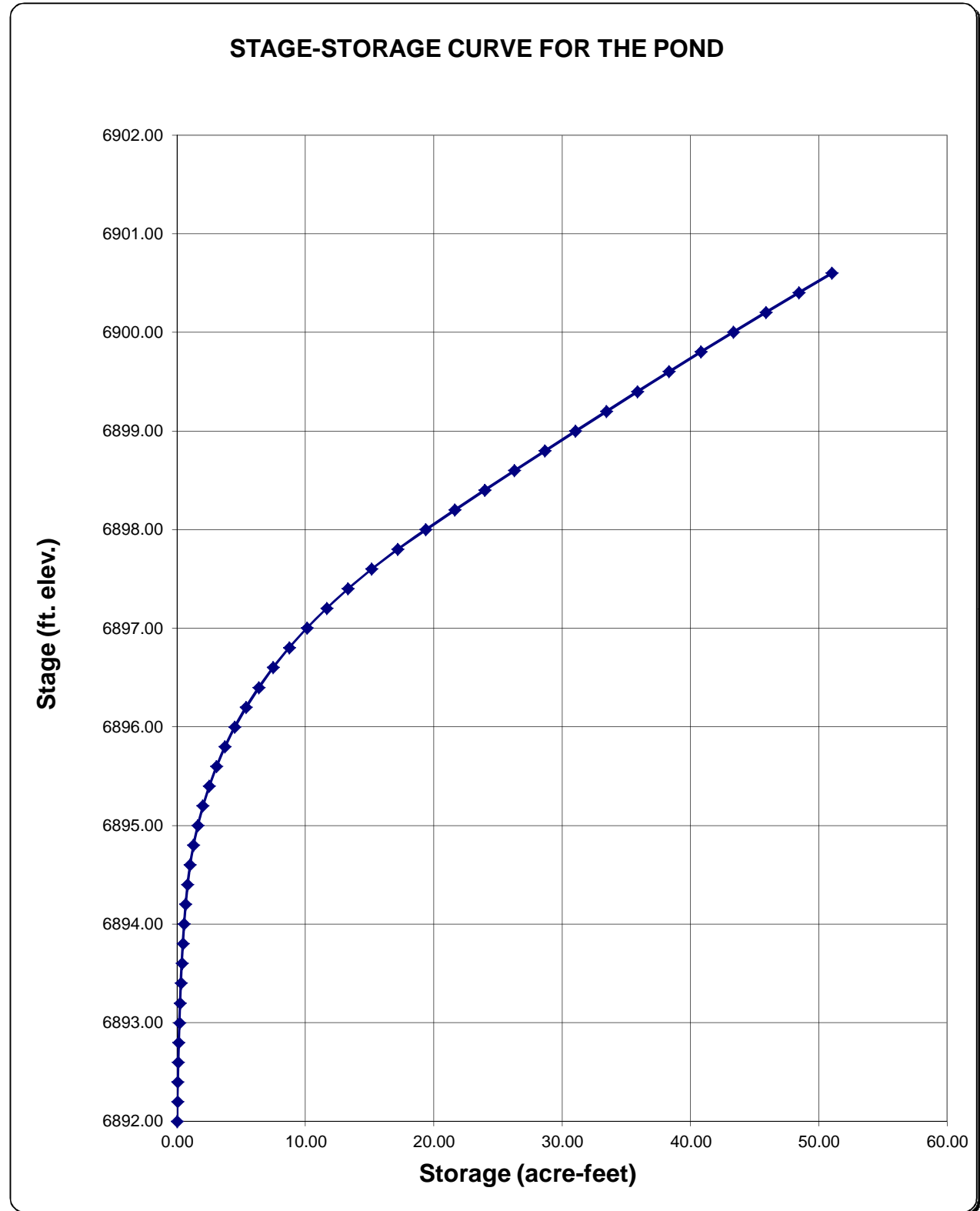
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA':  MINOR acre-ft.  
Storage Requirement from Sheet 'Hydrograph':  MAJOR 44,389 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum':  acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage ft (input)	Side Slope (H:V) Below El. (input)	Pond Width at Stage ft (output)	Pond Length at Stage ft (output)	Surface Area at Stage ft <sup>2</sup> (output)	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage ft <sup>3</sup> (output)	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6892.00		40.00	240.00	4,800.0		0.110	0.000		
	6892.20	10.00	44.18	265.08	5,855.8		1,066	0.134	0.024	
	6892.40	10.00	48.36	290.17	7,016.4		2,353	0.161	0.054	
	6892.60	10.00	52.54	315.25	8,281.9		3,883	0.190	0.089	
	6892.80	10.00	56.72	340.33	9,652.2		5,676	0.222	0.130	
	6893.00	10.00	60.90	365.42	11,127.4		7,754	0.255	0.178	
	6893.20	10.00	65.08	390.50	12,707.5		10,137	0.292	0.233	
	6893.40	10.00	69.26	415.58	14,392.4		12,847	0.330	0.295	
	6893.60	10.00	73.44	440.67	16,182.2		15,905	0.371	0.365	
	6893.80	10.00	77.62	465.75	18,076.8		19,331	0.415	0.444	
	6894.00	10.00	81.81	490.83	20,076.3		23,146	0.461	0.531	
	6894.20	40.00	98.03	588.16	28,828.1		28,037	0.662	0.644	
	6894.40	40.00	114.25	685.50	39,158.9		34,835	0.899	0.800	
	6894.60	40.00	130.47	782.83	51,068.6		43,858	1.172	1.007	
	6894.80	40.00	146.69	880.16	64,557.2		55,421	1.482	1.272	
	6895.00	40.00	162.92	977.50	79,624.8		69,839	1.828	1.603	
	6895.20	40.00	179.14	1074.83	96,271.3		87,428	2.210	2.007	
	6895.40	40.00	195.36	1172.16	114,496.8		108,505	2.628	2.491	
	6895.60	40.00	211.58	1269.49	134,301.2		133,385	3.083	3.062	
	6895.80	40.00	227.80	1366.83	155,684.6		162,384	3.574	3.728	
	6896.00	40.00	244.03	1464.16	178,646.9		195,817	4.101	4.495	
	6896.20	40.00	260.25	1561.49	203,188.2		234,000	4.665	5.372	
	6896.40	40.00	276.47	1658.82	229,308.4		277,250	5.264	6.365	
-WQCV	6896.60	40.00	292.69	1756.16	257,007.5		325,882	5.900	7.481	
	6896.80	40.00	308.92	1853.49	286,285.6		380,211	6.572	8.728	
	6897.00	40.00	325.14	1950.82	317,142.6		440,554	7.281	10.114	
	6897.20	40.00	341.36	2048.16	349,578.6		507,226	8.025	11.644	
	6897.40	40.00	357.58	2145.49	383,593.5		580,543	8.806	13.327	
	6897.60	40.00	373.80	2242.82	419,187.4		660,821	9.623	15.170	
	6897.80	40.00	390.03	2340.15	456,360.2		748,376	10.477	17.180	
100-yr	6898.00	40.00	406.25	2437.49	495,111.9		843,523	11.366	19.365	
	6898.20	5.00	408.42	2450.53	500,424.2		943,077	11.488	21.650	
	6898.40	5.00	410.60	2463.57	505,764.8		1,043,696	11.611	23.960	
	6898.60	5.00	412.77	2476.61	511,133.8		1,145,385	11.734	26.294	
	6898.80	5.00	414.94	2489.65	516,531.2		1,248,152	11.858	28.654	
	6899.00	5.00	417.12	2502.69	521,956.9		1,352,001	11.982	31.038	
	6899.20	5.00	419.29	2515.74	527,410.9		1,456,937	12.108	33.447	
	6899.40	5.00	421.46	2528.78	532,893.3		1,562,968	12.234	35.881	
	6899.60	5.00	423.64	2541.82	538,404.0		1,670,098	12.360	38.340	
	6899.80	5.00	425.81	2554.86	543,943.1		1,778,332	12.487	40.825	
Spillway	6900.00	5.00	427.98	2567.90	549,510.5		1,887,678	12.615	43.335	
	6900.20	5.00	430.16	2580.94	555,106.2		1,998,139	12.743	45.871	
	6900.40	5.00	432.33	2593.99	560,730.3		2,109,723	12.873	48.433	
	6900.60	5.00	434.50	2607.03	566,382.8		2,222,434	13.002	51.020	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Sub Regional Pond SR5 at Condor Rd

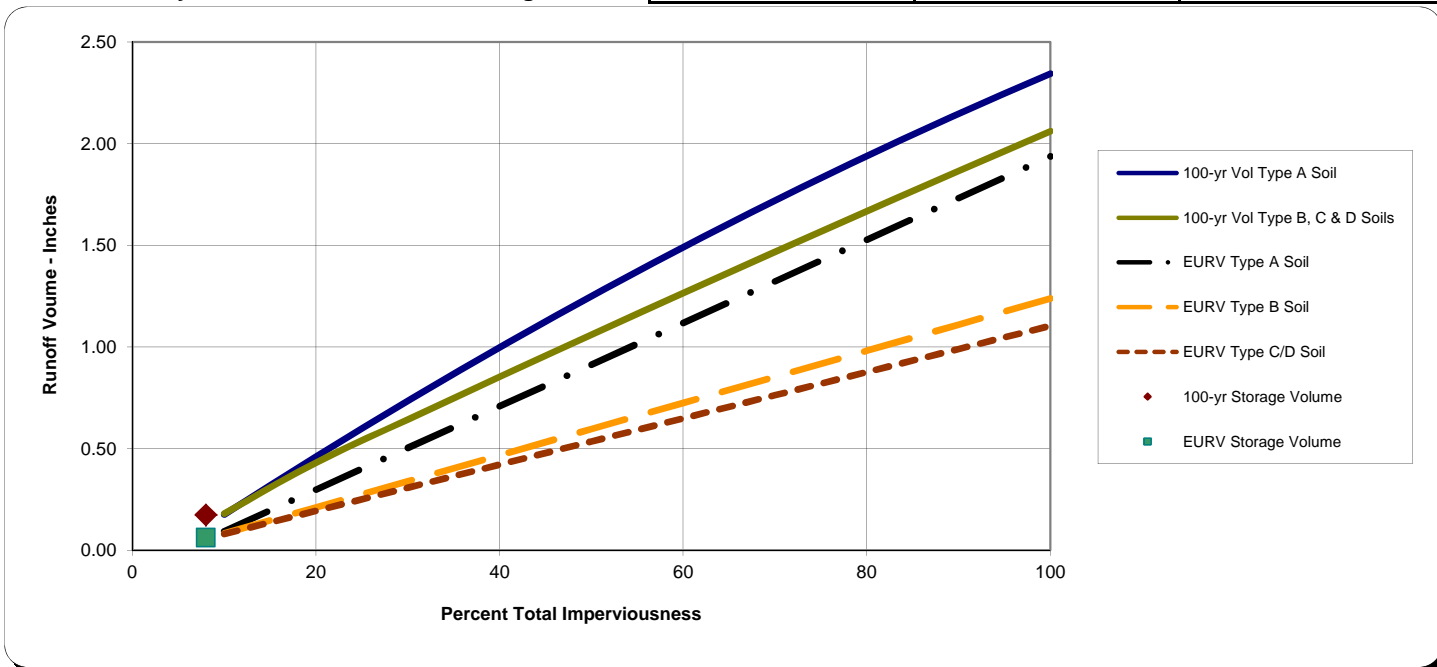
\* User input data shown in blue.

Area of Watershed (acres)	673.00	
Subwatershed Imperviousness	8.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	8.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	673.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.06	3.4959	Design Outlet to Empty EURV in 72 Hours
0.17	9.74	572.05

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

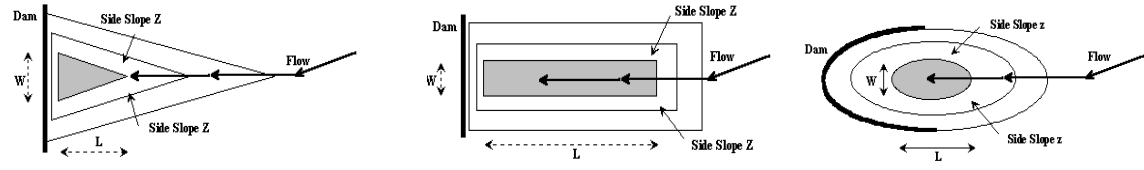
- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR5

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 245.00 ft  
Length of Pond Bottom, L = 250.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

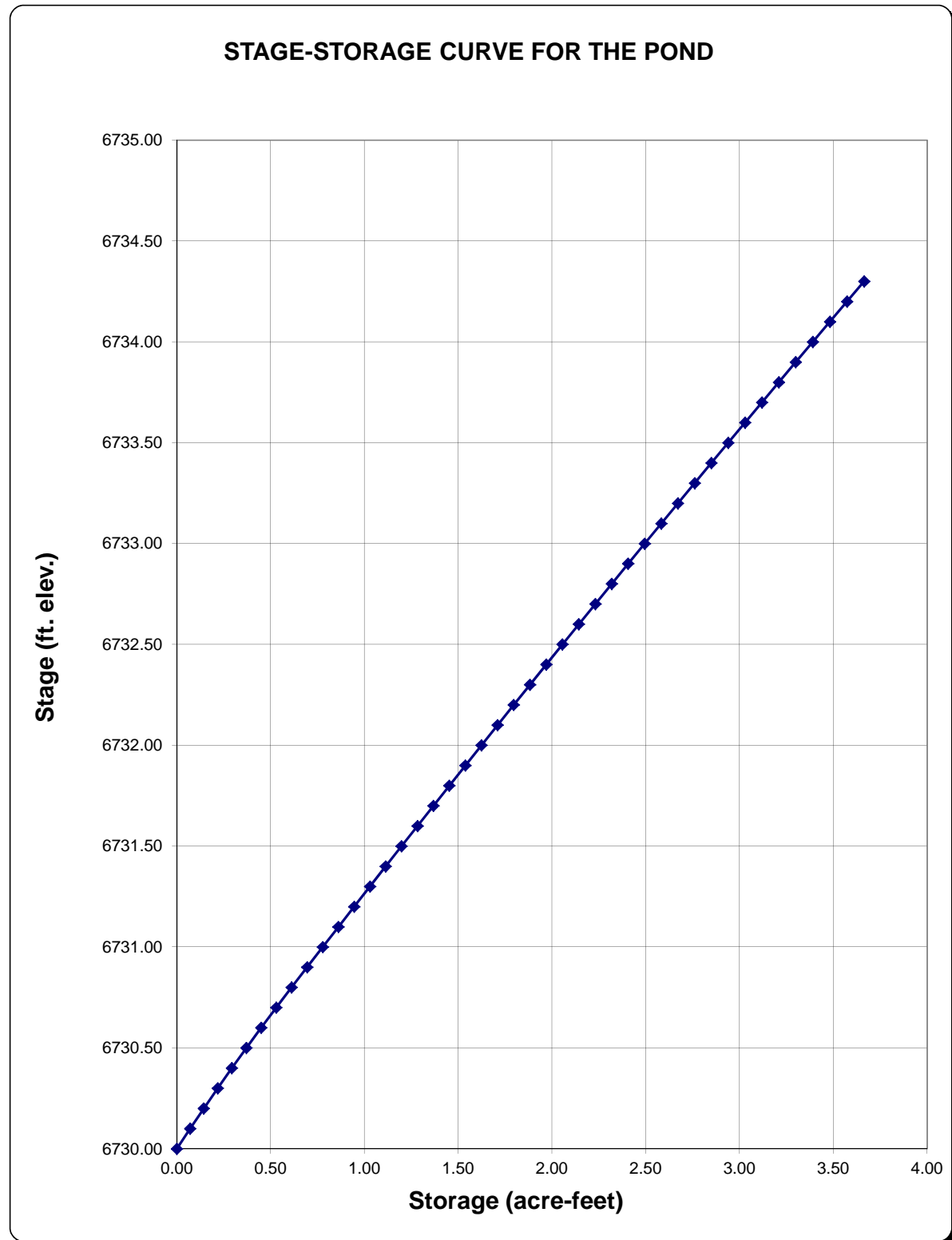
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 44.999 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 3.496 MINOR 9.739 MAJOR acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) ft/ft Below El. (input)	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6730.00		245.00	250.00	30,625.0			0.703	0.000	
	6730.10	10.00	247.62	252.67	31,283.3		3,095	0.718	0.071	
	6730.20	10.00	250.24	255.35	31,948.6		6,257	0.733	0.144	
	6730.30	10.00	252.86	258.02	32,620.9		9,485	0.749	0.218	
	6730.40	10.00	255.48	260.69	33,300.2		12,782	0.764	0.293	
	6730.50	10.00	258.10	263.36	33,986.5		16,146	0.780	0.371	
	6730.60	10.00	260.72	266.04	34,679.8		19,579	0.796	0.449	
	6730.70	10.00	263.33	268.71	35,380.1		23,082	0.812	0.530	
	6730.80	10.00	265.95	271.38	36,087.4		26,656	0.828	0.612	
	6730.90		266.35	271.78	36,193.9		30,270	0.831	0.695	
	6731.00		266.74	272.18	36,300.5		33,894	0.833	0.778	
	6731.10		267.13	272.58	36,407.2		37,530	0.836	0.862	
	6731.20		267.52	272.98	36,514.2		41,176	0.838	0.945	
	6731.30		267.91	273.38	36,621.3		44,833	0.841	1.029	
	6731.40		268.31	273.78	36,728.5		48,500	0.843	1.113	
	6731.50		268.70	274.18	36,835.9		52,178	0.846	1.198	
	6731.60		269.09	274.58	36,943.5		55,867	0.848	1.283	
	6731.70		269.48	274.98	37,051.2		59,567	0.851	1.367	
	6731.80		269.87	275.38	37,159.1		63,277	0.853	1.453	
	6731.90		270.27	275.78	37,267.1		66,999	0.856	1.538	
	6732.00		270.66	276.18	37,375.3		70,731	0.858	1.624	
	6732.10		271.05	276.58	37,483.6		74,474	0.861	1.710	
	6732.20		271.44	276.98	37,592.1		78,228	0.863	1.796	
	6732.30		271.83	277.38	37,700.8		81,992	0.865	1.882	
	6732.40		272.23	277.78	37,809.6		85,768	0.868	1.969	
	6732.50		272.62	278.18	37,918.5		89,554	0.870	2.056	
	6732.60		273.01	278.58	38,027.7		93,352	0.873	2.143	
	6732.70		273.40	278.98	38,136.9		97,160	0.876	2.230	
	6732.80		273.79	279.38	38,246.4		100,979	0.878	2.318	
	6732.90		274.19	279.78	38,356.0		104,809	0.881	2.406	
	6733.00		274.58	280.18	38,465.7		108,650	0.883	2.494	
	6733.10		274.97	280.58	38,575.6		112,502	0.886	2.583	
	6733.20		275.36	280.98	38,685.7		116,365	0.888	2.671	
	6733.30		275.75	281.38	38,795.9		120,239	0.891	2.760	
	6733.40		276.15	281.78	38,906.3		124,124	0.893	2.850	
	6733.50		276.54	282.18	39,016.8		128,021	0.896	2.939	
	6733.60		276.93	282.58	39,127.5		131,928	0.898	3.029	
	6733.70		277.32	282.98	39,238.4		135,846	0.901	3.119	
	6733.80		277.71	283.38	39,349.4		139,776	0.903	3.209	
	6733.90		278.11	283.78	39,460.6		143,716	0.906	3.299	
	6734.00		278.50	284.18	39,571.9		147,668	0.908	3.390	
	6734.10		278.89	284.58	39,683.4		151,630	0.911	3.481	
	6734.20		279.28	284.98	39,795.0		155,604	0.914	3.572	
	6734.30		279.67	285.38	39,906.8		159,589	0.916	3.664	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

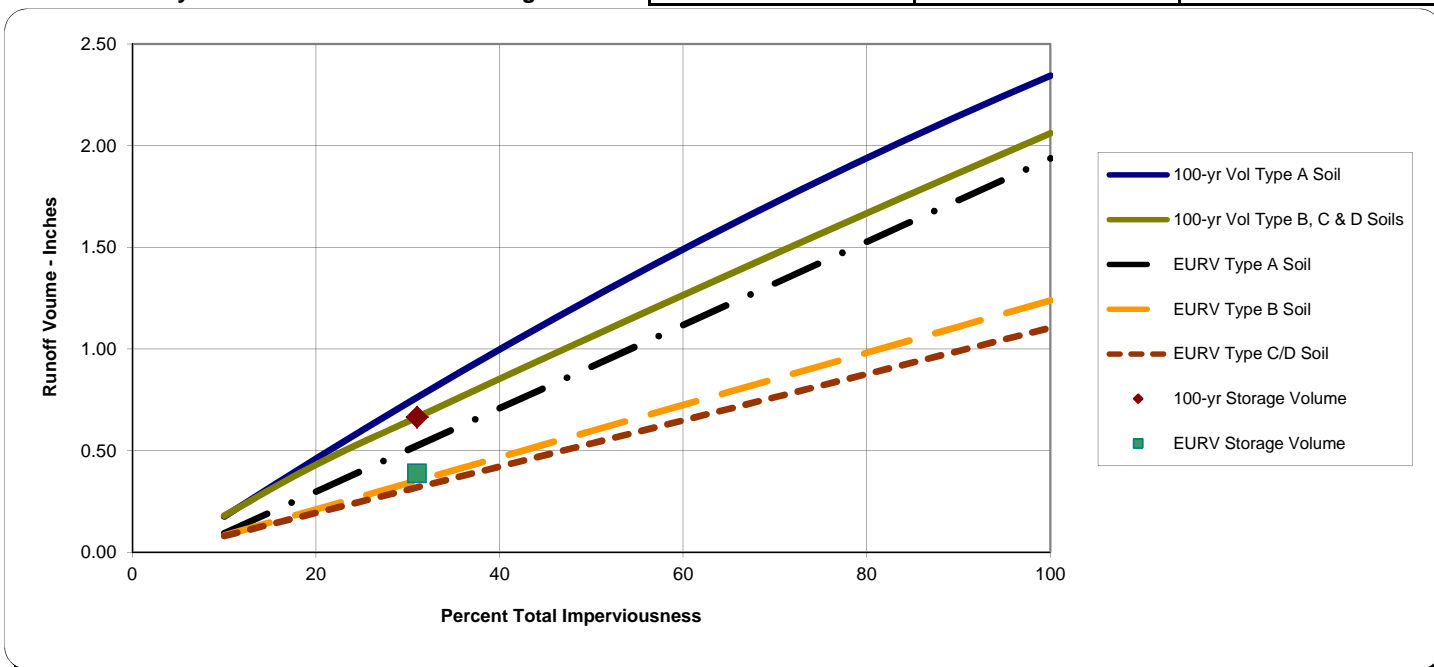
**Project:** Falcon DBPS  
**Basin ID:** Sub Regional Pond SR6

\* User input data shown in blue.

Area of Watershed (acres)	229.00	
Subwatershed Imperviousness	31.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	31.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B	100.0%	229.0
Type C or D		0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

	Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume <sup>4</sup>	0.39	7.3917	Design Outlet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV <sup>5</sup>	0.66	12.68	194.65



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



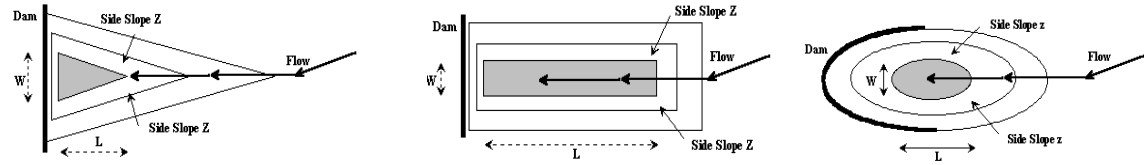


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR6

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 260.00 ft  
Length of Pond Bottom, L = 320.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

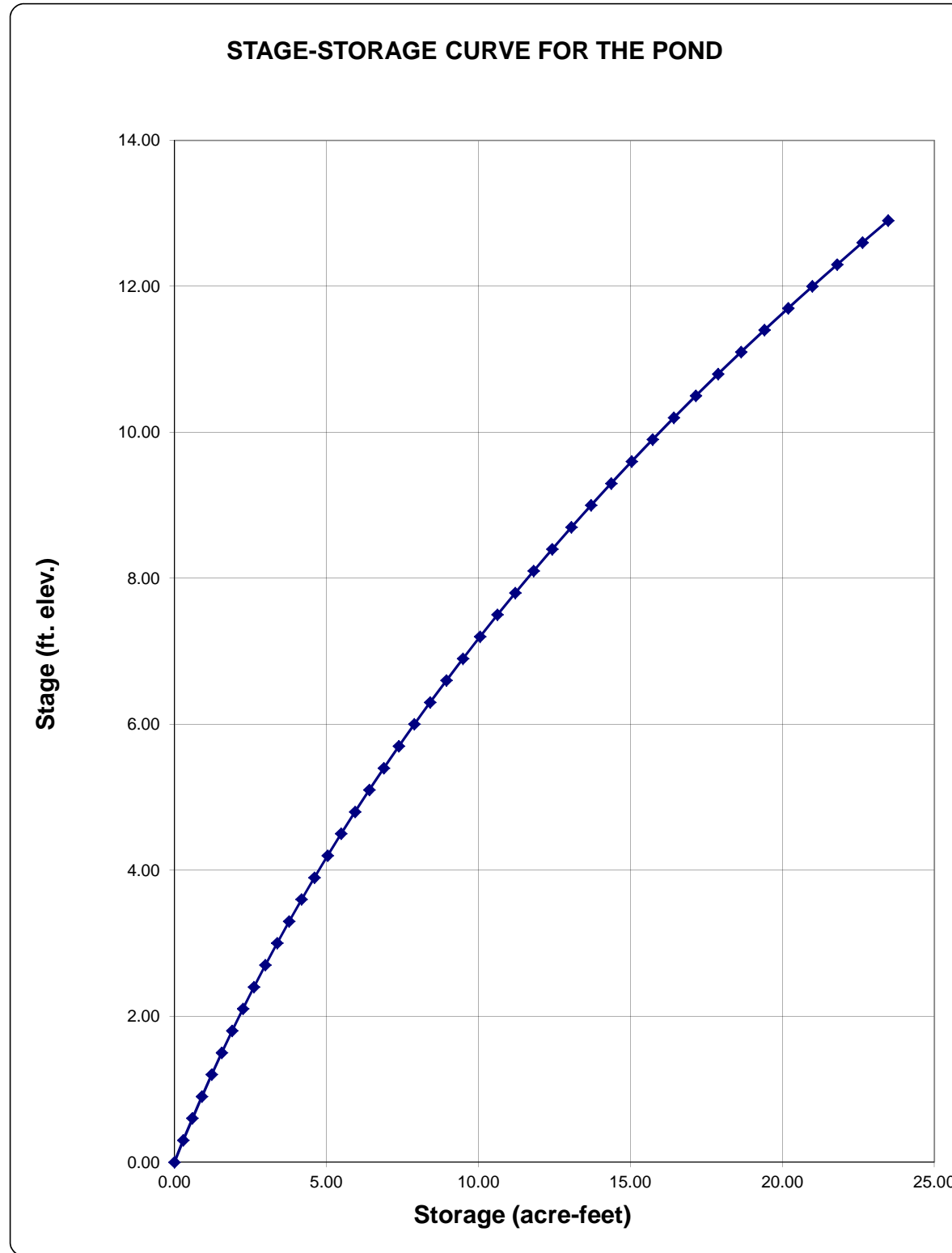
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 6.943 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 7.392 MINOR 12.680 MAJOR acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (ft) (input)	Side Slope (H:V) Below El. (input)	Pond Width at Stage (ft) (output)	Pond Length at Stage (ft) (output)	Surface Area at Stage (ft <sup>2</sup> ) (output)	Surface Area at Stage ft <sup>2</sup> User Override (output)	Volume Below Stage (ft <sup>3</sup> ) (output)	Surface Area at Stage (acres) (output)	Volume Below Stage (acre-ft) (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	0.00		260.00	320.00	41,600.0		0.955	0.000		
	0.30	5.00	264.41	325.42	43,022.4		12,693	0.988	0.291	
	0.60	5.00	268.82	330.85	44,468.8		25,817	1.021	0.593	
	0.90	5.00	273.22	336.27	45,939.0		39,378	1.055	0.904	
	1.20	5.00	277.63	341.70	47,433.2		53,384	1.089	1.226	
	1.50	5.00	282.04	347.12	48,951.2		67,842	1.124	1.557	
	1.80	5.00	286.45	352.55	50,493.2		82,758	1.159	1.900	
	2.10	5.00	290.85	357.97	52,059.1		98,141	1.195	2.253	
	2.40	5.00	295.26	363.40	53,648.9		113,997	1.232	2.617	
	2.70	5.00	299.67	368.82	55,262.6		130,334	1.269	2.992	
	3.00	5.00	304.08	374.25	56,900.2		147,159	1.306	3.378	
	3.30	5.00	308.48	379.67	58,561.8		164,478	1.344	3.776	
	3.60	5.00	312.89	385.10	60,247.2		182,299	1.383	4.185	
	3.90	5.00	317.30	390.52	61,956.6		200,630	1.422	4.606	
	4.20	5.00	321.71	395.95	63,689.8		219,477	1.462	5.038	
	4.50	5.00	326.12	401.37	65,447.0		238,847	1.502	5.483	
	4.80	5.00	330.52	406.80	67,228.1		258,748	1.543	5.940	
	5.10	5.00	334.93	412.22	69,033.1		279,188	1.585	6.409	
	5.40	5.00	339.34	417.65	70,862.0		300,172	1.627	6.891	
EURV	5.70	5.00	343.75	423.07	72,714.8		321,708	1.669	7.385	
	6.00	5.00	348.15	428.50	74,591.6		343,804	1.712	7.893	
	6.30	5.00	352.56	433.92	76,492.2		366,467	1.756	8.413	
	6.60	5.00	356.97	439.35	78,416.8		389,703	1.800	8.946	
	6.90	5.00	361.38	444.77	80,365.2		413,521	1.845	9.493	
	7.20	5.00	365.78	450.20	82,337.6		437,926	1.890	10.053	
	7.50	5.00	370.19	455.62	84,333.9		462,927	1.936	10.627	
	7.80	5.00	374.60	461.05	86,354.1		488,530	1.982	11.215	
100-yr	8.10	5.00	379.01	466.47	88,398.2		514,743	2.029	11.817	
	8.40	5.00	383.42	471.90	90,466.2		541,572	2.077	12.433	
	8.70	5.00	387.82	477.32	92,558.2		569,026	2.125	13.063	
	9.00	5.00	392.23	482.75	94,674.0		597,111	2.173	13.708	
	9.30	5.00	396.64	488.17	96,813.8		625,834	2.223	14.367	
	9.60	5.00	401.05	493.60	98,977.5		655,203	2.272	15.041	
	9.90	5.00	405.45	499.02	101,165.0		685,224	2.322	15.731	
Spillway	10.20	5.00	409.86	504.45	103,376.5		715,905	2.373	16.435	
	10.50	5.00	414.27	509.87	105,611.9		747,254	2.425	17.155	
	10.80	5.00	418.68	515.30	107,871.2		779,276	2.476	17.890	
	11.10	5.00	423.09	520.72	110,154.5		811,980	2.529	18.640	
	11.40	5.00	427.49	526.15	112,461.6		845,372	2.582	19.407	
	11.70	5.00	431.90	531.57	114,792.7		879,461	2.635	20.190	
	12.00	5.00	436.31	536.99	117,147.6		914,252	2.689	20.988	
	12.30	5.00	440.72	542.42	119,526.5		949,753	2.744	21.803	
	12.60	5.00	445.12	547.84	121,929.3		985,971	2.799	22.635	
	12.90	5.00	449.53	553.27	124,356.0		1,022,914	2.855	23.483	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

**Project:** Falcon DBPS  
**Basin ID:** The Meadows Pond #1

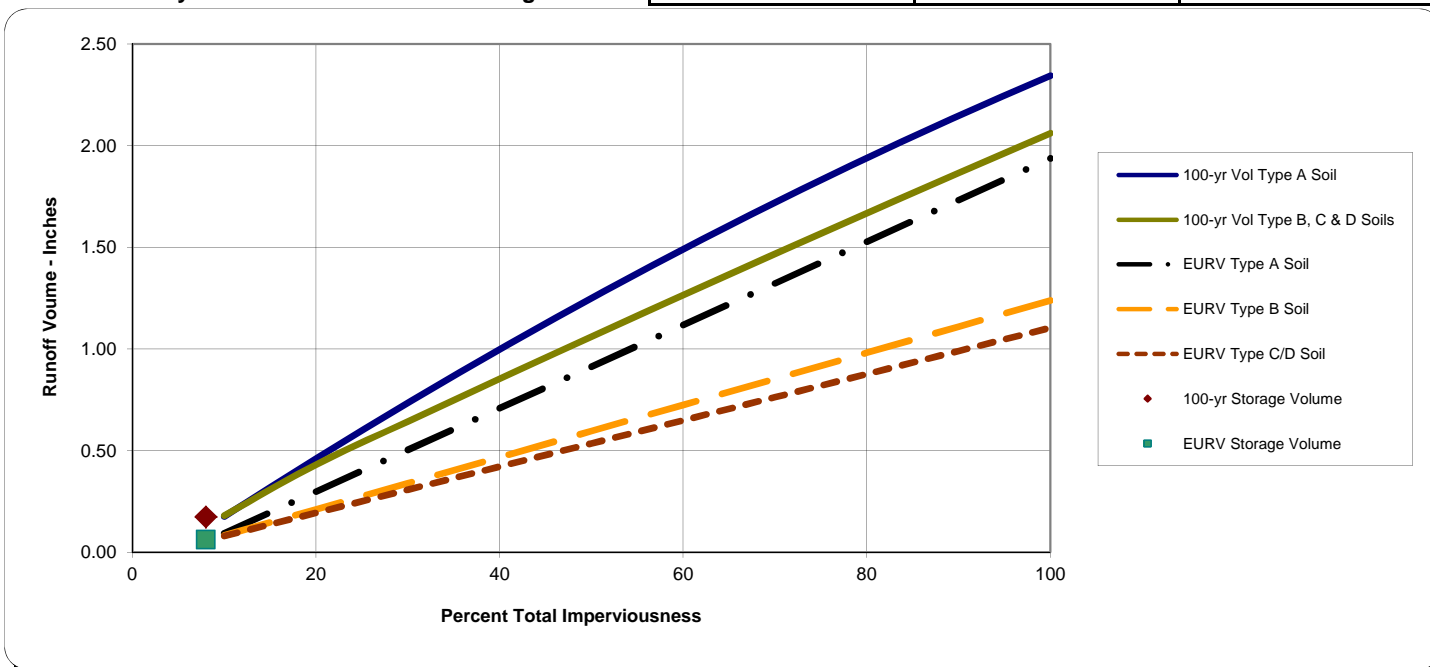
\* User input data shown in blue.

