Appendix F

Reclaim Pond Outlet Channel Sizing

Calculation Documentation

Problem Statement:

The Chino Mines Company's Cobre Mine (Cobre), in accordance with the New Mexico Environmental Department (NMED) and the Mining and Minerals Division (MMD) regulation, must produce a closure plan in the event of a mine closure. The Cobre Closure Plan (CCP) serves to prevent significant risk of environmental impact and loss of life in the event of a mine closure. The reclaimed Reclaim Pond (RRP), located to the north and upstream of Cobre's Main Tailings Impoundment (MTI), must have a plan to be reclaimed in the event of a mine closure according to the CCP. As part of the plan, the RRP is to have an outlet channel installed to allow clean stormwater to flow freely from the basins located upstream and around the MTI where it will join Cobre's stormwater conveyance network (PLAN, Telesto, 2023). The outlet must be built according to the New Mexico Office of the State Engineer's (OSE) standards. Also, the outlet is to be designed to prevent any future long-term storage of stormwater in the pond and subsequently, infiltration of stored waters from the RRP into the MTI.

Objectives:

1. Design and size a closure RRP outlet channel that will convey the PMP runoff event from the basins upgradient of the reclaim pond to the Grape Gulch Drainage following NMOSE guidelines for dam spillways (OSE 2021).
2. If proposed design is in-adequate, redesign to appropriate dimensions.

Approach:

1. Delineate basins upstream of the RRP.
2. Calculate PMP/PMF.
3. Develop stage-capacity relationship for RRP.
4. Determine proposed RRP outlet channel stage capacity.
5. Determine stage-capacity-discharge relationship for RRP and outlet
6. Determine peak stormwater inflow to RRP.
7. Determine if RRP outlet channel with a bottom width of 20 feet as proposed in the 2014 CCP is properly sized to convey the PMP runoff event from the RRP to the Grape Gulch Drainage.
8. Change design as necessary

TELESTO SOLUTIONS • INCORPORATED	Job No: 200189h-001-01 Client: Chino Mines Company Page 2 of 28 Task: Reclaim Pond Computed By: G. Laney GL Date: 05/23/23 Outlet Channel Sizing Checked By: J. Cullor JC Date: 05/31/23

Data and Assumptions:

1. Basin delineation:

Data and Assumptions:

2. Basin data: All basin data was retrieved from the DP-181 stormwater runoff calculation report (Telesto, 2022) and are assumed to be the same as presented in the report.

Basin Data			
Basin	Area (mi^2)	Curve Number (CN)	Lag Time (min)
Reclaim Pond	0.4156	76.4	11.7
MTI Top	0.2434	79.5	14.4
MTI-1	0.0572	71	5.9
MTI-2	0.014	80	2.3
MTI-3	0.0053	71	4.8

3. Routing data: Dimensions taken as measured or designed in AutoCAD. Manning's n taken at 0.03 for all reaches (Chow, 1959). The RRP outlet taken as a smooth and uniform excavated rock cut with a Manning's n of 0.035 (Chow, 1959)

Routing Data					
Reach	Length	Slope (ft/ft)	Manning's n	Bottom Width (ft)	Side Slope (ft/ft)
Reclaim Pond Outlet Channel	846.63	0.015874	0.035	20	1
Tailings Surface Drainage A	2666.5	0.01	0.03	0.01	10
Tailings Surface Drainage B	300	0.01	0.03	0.01	10
MTI-1 to MTI Top	1107	0.045	0.03	2	2
MTI-2 to MTI-Top	1590	0.052	0.03	2	2
MTI-3 to MTI Top	1268.23	0.059	0.03	2	2

4. Excavated or Dredged Channels			
a. Earth, straight, and uniform			
1. clean, recently completed	0.016	0.018	0.020
2. clean, after weathering	0.018	0.022	0.025
3. gravel, uniform section, clean	0.022	0.025	0.030
4. with short grass, few weeds	0.022	0.027	0.033
b. Earth winding and sluggish			
1. no vegetation	0.023	0.025	0.030
2. grass, some weeds	0.025	0.030	0.033
3. dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. earth bottom and rubble sides	0.028	0.030	0.035
5. stony bottom and weedy banks	0.025	0.035	0.040
6. cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. no vegetation	0.025	0.028	0.033
2. light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. smooth and uniform	0.025	0.035	0.040
2. jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. dense weeds, high as flow depth	0.050	0.080	0.120
2. clean bottom, brush on sides	0.040	0.050	0.080
3. same as above, highest stage of flow	0.045	0.070	0.110
4. dense brush, high stage	0.080	0.100	0.140

Data and Assumptions:

4. PMP/PMF.
   a) Basin shapefile (for REPS GIS PMP tool) (REPS, 2018). The PMP event is defined by the CO/NM REPS tool as required by the NMOSE dam spillway guidelines (OSE, 2021).

TELESTO SOLUTIONS INCORPORATED		
Job No: 200189h-001-01	Client: Chino Mines Company	Page 5 of 28
Task: Reclaim Pond	Computed By: G. Laney	Date: 05/23/23
Outlet Channel Sizing	Checked By: J. Cullor	Date: 05/31/23

Data and Assumptions:

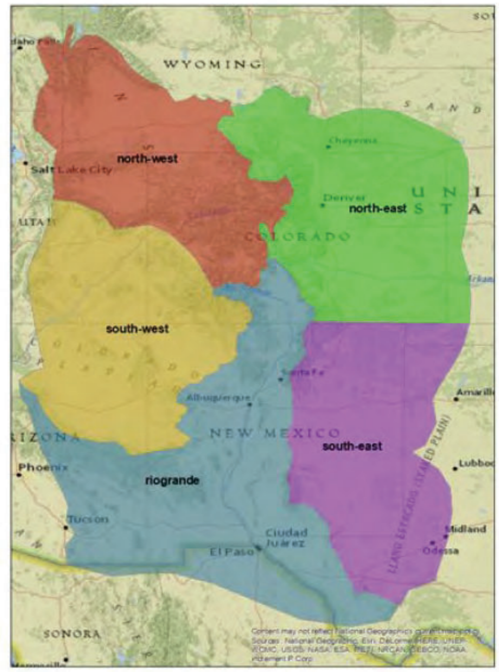
4. PMP/PMF.