Area of Watershed (acres)	37.00	
Subwatershed Imperviousness	8.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	8.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	37.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.06	0.1922	Design Outlet to Empty EURV in 72 Hours
0.17	0.54	31.45

Excess Urban Runoff Volume<sup>4</sup>  
 100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

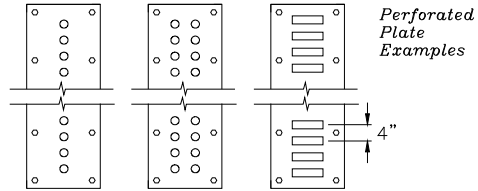
Project: **Falcon DBPS**  
 Basin ID: **The Meadows Pond #1**

Project: **Falcon DBPS**  
 Basin ID: **The Meadows Pond #1**

**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p$  = 8.0 percent  
 Catchment Area, A = 37.000 acres  
 Depth at WQCV outlet above lowest perforation, H = 12 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, NL = 3  
 Orifice discharge coefficient,  $C_o$  = 0.65

Diameter of holes, D = 1.431 in.  
 Number of holes per row, N = 1  
**OR**  
 Height of slot, H = in.  
 Width of slot, W = in.

Time to Drain the Pond = 72 hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**

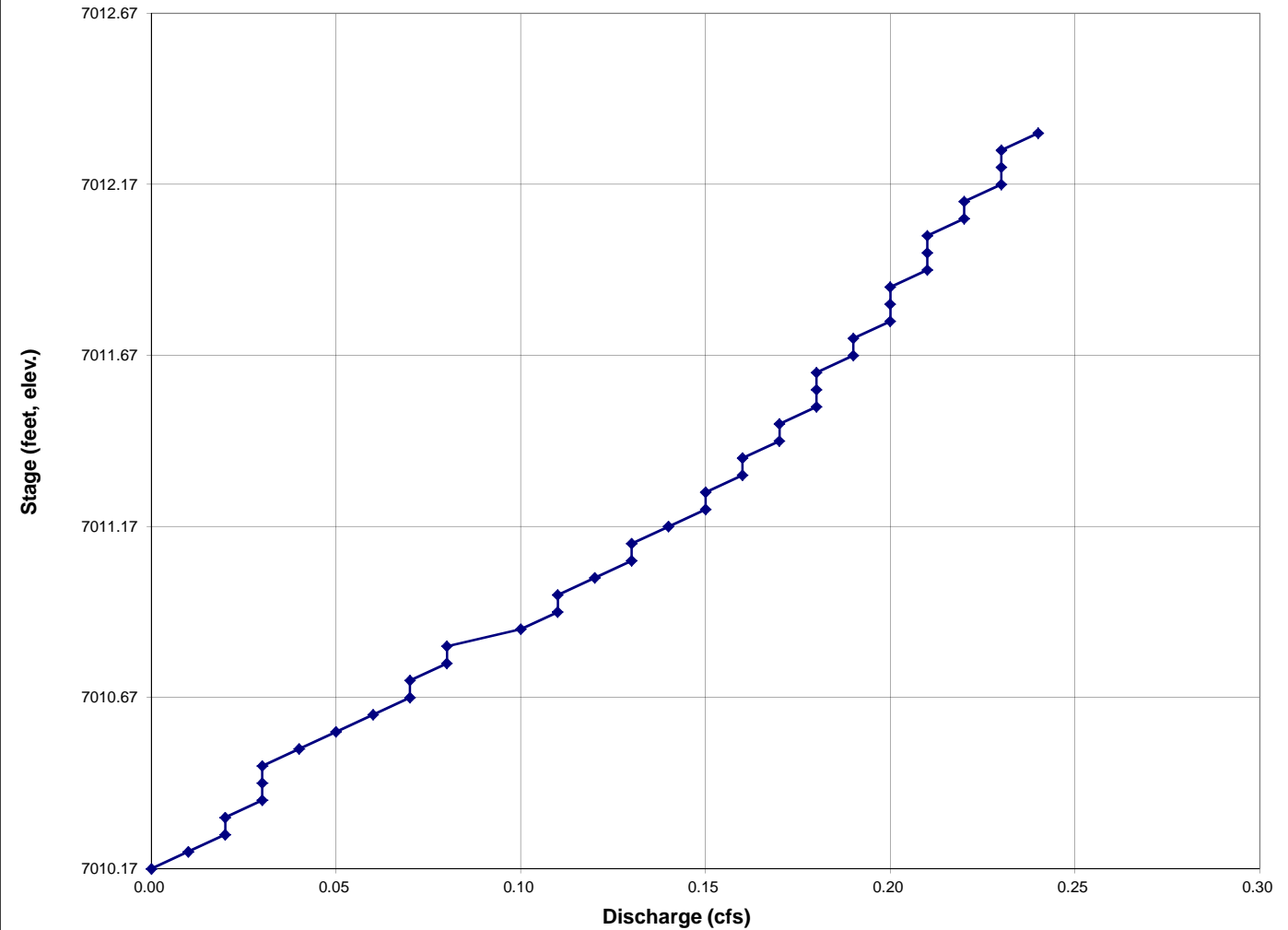


**Outlet Design Information (Output):**  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.062 watershed inches  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.192 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 1.61 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 1.61 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.011 square feet

**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow	
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18		
7010.17	7010.17	7010.50	7010.83																	
	Collection Capacity for Each Row of Holes in cfs																			
7010.17	0.003	0.000	0.000																	0.00
7010.22	0.013	0.000	0.000																	0.01
7010.27	0.019	0.000	0.000																	0.02
7010.32	0.023	0.000	0.000																	0.02
7010.37	0.026	0.000	0.000																	0.03
7010.42	0.029	0.000	0.000																	0.03
7010.47	0.032	0.000	0.000																	0.03
7010.52	0.035	0.008	0.000																	0.04
7010.57	0.037	0.015	0.000																	0.05
7010.62	0.039	0.020	0.000																	0.06
7010.67	0.041	0.024	0.000																	0.07
7010.72	0.043	0.027	0.000																	0.07
7010.77	0.045	0.030	0.000																	0.08
7010.82	0.047	0.033	0.000																	0.08
7010.87	0.049	0.035	0.012																	0.10
7010.92	0.051	0.038	0.017																	0.11
7010.97	0.052	0.040	0.022																	0.11
7011.02	0.054	0.042	0.025																	0.12
7011.07	0.055	0.044	0.029																	0.13
7011.12	0.057	0.046	0.031																	0.13
7011.17	0.058	0.048	0.034																	0.14
7011.22	0.060	0.049	0.036																	0.15
7011.27	0.061	0.051	0.039																	0.15
7011.32	0.063	0.053	0.041																	0.16
7011.37	0.064	0.054	0.043																	0.16
7011.42	0.065	0.056	0.045																	0.17
7011.47	0.067	0.057	0.047																	0.17
7011.52	0.068	0.059	0.048																	0.18
7011.57	0.069	0.060	0.050																	0.18
7011.62	0.070	0.062	0.052																	0.18
7011.67	0.071	0.063	0.053																	0.19
7011.72	0.073	0.064	0.055																	0.19
7011.77	0.074	0.066	0.056																	0.20
7011.82	0.075	0.067	0.058																	0.20
7011.87	0.076	0.068	0.059																	0.20
7011.92	0.077	0.069	0.061																	0.21
7011.97	0.078	0.071	0.062																	0.21
7012.02	0.079	0.072	0.064																	0.21
7012.07	0.080	0.073	0.065																	0.22
7012.12	0.081	0.074	0.066																	0.22
7012.17	0.082	0.075	0.067																	0.23
7012.22	0.083	0.076	0.069																	0.23
7012.27	0.084	0.078	0.070																	0.23
7012.32	0.085	0.079	0.071																	0.24

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

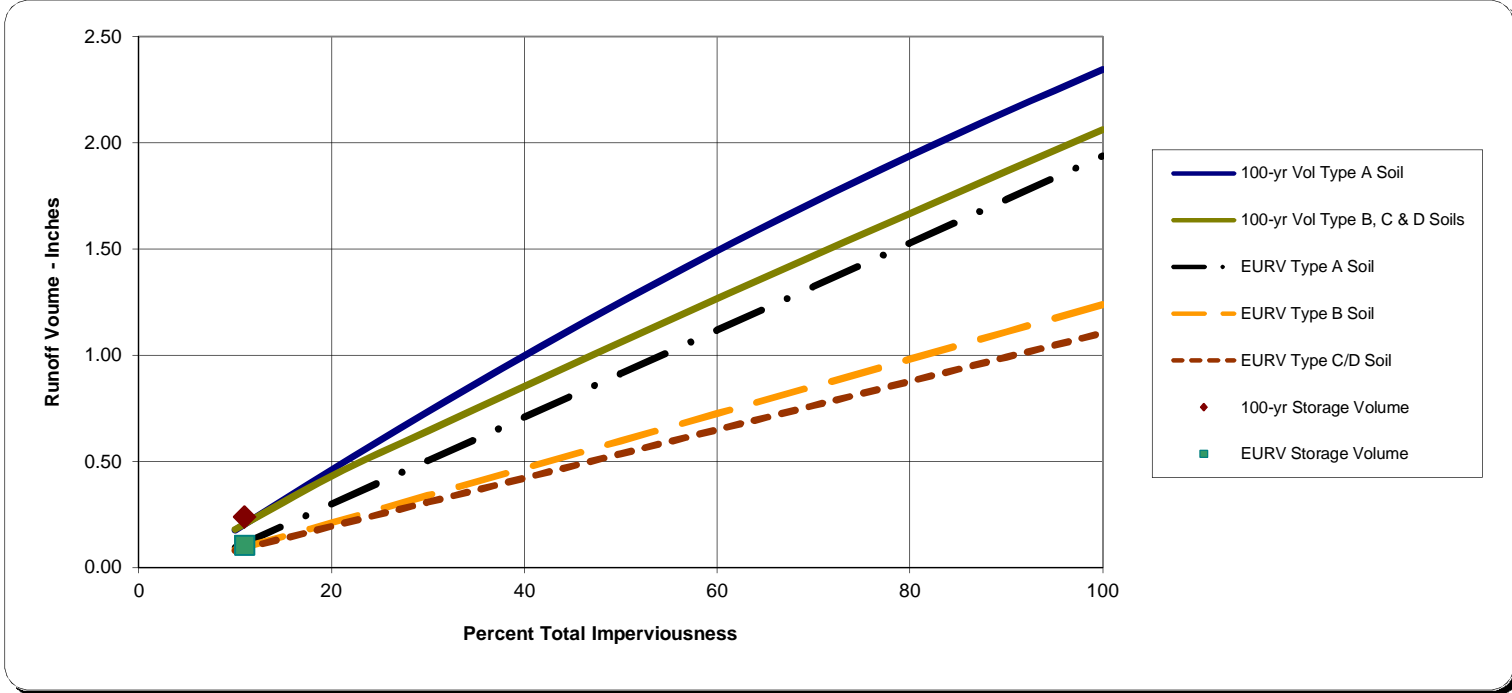
**Project:** Falcon DBPS  
**Basin ID:** The Meadows Pond #2

\* User input data shown in blue.

Area of Watershed (acres)	186.00	
Subwatershed Imperviousness	11.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	11.0%	
Hydrologic Soil Type	<b>Percentage of Area</b>	<b>Area (acres)</b>
Type A	0.0	0.0
Type B	100.0%	186.0
Type C or D	0.0	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018
Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.10	1.6233	Design Outlet to Empty EURV in 72 Hours
0.24	3.69	158.10

**Excess Urban Runoff Volume<sup>4</sup>**  
**100-year Detention Volume Including WQCV<sup>5</sup>**



- Notes:**
- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
  - 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
  - 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
  - 4) EURV approximates the difference between developed and pre-developed runoff volume.
  - 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

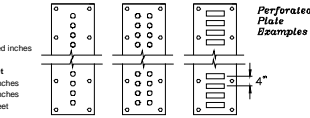
**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **The Meadows Pond #2**

Project: **Falcon DBPS**  
 Basin ID: **The Meadows Pond #2**

**WQCV Design Volume Input:**

Catchment Imperviousness, I<sub>c</sub> = **11.0** percent  
 Catchment Area, A<sub>c</sub> = **186,000** acres  
 Depth at WQCV outlet above lowest perforation, H = **32** inches  
 Vertical distance between rows, h = **4.00** inches  
 Number of rows, N<sub>r</sub> = **4**  
 Orifice discharge coefficient, C<sub>d</sub> = **0.65**  
 Diameter of holes, D = **0.25** in.  
 Number of holes per row, N<sub>h</sub> = **68**  
 Time to Drain the Pond = **72** hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**



**Outlet Design Information (Output):**

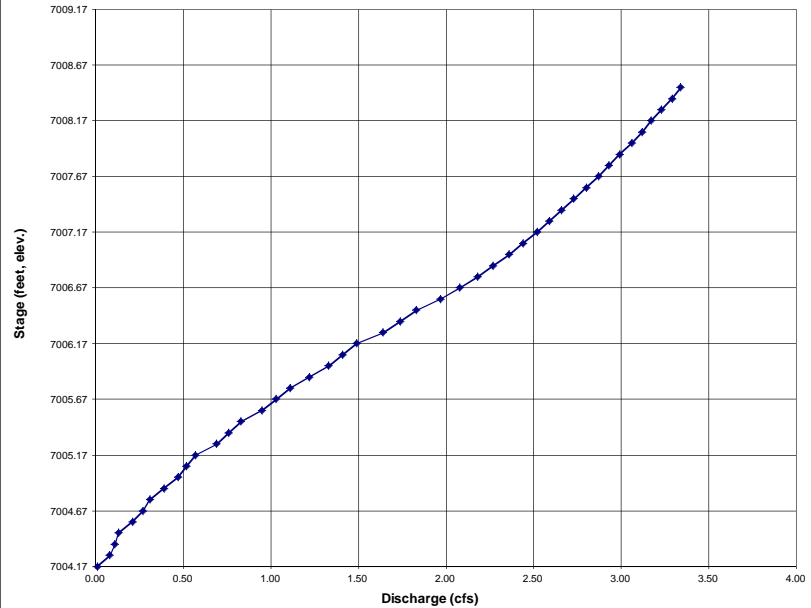
Excess Urban Runoff Volume (From Full-Spectrum Sheet) = **0.105** watershed inches  
 N/A

Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = **1.623** acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> = **6.57** square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = **6.57** square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = **0.046** square feet

**Calculation of Collection Capacity:**

Stage # (feet)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1 7004.17	Row 2 7004.50	Row 3 7004.83	Row 4 7005.17	Row 5 7005.50	Row 6 7005.83	Row 7 7006.17	Row 8 7006.50	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
7004.17	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.01
7004.27	0.076	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.08
7004.37	0.107	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.11
7004.47	0.131	0.000	0.000	0.000	0.000	0.000	0.000	0.000											0.13
7004.57	0.151	0.063	0.000	0.000	0.000	0.000	0.000	0.000											0.21
7004.67	0.169	0.098	0.000	0.000	0.000	0.000	0.000	0.000											0.27
7004.77	0.185	0.124	0.000	0.000	0.000	0.000	0.000	0.000											0.31
7004.87	0.199	0.145	0.048	0.000	0.000	0.000	0.000	0.000											0.39
7004.97	0.213	0.163	0.089	0.000	0.000	0.000	0.000	0.000											0.47
7005.07	0.226	0.180	0.117	0.000	0.000	0.000	0.000	0.000											0.52
7005.17	0.238	0.195	0.139	0.000	0.000	0.000	0.000	0.000											0.57
7005.27	0.250	0.209	0.158	0.075	0.000	0.000	0.000	0.000											0.69
7005.37	0.261	0.222	0.175	0.106	0.000	0.000	0.000	0.000											0.76
7005.47	0.271	0.234	0.190	0.130	0.000	0.000	0.000	0.000											0.83
7005.57	0.282	0.246	0.205	0.150	0.063	0.000	0.000	0.000											0.95
7005.67	0.292	0.257	0.218	0.169	0.098	0.000	0.000	0.000											1.03
7005.77	0.301	0.268	0.231	0.184	0.124	0.000	0.000	0.000											1.11
7005.87	0.310	0.278	0.243	0.199	0.145	0.048	0.000	0.000											1.22
7005.97	0.319	0.288	0.254	0.213	0.163	0.089	0.000	0.000											1.33
7006.07	0.328	0.298	0.265	0.226	0.180	0.117	0.000	0.000											1.41
7006.17	0.337	0.307	0.275	0.238	0.195	0.139	0.000	0.000											1.49
7006.27	0.345	0.316	0.285	0.249	0.209	0.158	0.075	0.000											1.64
7006.37	0.353	0.325	0.295	0.261	0.222	0.175	0.106	0.000											1.74
7006.47	0.361	0.334	0.305	0.271	0.234	0.190	0.130	0.000											1.83
7006.57	0.369	0.342	0.314	0.281	0.246	0.205	0.150	0.000											1.97
7006.67	0.376	0.350	0.323	0.291	0.257	0.218	0.168	0.098											2.08
7006.77	0.384	0.358	0.331	0.301	0.268	0.231	0.184	0.124											2.18
7006.87	0.391	0.366	0.340	0.310	0.278	0.243	0.199	0.145											2.27
7006.97	0.398	0.374	0.348	0.319	0.288	0.254	0.213	0.163											2.36
7007.07	0.405	0.381	0.356	0.328	0.298	0.265	0.226	0.180											2.44
7007.17	0.412	0.389	0.364	0.336	0.307	0.275	0.238	0.195											2.52
7007.27	0.419	0.396	0.371	0.345	0.316	0.285	0.248	0.209											2.59
7007.37	0.426	0.403	0.379	0.353	0.325	0.295	0.261	0.222											2.66
7007.47	0.432	0.410	0.386	0.361	0.334	0.305	0.271	0.234											2.73
7007.57	0.439	0.417	0.394	0.368	0.342	0.314	0.281	0.246											2.80
7007.67	0.445	0.423	0.401	0.376	0.350	0.323	0.291	0.257											2.87
7007.77	0.451	0.430	0.408	0.383	0.358	0.331	0.301	0.268											2.93
7007.87	0.458	0.437	0.415	0.391	0.366	0.340	0.310	0.278											2.99
7007.97	0.464	0.443	0.421	0.398	0.374	0.348	0.319	0.288											3.06
7008.07	0.470	0.449	0.428	0.405	0.381	0.356	0.328	0.298											3.12
7008.17	0.476	0.456	0.435	0.412	0.389	0.364	0.336	0.307											3.17
7008.27	0.482	0.462	0.441	0.419	0.396	0.371	0.345	0.316											3.23
7008.37	0.488	0.468	0.447	0.425	0.403	0.379	0.353	0.325											3.29
7008.47	0.493	0.474	0.454	0.432	0.410	0.386	0.361	0.334											3.34

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Woodmen Hills Pond #1 South

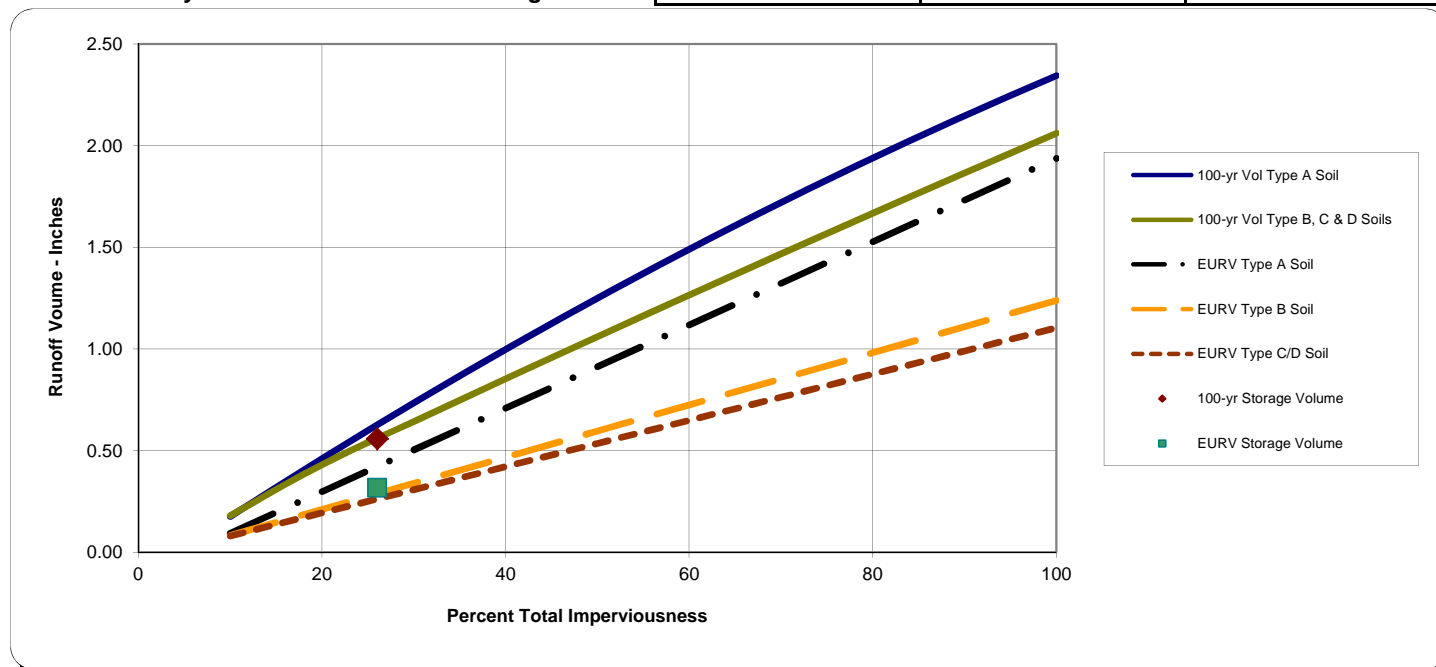
\* User input data shown in blue.

Area of Watershed (acres)	226.00	
Subwatershed Imperviousness	26.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	26.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	226.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.32	5.9642	Design Outlet to Empty EURV in 72 Hours
0.56	10.52	192.10

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV





## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Woodmen Hills Pond #2

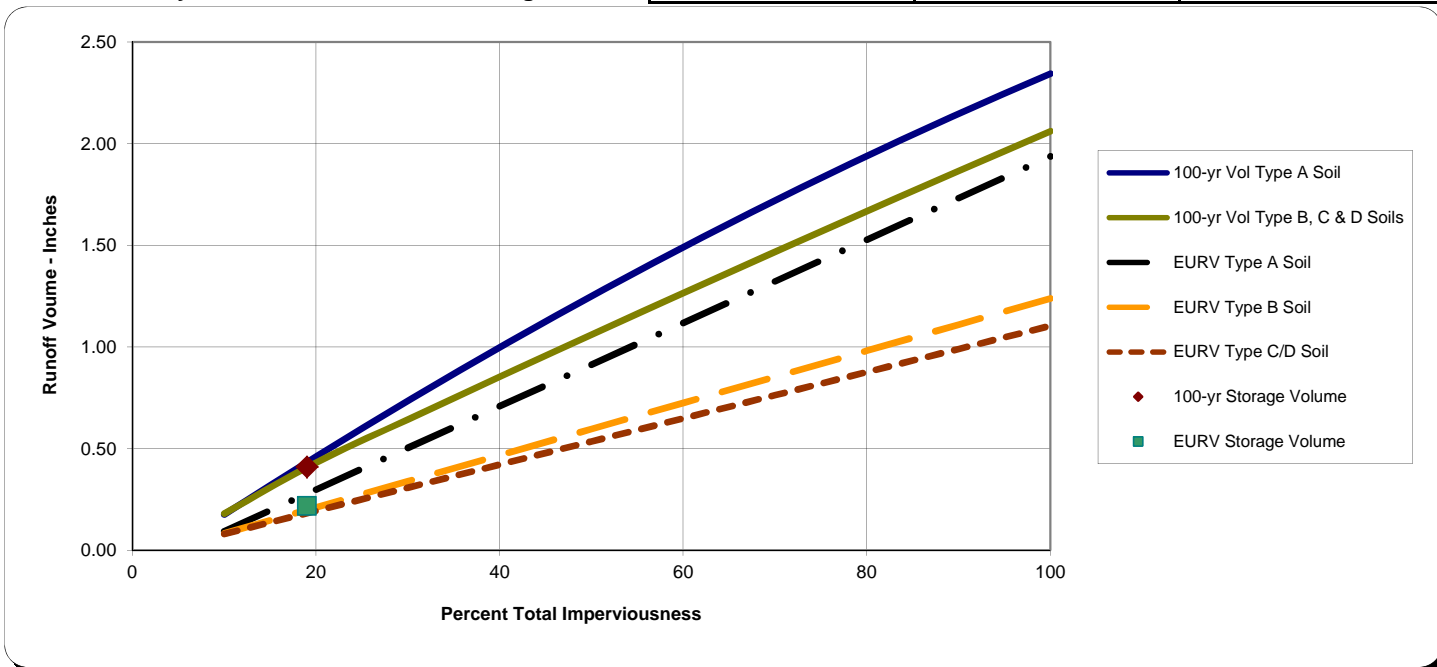
\* User input data shown in blue.

Area of Watershed (acres)	75.00	
Subwatershed Imperviousness	19.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	19.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	75.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.22	1.3611	Design Outlet to Empty EURV in 72 Hours
0.41	2.56	63.75

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

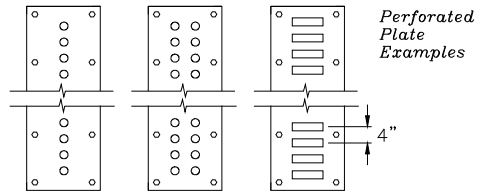
Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #2**

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #2**

**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p$  = 19.0 percent  
 Catchment Area,  $A_c$  = 75.000 acres  
 Depth at WQCV outlet above lowest perforation,  $H$  = 12 inches  
 Vertical distance between rows,  $h$  = 4.00 inches  
 Number of rows,  $N_L$  = 3  
 Orifice discharge coefficient,  $C_o$  = 0.65

Diameter of holes,  $D$  = [ ] in.  
 Number of holes per row,  $N$  = [ ]  
 OR  
 Height of slot,  $H$  = 2.00 in.  
 Width of slot,  $W$  = 5.78 in.