   b) Unscaled hyetographs (OSE, 2021)

Local Storm (LS)	
Time	1. Synthetic
Minutes	Unscaled Incremental Precipitation
5	0.0045
10	0.0070
15	0.0120
20	0.0190
25	0.0308
30	0.0406
35	0.0749
40	0.1340
45	0.1570
50	0.1280
55	0.1050
60	0.0910
65	0.0462
70	0.0345
75	0.0255
80	0.0225
85	0.0160
90	0.0140
95	0.0100
100	0.0080
105	0.0060
110	0.0050
115	0.0045
120	0.0040
125	0.0030
130	0.0030
135	0.0040
140	0.0050
145	0.0060
150	0.0180
155	0.0060
160	0.0050
165	0.0040
170	0.0030
175	0.0020
180	0.0010

Mesoscale with Embedded Convection (MEC)	
Time	2. Synthetic
Minutes	Unscaled Incremental Precipitation
5	0.0092
10	0.0100
15	0.0110
20	0.0119
25	0.0129
30	0.0140
35	0.0151
40	0.0163
45	0.0175
50	0.0188
55	0.0201
60	0.0215
65	0.0228
70	0.0230
75	0.0240
80	0.0310
85	0.0480
90	0.0800
95	0.0600
100	0.0440
105	0.0360
110	0.0260
115	0.0250
120	0.0230
125	0.0229
130	0.0228
135	0.0222
140	0.0208
145	0.0194
150	0.0181
155	0.0169
160	0.0157
165	0.0151
170	0.0141
175	0.0130
180	0.0122
185	0.0113
190	0.0104
195	0.0096
200	0.0092
205	0.0088
210	0.0084
215	0.0080
220	0.0077
225	0.0073
230	0.0071
235	0.0070
240	0.0069
245	0.0066
250	0.0063
255	0.0061
260	0.0058
265	0.0056
270	0.0054
275	0.0052
280	0.0050
285	0.0048
290	0.0046
295	0.0044
300	0.0042
305	0.0000
310	0.0000
315	0.0000
320	0.0000
325	0.0000
330	0.0000
335	0.0000
340	0.0000
345	0.0000
350	0.0000
355	0.0000
360	0.0000
365	0.0000
370	0.0000
375	0.0000
380	0.0000
385	0.0000
390	0.0000
395	0.0000
400	0.0000
405	0.0000
410	0.0000
415	0.0000
420	0.0000
425	0.0000
430	0.0000
435	0.0000
440	0.0000
445	0.0000
450	0.0000

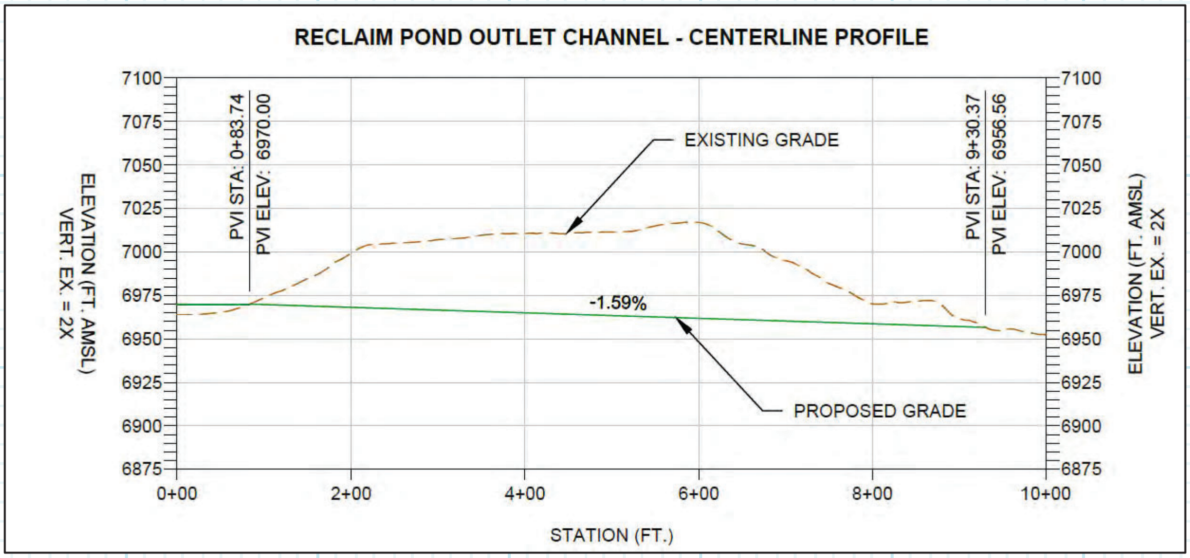
Mid-Latitude Cyclone (MLC)		
Time	3. Center-Loaded Synthetic	4. Multi-Pulse Synthetic
Hours	Unscaled Incremental Precipitation	Unscaled Incremental Precipitation
1	0.0060	0.0050
2	0.0061	0.0100
3	0.0062	0.0125
4	0.0063	0.0150
5	0.0064	0.0200
6	0.0065	0.0310
7	0.0066	0.0150
8	0.0067	0.0050
9	0.0068	0.0000
10	0.0069	0.0000
11	0.0071	0.0000
12	0.0073	0.0000
13	0.0075	0.0050
14	0.0084	0.0150
15	0.0091	0.0300
16	0.0100	0.0500
17	0.0109	0.0850
18	0.0120	0.0400
19	0.0132	0.0250
20	0.0148	0.0150
21	0.0165	0.0100
22	0.0180	0.0000
23	0.0197	0.0000
24	0.0215	0.0000
25	0.0231	0.0000
26	0.0251	0.0000
27	0.0273	0.0000
28	0.0296	0.0030
29	0.0329	0.0050
30	0.0370	0.0080
31	0.0450	0.0110
32	0.0950	0.0140
33	0.0570	0.0177
34	0.0490	0.0220
35	0.0410	0.0275
36	0.0360	0.0307
37	0.0319	0.0391
38	0.0307	0.1330
39	0.0284	0.0620
40	0.0262	0.0540
41	0.0241	0.0421
42	0.0221	0.0380
43	0.0203	0.0342
44	0.0186	0.0245
45	0.0169	0.0197
46	0.0154	0.0140
47	0.0141	0.0080
48	0.0128	0.0040
49	0.0112	0.0000
50	0.0095	0.0000
51	0.0083	0.0000
52	0.0075	0.0000
53	0.0069	0.0000
54	0.0066	0.0050
55	0.0000	0.0250
56	0.0000	0.0400
57	0.0000	0.0150
58	0.0000	0.0100
59	0.0000	0.0050

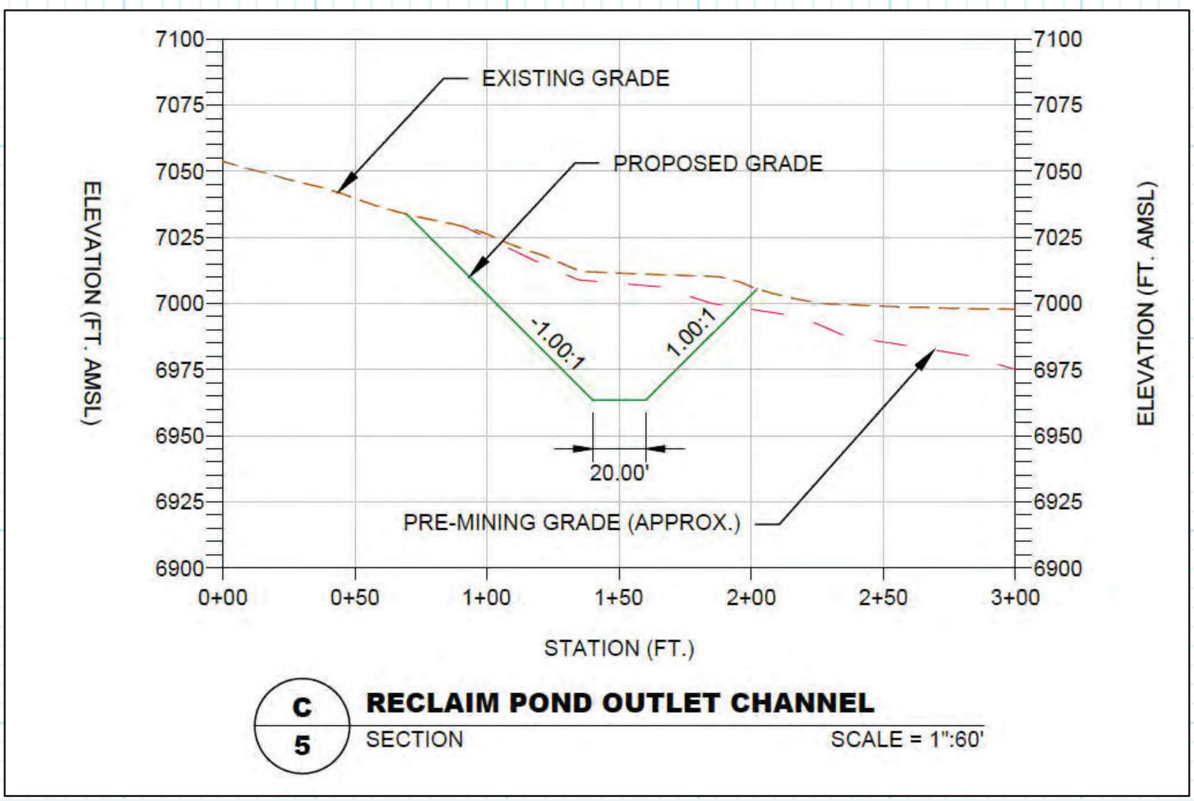


Storm Type Duration Increment of Precipitation	East Temporal Distributions	Rio Grande Temporal Distributions	West Temporal Distributions
Local Storm (LS) 2 hours 5 minutes	Synthetic Storm	Synthetic Storm	Synthetic Storm
Mesoscale Embedded Convection Storm (MEC) 6 hours 5 minutes	Front-Loaded Synthetic Storm	Synthetic Storm	Synthetic Storm
	Back-Loaded Synthetic Storm	---	---
Mid-Latitude Cyclone/Tropical Storm Remnant Storm (MLC/TSR) 48 hours 1 hour	Center-Loaded Synthetic Storm	Center-Loaded Synthetic Storm	Synthetic Storm
	Back-Loaded Synthetic Storm	Multi-Pulse Synthetic Storm	---

Data and Assumptions:

5. Proposed outlet design.
   a) Outlet cross-sections (Telesto, 2014)





Data and Assumptions:

6. Assume CAT D10 Dozer to be used for RRP outlet bottom width construction
    a) CAT D10 dozer dimensions (CAT, 2023)
        i. Minimum outlet channel bottom width-
            i. Use blade width of 13 feet

DIMENSIONS (APPROXIMATE)