Time to Drain the Pond = 72 hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**

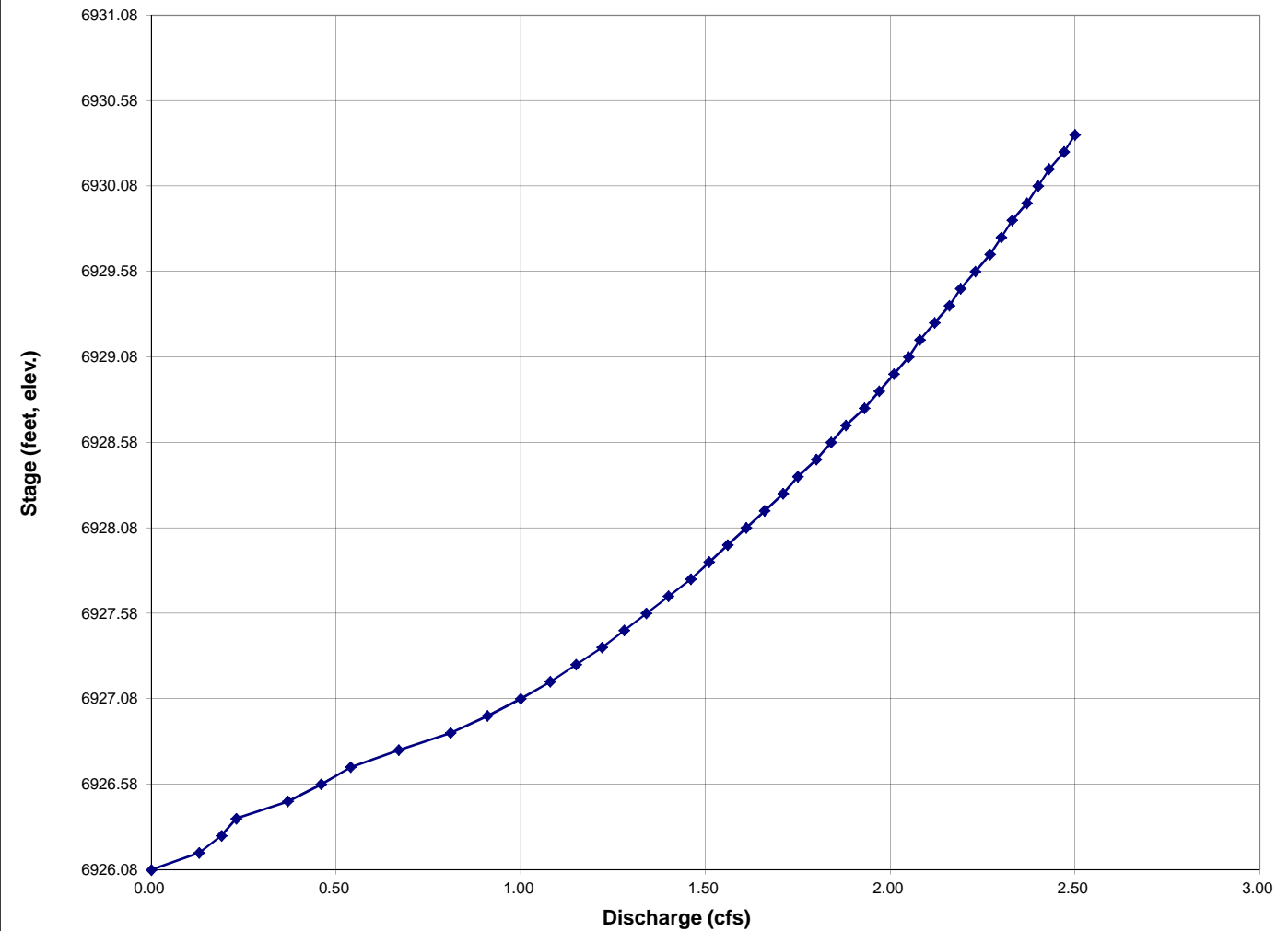


**Outlet Design Information (Output):**  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.218 watershed inches  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 1.361 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 11.55 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 11.55 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.080 square feet

**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6926.08	6926.42	6926.75																
	Collection Capacity for Each Row of Holes in cfs																		
6926.08	0.000	0.000	0.000																0.00
6926.18	0.130	0.000	0.000																0.13
6926.28	0.186	0.000	0.000																0.19
6926.38	0.228	0.000	0.000																0.23
6926.48	0.264	0.102	0.000																0.37
6926.58	0.295	0.167	0.000																0.46
6926.68	0.323	0.213	0.000																0.54
6926.78	0.349	0.251	0.072																0.67
6926.88	0.374	0.284	0.151																0.81
6926.98	0.396	0.313	0.201																0.91
6927.08	0.418	0.340	0.240																1.00
6927.18	0.438	0.365	0.274																1.08
6927.28	0.458	0.388	0.305																1.15
6927.38	0.477	0.410	0.332																1.22
6927.48	0.495	0.431	0.357																1.28
6927.58	0.512	0.451	0.381																1.34
6927.68	0.529	0.470	0.403																1.40
6927.78	0.545	0.488	0.425																1.46
6927.88	0.561	0.506	0.445																1.51
6927.98	0.576	0.523	0.464																1.56
6928.08	0.591	0.539	0.483																1.61
6928.18	0.606	0.555	0.500																1.66
6928.28	0.620	0.571	0.518																1.71
6928.38	0.634	0.586	0.534																1.75
6928.48	0.648	0.601	0.550																1.80
6928.58	0.661	0.615	0.566																1.84
6928.68	0.674	0.629	0.581																1.88
6928.78	0.687	0.643	0.596																1.93
6928.88	0.700	0.656	0.611																1.97
6928.98	0.712	0.669	0.625																2.01
6929.08	0.724	0.682	0.639																2.05
6929.18	0.736	0.695	0.652																2.08
6929.28	0.748	0.708	0.666																2.12
6929.38	0.760	0.720	0.679																2.16
6929.48	0.771	0.732	0.691																2.19
6929.58	0.782	0.744	0.704																2.23
6929.68	0.794	0.755	0.716																2.27
6929.78	0.804	0.767	0.728																2.30
6929.88	0.815	0.778	0.740																2.33
6929.98	0.826	0.789	0.752																2.37
6930.08	0.837	0.800	0.764																2.40
6930.18	0.847	0.811	0.775																2.43
6930.28	0.857	0.822	0.786																2.47
6930.38	0.867	0.833	0.797																2.50

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

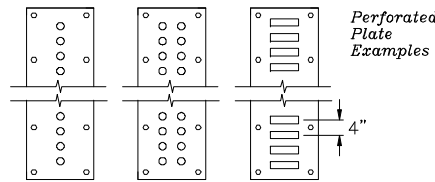
Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #3**

**WQCV Design Volume (Input):**

Catchment Imperviousness,  $I_p$  = 22.0 percent  
 Catchment Area, A = 183,000 acres  
 Depth at WQCV outlet above lowest perforation, H = 12 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, N<sub>L</sub> = 3  
 Orifice discharge coefficient, C<sub>d</sub> = 0.65

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H = 2.00 in.  
 Width of slot, W = 16.96 in.

Time to Drain the Pond = 72 hours  
 Drain Time Other than USDCM-recommended 40-hour has been selected.



**Outlet Design Information (Output):**

Water Quality Capture Volume (1.0 \* (0.91 \* I<sup>0.3</sup> - 1.19 \* I<sup>0.2</sup> + 0.78 \* I)), WQCV = 0.124 watershed inches  
 Water Quality Capture Volume (WQCV) = 1.886 acre-feet  
**Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 2.264 acre-feet**  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> = 16.05 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 33.93 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 0.236 square feet

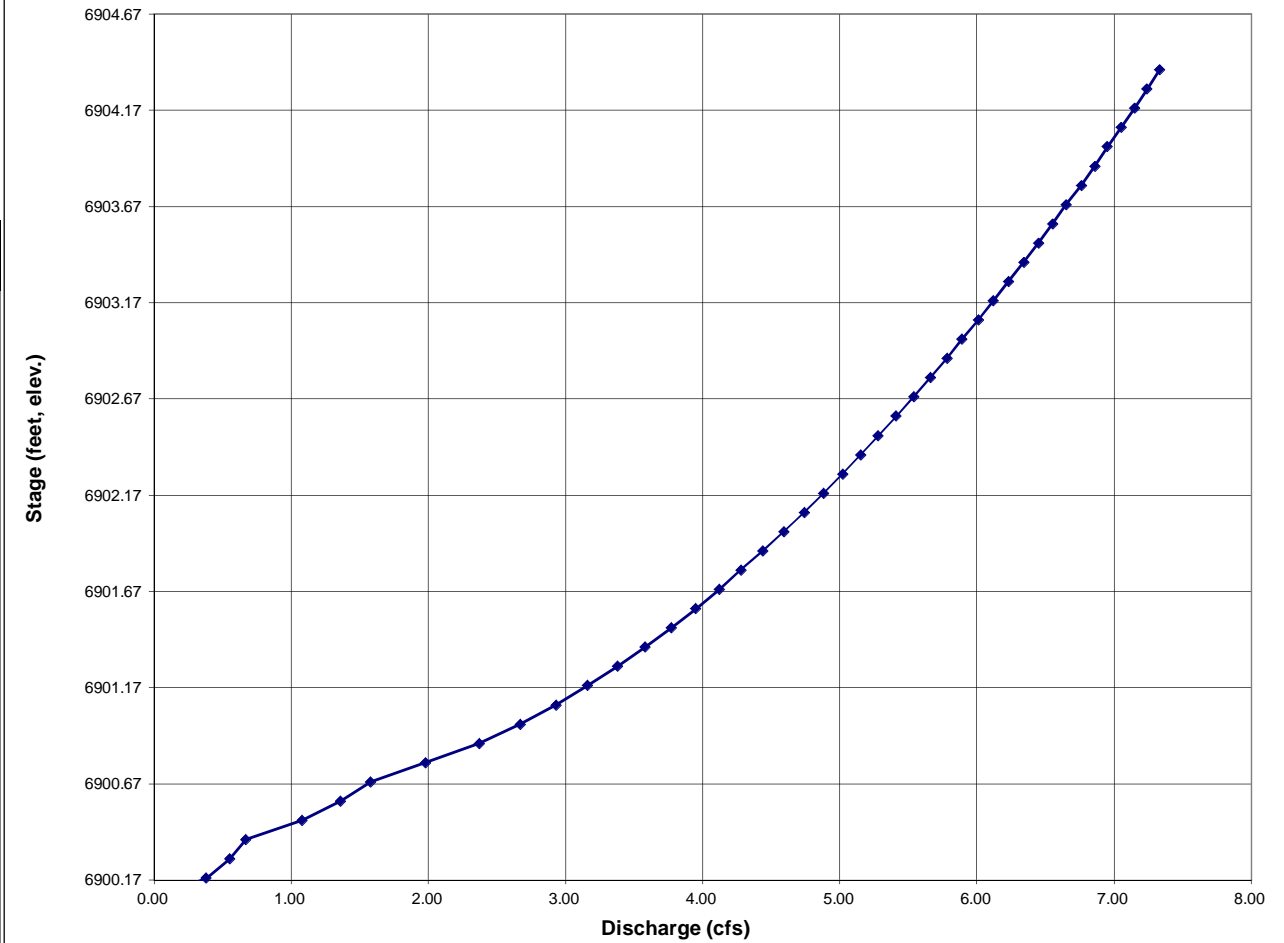
**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6900.08	6900.42	6900.75																
	Collection Capacity for Each Row of Holes in cfs																		
6900.08	0.000	0.000	0.000																0.00
6900.18	0.383	0.000	0.000																0.38
6900.28	0.545	0.000	0.000																0.55
6900.38	0.670	0.000	0.000																0.67
6900.48	0.774	0.301	0.000																1.08
6900.58	0.866	0.492	0.000																1.36
6900.68	0.950	0.627	0.000																1.58
6900.78	1.026	0.737	0.213																1.98
6900.88	1.097	0.834	0.443																2.37
6900.98	1.164	0.920	0.589																2.67
6901.08	1.227	0.998	0.706																2.93
6901.18	1.287	1.071	0.806																3.16
6901.28	1.345	1.140	0.895																3.38
6901.38	1.400	1.204	0.976																3.58
6901.48	1.453	1.265	1.050																3.77
6901.58	1.504	1.324	1.120																3.95
6901.68	1.553	1.380	1.185																4.12
6901.78	1.601	1.433	1.247																4.28
6901.88	1.648	1.485	1.306																4.44
6901.98	1.693	1.535	1.363																4.59
6902.08	1.737	1.583	1.417																4.74
6902.18	1.780	1.630	1.470																4.88
6902.28	1.822	1.676	1.520																5.02
6902.38	1.863	1.721	1.569																5.15
6902.48	1.903	1.764	1.617																5.28
6902.58	1.942	1.806	1.663																5.41
6902.68	1.981	1.848	1.707																5.54
6902.78	2.018	1.888	1.751																5.66
6902.88	2.055	1.928	1.794																5.78
6902.98	2.092	1.966	1.835																5.89
6903.08	2.128	2.004	1.876																6.01
6903.18	2.163	2.042	1.916																6.12
6903.28	2.197	2.078	1.955																6.23
6903.38	2.232	2.114	1.993																6.34
6903.48	2.265	2.150	2.031																6.45
6903.58	2.298	2.185	2.068																6.55
6903.68	2.331	2.219	2.104																6.65
6903.78	2.363	2.253	2.139																6.76
6903.88	2.395	2.286	2.174																6.86
6903.98	2.426	2.319	2.209																6.95
6904.08	2.457	2.351	2.243																7.05
6904.18	2.488	2.383	2.276																7.15
6904.28	2.518	2.415	2.309																7.24
6904.38	2.548	2.446	2.342																7.33

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #3**

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

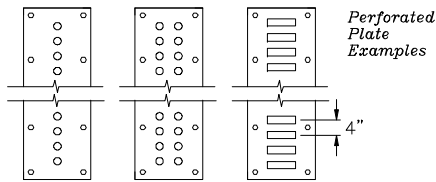
Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #4**

WQCV Design Volume (Input):

Catchment Imperviousness, I<sub>p</sub> = **34.0** percent  
 Catchment Area, A = **346,000** acres  
 Depth at WQCV outlet above lowest perforation, H = **20** inches  
 Vertical distance between rows, h = **4.00** inches  
 Number of rows, N<sub>L</sub> = **5**  
 Orifice discharge coefficient, C<sub>o</sub> = **0.65**

Diameter of holes, D = **1.00** in.  
 Number of holes per row, N = **OR**  
 OR  
 Height of slot, H = **2.00** in.  
 Width of slot, W = **25.77** in.

Time to Drain the Pond = **40** hours  
**Water Quality Capture Volume Method Selected (40-Hour Release)**



Outlet Design Information (Output):

Water Quality Capture Volume (1.0 \* (0.91 \* I<sub>p</sub><sup>3</sup> - 1.19 \* I<sub>p</sub><sup>2</sup> + 0.78 \* I<sub>p</sub>)), WQCV = **0.163** watershed inches  
 Water Quality Capture Volume (WQCV) = **4.711** acre-feet  
**Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 5.654** acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> = **51.54** square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = **51.54** square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = **0.358** square feet

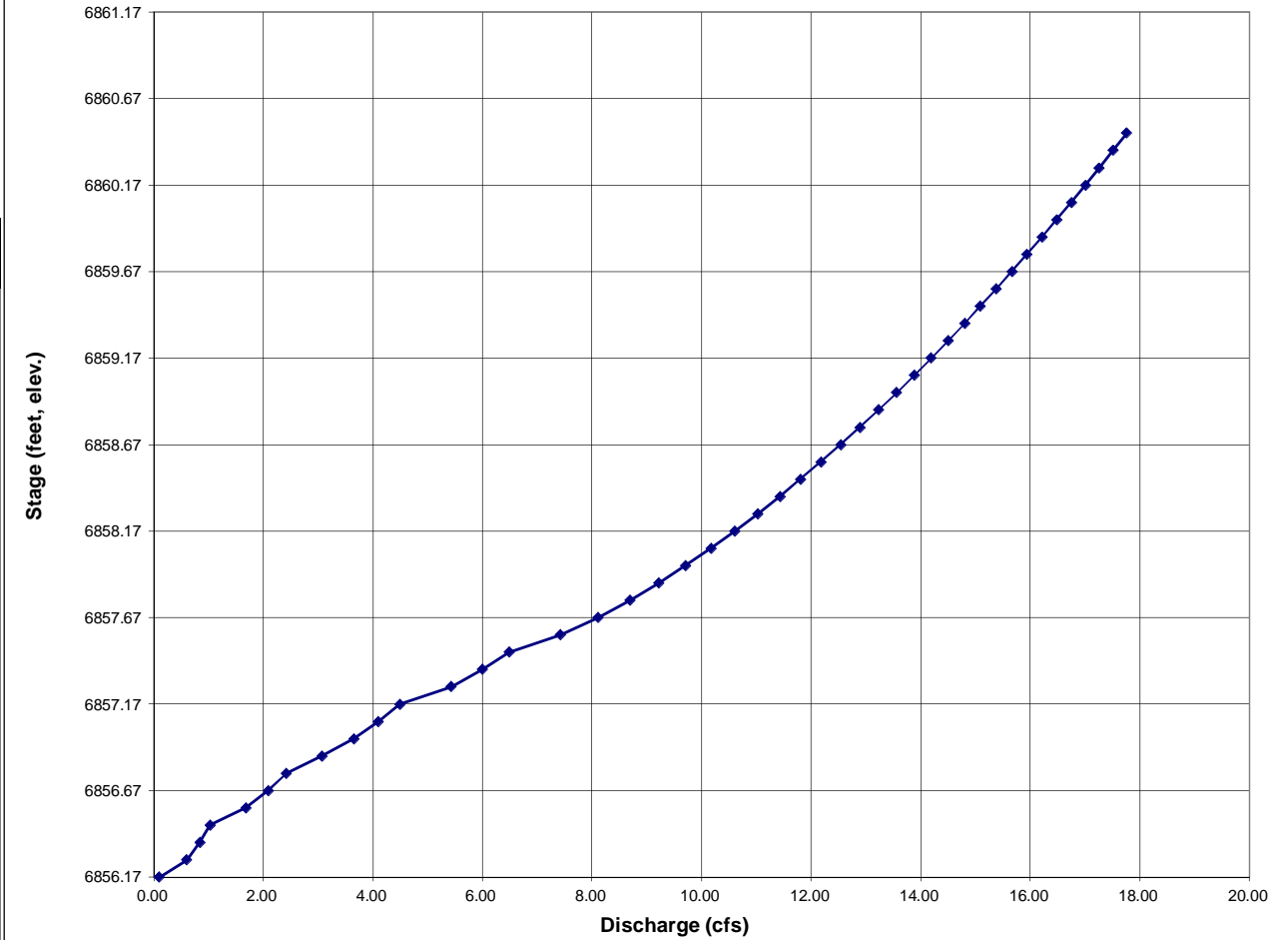
Calculation of Collection Capacity:

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow	
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18		
	6856.17	6856.50	6856.83	6857.17	6857.50															
		Collection Capacity for Each Row of Holes in cfs																		
6856.17	0.102	0.000	0.000	0.000	0.000															
6856.27	0.599	0.000	0.000	0.000	0.000															
6856.37	0.841	0.000	0.000	0.000	0.000															
6856.47	1.028	0.000	0.000	0.000	0.000															
6856.57	1.185	0.494	0.000	0.000	0.000															
6856.67	1.324	0.770	0.000	0.000	0.000															
6856.77	1.450	0.970	0.000	0.000	0.000															
6856.87	1.565	1.136	0.373	0.000	0.000															
6856.97	1.673	1.280	0.698	0.000	0.000															
6857.07	1.774	1.409	0.915	0.000	0.000															
6857.17	1.870	1.528	1.089	0.000	0.000															
6857.27	1.961	1.638	1.238	0.590	0.000															
6857.37	2.048	1.741	1.372	0.835	0.000															
6857.47	2.131	1.839	1.493	1.022	0.000															
6857.57	2.211	1.931	1.606	1.181	0.494															
6857.67	2.289	2.019	1.711	1.320	0.770															
6857.77	2.364	2.104	1.810	1.446	0.970															
6857.87	2.436	2.185	1.904	1.562	1.136															
6857.97	2.507	2.263	1.993	1.670	1.280															
6858.07	2.575	2.339	2.079	1.771	1.409															
6858.17	2.642	2.412	2.161	1.867	1.528															
6858.27	2.707	2.484	2.240	1.958	1.638															
6858.37	2.771	2.553	2.317	2.045	1.741															
6858.47	2.833	2.620	2.391	2.128	1.839															
6858.57	2.894	2.686	2.462	2.209	1.931															
6858.67	2.953	2.750	2.532	2.286	2.019															
6858.77	3.012	2.813	2.600	2.361	2.104															
6858.87	3.069	2.874	2.666	2.434	2.185															
6858.97	3.125	2.934	2.731	2.505	2.263															
6859.07	3.181	2.993	2.794	2.573	2.339															
6859.17	3.235	3.050	2.856	2.640	2.412															
6859.27	3.288	3.107	2.916	2.705	2.484															
6859.37	3.341	3.163	2.975	2.769	2.553															
6859.47	3.393	3.217	3.033	2.831	2.620															
6859.57	3.444	3.271	3.090	2.892	2.686															
6859.67	3.494	3.324	3.146	2.952	2.750															
6859.77	3.544	3.376	3.201	3.010	2.813															
6859.87	3.592	3.427	3.255	3.067	2.874															
6859.97	3.641	3.477	3.308	3.124	2.934															
6860.07	3.688	3.527	3.360	3.179	2.993															
6860.17	3.735	3.576	3.412	3.233	3.050															
6860.27	3.781	3.625	3.462	3.287	3.107															
6860.37	3.827	3.672	3.512	3.339	3.163															
6860.47	3.872	3.720	3.562	3.391	3.217															

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #4**

STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Woodmen Hills Pond #5

\* User input data shown in blue.

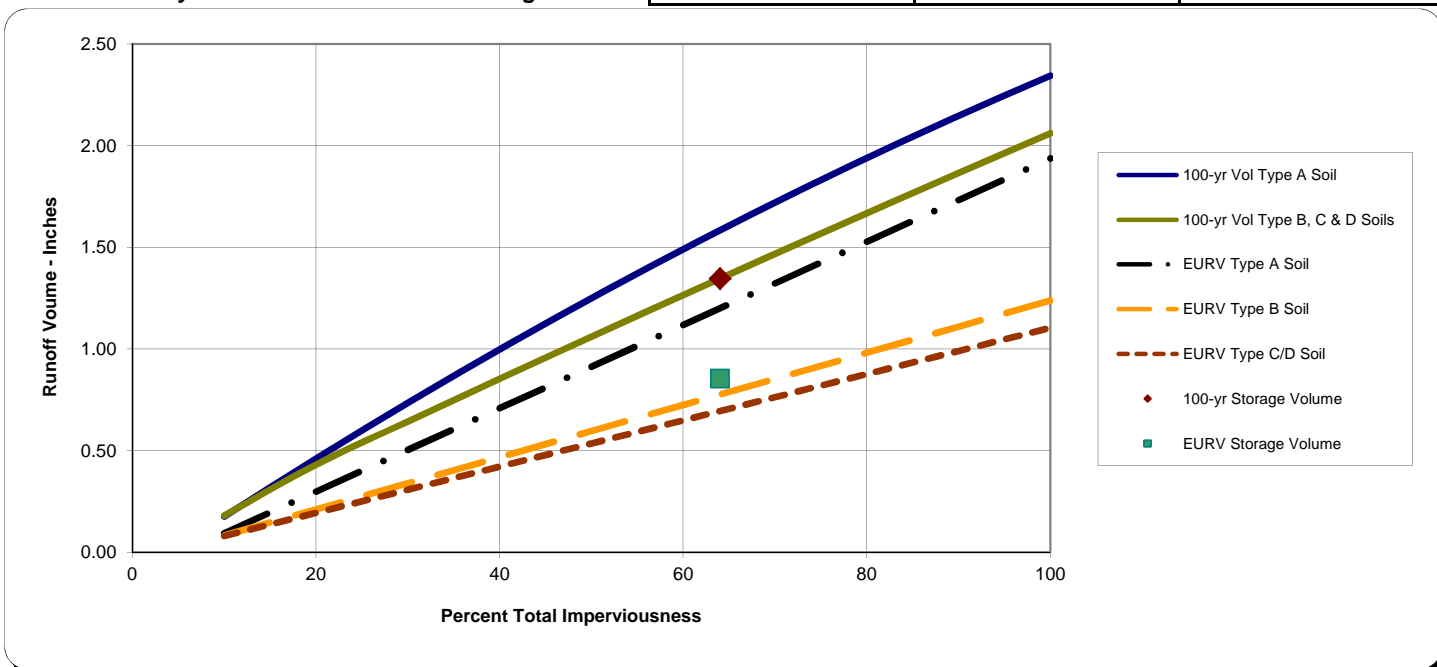
Area of Watershed (acres)	28.00	
Subwatershed Imperviousness	64.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	64.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	28.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.85	1.9918	Design Outlet to Empty EURV in 72 Hours
1.35	3.14	23.80

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Paint Brush Hills Pond A

\* User input data shown in blue.

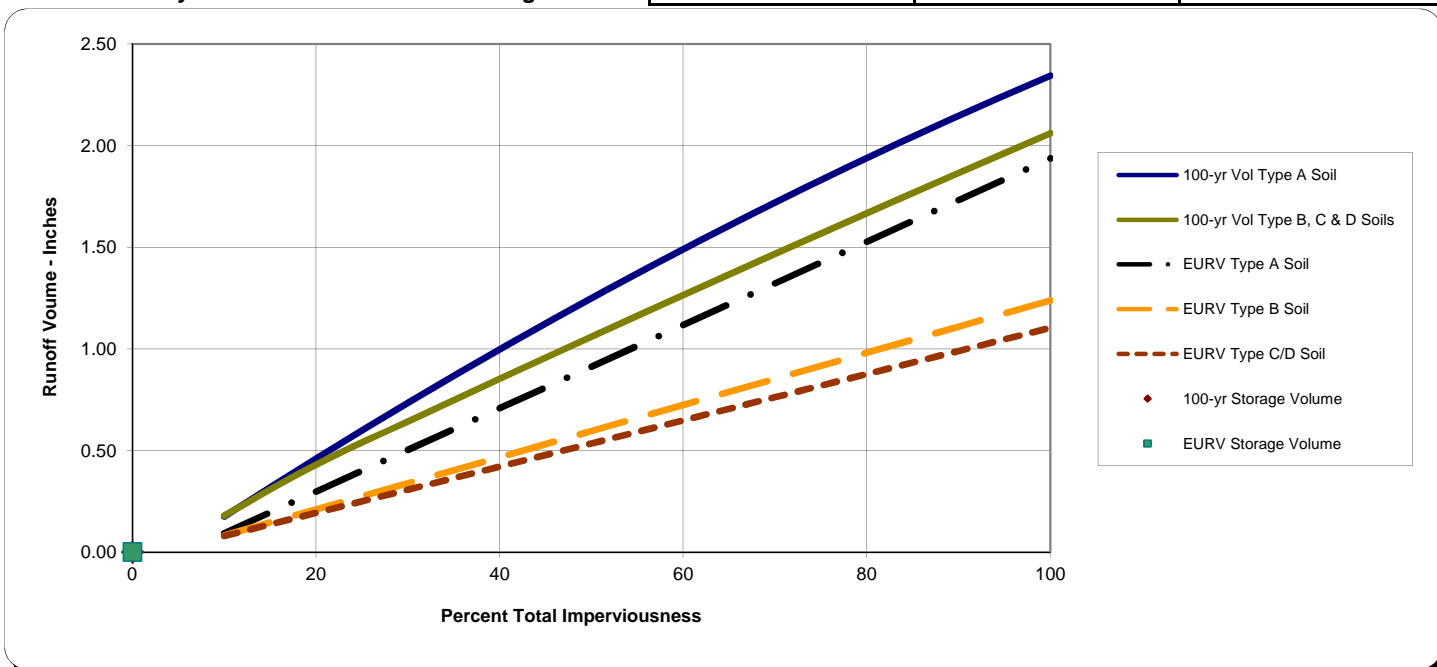
Area of Watershed (acres)		
Subwatershed Imperviousness		
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>		
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B		0.0
Type C or D		0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
0	0.0	0.0000

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.00	0.0000	Design Outlet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV <sup>5</sup>	0.00	0.00

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
Basin ID: **Paint Brush Hills Pond A**

Project: **Falcon DBPS**  
Basin ID: **Paint Brush Hills Pond A**

**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p = 30.0$  percent  
 Catchment Area,  $A = 65.000$  acres  
 Diameter of holes,  $D =$  in.  
 Number of holes per row,  $N =$   
 OR  
 Diameter of holes,  $D =$  in.  
 Number of holes per row,  $N =$   
 Time to Drain the Pond = **40** hours  
**Water Quality Capture Volume Method Selected (40-Hour Release)**

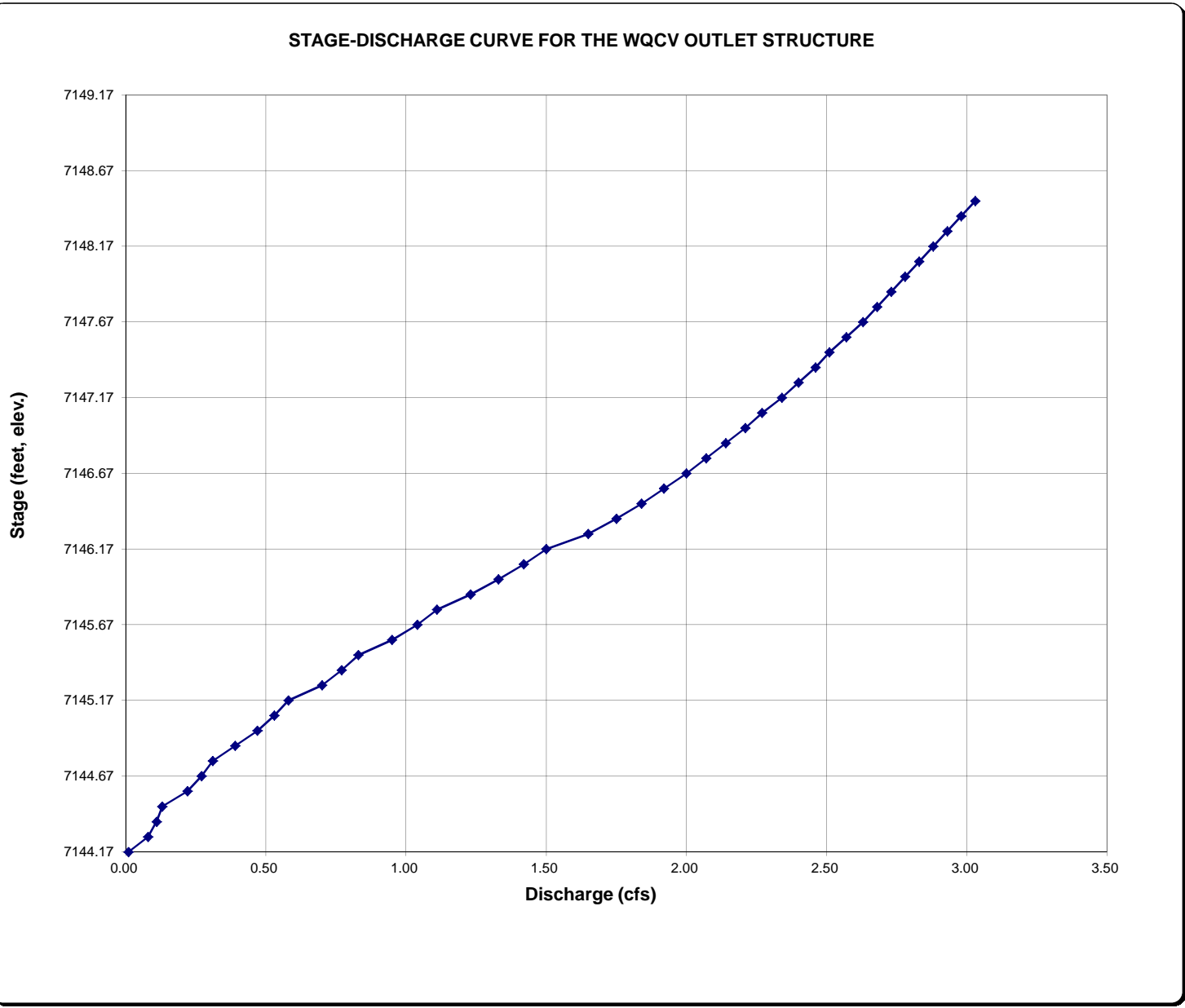
Depth at WQCV outlet above lowest perforation,  $H = 28$  inches  
 Vertical distance between rows,  $h = 4.00$  inches  
 Number of rows,  $N_L = 7$   
 Orifice discharge coefficient,  $C_o = 0.65$   
 Height of slot,  $H_s = 2.00$  in.  
 Width of slot,  $W_s = 3.30$  in.