Ground Clearance*	28.3 in
Track Gauge	100.4 in
Width - Without Trunnions - 610 mm/24 in ES	130.4 in
Width - Over Trunnions	148 in
Height - FOPS Cab*	162.8 in
Height - Top of Stack*	171.5 in
Height - ROPS/Canopy*	173.5 in
Note (1)	*Includes grouser height for total dimensions on hard surfaces.
Length - Track on Ground	152.8 in
Overall Length - Basic Tractor	209.6 in
Length - With SU-Blade	252 in
Length - With U-Blade	305.1 in
Length - With Single-Shank Ripper	278.9 in
Length - With Multi-Shank Ripper	235.1 in
Overall Length - SU-Blade/SS Ripper	360.6 in

LARGE DOZERS

D10

Engine Model

Cat® C27

Engine Power - Net SAE J1349/ISO 9249** - Forward

602 HP

Operating Weight

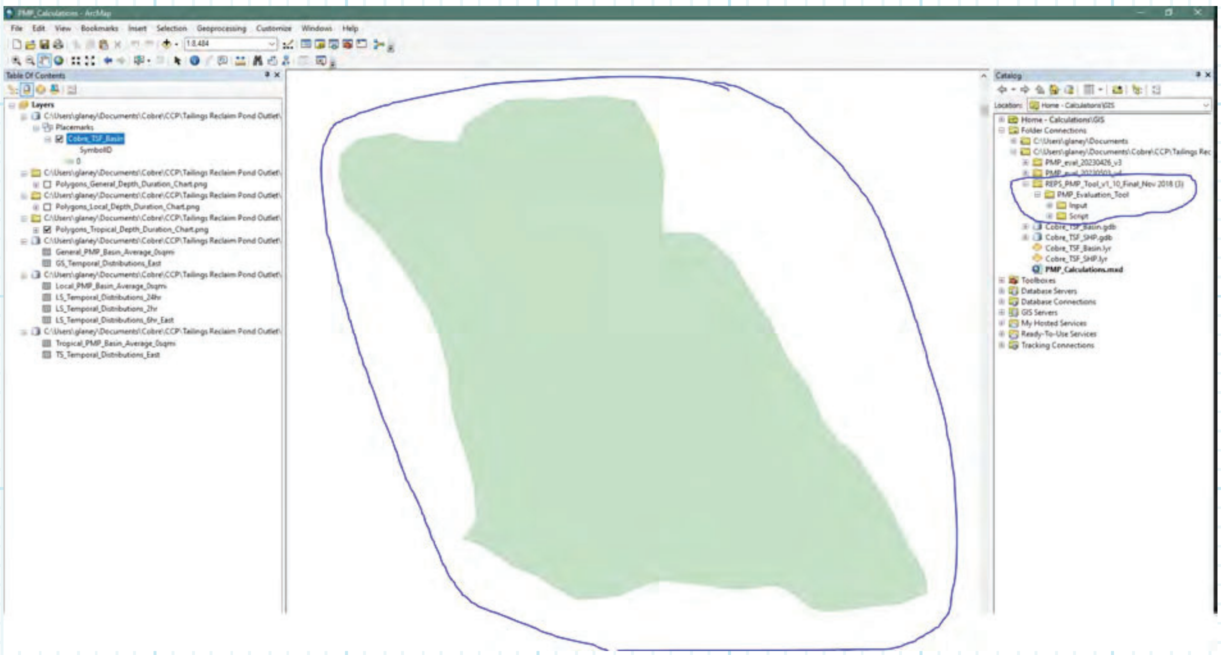
154888 lb

VIEW

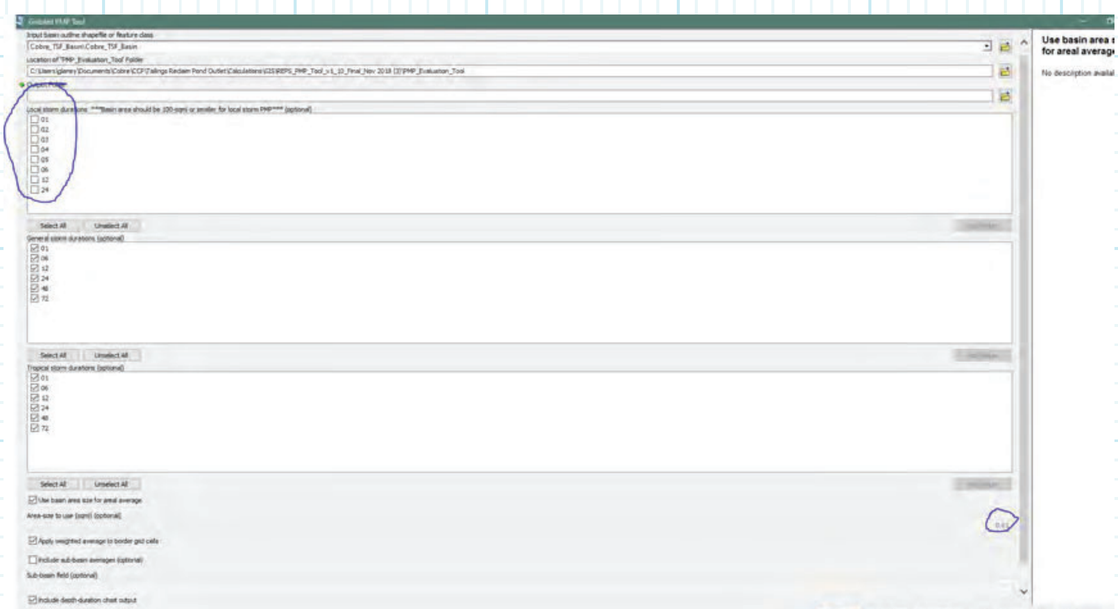
☐ Compare models

Calculations:

1. Determine PMP (from REPS GIS PMP tool) (REPS, 2018)
   a. Load GIS tool and basin shapefile to ArcMap



   b. Run tool
      1. Area entered as 0.01 sqmi
      2. Local storms run separately



Calculations Cont'd:

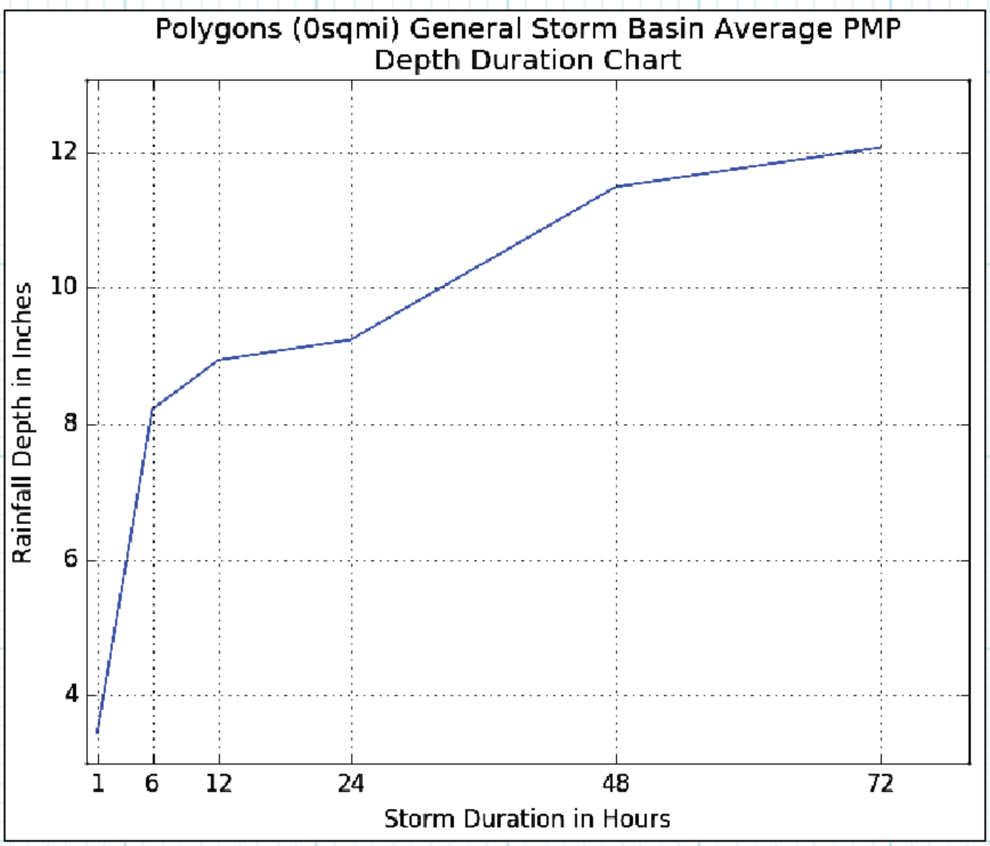
1. Determine PMP (from REPS GIS PMP tool)
   c. Results from tool
      i. Tables

General Storm Average PMP (in)						
STORM_TYPE	PMP_01	PMP_06	PMP_12	PMP_24	PMP_48	PMP_72
General	3.45	8.22	8.94	9.24	11.49	12.07

Local Storm Average PMP (in)								
STORM_TYPE	PMP_01	PMP_02	PMP_03	PMP_04	PMP_05	PMP_06	PMP_12	PMP_24
Local	9.59	11.62	13.84	14.47	14.47	14.47	15.14	15.67

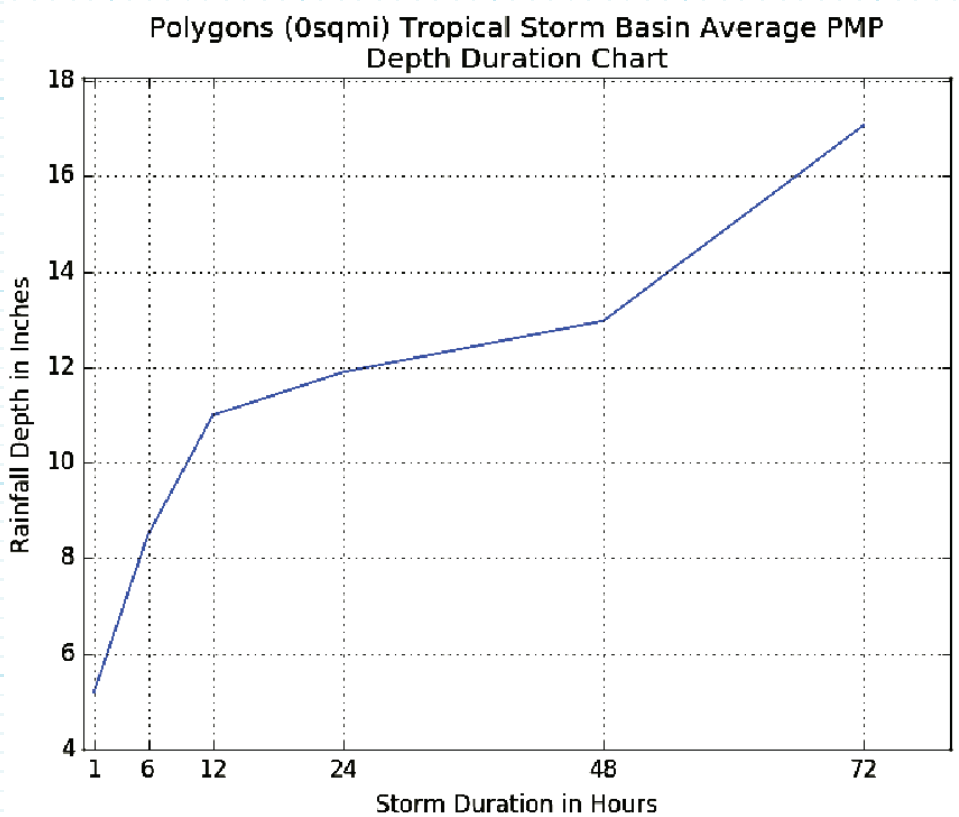
Tropical Storm Average PMP (in)						
STORM_TYPE	PMP_01	PMP_06	PMP_12	PMP_24	PMP_48	PMP_72
Tropical	5.19	8.5	11	11.9	12.97	17.06

      ii. Depth-duration curves



Calculations Cont'd:

1. Determine PMP (from REPS GIS PMP tool)
   c. Results from tool
      iii. Depth-duration curves Cont'd

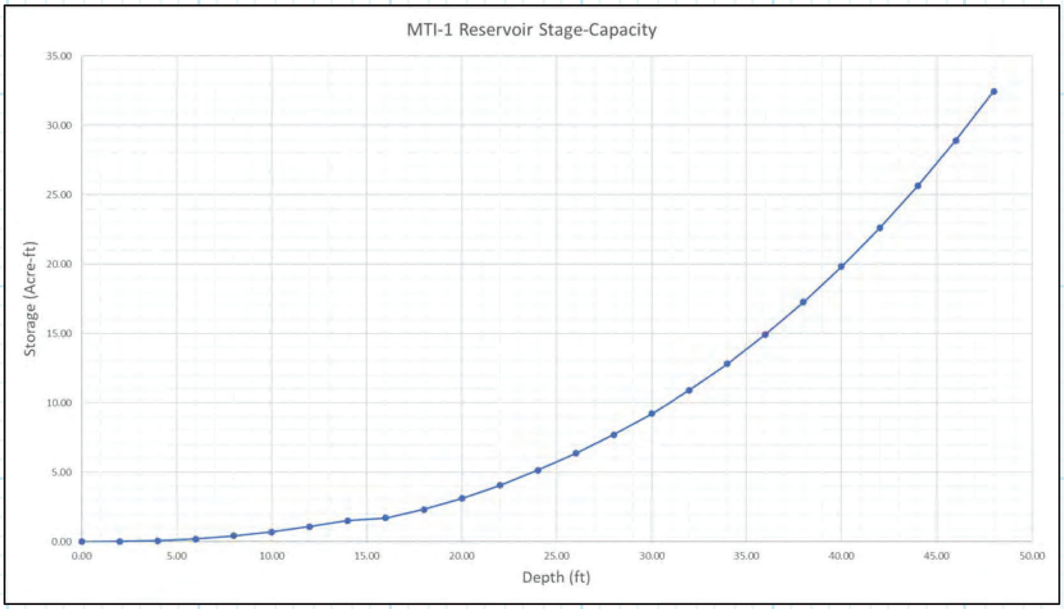


Calculations Cont'd:

2. Develop stage-capacity relationship for basin reservoirs
   a. Civil 3D
      i. Create volume surfaces of reservoirs from existing topography in AutoCAD Civil 3D
      ii. Analyze and export stage-capacity data to Excel

Calculations Cont'd:

2. Develop stage-capacity relationship for basin reservoirs
   b. Excel
      i. Determine reservoir stage-capacity relationships within drainage basins



MTI-1 Reservoir Capacity					
Contour Elevation (ft)	Depth (ft)	Cumulative Volume (Acre-ft)	Contour Area (ft^2)	(Incremental volume(Cuft)	Cumulative Volume(Cuft)
6,996	0	0.00	162	N/A	0
6,998	2	0.03	1,288	1,297	1,297
7,000	4	0.06	132	1,222	2,519
7,002	6	0.20	4,150	6,182	8,701
7,004	8	0.42	5,672	9,783	18,484
7,006	10	0.72	7,220	12,861	31,345
7,008	12	1.09	8,733	15,929	47,274
7,010	14	1.52	10,286	18,998	66,271
7,012	16	1.71	225	8,021	74,293
7,014	18	2.34	15,553	27,671	101,964
7,016	20	3.13	19,000	34,496	136,460
7,018	22	4.07	22,051	41,014	177,474
7,020	24	5.15	24,983	47,004	224,478
7,022	26	6.37	27,910	52,866	277,344
7,024	28	7.72	31,027	58,910	336,253
7,026	30	9.23	34,862	65,853	402,106
7,028	32	10.93	39,042	73,865	475,971
7,030	34	12.82	43,567	82,567	558,538
7,032	36	14.93	48,391	91,916	650,454
7,034	38	17.27	53,416	101,766	752,220
7,036	40	19.83	58,150	111,533	863,753
7,038	42	22.62	63,475	121,586	985,339
7,040	44	25.65	68,594	132,036	1,117,375
7,042	46	28.92	73,987	142,547	1,259,922
7,044	48	32.46	79,973	153,921	1,413,843

Cumulative volume converted to Acre-ft

Depth at each contour elevation

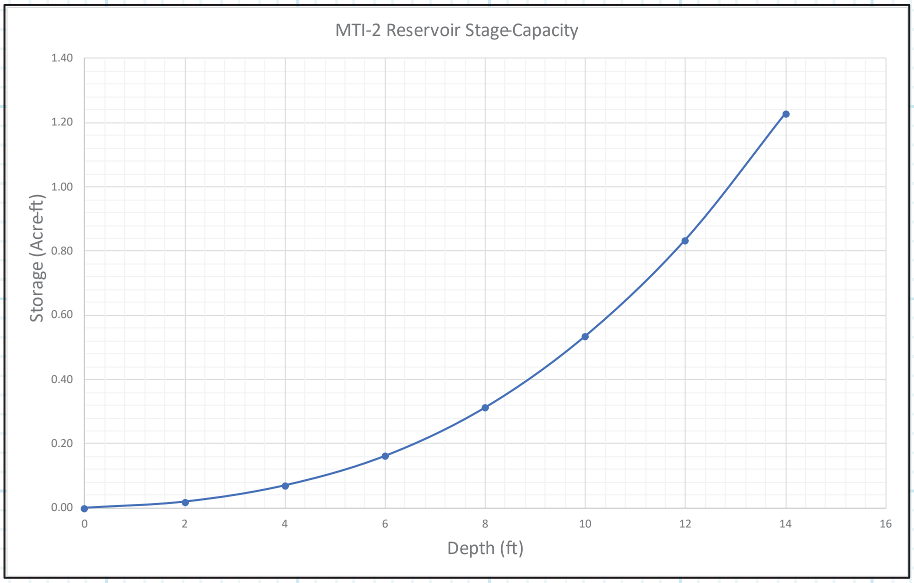
Area at each contour interval, from AutoCAD Civil 3D

Contour Area* Incremental depth (2ft)

Summation of all incremental volumes at each contour elevation

Calculations Cont'd:

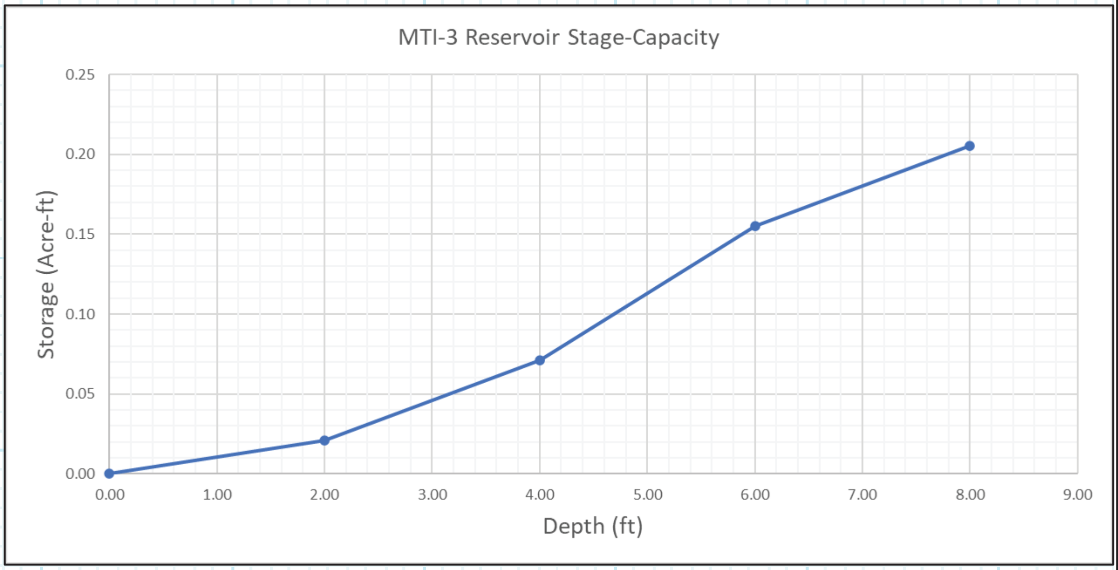
2. Develop stage-capacity relationship for basin reservoirs
   b. Excel
      ii. Determine reservoir stage-capacity relationships within drainage basins



MTI-2 Reservoir Capacity					
Contour Elevation (ft)	Depth (ft)	Cumulative Volume (Acre-ft)	Contour Area (ft^2)	(Incremental volume(Cuft)	Cumulative Volume(Cuft)
7,064	0	0.00	155	N/A	0
7,066	2	0.02	762	841	841
7,068	4	0.07	1,487	2,209	3,050
7,070	6	0.16	2,552	3,992	7,042
7,072	8	0.31	4,069	6,563	13,605
7,074	10	0.53	5,662	9,688	23,293
7,076	12	0.83	7,454	13,075	36,368
7,078	14	1.23	9,739	17,142	53,510

Calculations Cont'd:

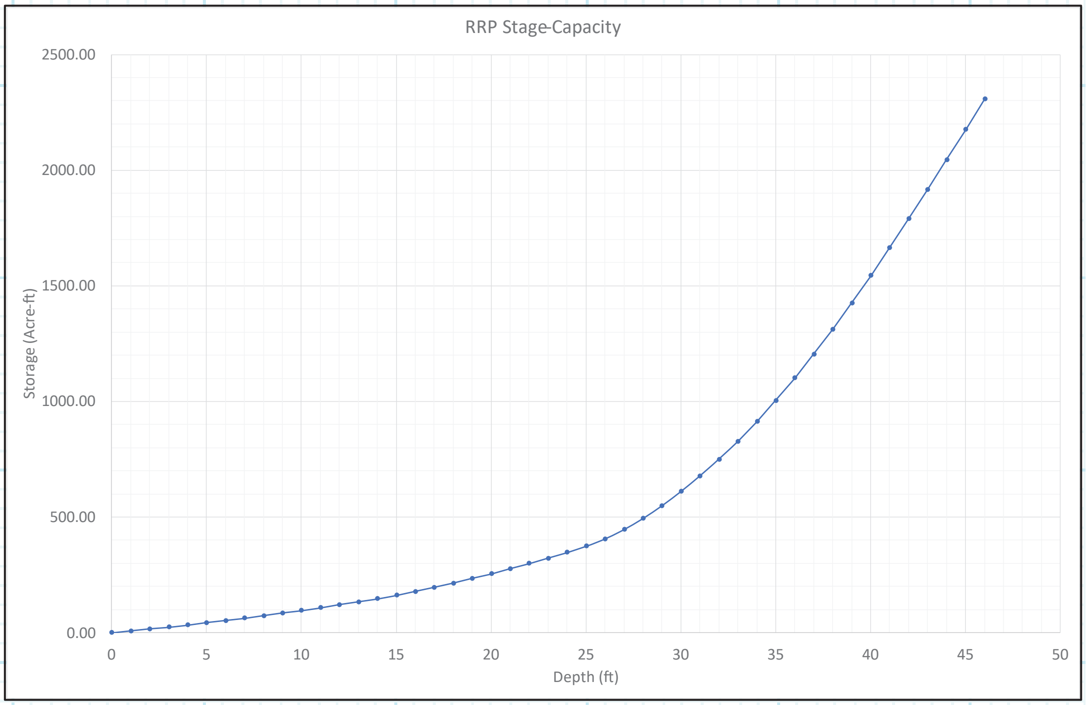
2. Develop stage-capacity relationship for basin reservoirs
   b. Excel
      iii. Determine reservoir stage-capacity relationships within drainage basins