**Outlet Design Information (Output):**  
 Water Quality Capture Volume ( $1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I)$ ), WQCV = 0.151 watershed inches  
 Water Quality Capture Volume (WQCV) = 0.820 acre-feet  
 Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 0.985 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o = 6.61$  square inches  
 Total opening area at each row based on user-input above,  $A_o = 6.61$  square inches  
 Total opening area at each row based on user-input above,  $A_o = 0.046$  square feet

**Calculation of Collection Capacity:**

Perforated Plate Examples

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	7144.17	7144.50	7144.83	7145.17	7145.50	7145.83	7146.17												
	Collection Capacity for Each Row of Holes in cfs																		
7144.17	0.013	0.000	0.000	0.000	0.000	0.000	0.000												0.01
7144.27	0.077	0.000	0.000	0.000	0.000	0.000	0.000												0.08
7144.37	0.108	0.000	0.000	0.000	0.000	0.000	0.000												0.11
7144.47	0.132	0.000	0.000	0.000	0.000	0.000	0.000												0.13
7144.57	0.152	0.063	0.000	0.000	0.000	0.000	0.000												0.22
7144.67	0.170	0.099	0.000	0.000	0.000	0.000	0.000												0.27
7144.77	0.186	0.124	0.000	0.000	0.000	0.000	0.000												0.31
7144.87	0.201	0.146	0.048	0.000	0.000	0.000	0.000												0.39
7144.97	0.214	0.164	0.090	0.000	0.000	0.000	0.000												0.47
7145.07	0.227	0.181	0.117	0.000	0.000	0.000	0.000												0.53
7145.17	0.240	0.196	0.140	0.000	0.000	0.000	0.000												0.58
7145.27	0.251	0.210	0.159	0.076	0.000	0.000	0.000												0.70
7145.37	0.262	0.223	0.176	0.107	0.000	0.000	0.000												0.77
7145.47	0.273	0.236	0.191	0.131	0.000	0.000	0.000												0.83
7145.57	0.283	0.248	0.206	0.151	0.063	0.000	0.000												0.95
7145.67	0.293	0.259	0.219	0.169	0.099	0.000	0.000												1.04
7145.77	0.303	0.270	0.232	0.185	0.124	0.000	0.000												1.11
7145.87	0.312	0.280	0.244	0.200	0.146	0.048	0.000												1.23
7145.97	0.321	0.290	0.255	0.214	0.164	0.090	0.000												1.33
7146.07	0.330	0.300	0.266	0.227	0.181	0.117	0.000												1.42
7146.17	0.339	0.309	0.277	0.239	0.196	0.140	0.000												1.50
7146.27	0.347	0.318	0.287	0.251	0.210	0.159	0.076												1.65
7146.37	0.355	0.327	0.297	0.262	0.223	0.176	0.107												1.75
7146.47	0.363	0.336	0.306	0.273	0.236	0.191	0.131												1.84
7146.57	0.371	0.344	0.316	0.283	0.248	0.206	0.151												1.92
7146.67	0.379	0.352	0.325	0.293	0.259	0.219	0.169												2.00
7146.77	0.386	0.361	0.333	0.303	0.270	0.232	0.185												2.07
7146.87	0.393	0.368	0.342	0.312	0.280	0.244	0.200												2.14
7146.97	0.401	0.376	0.350	0.321	0.290	0.255	0.214												2.21
7147.07	0.408	0.384	0.358	0.330	0.300	0.266	0.227												2.27
7147.17	0.415	0.391	0.366	0.338	0.309	0.277	0.239												2.34
7147.27	0.422	0.398	0.374	0.347	0.318	0.287	0.251												2.40
7147.37	0.428	0.405	0.381	0.355	0.327	0.297	0.262												2.46
7147.47	0.435	0.412	0.389	0.363	0.336	0.306	0.273												2.51
7147.57	0.441	0.419	0.396	0.371	0.344	0.316	0.283												2.57
7147.67	0.448	0.426	0.403	0.378	0.352	0.325	0.293												2.63
7147.77	0.454	0.433	0.410	0.386	0.361	0.333	0.303												2.68
7147.87	0.460	0.439	0.417	0.393	0.368	0.342	0.312												2.73
7147.97	0.467	0.446	0.424	0.400	0.376	0.350	0.321												2.78
7148.07	0.473	0.452	0.431	0.407	0.384	0.358	0.330												2.83
7148.17	0.479	0.458	0.437	0.414	0.391	0.366	0.338												2.88
7148.27	0.485	0.465	0.444	0.421	0.398	0.374	0.347												2.93
7148.37	0.491	0.471	0.450	0.428	0.405	0.381	0.355												2.98
7148.47	0.496	0.477	0.457	0.435	0.412	0.389	0.363												3.03





## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Paint Brush Hills Pond B1 & B2

\* User input data shown in blue.

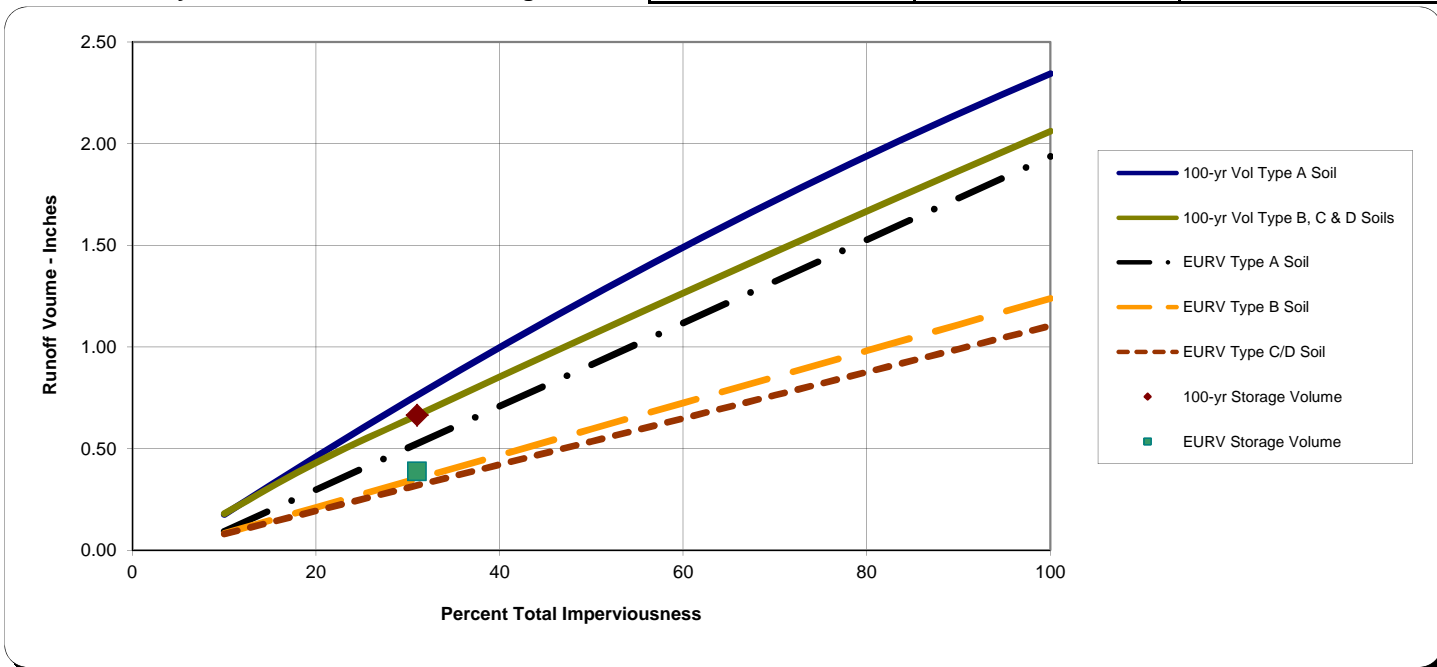
Area of Watershed (acres)	231.00	
Subwatershed Imperviousness	31.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	31.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	231.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.39	7.4563	Design Outlet to Empty EURV in 72 Hours
0.66	12.79	196.35

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Paint Brush Hills Pond C

\* User input data shown in blue.

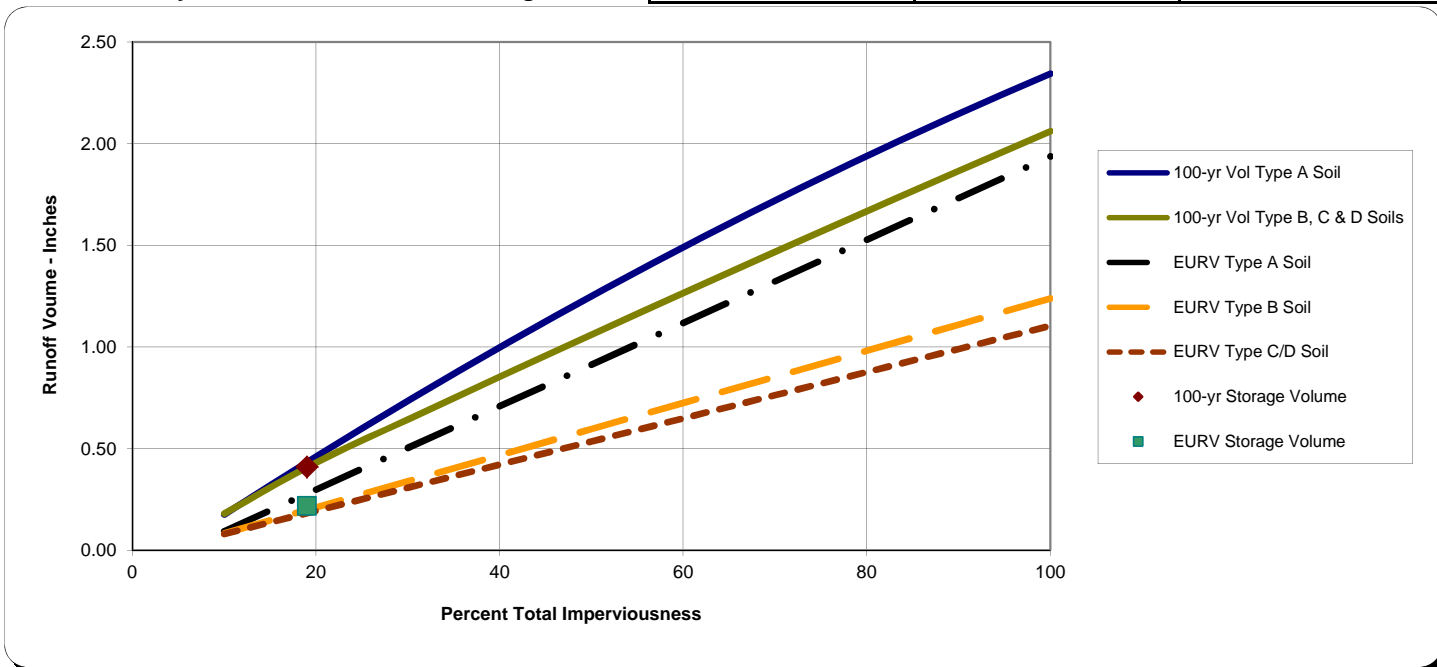
Area of Watershed (acres)	120.00	
Subwatershed Imperviousness	19.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	19.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	120.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.22	2.1777	Design Outlet to Empty EURV in 72 Hours
0.41	4.10	102.00

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

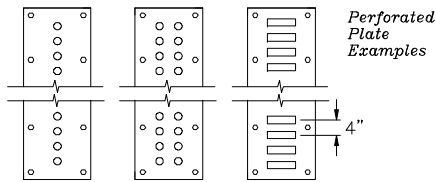
Project: **Falcon DBPS**  
 Basin ID: **Regional Pond MN**

**WQCV Design Volume (Input):**

Catchment Imperviousness,  $I_p$  = 28.0 percent  
 Catchment Area, A = 169,000 acres  
 Depth at WQCV outlet above lowest perforation, H = 16 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, N<sub>L</sub> = 4  
 Orifice discharge coefficient, C<sub>o</sub> = 0.65

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H = 2.00 in.  
 Width of slot, W = 12.98 in.

Time to Drain the Pond = 40 hours  
**Water Quality Capture Volume Method Selected (40-Hour Release)**



**Outlet Design Information (Output):**

Water Quality Capture Volume (1.0 \* (0.91 \* I<sub>p</sub><sup>3</sup> - 1.19 \* I<sub>p</sub><sup>2</sup> + 0.78 \* I<sub>p</sub>)), WQCV = 0.145 watershed inches  
 Water Quality Capture Volume (WQCV) = 2.043 acre-feet  
**Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 2.452 acre-feet**  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows), A<sub>o</sub> = 25.95 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 25.95 square inches  
 Total opening area at each row based on user-input above, A<sub>o</sub> = 0.180 square feet

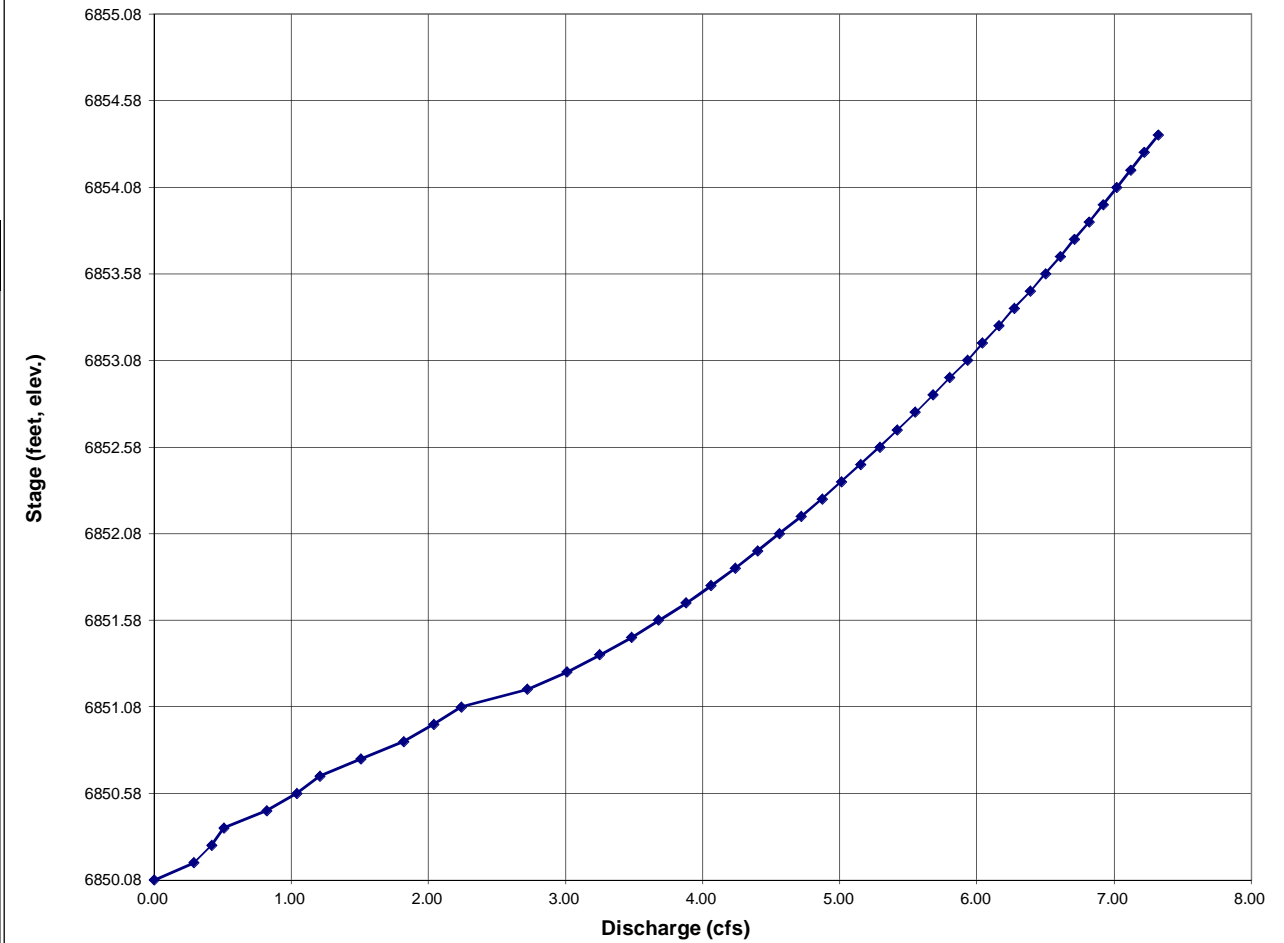
**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6850.08	6850.42	6850.75	6851.08															
	Collection Capacity for Each Row of Holes in cfs																		
6850.08	0.000	0.000	0.000	0.000															
6850.18	0.293	0.000	0.000	0.000															
6850.28	0.417	0.000	0.000	0.000															
6850.38	0.512	0.000	0.000	0.000															
6850.48	0.592	0.230	0.000	0.000															
6850.58	0.663	0.376	0.000	0.000															
6850.68	0.726	0.479	0.000	0.000															
6850.78	0.785	0.564	0.163	0.000															
6850.88	0.839	0.638	0.339	0.000															
6850.98	0.890	0.704	0.451	0.000															
6851.08	0.939	0.764	0.540	0.000															
6851.18	0.985	0.820	0.616	0.297															
6851.28	1.029	0.872	0.684	0.420															
6851.38	1.071	0.921	0.746	0.515															
6851.48	1.111	0.968	0.803	0.595															
6851.58	1.150	1.013	0.856	0.665															
6851.68	1.188	1.055	0.907	0.728															
6851.78	1.225	1.096	0.954	0.787															
6851.88	1.260	1.136	0.999	0.841															
6851.98	1.295	1.174	1.043	0.892															
6852.08	1.329	1.211	1.084	0.940															
6852.18	1.361	1.247	1.124	0.986															
6852.28	1.393	1.282	1.163	1.030															
6852.38	1.425	1.316	1.200	1.072															
6852.48	1.456	1.349	1.237	1.112															
6852.58	1.486	1.382	1.272	1.151															
6852.68	1.515	1.413	1.306	1.189															
6852.78	1.544	1.444	1.339	1.226															
6852.88	1.572	1.475	1.372	1.261															
6852.98	1.600	1.504	1.404	1.296															
6853.08	1.628	1.533	1.435	1.330															
6853.18	1.654	1.562	1.465	1.362															
6853.28	1.681	1.590	1.495	1.394															
6853.38	1.707	1.617	1.525	1.426															
6853.48	1.733	1.645	1.553	1.456															
6853.58	1.758	1.671	1.582	1.486															
6853.68	1.783	1.697	1.609	1.516															
6853.78	1.808	1.723	1.636	1.545															
6853.88	1.832	1.749	1.663	1.573															
6853.98	1.856	1.774	1.690	1.601															
6854.08	1.880	1.799	1.716	1.628															
6854.18	1.903	1.823	1.741	1.655															
6854.28	1.926	1.847	1.766	1.682															
6854.38	1.949	1.871	1.791	1.708															

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **Regional Pond MN**

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS  
 Basin ID: Regional Pond R1

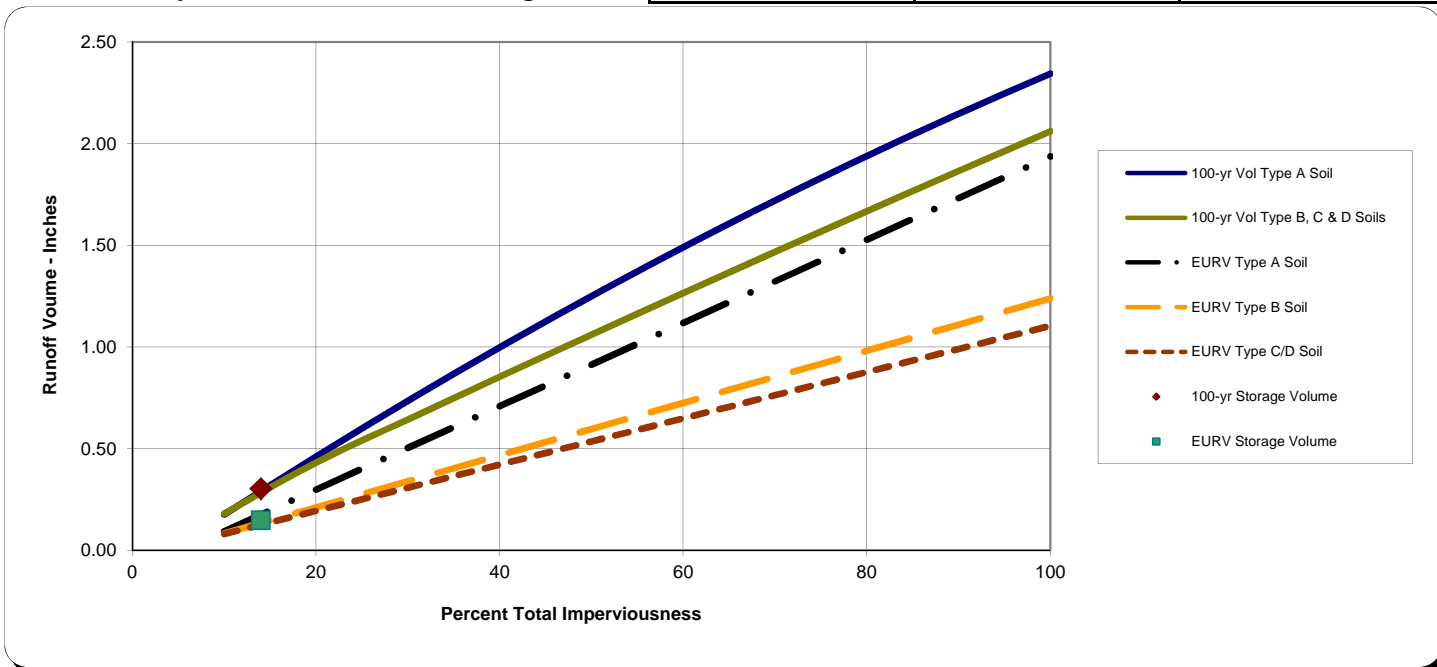
\* User input data shown in blue.

Area of Watershed (acres)	548.00	
Subwatershed Imperviousness	14.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	14.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	548.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.15	6.7184	Design Outlet to Empty EURV in 72 Hours
0.30	13.83	465.80

Excess Urban Runoff Volume<sup>4</sup>  
 100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

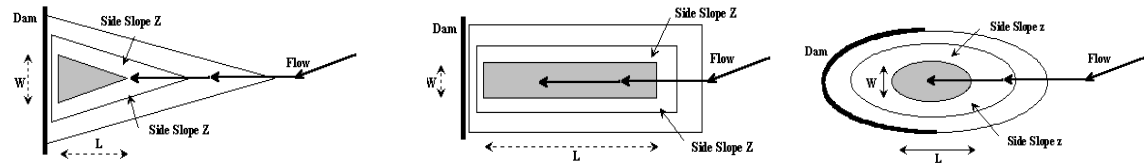


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Regional Pond R1

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 280.00 ft  
Length of Pond Bottom, L = 340.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

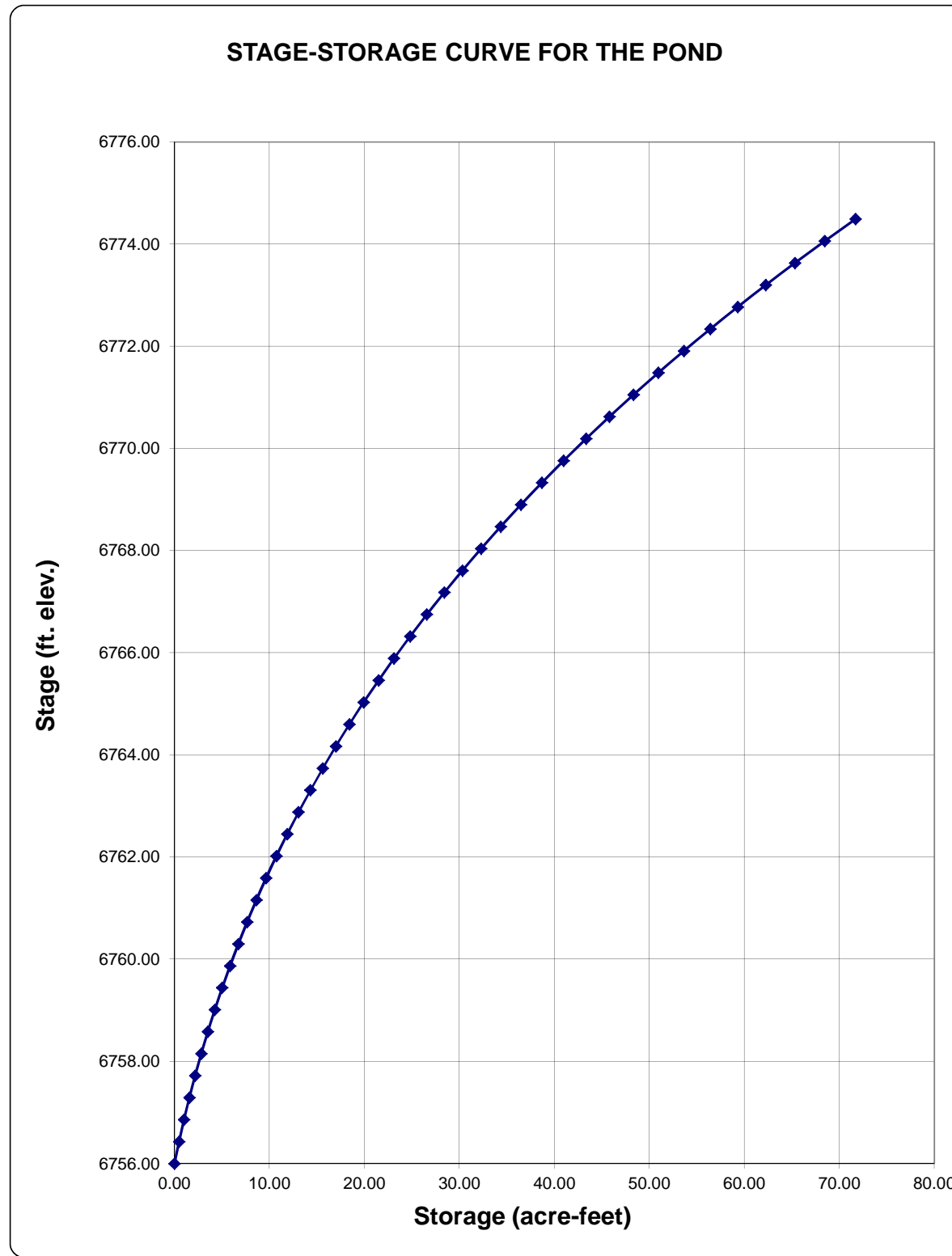
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 11.343 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 6.718 MINOR 13.832 MAJOR acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) Below El. (input)	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6756.00		280.00	340.00	47,600.0			1.093	0.000	
	6756.43	10.00	290.72	353.01	51,313.5		21,266	1.178	0.488	
	6756.86	10.00	301.43	366.03	55,166.5		44,160	1.266	1.014	
	6757.29	10.00	312.15	379.04	59,158.9		68,740	1.358	1.578	
	6757.72	10.00	322.87	392.05	63,290.9		95,066	1.453	2.182	
	6758.15	10.00	333.59	405.07	67,562.2		123,200	1.551	2.828	
	6758.58	10.00	344.30	418.08	71,973.1		153,200	1.652	3.517	
	6759.01	10.00	355.02	431.09	76,523.4		185,127	1.757	4.250	
	6759.44	10.00	365.74	444.11	81,213.2		219,040	1.864	5.028	
	6759.87	10.00	376.45	457.12	86,042.4		255,000	1.975	5.854	
EURV	6760.30	10.00	387.17	470.14	91,011.1		293,066	2.089	6.728	
	6760.73	10.00	397.89	483.15	96,119.3		333,299	2.207	7.652	
	6761.16	10.00	408.60	496.16	101,366.9		375,759	2.327	8.626	
	6761.59	10.00	419.32	509.18	106,754.0		420,505	2.451	9.653	
	6762.02	10.00	430.04	522.19	112,280.6		467,597	2.578	10.735	
	6762.45	10.00	440.76	535.20	117,946.6		517,096	2.708	11.871	
	6762.88	10.00	451.47	548.22	123,752.1		569,061	2.841	13.064	
	6763.31	10.00	462.19	561.23	129,697.1		623,553	2.977	14.315	
	6763.74	10.00	472.91	574.24	135,781.5		680,631	3.117	15.625	
	6764.17	10.00	483.62	587.26	142,005.4		740,355	3.260	16.996	
	6764.60	10.00	494.34	600.27	148,368.8		802,786	3.406	18.429	
	6765.03	10.00	505.06	613.28	154,871.6		867,982	3.555	19.926	
	6765.46	10.00	515.77	626.30	161,513.9		936,005	3.708	21.488	
	6765.89	10.00	526.49	639.31	168,295.7		1,006,914	3.864	23.116	
100-yr	6766.32	10.00	537.21	652.32	175,216.9		1,080,769	4.022	24.811	
	6766.75	10.00	547.93	665.34	182,277.6		1,157,631	4.185	26.576	
	6767.18	10.00	558.64	678.35	189,477.8		1,237,558	4.350	28.410	
	6767.61	10.00	569.36	691.36	196,817.4		1,320,612	4.518	30.317	
Spillway	6768.04	10.00	580.08	704.38	204,296.5		1,406,851	4.690	32.297	
	6768.47	10.00	590.79	717.39	211,915.0		1,496,337	4.865	34.351	
	6768.90	10.00	601.51	730.41	219,673.1		1,589,128	5.043	36.481	
	6769.33	10.00	612.23	743.42	227,570.5		1,685,285	5.224	38.689	
	6769.76	10.00	622.94	756.43	235,607.5		1,784,869	5.409	40.975	
	6770.19	10.00	633.66	769.45	243,783.9		1,887,938	5.597	43.341	
	6770.62	10.00	644.38	782.46	252,099.8		1,994,553	5.787	45.789	
	6771.05	10.00	655.10	795.47	260,555.2		2,104,774	5.982	48.319	
	6771.48	10.00	665.81	808.49	269,150.0		2,218,660	6.179	50.933	
	6771.91	10.00	676.53	821.50	277,884.3		2,336,273	6.379	53.633	
	6772.34	10.00	687.25	834.51	286,758.0		2,457,671	6.583	56.420	
	6772.77	10.00	697.96	847.53	295,771.2		2,582,914	6.790	59.296	
	6773.20	10.00	708.68	860.54	304,923.9		2,712,064	7.000	62.260	
	6773.63	10.00	719.40	873.55	314,216.0		2,845,179	7.213	65.316	
	6774.06	10.00	730.11	886.57	323,647.7		2,982,320	7.430	68.465	
	6774.49	10.00	740.83	899.58	333,218.7		3,123,546	7.650	71.707	





## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

**Project:** Falcon DBPS  
**Basin ID:** Regional Pond R2

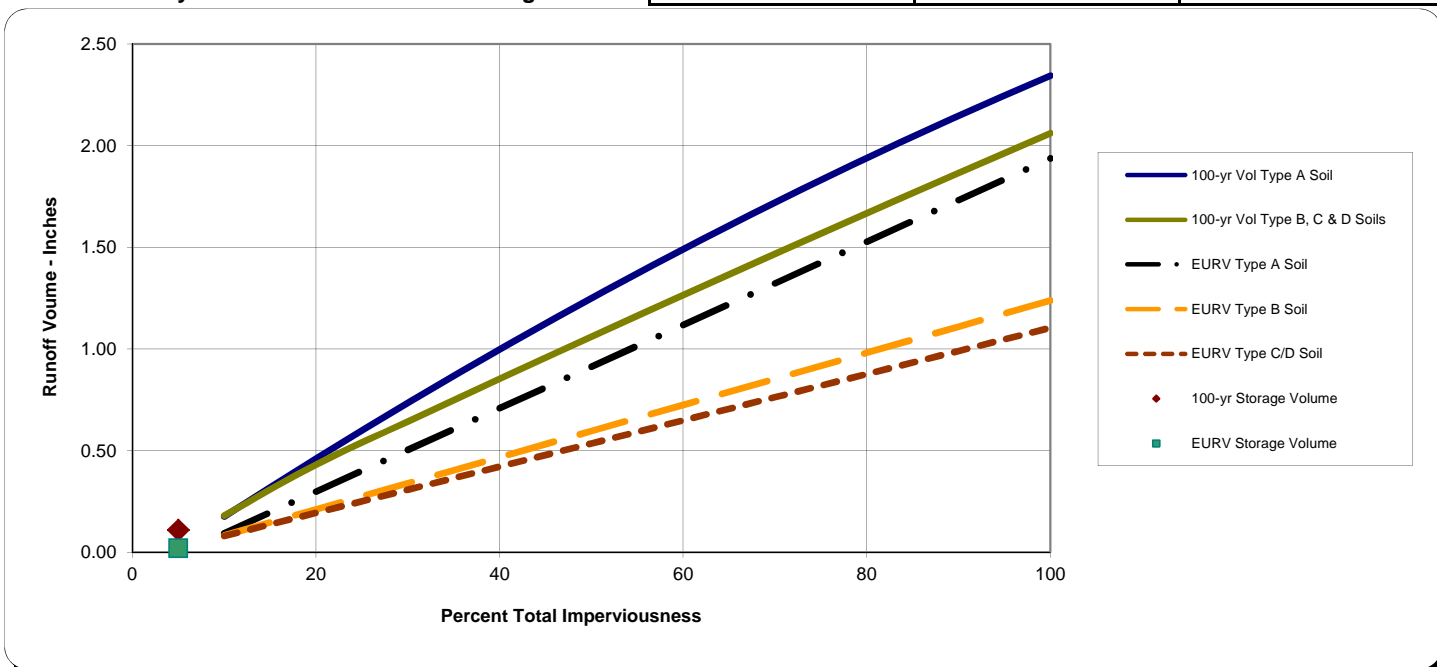
\* User input data shown in blue.

Area of Watershed (acres)	1882.00	
Subwatershed Imperviousness	5.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	5.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	1882.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.02	3.1277	Design Outlet to Empty EURV in 72 Hours
0.11	17.05	1599.70

Excess Urban Runoff Volume<sup>4</sup>  
 100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

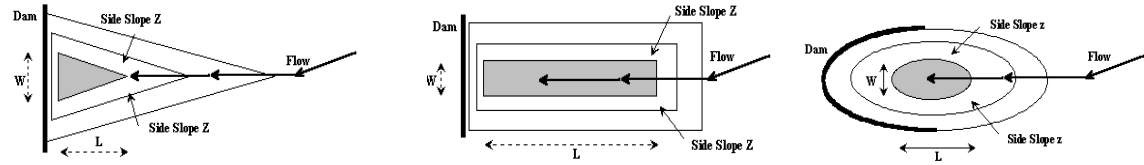


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Regional Pond R2

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 200.00 ft  
Length of Pond Bottom, L = 200.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

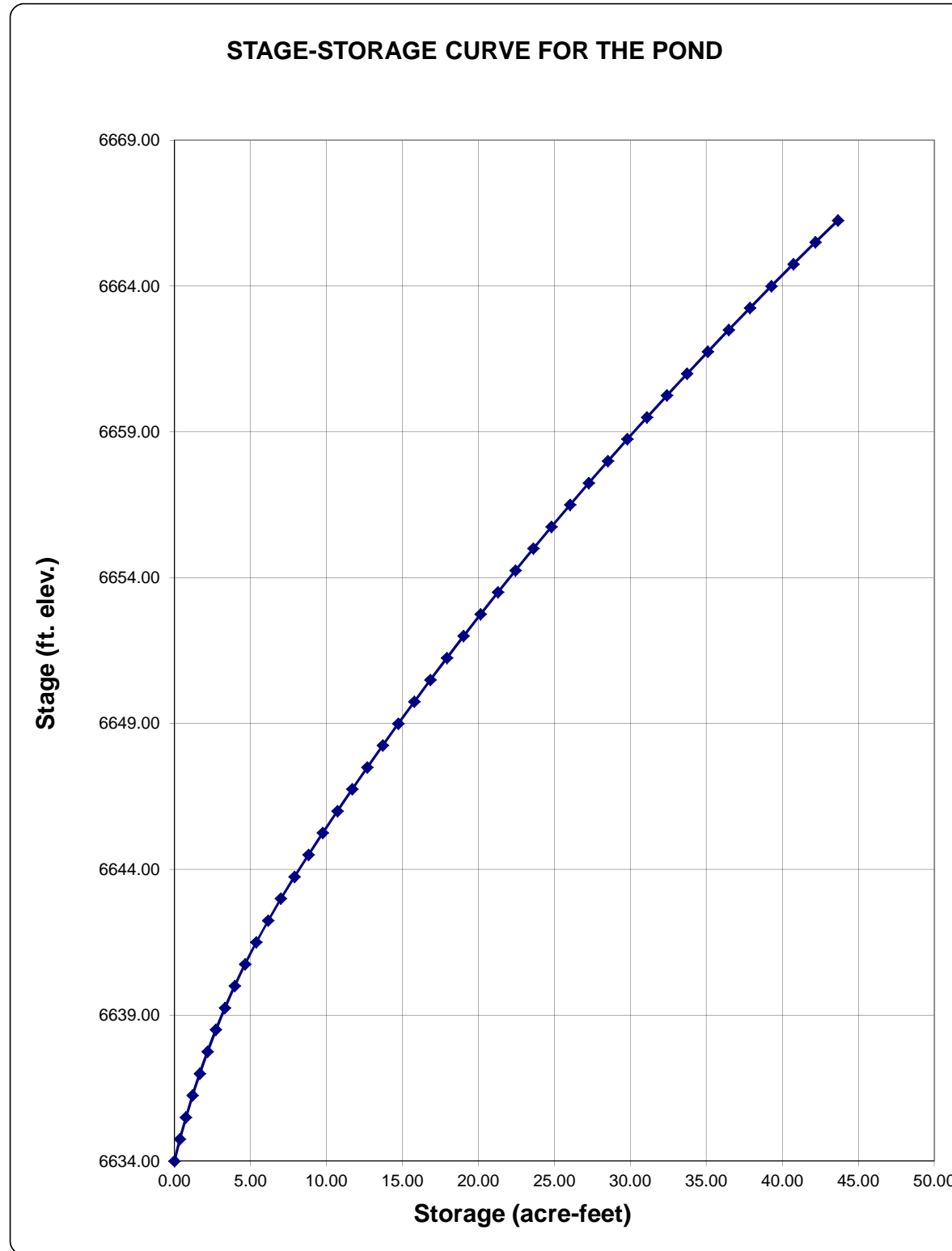
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 80.962 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 3.128 MINOR 17.049 MAJOR acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) ft/ft Below El. (input)	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6634.00		200.00	200.00	20,000.0			0.459	0.000	
	6634.75	4.00	209.71	209.71	21,988.8		15,746	0.505	0.361	
	6635.50	4.00	219.42	219.42	24,071.8		33,018	0.553	0.758	
	6636.25	4.00	229.12	229.12	26,249.0		51,889	0.603	1.191	
	6637.00	4.00	238.83	238.83	28,520.6		72,427	0.655	1.663	
	6637.75	4.00	248.54	248.54	30,886.3		94,705	0.709	2.174	
	6638.50	4.00	258.25	258.25	33,346.3		118,792	0.766	2.727	
-elev of EURV	6639.25	4.00	267.96	267.96	35,900.6		144,760	0.824	3.323	
	6640.00	4.00	277.67	277.67	38,549.1		172,678	0.885	3.964	
	6640.75	4.00	287.37	287.37	41,291.9		202,619	0.948	4.651	
	6641.50	4.00	297.08	297.08	44,128.9		234,652	1.013	5.387	
	6642.25	4.00	306.79	306.79	47,060.1		268,847	1.080	6.172	
	6643.00	4.00	316.50	316.50	50,085.6		305,277	1.150	7.008	
-elev of 100-yr	6643.75	4.00	326.21	326.21	53,205.4		344,011	1.221	7.897	
	6644.50		329.21	329.21	54,188.5		384,284	1.244	8.822	
	6645.25		332.21	332.21	55,180.6		425,297	1.267	9.763	
	6646.00		335.21	335.21	56,181.7		467,058	1.290	10.722	
	6646.75		338.21	338.21	57,191.9		509,573	1.313	11.698	
	6647.50		341.21	341.21	58,211.0		552,849	1.336	12.692	
	6648.25		344.21	344.21	59,239.1		596,893	1.360	13.703	
	6649.00		347.21	347.21	60,276.2		641,712	1.384	14.732	
	6649.75		350.21	350.21	61,322.3		687,311	1.408	15.778	
	6650.50		353.21	353.21	62,377.5		733,698	1.432	16.843	
	6651.25		356.21	356.21	63,441.6		780,881	1.456	17.927	
	6652.00		359.21	359.21	64,514.7		828,864	1.481	19.028	
	6652.75		362.21	362.21	65,596.8		877,656	1.506	20.148	
	6653.50		365.21	365.21	66,687.9		927,263	1.531	21.287	
	6654.25		368.21	368.21	67,788.1		977,691	1.556	22.445	
	6655.00		371.21	371.21	68,897.2		1,028,948	1.582	23.621	
	6655.75		374.21	374.21	70,015.3		1,081,040	1.607	24.817	
	6656.50		377.21	377.21	71,142.4		1,133,975	1.633	26.032	
	6657.25		380.21	380.21	72,278.5		1,187,757	1.659	27.267	
	6658.00		383.21	383.21	73,423.7		1,242,396	1.686	28.521	
	6658.75		386.21	386.21	74,577.8		1,297,896	1.712	29.796	
	6659.50		389.21	389.21	75,740.9		1,354,266	1.739	31.090	
	6660.25		392.21	392.21	76,913.0		1,411,511	1.766	32.404	
	6661.00		395.21	395.21	78,094.1		1,469,639	1.793	33.738	
	6661.75		398.21	398.21	79,284.3		1,528,656	1.820	35.093	
	6662.50		401.21	401.21	80,483.4		1,588,569	1.848	36.469	
	6663.25		404.21	404.21	81,691.5		1,649,384	1.875	37.865	
	6664.00		407.21	407.21	82,908.6		1,711,109	1.903	39.282	
	6664.75		410.21	410.21	84,134.7		1,773,750	1.931	40.720	
	6665.50		413.21	413.21	85,369.9		1,837,315	1.960	42.179	
	6666.25		416.21	416.21	86,614.0		1,901,809	1.988	43.660	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Regional Pond WU

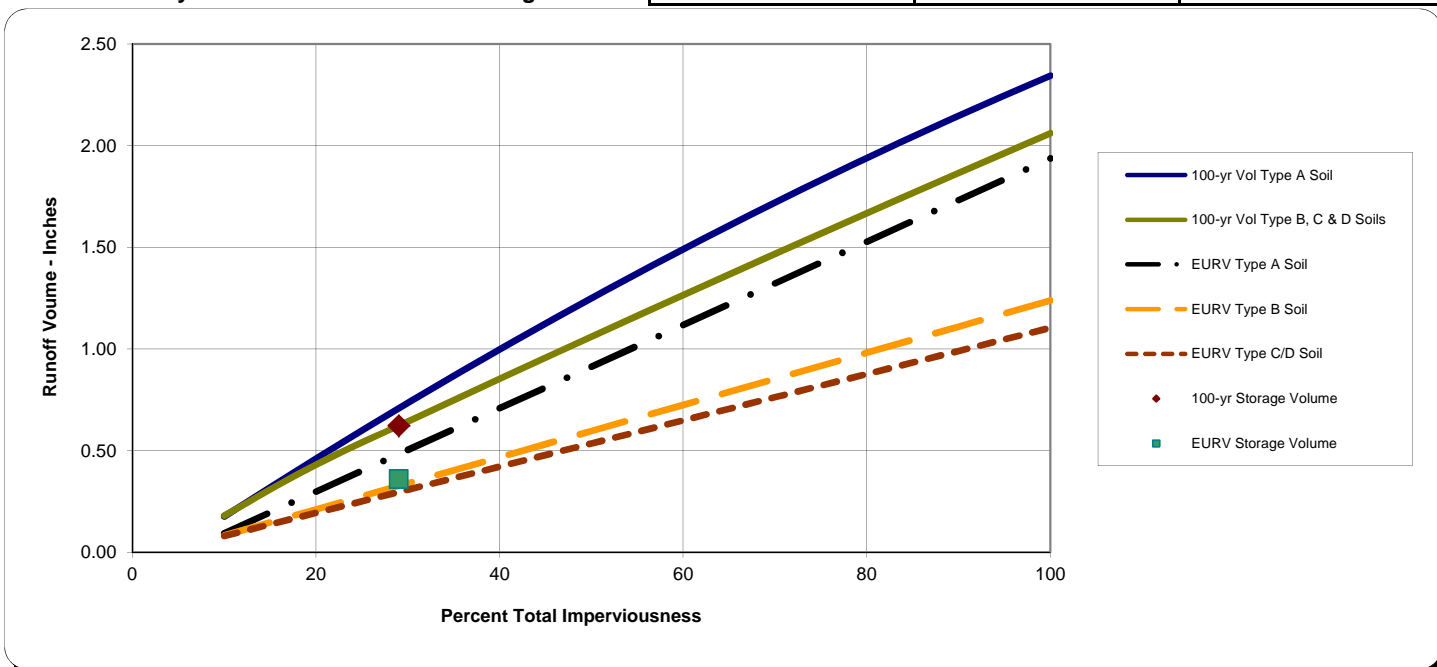
\* User input data shown in blue.

Area of Watershed (acres)	467.00
Subwatershed Imperviousness	29.0%
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0
Effective Imperviousness <sup>1</sup>	29.0%
Hydrologic Soil Type	Percentage of Area      Area (acres)
Type A	0.0
Type B	100.0%      467.0
Type C or D	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.36	13.9741	Design Outlet to Empty EURV in 72 Hours
0.62	24.22	396.95

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



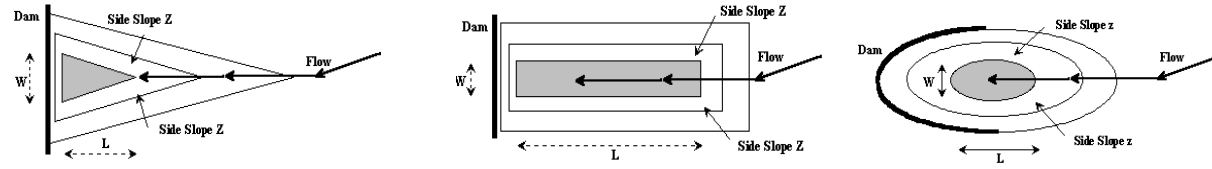


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR1

Project:  
Basin ID:



Design Information (Input):

Width of Pond Bottom, W = 175.00 ft  
Length of Pond Bottom, L = 350.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 5.00 ft/ft

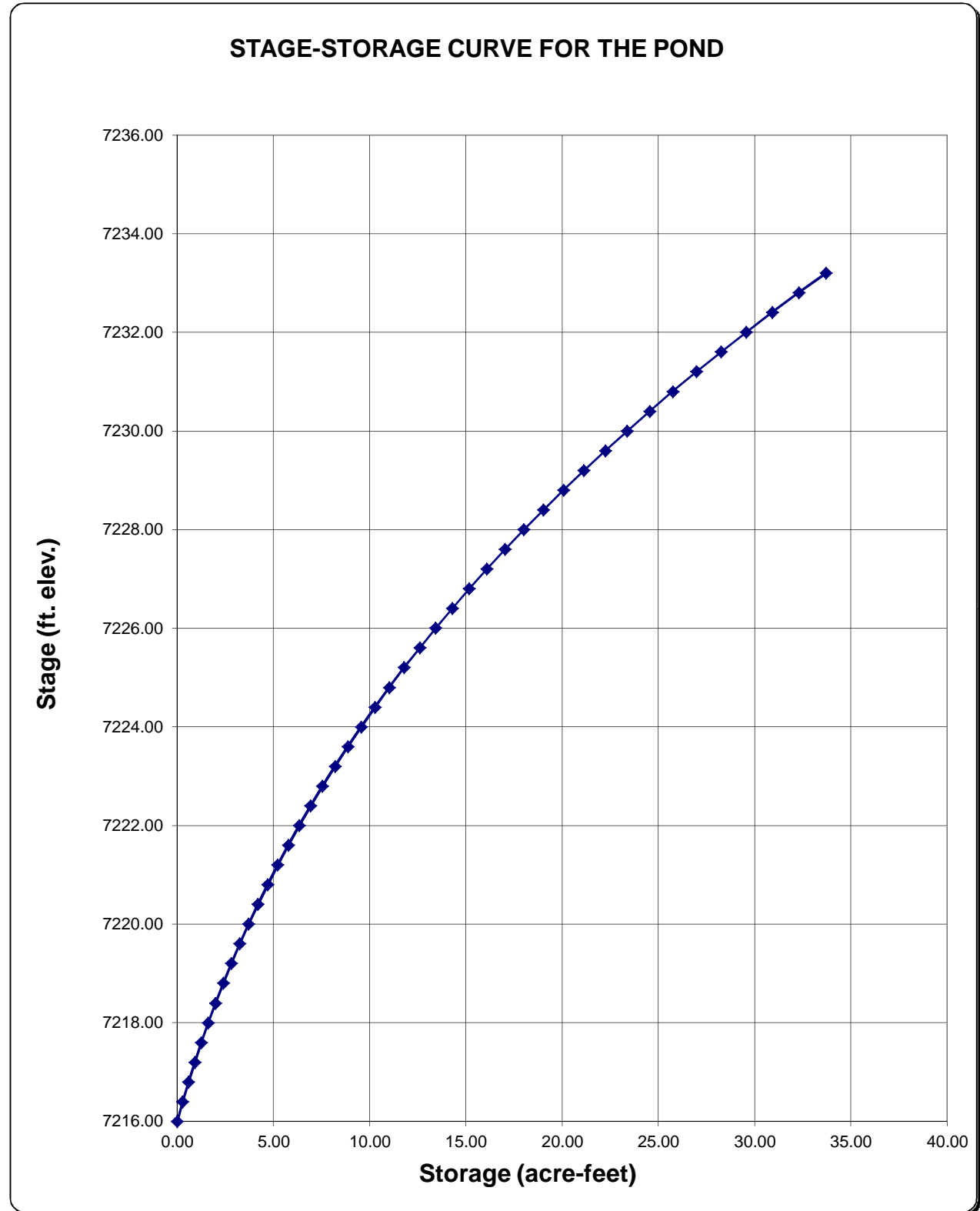
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA':  MINOR acre-ft.  
Storage Requirement from Sheet 'Hydrograph':  MAJOR 3.640 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum':  acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage ft (input)	Side Slope (H:V) ft/ft Below El. (input)	Pond Width at Stage ft (output)	Pond Length at Stage ft (output)	Surface Area at Stage ft <sup>2</sup> (output)	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage ft <sup>3</sup> (output)	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	7216.00		175.00	350.00	30,625.0		0.703	0.000		
	7216.40	5.00	180.12	360.25	32,444.3		12,614	0.745	0.290	
	7216.80	5.00	185.25	370.49	34,316.2		25,966	0.788	0.596	
	7217.20	5.00	190.37	380.74	36,240.5		40,077	0.832	0.920	
	7217.60	5.00	195.49	390.98	38,217.3		54,969	0.877	1.262	
WQCV	7218.00	5.00	200.62	401.23	40,246.6		70,662	0.924	1.622	
	7218.40	5.00	205.74	411.48	42,328.4		87,177	0.972	2.001	
	7218.80	5.00	210.86	421.72	44,462.7		104,535	1.021	2.400	
	7219.20	5.00	215.98	431.97	46,649.5		122,757	1.071	2.818	
	7219.60	5.00	221.11	442.22	48,888.7		141,865	1.122	3.257	
	7220.00	5.00	226.23	452.46	51,180.5		161,879	1.175	3.716	
	7220.40	5.00	231.35	462.71	53,524.7		182,820	1.229	4.197	
	7220.80	5.00	236.48	472.95	55,921.5		204,709	1.284	4.699	
	7221.20	5.00	241.60	483.20	58,370.7		227,567	1.340	5.224	
	7221.60	5.00	246.72	493.45	60,872.5		251,416	1.397	5.772	
	7222.00	5.00	251.85	503.69	63,426.7		276,276	1.456	6.342	
	7222.40	5.00	256.97	513.94	66,033.4		302,168	1.516	6.937	
	7222.80	5.00	262.09	524.19	68,692.6		329,113	1.577	7.555	
	7223.20	5.00	267.22	534.43	71,404.3		357,133	1.639	8.199	
	7223.60	5.00	272.34	544.68	74,168.5		386,247	1.703	8.867	
	7224.00	5.00	277.46	554.92	76,985.2		416,478	1.767	9.561	
	7224.40	5.00	282.59	565.17	79,854.4		447,846	1.833	10.281	
	7224.80	5.00	287.71	575.42	82,776.1		480,372	1.900	11.028	
	7225.20	5.00	292.83	585.66	85,750.2		514,077	1.969	11.802	
	7225.60	5.00	297.95	595.91	88,776.9		548,983	2.038	12.603	
	7226.00	5.00	303.08	606.16	91,856.1		585,109	2.109	13.432	
	7226.40	5.00	308.20	616.40	94,987.7		622,478	2.181	14.290	
	7226.80	5.00	313.32	626.65	98,171.8		661,110	2.254	15.177	
	7227.20	5.00	318.45	636.89	101,408.5		701,026	2.328	16.093	
	7227.60	5.00	323.57	647.14	104,697.6		742,247	2.404	17.040	
	7228.00	5.00	328.69	657.39	108,039.2		784,795	2.480	18.016	
	7228.40	5.00	333.82	667.63	111,433.3		828,689	2.558	19.024	
	7228.80	5.00	338.94	677.88	114,879.9		873,952	2.637	20.063	
	7229.20	5.00	344.06	688.12	118,379.0		920,603	2.718	21.134	
	7229.60	5.00	349.19	698.37	121,930.6		968,665	2.799	22.237	
	7230.00	5.00	354.31	708.62	125,534.7		1,018,158	2.882	23.374	
	7230.40	5.00	359.43	718.86	129,191.2		1,069,104	2.966	24.543	
	7230.80	5.00	364.55	729.11	132,900.3		1,121,522	3.051	25.747	
	7231.20	5.00	369.68	739.36	136,661.8		1,175,434	3.137	26.984	
	7231.60	5.00	374.80	749.60	140,475.9		1,230,862	3.225	28.257	
	7232.00	5.00	379.92	759.85	144,342.4		1,287,825	3.314	29.564	
	7232.40	5.00	385.05	770.09	148,261.4		1,346,346	3.404	30.908	
	7232.80	5.00	390.17	780.34	152,233.0		1,406,445	3.495	32.288	
	7233.20	5.00	395.29	790.59	156,257.0		1,468,143	3.587	33.704	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Sub Regional Pond SR2

\* User input data shown in blue.

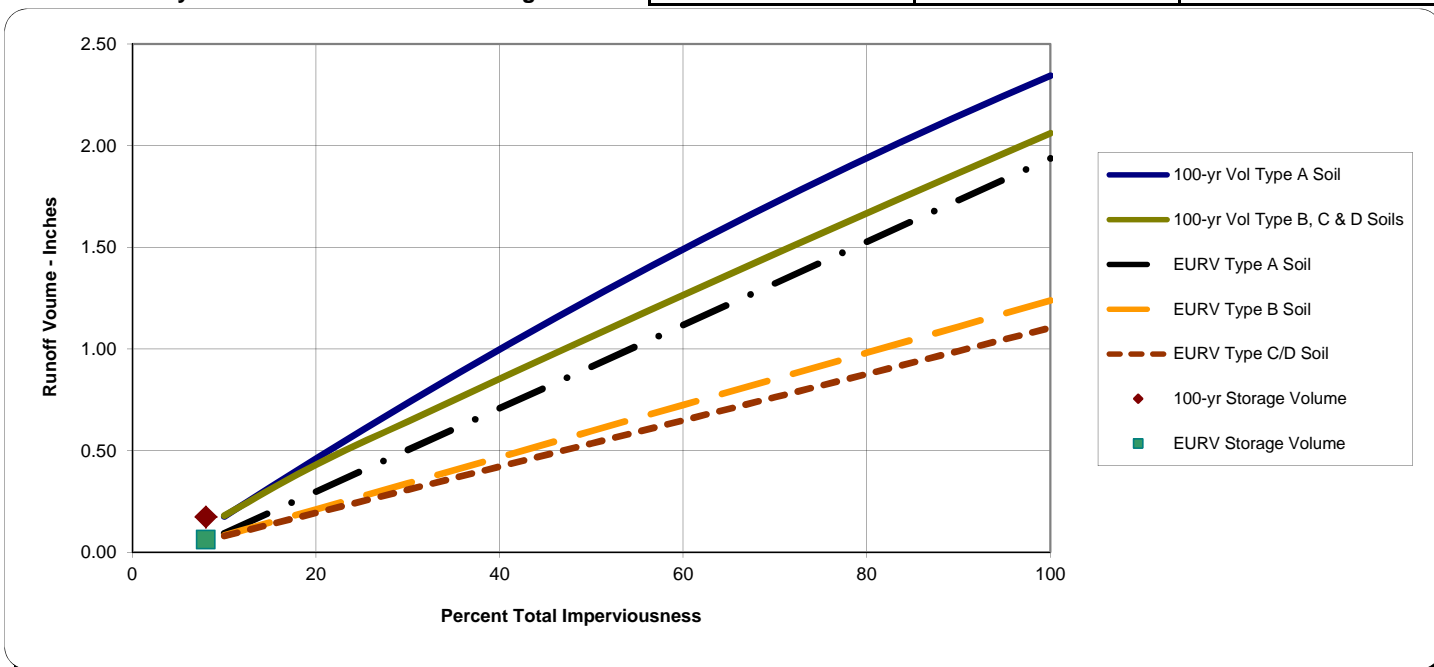
Area of Watershed (acres)	394.00	
Subwatershed Imperviousness	8.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	8.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	394.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.06	2.0467	Design Outlet to Empty EURV in 72 Hours
0.17	5.70	334.90

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



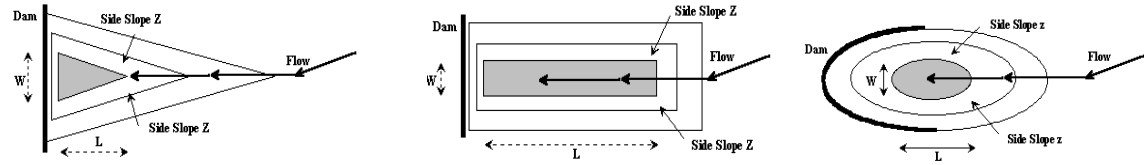


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR2

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 200.00 ft  
Length of Pond Bottom, L = 280.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

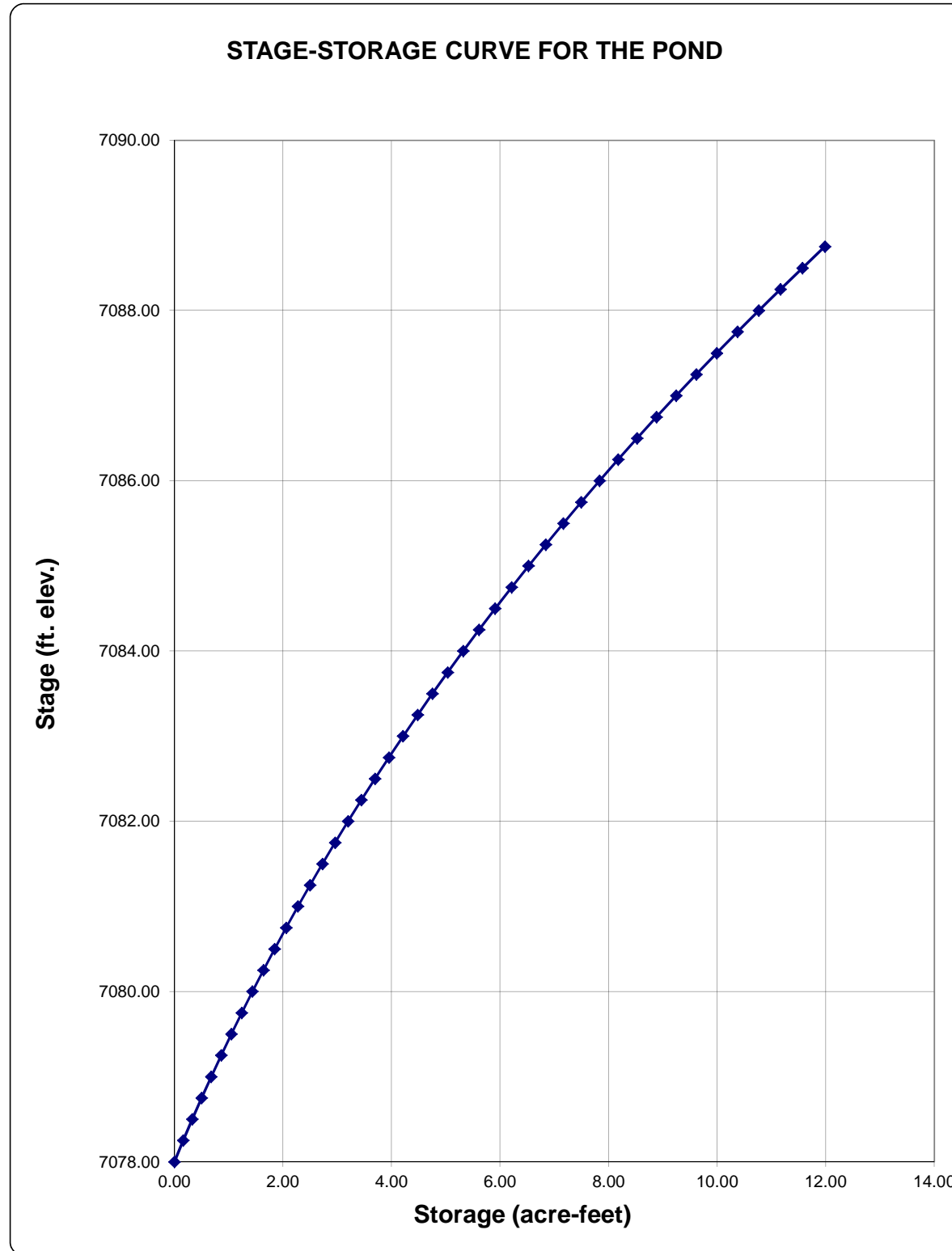
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 2.047 5.701 acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) Below El. (input) ft/ft	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	7078.00	4.00	200.00	280.00	28,000.0		7,100	0.643	0.000	
	7078.25	4.00	202.84	283.97	28,800.3		14,402	0.661	0.163	
	7078.50	4.00	205.68	287.95	29,611.8		21,907	0.680	0.331	
	7078.75	4.00	208.51	291.92	30,434.7		29,620	0.699	0.503	
	7079.00	4.00	211.35	295.89	31,268.8		37,543	0.718	0.680	
	7079.25	4.00	214.19	299.87	32,114.2		45,679	0.737	0.862	
	7079.50	4.00	217.03	303.84	32,970.8		54,030	0.757	1.049	
	7079.75	4.00	219.87	307.81	33,838.8		62,600	0.777	1.240	
	7080.00	4.00	222.70	311.79	34,718.0		71,390	0.797	1.437	
	7080.25	4.00	225.54	315.76	35,608.5		80,405	0.817	1.639	
	7080.50	4.00	228.38	319.73	36,510.2		89,647	0.838	1.846	
EURV	7080.75	4.00	231.22	323.71	37,423.3		99,118	0.859	2.058	
	7081.00	4.00	234.06	327.68	38,347.6		108,822	0.880	2.275	
	7081.25	4.00	236.89	331.65	39,283.2		118,761	0.902	2.498	
	7081.50	4.00	239.73	335.62	40,230.0		128,939	0.924	2.726	
	7081.75	4.00	242.57	339.60	41,188.2		139,357	0.946	2.960	
	7082.00	4.00	245.41	343.57	42,157.6		150,019	0.968	3.199	
	7082.25	4.00	248.25	347.54	43,138.3		160,927	0.990	3.444	
	7082.50	4.00	251.08	351.52	44,130.3		172,085	1.013	3.694	
	7082.75	4.00	253.92	355.49	45,133.5		183,496	1.036	3.951	
	7083.00	4.00	256.76	359.46	46,148.1		195,161	1.059	4.212	
	7083.25	4.00	259.60	363.44	47,173.9		207,084	1.083	4.480	
	7083.50	4.00	262.44	367.41	48,210.9		219,268	1.107	4.754	
	7083.75	4.00	265.27	371.38	49,259.3		231,715	1.131	5.034	
	7084.00	4.00	268.11	375.36	50,318.9		244,428	1.155	5.319	
	7084.25	4.00	270.95	379.33	51,389.8		257,411	1.180	5.611	
	7084.50	4.00	273.79	383.30	52,472.0		270,666	1.205	5.909	
	7084.75	4.00	276.63	387.28	53,565.5		284,195	1.230	6.214	
	7085.00	4.00	279.46	391.25	54,670.2		298,002	1.255	6.524	
	7085.25	4.00	282.30	395.22	55,786.2		312,090	1.281	6.841	
	7085.50	4.00	285.14	399.20	56,913.5		326,461	1.307	7.165	
	7085.75	4.00	287.98	403.17	58,052.1		341,117	1.333	7.495	
	7086.00	4.00	290.82	407.14	59,201.9		356,063	1.359	7.831	
	7086.25	4.00	293.65	411.12	60,363.0		371,300	1.386	8.174	
	7086.50	4.00	296.49	415.09	61,535.4		386,832	1.413	8.524	
	7086.75	4.00	299.33	419.06	62,719.1		402,661	1.440	8.880	
	7087.00	4.00	302.17	423.04	63,914.0		418,790	1.467	9.244	
	7087.25	4.00	305.01	427.01	65,120.2		435,223	1.495	9.614	
	7087.50	4.00	307.84	430.98	66,337.7		451,961	1.523	9.991	
	7087.75	4.00	310.68	434.96	67,566.5		469,007	1.551	10.376	
	7088.00	4.00	313.52	438.93	68,806.5		486,365	1.580	10.767	
	7088.25	4.00	316.36	442.90	70,057.8		504,038	1.608	11.165	
	7088.50	4.00	319.20	446.87	71,320.4		522,027	1.637	11.571	
	7088.75	4.00	322.03	450.85	72,594.3			1.667	11.984	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Sub Regional Pond SR3

\* User input data shown in blue.

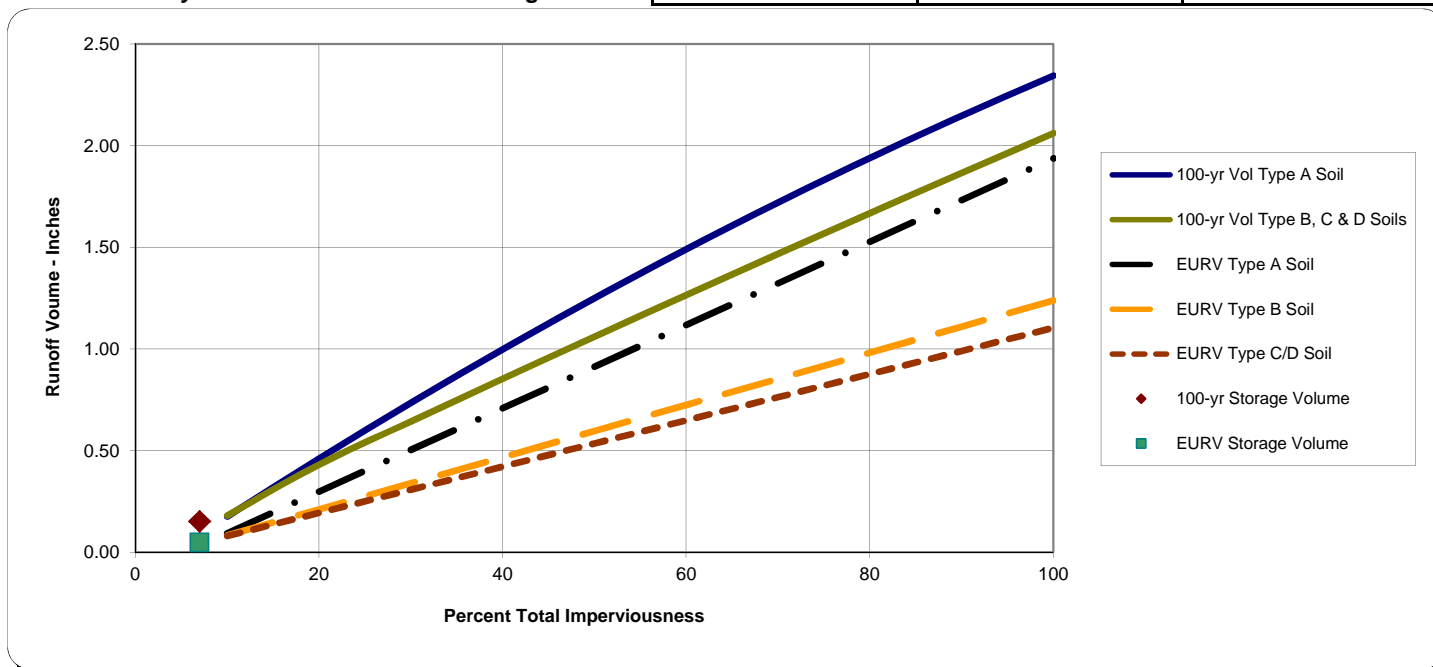
Area of Watershed (acres)	256.00	
Subwatershed Imperviousness	7.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	7.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	256.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.05	1.0284	Design Outlet to Empty EURV in 72 Hours
0.15	3.24	217.60

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

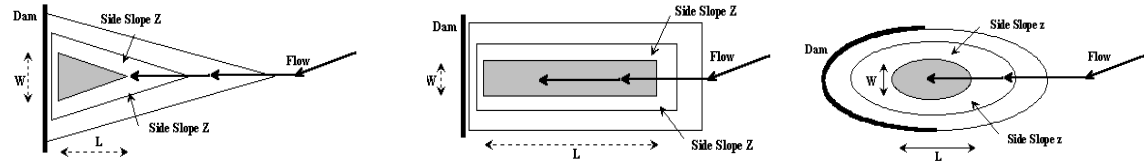


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR3

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 100.00 ft  
Length of Pond Bottom, L = 200.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

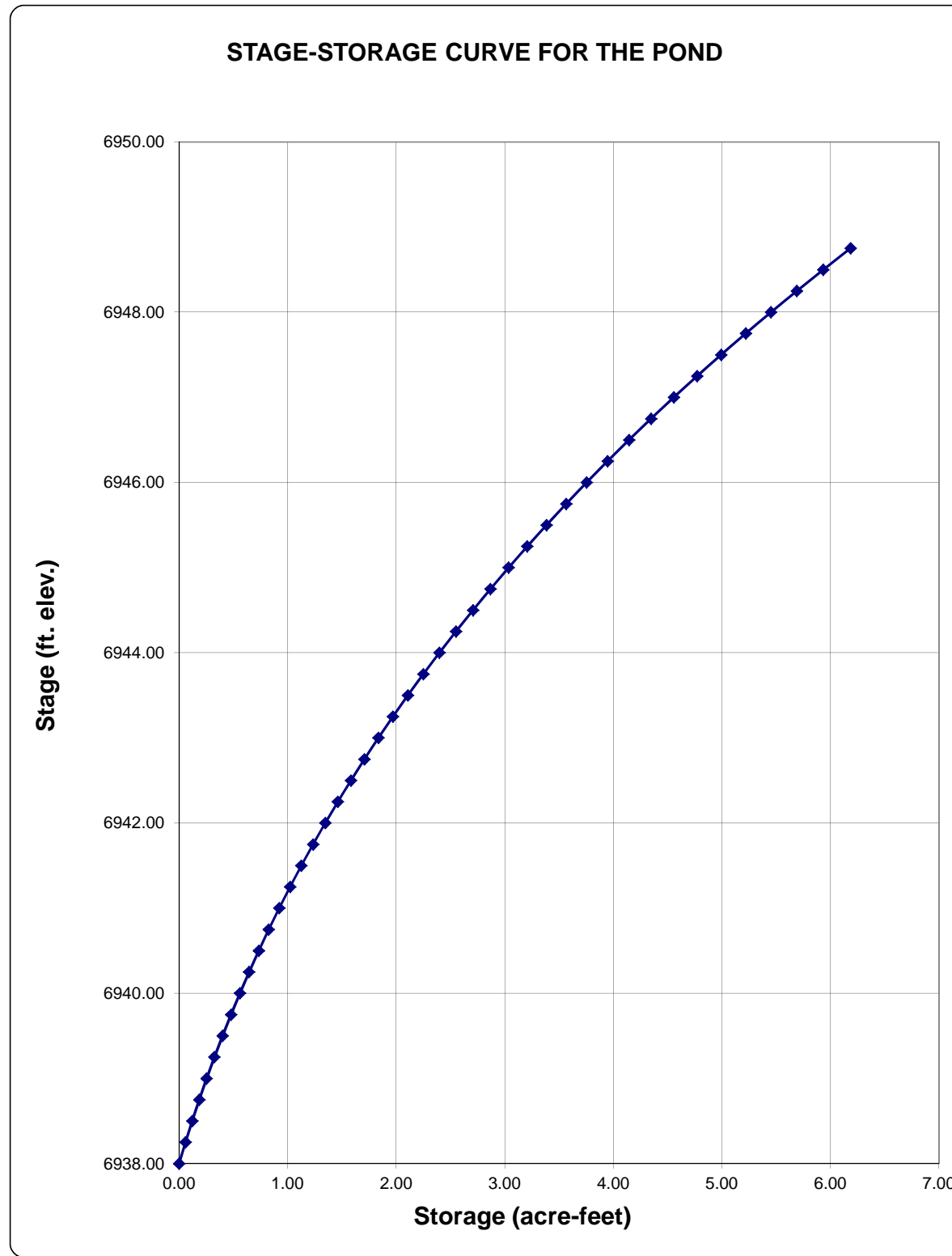
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 1.028 3.243 acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) Below El. (input) ft/ft	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6938.00	4.00	100.00	200.00	10,000.0		0.230	0.000		
	6938.25	4.00	102.56	205.12	10,518.9		2,565	0.241	0.059	
	6938.50	4.00	105.12	210.25	11,050.9		5,261	0.254	0.121	
	6938.75	4.00	107.68	215.37	11,596.0		8,092	0.266	0.186	
	6939.00	4.00	110.25	220.49	12,154.2		11,061	0.279	0.254	
	6939.25	4.00	112.81	225.62	12,725.6		14,171	0.292	0.325	
	6939.50	4.00	115.37	230.74	13,310.1		17,425	0.306	0.400	
	6939.75	4.00	117.93	235.86	13,907.7		20,827	0.319	0.478	
	6940.00	4.00	120.49	240.98	14,518.4		24,381	0.333	0.560	
	6940.25	4.00	123.05	246.11	15,142.3		28,088	0.348	0.645	
	6940.50	4.00	125.62	251.23	15,779.3		31,953	0.362	0.734	
	6940.75	4.00	128.18	256.35	16,429.4		35,979	0.377	0.826	
	6941.00	4.00	130.74	261.48	17,092.6		40,170	0.392	0.922	
EURV	6941.25	4.00	133.30	266.60	17,768.9		44,527	0.408	1.022	
	6941.50	4.00	135.86	271.72	18,458.4		49,056	0.424	1.126	
	6941.75	4.00	138.42	276.85	19,161.0		53,758	0.440	1.234	
	6942.00	4.00	140.98	281.97	19,876.7		58,638	0.456	1.346	
	6942.25	4.00	143.55	287.09	20,605.6		63,698	0.473	1.462	
	6942.50	4.00	146.11	292.22	21,347.5		68,942	0.490	1.583	
	6942.75	4.00	148.67	297.34	22,102.6		74,374	0.507	1.707	
	6943.00	4.00	151.23	302.46	22,870.8		79,995	0.525	1.836	
	6943.25	4.00	153.79	307.59	23,652.2		85,811	0.543	1.970	
	6943.50	4.00	156.35	312.71	24,446.6		91,823	0.561	2.108	
	6943.75	4.00	158.92	317.83	25,254.2		98,036	0.580	2.251	
	6944.00	4.00	161.48	322.95	26,074.9		104,452	0.599	2.398	
	6944.25	4.00	164.04	328.08	26,908.7		111,075	0.618	2.550	
	6944.50	4.00	166.60	333.20	27,755.7		117,908	0.637	2.707	
	6944.75	4.00	169.16	338.32	28,615.8		124,954	0.657	2.869	
	6945.00	4.00	171.72	343.45	29,489.0		132,217	0.677	3.035	
	6945.25	4.00	174.29	348.57	30,375.3		139,700	0.697	3.207	
	6945.50	4.00	176.85	353.69	31,274.7		147,407	0.718	3.384	
	6945.75	4.00	179.41	358.82	32,187.3		155,339	0.739	3.566	
	6946.00	4.00	181.97	363.94	33,113.0		163,502	0.760	3.753	
	6946.25	4.00	184.53	369.06	34,051.8		171,898	0.782	3.946	
	6946.50	4.00	187.09	374.19	35,003.7		180,529	0.804	4.144	
	6946.75	4.00	189.65	379.31	35,968.8		189,401	0.826	4.348	
	6947.00	4.00	192.22	384.43	36,947.0		198,515	0.848	4.557	
	6947.25	4.00	194.78	389.55	37,938.3		207,876	0.871	4.772	
	6947.50	4.00	197.34	394.68	38,942.7		217,486	0.894	4.993	
	6947.75	4.00	199.90	399.80	39,960.2		227,349	0.917	5.219	
	6948.00	4.00	202.46	404.92	40,990.9		237,468	0.941	5.452	
	6948.25	4.00	205.02	410.05	42,034.7		247,846	0.965	5.690	
	6948.50	4.00	207.59	415.17	43,091.6		258,487	0.989	5.934	
	6948.75	4.00	210.15	420.29	44,161.7		269,394	1.014	6.184	



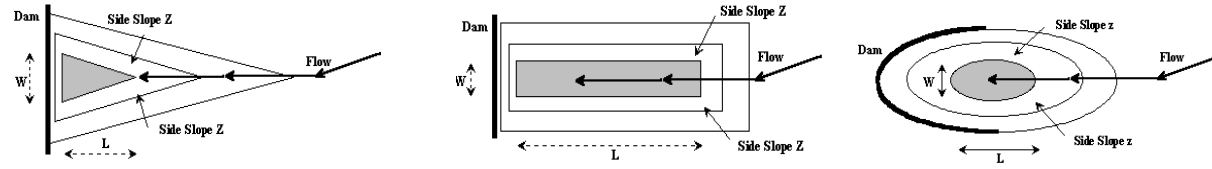


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR4

Project:  
Basin ID:



Design Information (Input):

Width of Pond Bottom, W = 40.00 ft  
Length of Pond Bottom, L = 240.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 5.00 ft/ft

Check Pond Shape

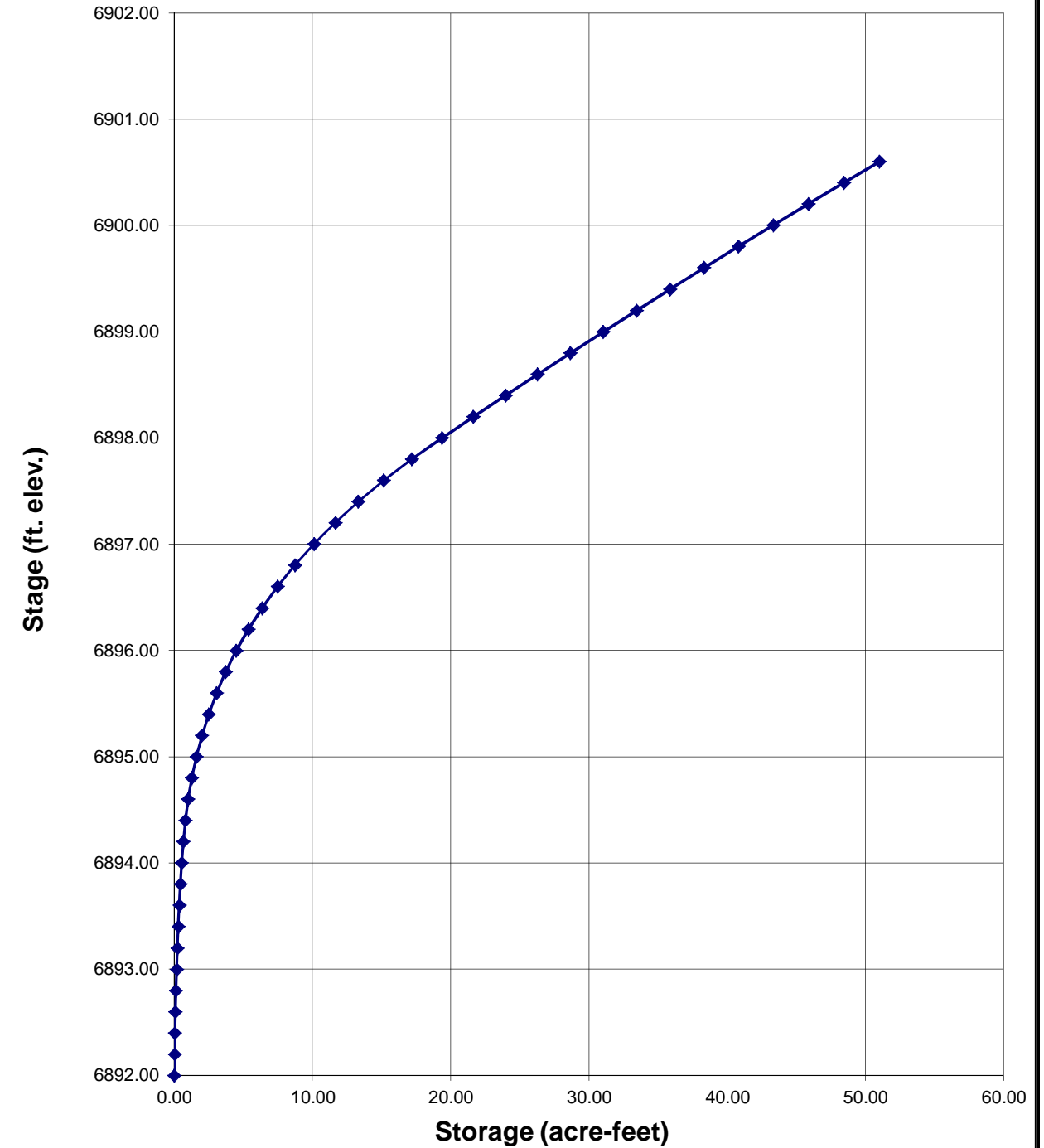
Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA':  acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 44,389 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum':  acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage ft (input)	Side Slope (H:V) Below El. (input)	Pond Width at Stage ft (output)	Pond Length at Stage ft (output)	Surface Area at Stage ft <sup>2</sup> (output)	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage ft <sup>3</sup> (output)	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6892.00		40.00	240.00	4,800.0		0.110	0.000		
	6892.20	10.00	44.18	265.08	5,855.8		1,066	0.134	0.024	
	6892.40	10.00	48.36	290.17	7,016.4		2,353	0.161	0.054	
	6892.60	10.00	52.54	315.25	8,281.9		3,883	0.190	0.089	
	6892.80	10.00	56.72	340.33	9,652.2		5,676	0.222	0.130	
	6893.00	10.00	60.90	365.42	11,127.4		7,754	0.255	0.178	
	6893.20	10.00	65.08	390.50	12,707.5		10,137	0.292	0.233	
	6893.40	10.00	69.26	415.58	14,392.4		12,847	0.330	0.295	
	6893.60	10.00	73.44	440.67	16,182.2		15,905	0.371	0.365	
	6893.80	10.00	77.62	465.75	18,076.8		19,331	0.415	0.444	
	6894.00	10.00	81.81	490.83	20,076.3		23,146	0.461	0.531	
	6894.20	40.00	98.03	588.16	28,828.1		28,037	0.662	0.644	
	6894.40	40.00	114.25	685.50	39,158.9		34,835	0.899	0.800	
	6894.60	40.00	130.47	782.83	51,068.6		43,858	1.172	1.007	
	6894.80	40.00	146.69	880.16	64,557.2		55,421	1.482	1.272	
	6895.00	40.00	162.92	977.50	79,624.8		69,839	1.828	1.603	
	6895.20	40.00	179.14	1074.83	96,271.3		87,428	2.210	2.007	
	6895.40	40.00	195.36	1172.16	114,496.8		108,505	2.628	2.491	
	6895.60	40.00	211.58	1269.49	134,301.2		133,385	3.083	3.062	
	6895.80	40.00	227.80	1366.83	155,684.6		162,384	3.574	3.728	
	6896.00	40.00	244.03	1464.16	178,646.9		195,817	4.101	4.495	
	6896.20	40.00	260.25	1561.49	203,188.2		234,000	4.665	5.372	
	6896.40	40.00	276.47	1658.82	229,308.4		277,250	5.264	6.365	
-WQCV	6896.60	40.00	292.69	1756.16	257,007.5		325,882	5.900	7.481	
	6896.80	40.00	308.92	1853.49	286,285.6		380,211	6.572	8.728	
	6897.00	40.00	325.14	1950.82	317,142.6		440,554	7.281	10.114	
	6897.20	40.00	341.36	2048.16	349,578.6		507,226	8.025	11.644	
	6897.40	40.00	357.58	2145.49	383,593.5		580,543	8.806	13.327	
	6897.60	40.00	373.80	2242.82	419,187.4		660,821	9.623	15.170	
	6897.80	40.00	390.03	2340.15	456,360.2		748,376	10.477	17.180	
100-yr	6898.00	40.00	406.25	2437.49	495,111.9		843,523	11.366	19.365	
	6898.20	5.00	408.42	2450.53	500,424.2		943,077	11.488	21.650	
	6898.40	5.00	410.60	2463.57	505,764.8		1,043,696	11.611	23.960	
	6898.60	5.00	412.77	2476.61	511,133.8		1,145,385	11.734	26.294	
	6898.80	5.00	414.94	2489.65	516,531.2		1,248,152	11.858	28.654	
	6899.00	5.00	417.12	2502.69	521,956.9		1,352,001	11.982	31.038	
	6899.20	5.00	419.29	2515.74	527,410.9		1,456,937	12.108	33.447	
	6899.40	5.00	421.46	2528.78	532,893.3		1,562,968	12.234	35.881	
	6899.60	5.00	423.64	2541.82	538,404.0		1,670,098	12.360	38.340	
	6899.80	5.00	425.81	2554.86	543,943.1		1,778,332	12.487	40.825	
Spillway	6900.00	5.00	427.98	2567.90	549,510.5		1,887,678	12.615	43.335	
	6900.20	5.00	430.16	2580.94	555,106.2		1,998,139	12.743	45.871	
	6900.40	5.00	432.33	2593.99	560,730.3		2,109,723	12.873	48.433	
	6900.60	5.00	434.50	2607.03	566,382.8		2,222,434	13.002	51.020	

STAGE-STORAGE CURVE FOR THE POND



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Sub Regional Pond SR5 at Condor Rd

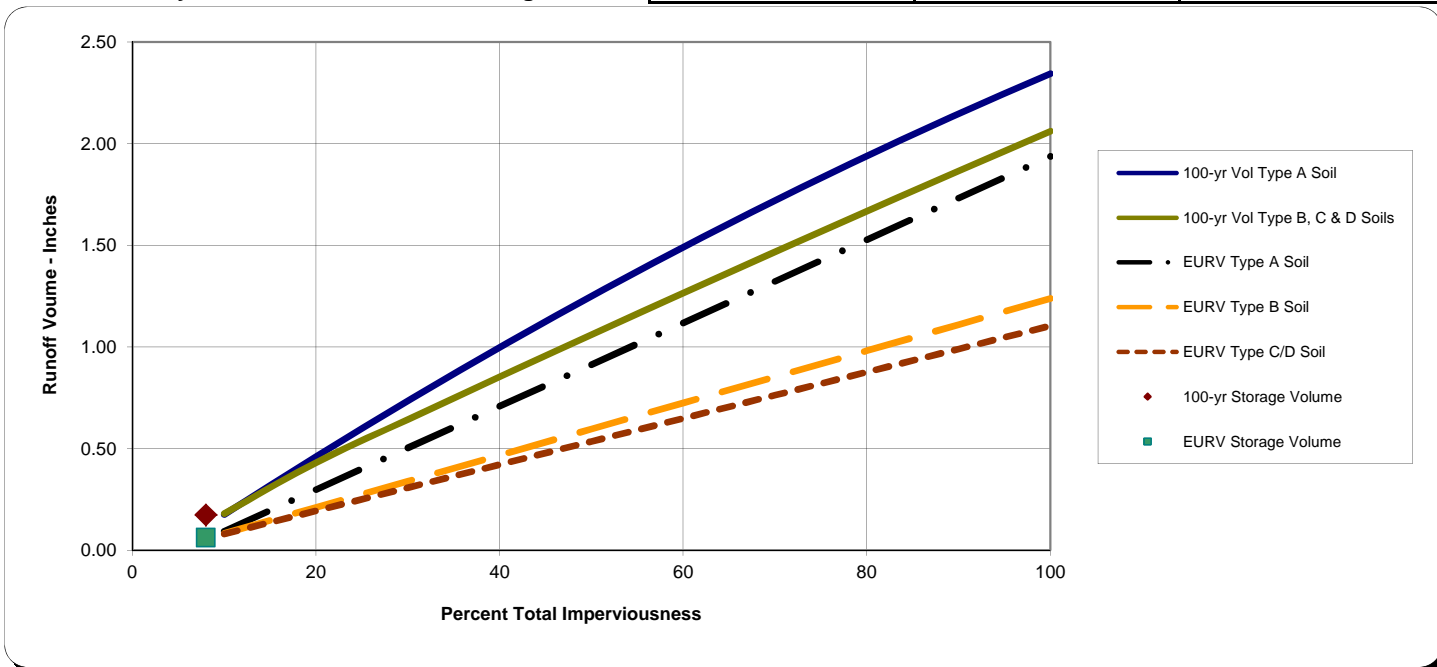
\* User input data shown in blue.

Area of Watershed (acres)	673.00	
Subwatershed Imperviousness	8.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	8.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	673.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.06	3.4959	Design Outlet to Empty EURV in 72 Hours
0.17	9.74	572.05

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

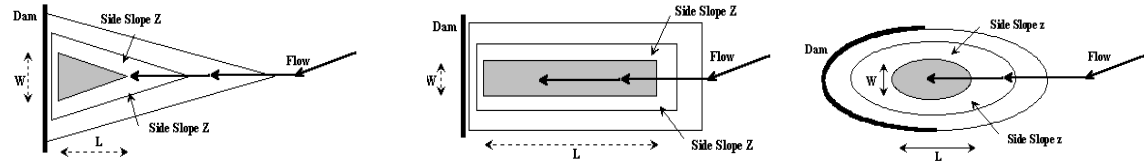


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR5

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 245.00 ft  
Length of Pond Bottom, L = 250.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

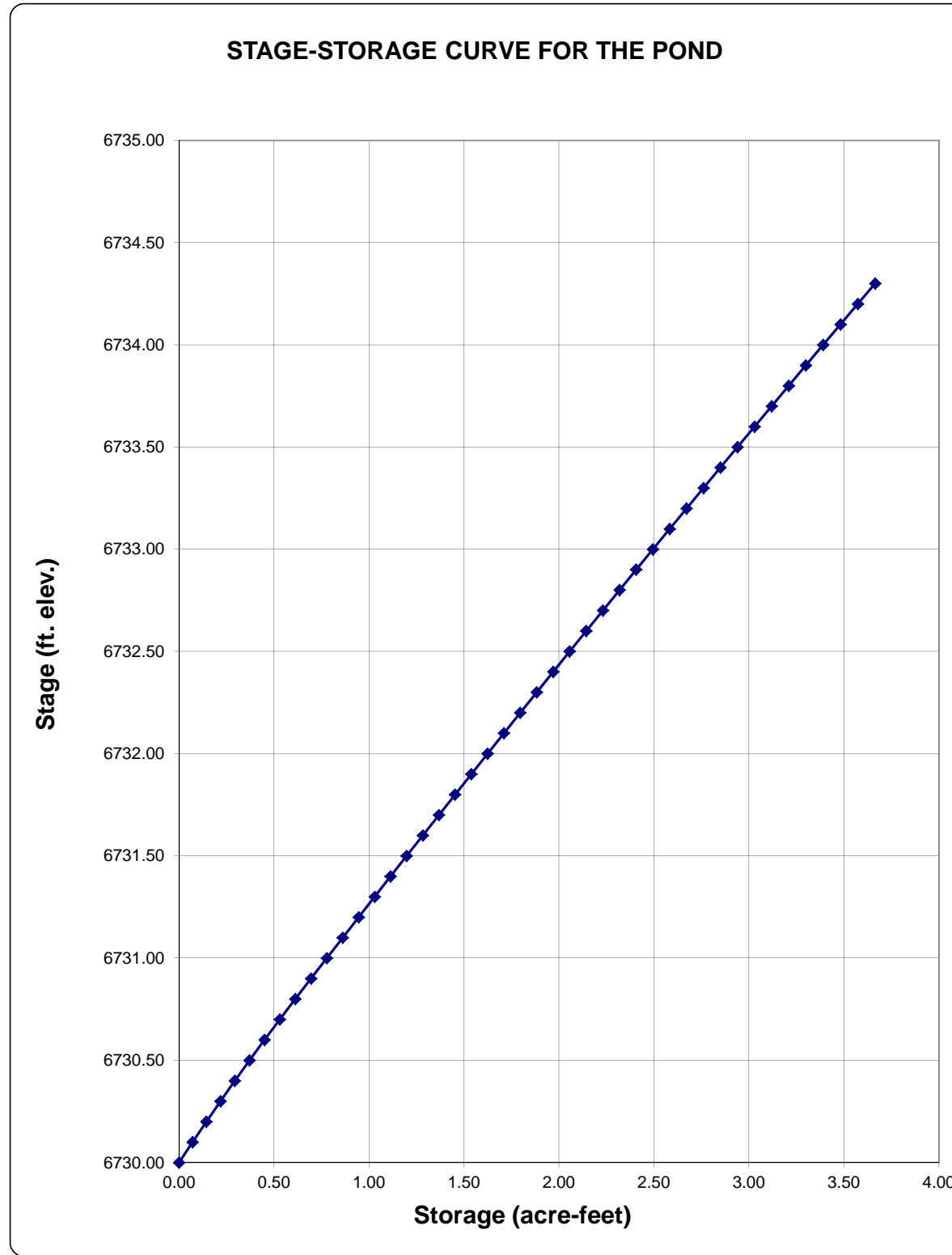
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 44.999 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 3.496 MINOR 9.739 MAJOR acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (input) ft	Side Slope (H:V) ft/ft Below El. (input)	Pond Width at Stage (output) ft	Pond Length at Stage (output) ft	Surface Area at Stage (output) ft <sup>2</sup>	Surface Area at Stage ft <sup>2</sup> User Override	Volume Below Stage (output) ft <sup>3</sup>	Surface Area at Stage acres (output)	Volume Below Stage acre-ft (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	6730.00		245.00	250.00	30,625.0			0.703	0.000	
	6730.10	10.00	247.62	252.67	31,283.3		3,095	0.718	0.071	
	6730.20	10.00	250.24	255.35	31,948.6		6,257	0.733	0.144	
	6730.30	10.00	252.86	258.02	32,620.9		9,485	0.749	0.218	
	6730.40	10.00	255.48	260.69	33,300.2		12,782	0.764	0.293	
	6730.50	10.00	258.10	263.36	33,986.5		16,146	0.780	0.371	
	6730.60	10.00	260.72	266.04	34,679.8		19,579	0.796	0.449	
	6730.70	10.00	263.33	268.71	35,380.1		23,082	0.812	0.530	
	6730.80	10.00	265.95	271.38	36,087.4		26,656	0.828	0.612	
	6730.90		266.35	271.78	36,193.9		30,270	0.831	0.695	
	6731.00		266.74	272.18	36,300.5		33,894	0.833	0.778	
	6731.10		267.13	272.58	36,407.2		37,530	0.836	0.862	
	6731.20		267.52	272.98	36,514.2		41,176	0.838	0.945	
	6731.30		267.91	273.38	36,621.3		44,833	0.841	1.029	
	6731.40		268.31	273.78	36,728.5		48,500	0.843	1.113	
	6731.50		268.70	274.18	36,835.9		52,178	0.846	1.198	
	6731.60		269.09	274.58	36,943.5		55,867	0.848	1.283	
	6731.70		269.48	274.98	37,051.2		59,567	0.851	1.367	
	6731.80		269.87	275.38	37,159.1		63,277	0.853	1.453	
	6731.90		270.27	275.78	37,267.1		66,999	0.856	1.538	
	6732.00		270.66	276.18	37,375.3		70,731	0.858	1.624	
	6732.10		271.05	276.58	37,483.6		74,474	0.861	1.710	
	6732.20		271.44	276.98	37,592.1		78,228	0.863	1.796	
	6732.30		271.83	277.38	37,700.8		81,992	0.865	1.882	
	6732.40		272.23	277.78	37,809.6		85,768	0.868	1.969	
	6732.50		272.62	278.18	37,918.5		89,554	0.870	2.056	
	6732.60		273.01	278.58	38,027.7		93,352	0.873	2.143	
	6732.70		273.40	278.98	38,136.9		97,160	0.876	2.230	
	6732.80		273.79	279.38	38,246.4		100,979	0.878	2.318	
	6732.90		274.19	279.78	38,356.0		104,809	0.881	2.406	
	6733.00		274.58	280.18	38,465.7		108,650	0.883	2.494	
	6733.10		274.97	280.58	38,575.6		112,502	0.886	2.583	
	6733.20		275.36	280.98	38,685.7		116,365	0.888	2.671	
	6733.30		275.75	281.38	38,795.9		120,239	0.891	2.760	
	6733.40		276.15	281.78	38,906.3		124,124	0.893	2.850	
	6733.50		276.54	282.18	39,016.8		128,021	0.896	2.939	
	6733.60		276.93	282.58	39,127.5		131,928	0.898	3.029	
	6733.70		277.32	282.98	39,238.4		135,846	0.901	3.119	
	6733.80		277.71	283.38	39,349.4		139,776	0.903	3.209	
	6733.90		278.11	283.78	39,460.6		143,716	0.906	3.299	
	6734.00		278.50	284.18	39,571.9		147,668	0.908	3.390	
	6734.10		278.89	284.58	39,683.4		151,630	0.911	3.481	
	6734.20		279.28	284.98	39,795.0		155,604	0.914	3.572	
	6734.30		279.67	285.38	39,906.8		159,589	0.916	3.664	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Sub Regional Pond SR6

\* User input data shown in blue.

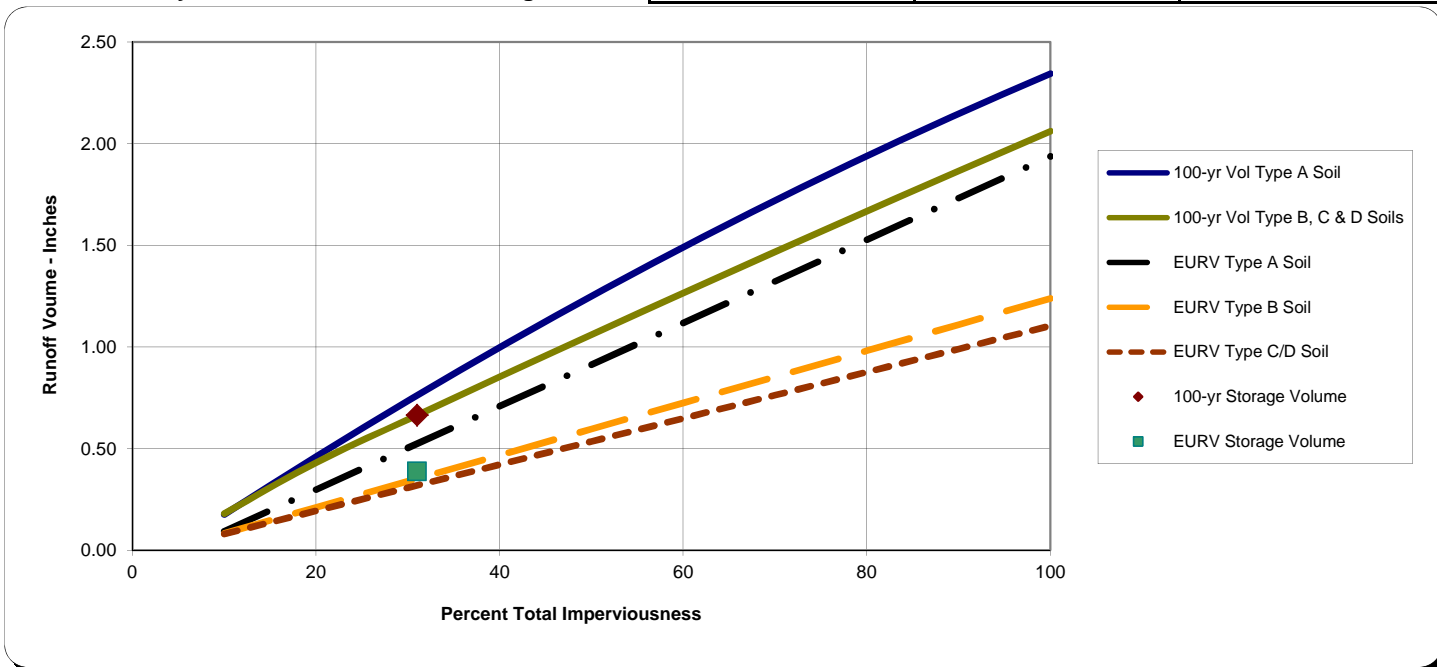
Area of Watershed (acres)	229.00	
Subwatershed Imperviousness	31.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	31.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	229.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.39	7.3917	Design Outlet to Empty EURV in 72 Hours
0.66	12.68	194.65

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

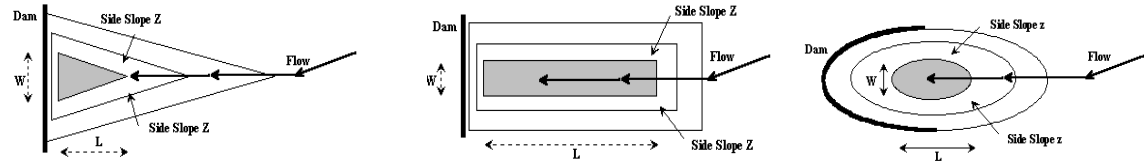


STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

STAGE-STORAGE SIZING FOR POLYGONAL, ELLIPTICAL, OR IRREGULAR PONDS

Project: Falcon DBPS  
Basin ID: Sub Regional Pond SR6

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_



Design Information (Input):

Width of Pond Bottom, W = 260.00 ft  
Length of Pond Bottom, L = 320.00 ft  
Dam Side-slope (H:V), Z<sub>d</sub> = 4.00 ft/ft

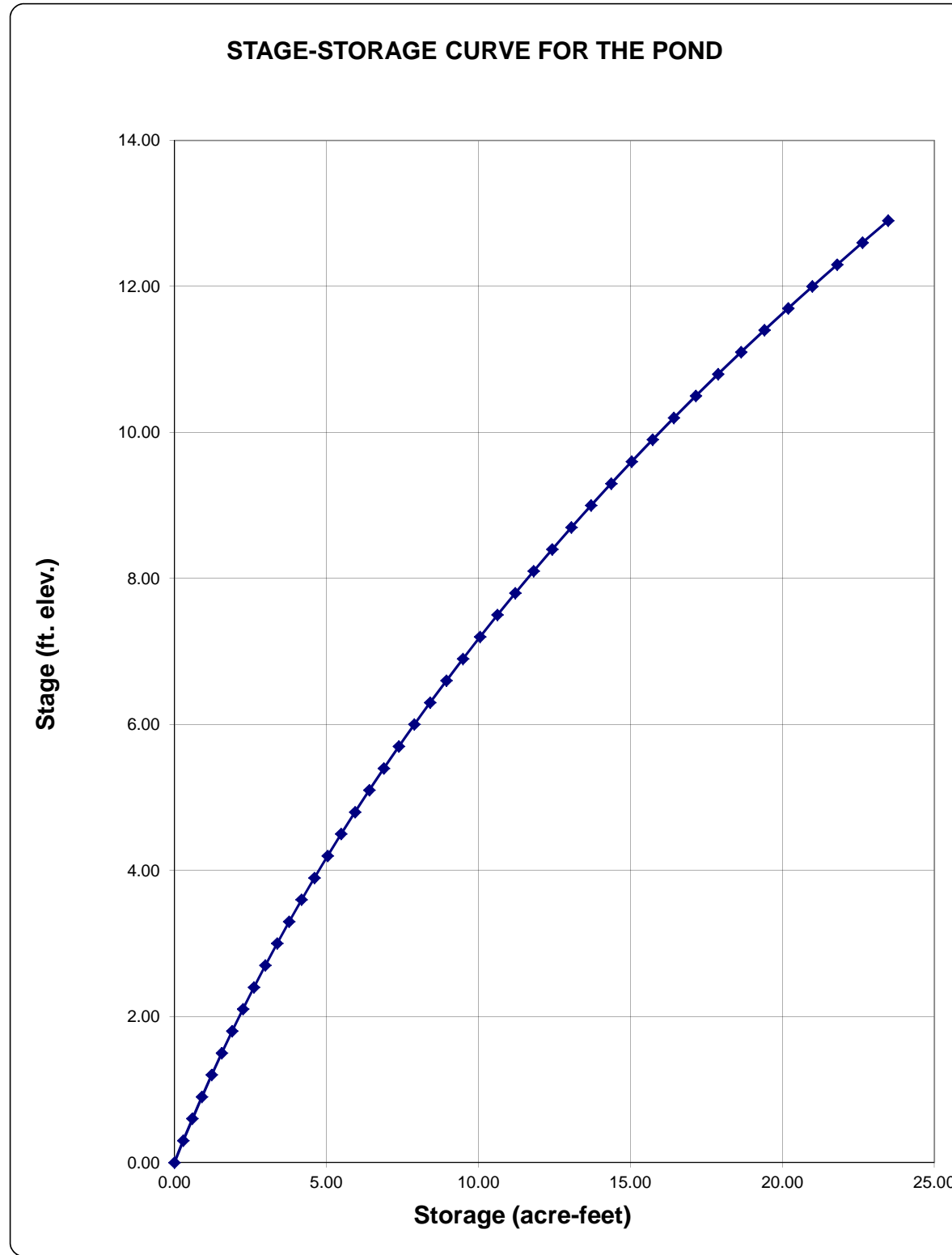
Check Pond Shape

Right Triangle  OR...  
Isosceles Triangle  OR...  
Rectangle  OR...  
Circle / Ellipse  OR...  
Irregular  (Use Override values in cells G32:G52)

Stage-Storage Relationship:

Storage Requirement from Sheet 'Modified FAA': \_\_\_\_\_ acre-ft.  
Storage Requirement from Sheet 'Hydrograph': 6.943 acre-ft.  
Storage Requirement from Sheet 'Full-Spectrum': 7.392 MINOR 12.680 MAJOR acre-ft.

Labels for WQCV, Minor, & Major Storage Stages (input)	Stage (ft) (input)	Side Slope (H:V) Below El. (input)	Pond Width at Stage (ft) (output)	Pond Length at Stage (ft) (output)	Surface Area at Stage (ft <sup>2</sup> ) (output)	Surface Area at Stage (ft <sup>2</sup> ) User Override (output)	Volume Below Stage (ft <sup>3</sup> ) (output)	Surface Area at Stage (acres) (output)	Volume Below Stage (acre-ft) (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (for goal seek)
	0.00		260.00	320.00	41,600.0		0.955	0.000		
	0.30	5.00	264.41	325.42	43,022.4		12,693	0.988	0.291	
	0.60	5.00	268.82	330.85	44,468.8		25,817	1.021	0.593	
	0.90	5.00	273.22	336.27	45,939.0		39,378	1.055	0.904	
	1.20	5.00	277.63	341.70	47,433.2		53,384	1.089	1.226	
	1.50	5.00	282.04	347.12	48,951.2		67,842	1.124	1.557	
	1.80	5.00	286.45	352.55	50,493.2		82,758	1.159	1.900	
	2.10	5.00	290.85	357.97	52,059.1		98,141	1.195	2.253	
	2.40	5.00	295.26	363.40	53,648.9		113,997	1.232	2.617	
	2.70	5.00	299.67	368.82	55,262.6		130,334	1.269	2.992	
	3.00	5.00	304.08	374.25	56,900.2		147,159	1.306	3.378	
	3.30	5.00	308.48	379.67	58,561.8		164,478	1.344	3.776	
	3.60	5.00	312.89	385.10	60,247.2		182,299	1.383	4.185	
	3.90	5.00	317.30	390.52	61,956.6		200,630	1.422	4.606	
	4.20	5.00	321.71	395.95	63,689.8		219,477	1.462	5.038	
	4.50	5.00	326.12	401.37	65,447.0		238,847	1.502	5.483	
	4.80	5.00	330.52	406.80	67,228.1		258,748	1.543	5.940	
	5.10	5.00	334.93	412.22	69,033.1		279,188	1.585	6.409	
	5.40	5.00	339.34	417.65	70,862.0		300,172	1.627	6.891	
EURV	5.70	5.00	343.75	423.07	72,714.8		321,708	1.669	7.385	
	6.00	5.00	348.15	428.50	74,591.6		343,804	1.712	7.893	
	6.30	5.00	352.56	433.92	76,492.2		366,467	1.756	8.413	
	6.60	5.00	356.97	439.35	78,416.8		389,703	1.800	8.946	
	6.90	5.00	361.38	444.77	80,365.2		413,521	1.845	9.493	
	7.20	5.00	365.78	450.20	82,337.6		437,926	1.890	10.053	
	7.50	5.00	370.19	455.62	84,333.9		462,927	1.936	10.627	
	7.80	5.00	374.60	461.05	86,354.1		488,530	1.982	11.215	
100-yr	8.10	5.00	379.01	466.47	88,398.2		514,743	2.029	11.817	
	8.40	5.00	383.42	471.90	90,466.2		541,572	2.077	12.433	
	8.70	5.00	387.82	477.32	92,558.2		569,026	2.125	13.063	
	9.00	5.00	392.23	482.75	94,674.0		597,111	2.173	13.708	
	9.30	5.00	396.64	488.17	96,813.8		625,834	2.223	14.367	
	9.60	5.00	401.05	493.60	98,977.5		655,203	2.272	15.041	
	9.90	5.00	405.45	499.02	101,165.0		685,224	2.322	15.731	
Spillway	10.20	5.00	409.86	504.45	103,376.5		715,905	2.373	16.435	
	10.50	5.00	414.27	509.87	105,611.9		747,254	2.425	17.155	
	10.80	5.00	418.68	515.30	107,871.2		779,276	2.476	17.890	
	11.10	5.00	423.09	520.72	110,154.5		811,980	2.529	18.640	
	11.40	5.00	427.49	526.15	112,461.6		845,372	2.582	19.407	
	11.70	5.00	431.90	531.57	114,792.7		879,461	2.635	20.190	
	12.00	5.00	436.31	536.99	117,147.6		914,252	2.689	20.988	
	12.30	5.00	440.72	542.42	119,526.5		949,753	2.744	21.803	
	12.60	5.00	445.12	547.84	121,929.3		985,971	2.799	22.635	
	12.90	5.00	449.53	553.27	124,356.0		1,022,914	2.855	23.483	



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: The Meadows Pond #1

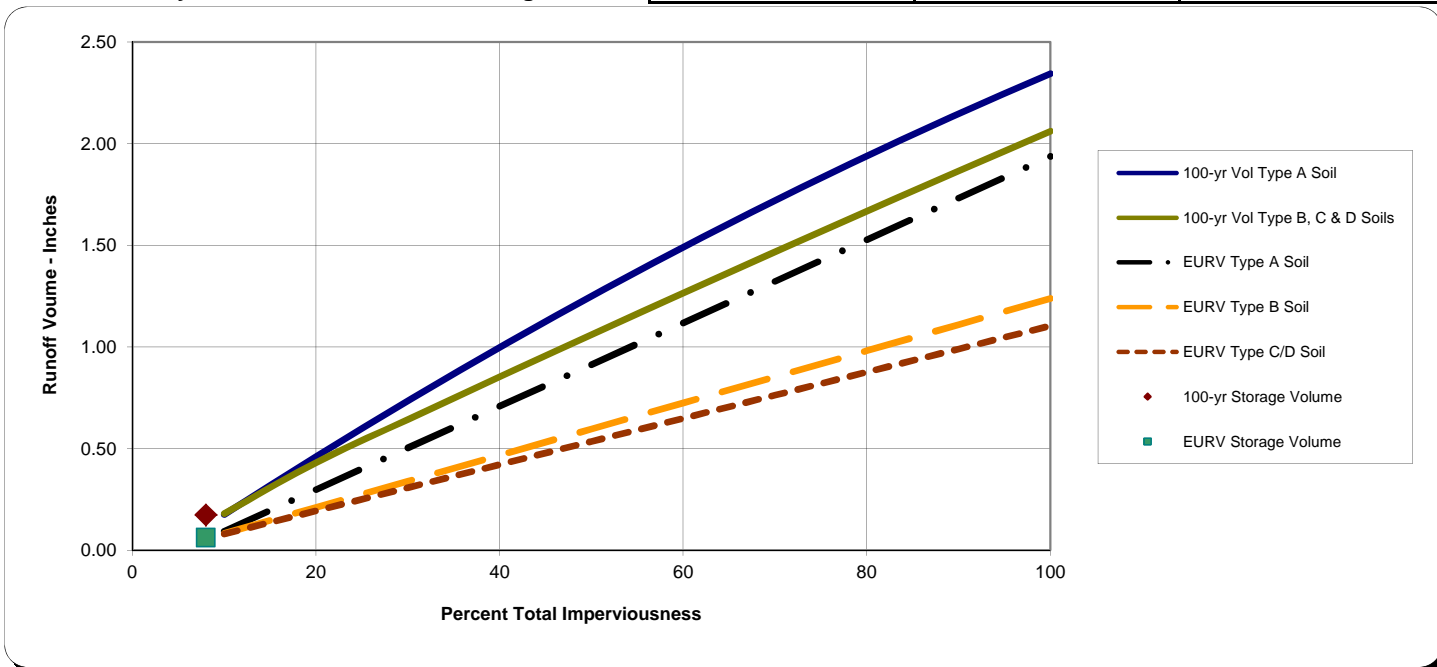
\* User input data shown in blue.

Area of Watershed (acres)	37.00
Subwatershed Imperviousness	8.0%
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0
Effective Imperviousness <sup>1</sup>	8.0%
Hydrologic Soil Type	Percentage of Area      Area (acres)
Type A	0.0
Type B	100.0%
Type C or D	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.06	0.1922	Design Outlet to Empty EURV in 72 Hours
0.17	0.54	31.45

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **The Meadows Pond #1**

Project: **Falcon DBPS**  
 Basin ID: **The Meadows Pond #1**

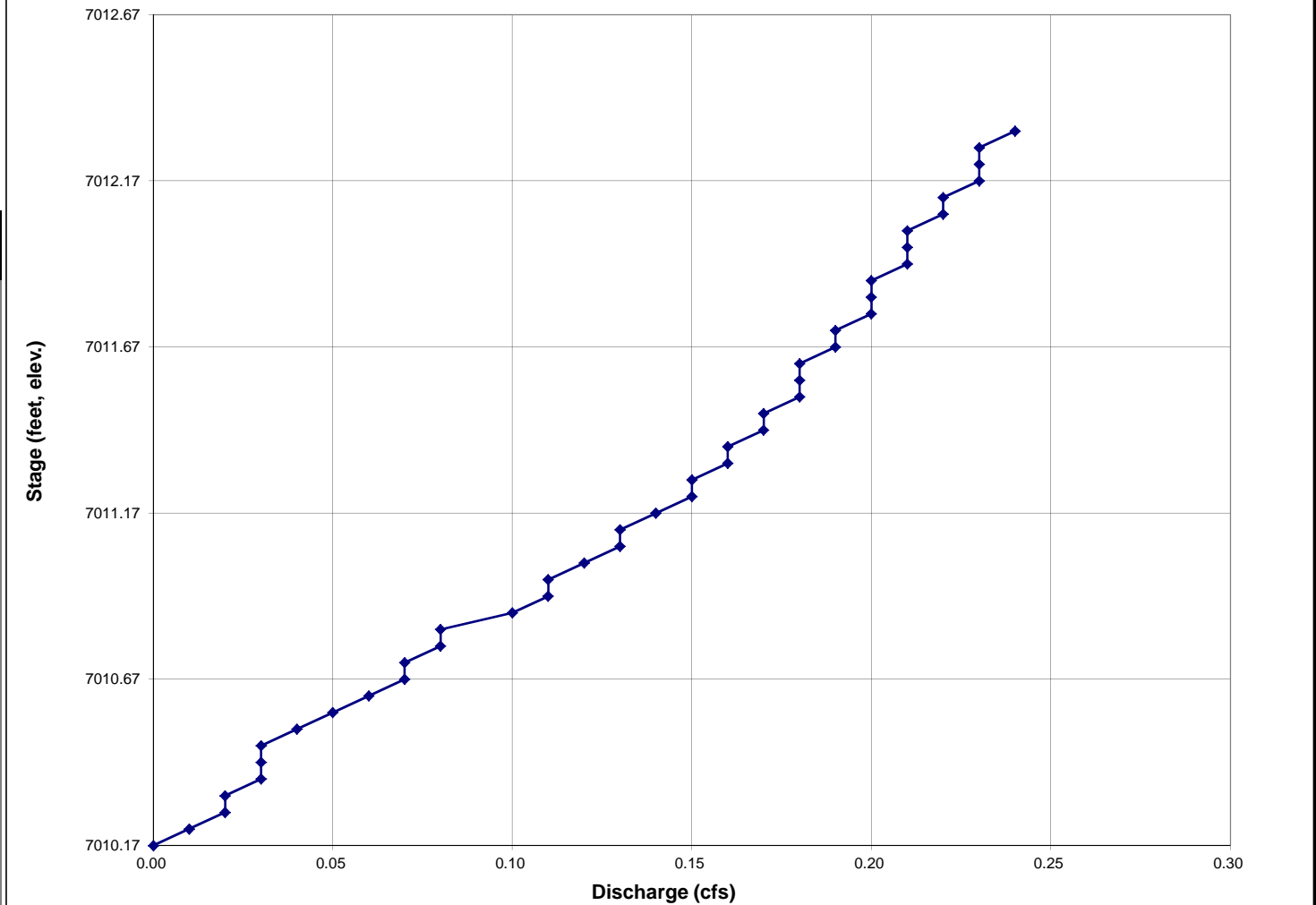
**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p$  = 8.0 percent  
 Catchment Area,  $A_c$  = 37.000 acres  
 Diameter of holes,  $D$  = 1.431 in.  
 Number of holes per row,  $N$  = 1  
 Time to Drain the Pond = 72 hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**  
 Depth at WQCV outlet above lowest perforation,  $H$  = 12 inches  
 Vertical distance between rows,  $h$  = 4.00 inches  
 Number of rows,  $N_L$  = 3  
 Orifice discharge coefficient,  $C_o$  = 0.65  
 Height of slot,  $H_s$  = in.  
 Width of slot,  $W_s$  = in.  
 Perforated Plate Examples

**Outlet Design Information (Output):**  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.062 watershed inches  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.192 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 1.61 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 1.61 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.011 square feet

**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow	
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18		
7010.17	7010.17	7010.50	7010.83																	
Collection Capacity for Each Row of Holes in cfs																				
7010.17	0.003	0.000	0.000																	0.00
7010.22	0.013	0.000	0.000																	0.01
7010.27	0.019	0.000	0.000																	0.02
7010.32	0.023	0.000	0.000																	0.02
7010.37	0.026	0.000	0.000																	0.03
7010.42	0.029	0.000	0.000																	0.03
7010.47	0.032	0.000	0.000																	0.03
7010.52	0.035	0.008	0.000																	0.04
7010.57	0.037	0.015	0.000																	0.05
7010.62	0.039	0.020	0.000																	0.06
7010.67	0.041	0.024	0.000																	0.07
7010.72	0.043	0.027	0.000																	0.07
7010.77	0.045	0.030	0.000																	0.08
7010.82	0.047	0.033	0.000																	0.08
7010.87	0.049	0.035	0.012																	0.10
7010.92	0.051	0.038	0.017																	0.11
7010.97	0.052	0.040	0.022																	0.11
7011.02	0.054	0.042	0.025																	0.12
7011.07	0.055	0.044	0.029																	0.13
7011.12	0.057	0.046	0.031																	0.13
7011.17	0.058	0.048	0.034																	0.14
7011.22	0.060	0.049	0.036																	0.15
7011.27	0.061	0.051	0.039																	0.15
7011.32	0.063	0.053	0.041																	0.16
7011.37	0.064	0.054	0.043																	0.16
7011.42	0.065	0.056	0.045																	0.17
7011.47	0.067	0.057	0.047																	0.17
7011.52	0.068	0.059	0.048																	0.18
7011.57	0.069	0.060	0.050																	0.18
7011.62	0.070	0.062	0.052																	0.18
7011.67	0.071	0.063	0.053																	0.19
7011.72	0.073	0.064	0.055																	0.19
7011.77	0.074	0.066	0.056																	0.20
7011.82	0.075	0.067	0.058																	0.20
7011.87	0.076	0.068	0.059																	0.20
7011.92	0.077	0.069	0.061																	0.21
7011.97	0.078	0.071	0.062																	0.21
7012.02	0.079	0.072	0.064																	0.21
7012.07	0.080	0.073	0.065																	0.22
7012.12	0.081	0.074	0.066																	0.22
7012.17	0.082	0.075	0.067																	0.23
7012.22	0.083	0.076	0.069																	0.23
7012.27	0.084	0.078	0.070																	0.23
7012.32	0.085	0.079	0.071																	0.24

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

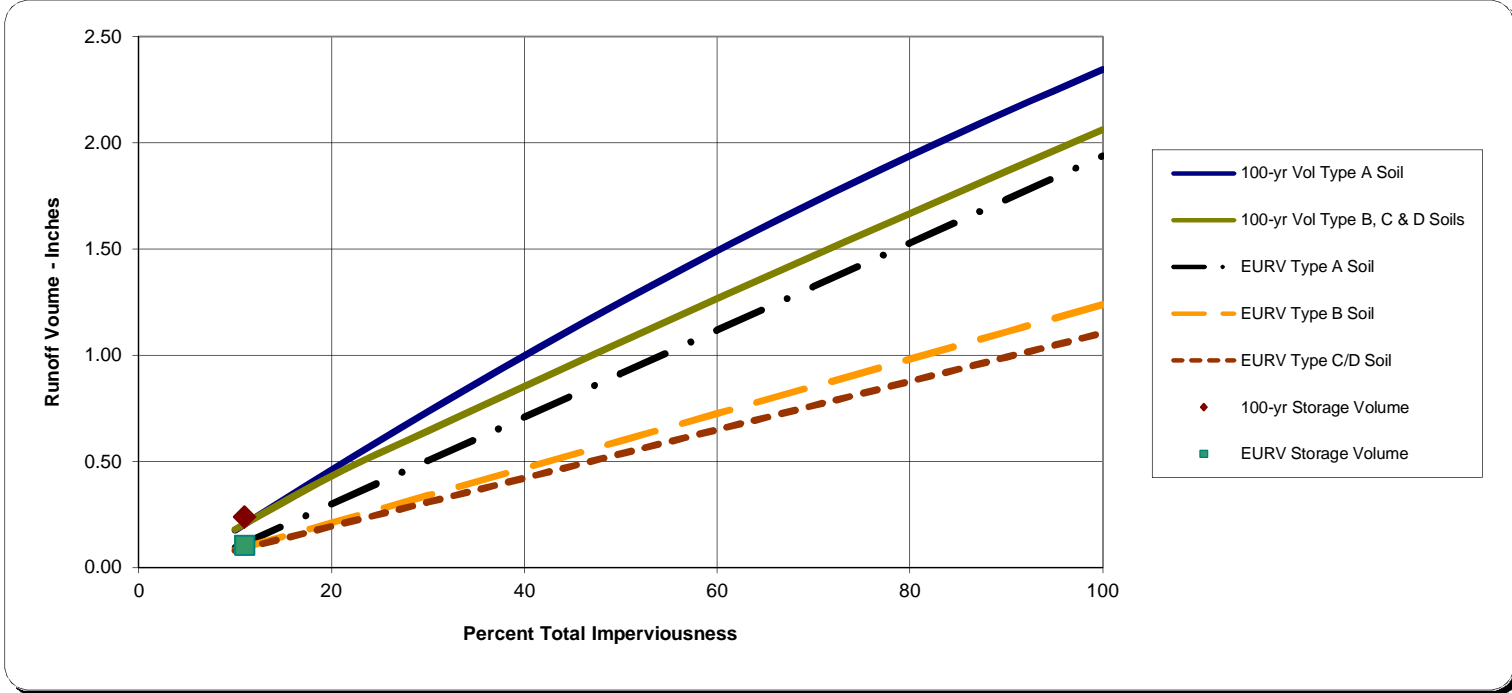
**Project:** Falcon DBPS  
**Basin ID:** The Meadows Pond #2

\* User input data shown in blue.

Area of Watershed (acres)	186.00	
Subwatershed Imperviousness	11.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	11.0%	
Hydrologic Soil Type	<b>Percentage of Area</b>	<b>Area (acres)</b>
Type A	0.0	0.0
Type B	100.0%	186.0
Type C or D	0.0	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018
Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.10	1.6233	Design Outlet to Empty EURV in 72 Hours
0.24	3.69	158.10

**Excess Urban Runoff Volume<sup>4</sup>**  
**100-year Detention Volume Including WQCV<sup>5</sup>**



- Notes:**
- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
  - 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
  - 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
  - 4) EURV approximates the difference between developed and pre-developed runoff volume.
  - 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV





## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Woodmen Hills Pond #1 South

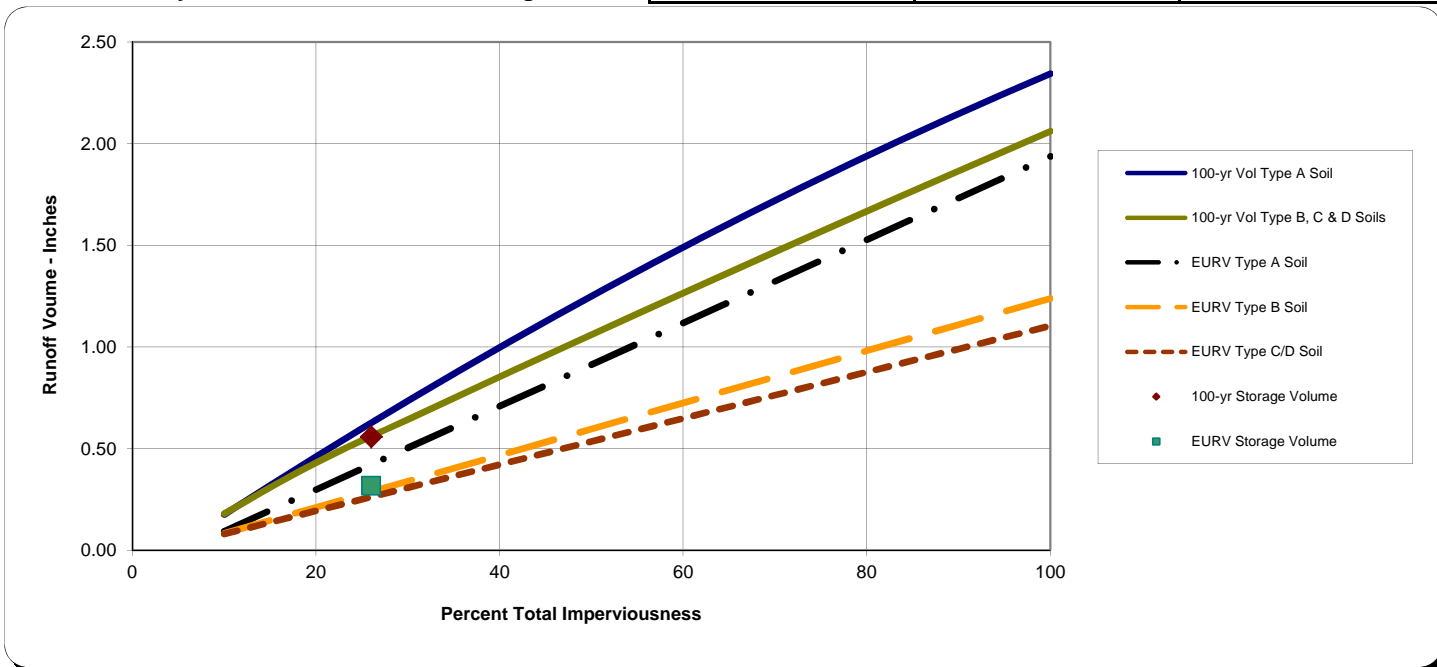
\* User input data shown in blue.

Area of Watershed (acres)	226.00	
Subwatershed Imperviousness	26.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	26.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	226.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.32	5.9642	Design Outlet to Empty EURV in 72 Hours
0.56	10.52	192.10

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV



## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Woodmen Hills Pond #2

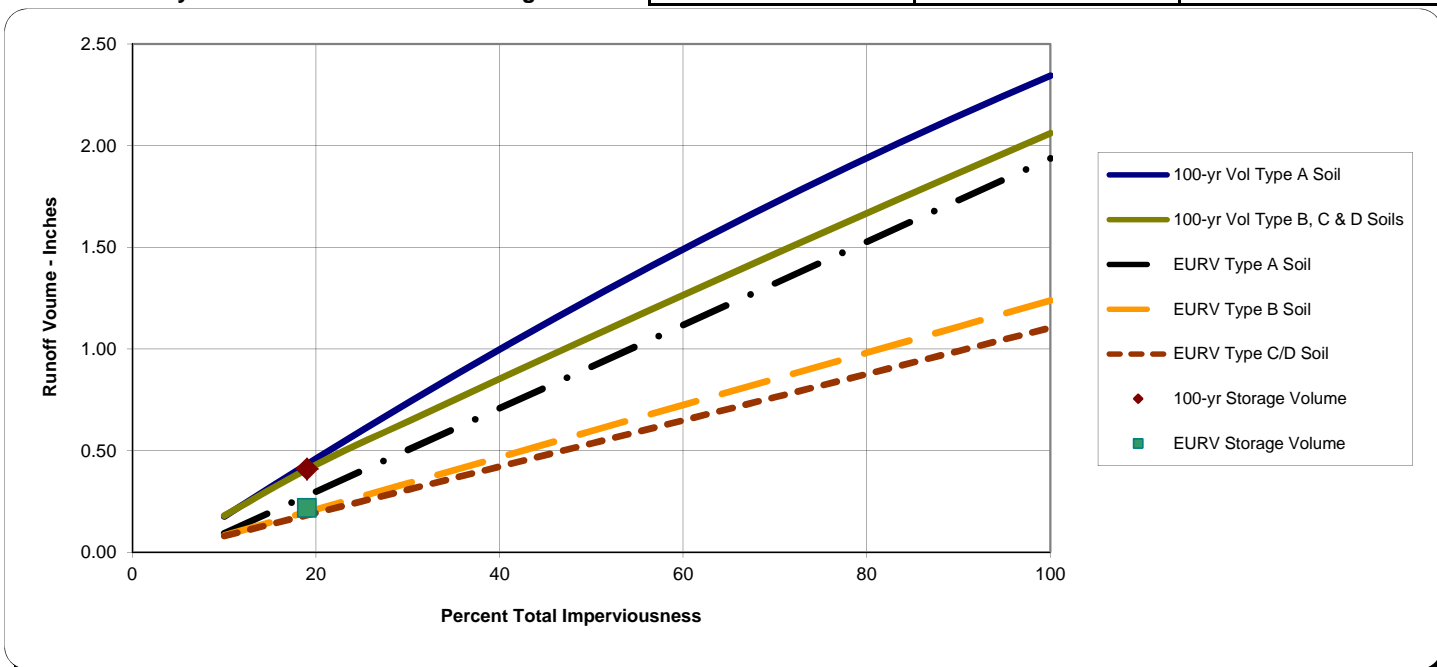
\* User input data shown in blue.

Area of Watershed (acres)	75.00	
Subwatershed Imperviousness	19.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	19.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	75.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.22	1.3611	Design Outlet to Empty EURV in 72 Hours
0.41	2.56	63.75

Excess Urban Runoff Volume<sup>4</sup>  
100-year Detention Volume Including WQCV<sup>5</sup>



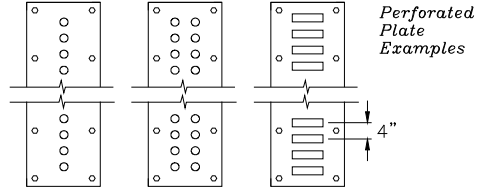
**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

### STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #2**

**WQCV Design Volume (Input):**  
 Catchment Imperviousness,  $I_p = 19.0$  percent  
 Catchment Area,  $A = 75.000$  acres  
 Depth at WQCV outlet above lowest perforation,  $H = 12$  inches  
 Vertical distance between rows,  $h = 4.00$  inches  
 Number of rows,  $N_L = 3$   
 Orifice discharge coefficient,  $C_o = 0.65$   
 Diameter of holes,  $D =$  in.  
 Number of holes per row,  $N =$   
 OR  
 Height of slot,  $H = 2.00$  in.  
 Width of slot,  $W = 5.78$  in.  
 Time to Drain the Pond = **72** hours  
**Excess Urban Runoff Volume Method Selected (72-Hour Release)**



**Outlet Design Information (Output):**  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 0.218 watershed inches  
 Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') = 1.361 acre-feet  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o = 11.55$  square inches  
 Total opening area at each row based on user-input above,  $A_o = 11.55$  square inches  
 Total opening area at each row based on user-input above,  $A_o = 0.080$  square feet

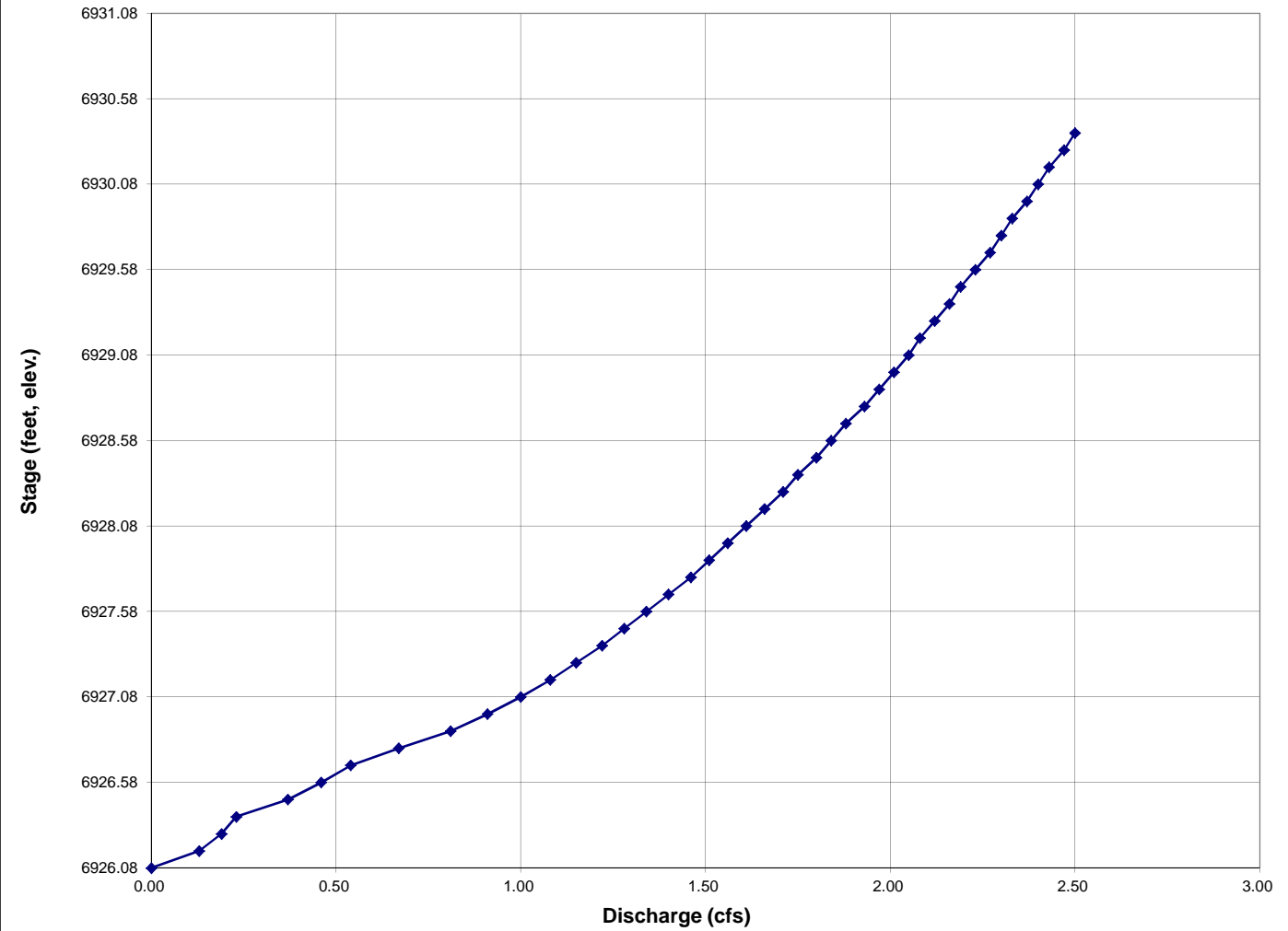
**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		$\Sigma$ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6926.08	6926.42	6926.75																
	Collection Capacity for Each Row of Holes in cfs																		
6926.08	0.000	0.000	0.000																0.00
6926.18	0.130	0.000	0.000																0.13
6926.28	0.186	0.000	0.000																0.19
6926.38	0.228	0.000	0.000																0.23
6926.48	0.264	0.102	0.000																0.37
6926.58	0.295	0.167	0.000																0.46
6926.68	0.323	0.213	0.000																0.54
6926.78	0.349	0.251	0.072																0.67
6926.88	0.374	0.284	0.151																0.81
6926.98	0.396	0.313	0.201																0.91
6927.08	0.418	0.340	0.240																1.00
6927.18	0.438	0.365	0.274																1.08
6927.28	0.458	0.388	0.305																1.15
6927.38	0.477	0.410	0.332																1.22
6927.48	0.495	0.431	0.357																1.28
6927.58	0.512	0.451	0.381																1.34
6927.68	0.529	0.470	0.403																1.40
6927.78	0.545	0.488	0.425																1.46
6927.88	0.561	0.506	0.445																1.51
6927.98	0.576	0.523	0.464																1.56
6928.08	0.591	0.539	0.483																1.61
6928.18	0.606	0.555	0.500																1.66
6928.28	0.620	0.571	0.518																1.71
6928.38	0.634	0.586	0.534																1.75
6928.48	0.648	0.601	0.550																1.80
6928.58	0.661	0.615	0.566																1.84
6928.68	0.674	0.629	0.581																1.88
6928.78	0.687	0.643	0.596																1.93
6928.88	0.700	0.656	0.611																1.97
6928.98	0.712	0.669	0.625																2.01
6929.08	0.724	0.682	0.639																2.05
6929.18	0.736	0.695	0.652																2.08
6929.28	0.748	0.708	0.666																2.12
6929.38	0.760	0.720	0.679																2.16
6929.48	0.771	0.732	0.691																2.19
6929.58	0.782	0.744	0.704																2.23
6929.68	0.794	0.755	0.716																2.27
6929.78	0.804	0.767	0.728																2.30
6929.88	0.815	0.778	0.740																2.33
6929.98	0.826	0.789	0.752																2.37
6930.08	0.837	0.800	0.764																2.40
6930.18	0.847	0.811	0.775																2.43
6930.28	0.857	0.822	0.786																2.47
6930.38	0.867	0.833	0.797																2.50

### STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #2**

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**



**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

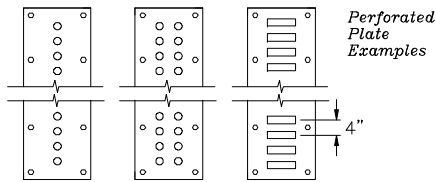
Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #3**

**WQCV Design Volume (Input):**

Catchment Imperviousness,  $I_p$  = 22.0 percent  
 Catchment Area, A = 183,000 acres  
 Depth at WQCV outlet above lowest perforation, H = 12 inches  
 Vertical distance between rows, h = 4.00 inches  
 Number of rows, NL = 3  
 Orifice discharge coefficient,  $C_o$  = 0.65

Diameter of holes, D =  in.  
 Number of holes per row, N =  OR  
 Height of slot, H = 2.00 in.  
 Width of slot, W = 16.96 in.

Time to Drain the Pond = 72 hours  
**Drain Time Other than USDCM-recommended 40-hour has been selected.**



**Outlet Design Information (Output):**

Water Quality Capture Volume ( $1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I)$ ), WQCV = 0.124 watershed inches  
 Water Quality Capture Volume (WQCV) = 1.886 acre-feet  
**Design Volume (WQCV / 12 \* Area \* 1.2) Vol = 2.264 acre-feet**  
 Recommended maximum outlet area per row (based on 4" vertical spacing of rows),  $A_o$  = 16.05 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 33.93 square inches  
 Total opening area at each row based on user-input above,  $A_o$  = 0.236 square feet

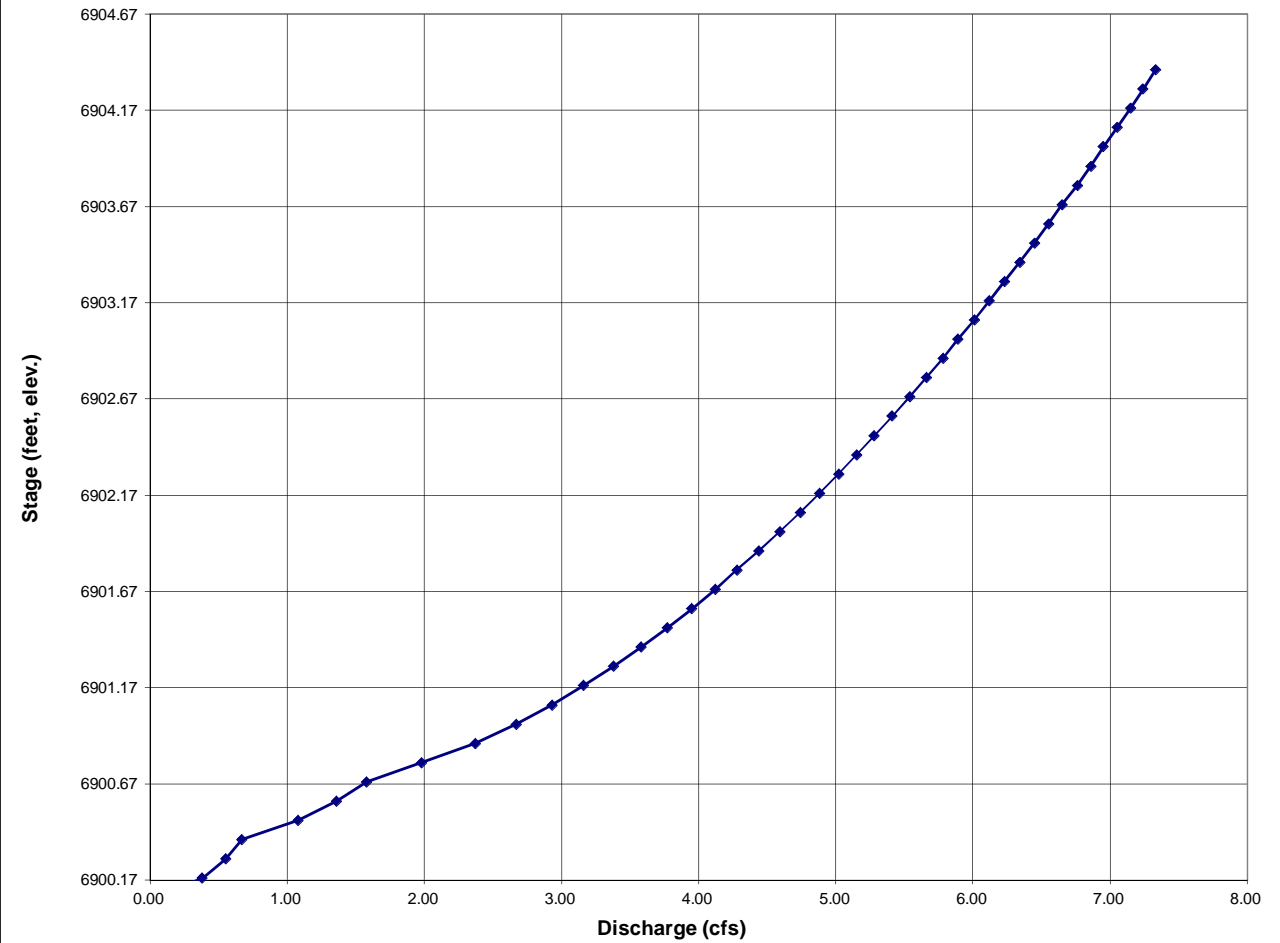
**Calculation of Collection Capacity:**

Stage ft (input)	Central Elevations of Rows of Holes in feet																		Σ Flow
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	
	6900.08	6900.42	6900.75																
	Collection Capacity for Each Row of Holes in cfs																		
6900.08	0.000	0.000	0.000																0.00
6900.18	0.383	0.000	0.000																0.38
6900.28	0.545	0.000	0.000																0.55
6900.38	0.670	0.000	0.000																0.67
6900.48	0.774	0.301	0.000																1.08
6900.58	0.866	0.492	0.000																1.36
6900.68	0.950	0.627	0.000																1.58
6900.78	1.026	0.737	0.213																1.98
6900.88	1.097	0.834	0.443																2.37
6900.98	1.164	0.920	0.589																2.67
6901.08	1.227	0.998	0.706																2.93
6901.18	1.287	1.071	0.806																3.16
6901.28	1.345	1.140	0.895																3.38
6901.38	1.400	1.204	0.976																3.58
6901.48	1.453	1.265	1.050																3.77
6901.58	1.504	1.324	1.120																3.95
6901.68	1.553	1.380	1.185																4.12
6901.78	1.601	1.433	1.247																4.28
6901.88	1.648	1.485	1.306																4.44
6901.98	1.693	1.535	1.363																4.59
6902.08	1.737	1.583	1.417																4.74
6902.18	1.780	1.630	1.470																4.88
6902.28	1.822	1.676	1.520																5.02
6902.38	1.863	1.721	1.569																5.15
6902.48	1.903	1.764	1.617																5.28
6902.58	1.942	1.806	1.663																5.41
6902.68	1.981	1.848	1.707																5.54
6902.78	2.018	1.888	1.751																5.66
6902.88	2.055	1.928	1.794																5.78
6902.98	2.092	1.966	1.835																5.89
6903.08	2.128	2.004	1.876																6.01
6903.18	2.163	2.042	1.916																6.12
6903.28	2.197	2.078	1.955																6.23
6903.38	2.232	2.114	1.993																6.34
6903.48	2.265	2.150	2.031																6.45
6903.58	2.298	2.185	2.068																6.55
6903.68	2.331	2.219	2.104																6.65
6903.78	2.363	2.253	2.139																6.76
6903.88	2.395	2.286	2.174																6.86
6903.98	2.426	2.319	2.209																6.95
6904.08	2.457	2.351	2.243																7.05
6904.18	2.488	2.383	2.276																7.15
6904.28	2.518	2.415	2.309																7.24
6904.38	2.548	2.446	2.342																7.33

**STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET**

Project: **Falcon DBPS**  
 Basin ID: **Woodmen Hills Pond #3**

**STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE**





## EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Falcon DBPS

Basin ID: Woodmen Hills Pond #5

\* User input data shown in blue.

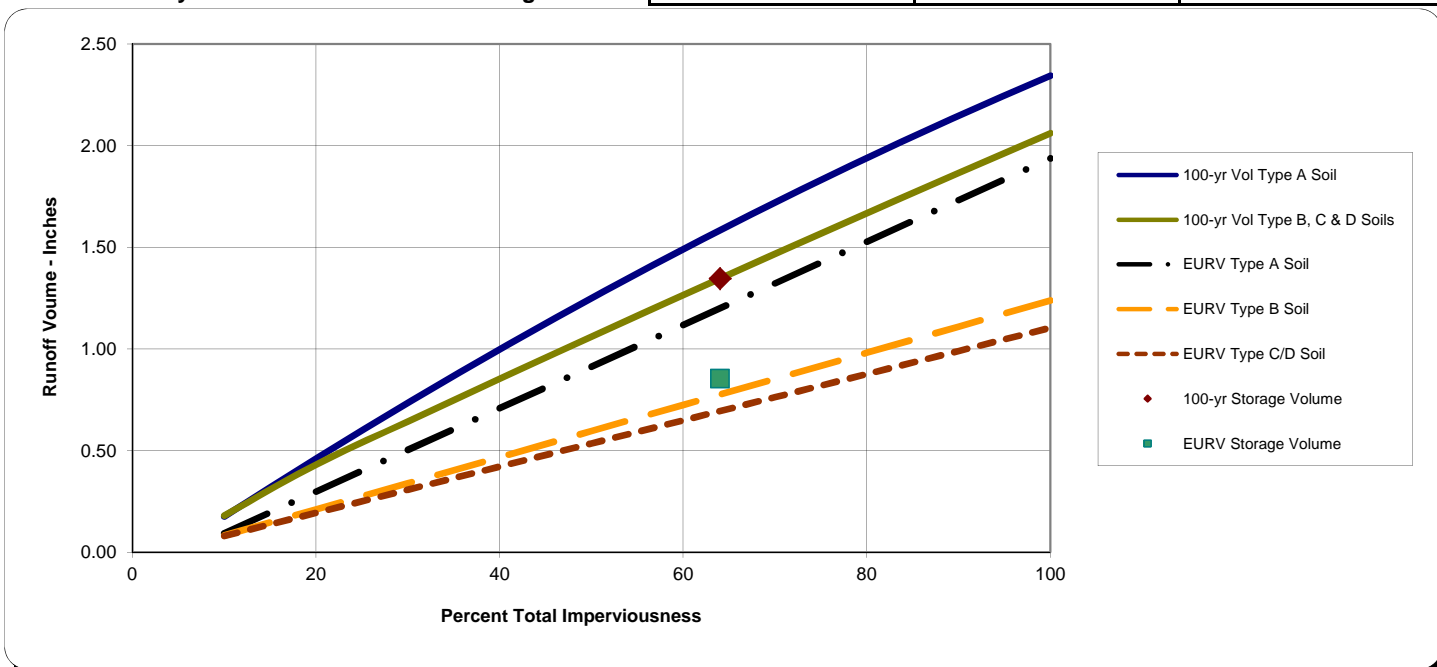
Area of Watershed (acres)	28.00	
Subwatershed Imperviousness	64.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0 ▼
Effective Imperviousness <sup>1</sup>	64.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	100.0%	28.0
Type C or D	0.0%	0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
4.5	0.6	0.0018

Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.85	1.9918	Design Outlet to Empty EURV in 72 Hours
1.35	3.14	23.80

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



**Notes:**

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