MTI-3 Reservoir Capacity					
Contour Elevation (ft)	Depth (ft)	Cumulative Volume (Acre-ft)	Contour Area (ft^2)	(Incremental volume(Cuft)	Cumulative Volume(Cuft)
7,050	0	0.00	201	N/A	0
7,052	2	0.02	769	908	908
7,054	4	0.07	1,459	2,192	3,100
7,056	6	0.15	2,214	3,648	6,747
7,058	8	0.21	280	2,188	8,936

Calculations Cont'd:

2. Develop stage-capacity relationship for basin reservoirs
   b. Excel
      iv. Determine reservoir stage-capacity relationships within drainage basins



Reduction of volume is due to a volumes of material within the reservoir area that reduce capacity. Volume measured in Civil 3D (Telesto, 2022).

Reclaimed Reclaim Pond Stage-Capacity

Contour Elevation	Depth (ft)	Total Cumulative Volume (Acre-ft)	Incremental Volume (cuft)	Reduction Incremental Volume (cuft)	Total Incremental Volume (Cuft)	Total Incremental Volume (Acre-ft)	Total Cumulative Volume (Cuft)
6970	0	0.00	0	0	0	0	0
6971	1	7.70	335609	0	335609	8	335609
6972	2	15.84	354491	0	354491	8	690100
6973	3	24.41	373260	0	373260	9	1063359
6974	4	33.41	392070	0	392070	9	1455429
6975	5	42.84	410800	0	410800	9	1866229
6976	6	52.70	429233	0	429233	10	2295462
6977	7	62.97	447416	0	447416	10	2742878
6978	8	73.65	465472	0	465472	11	3208350
6979	9	84.74	482748	0	482748	11	3691098
6980	10	96.20	499506	0	499506	11	4190604
6981	11	108.10	518308	0	518308	12	4708912
6982	12	120.50	540031	0	540031	12	5248942
6983	13	133.48	565471	0	565471	13	5814413
6984	14	147.12	593987	0	593987	14	6408400
6985	15	162.01	648621	0	648621	15	7057021
6986	16	178.40	714204	0	714204	16	7771225
6987	17	195.87	760700	0	760700	17	8531925
6988	18	214.39	806881	0	806881	19	9338806
6989	19	233.98	853166	0	853166	20	10191972
6990	20	254.55	896095	0	896095	21	11088067
6991	21	276.10	938608	0	938608	22	12026675
6992	22	298.61	980551	0	980551	23	13007226
6993	23	322.11	1023711	0	1023711	24	14030936
6994	24	346.66	1069339	0	1069339	25	15100275
6995	25	373.71	1178288	0	1178288	27	16278563
6996	26	404.92	1513751	154244	1359507	31	17638070
6997	27	445.63	1916099	142387	1773712	41	19411782
6998	28	493.63	2224025	133465	2090561	48	21502343
6999	29	548.63	2522731	126682	2396050	55	23898393
7000	30	610.02	2793774	119939	2673836	61	26572228
7001	31	677.20	3039676	113302	2926374	67	29498603
7002	32	749.70	3264735	106545	3158190	73	32656793
7003	33	827.74	3499068	99529	3399539	78	36056333
7004	34	912.44	3779862	90443	3689420	85	39745753
7005	35	1003.54	4045588	77038	3968551	91	43714303
7006	36	1100.46	4284315	62772	4221543	97	47935846
7007	37	1203.36	4531328	48806	4482523	103	52418369
7008	38	1311.93	4764492	35228	4729264	109	57147633
7009	39	1425.41	4968828	25824	4943005	113	62090638
7010	40	1543.25	5152236	19268	5132968	118	67223606
7011	41	1664.78	5306985	13131	5293854	122	72517460
7012	42	1789.27	5431054	8022	5423032	124	77940492
7013	43	1916.12	5530118	4615	5525504	127	83465996
7014	44	2044.73	5604177	2029	5602148	129	89068144
7015	45	2174.86	5668796	479	5668317	130	94736461
7016	46	2306.23	5722810	123	5722687	131	100459148

Calculations Cont'd:

3. Determine proposed outlet channel stage-capacity (Chow, 1959)
   a. Excel
      i. Use Manning's equation to calculate the stage-capacity of the proposed outlet channel

Outlet Channel Elevation Dicharge Relationship

	Manually Entered									Calculated					
	Depth	Bottom Width	Side Slope	Upstream Elevation	Upstream Station	Downstream Elevation	Downstream Station	Unit Constant	Manning's n	Length	Slope of Channel	Area of flow	Wetted Perimeter	Hydraulic Radius	Flow Rate
Symbol	D	Bw	s	Eu	Su	Ed	Sd	K	n	L	S	A	P	R	Q
Units	ft	ft	ft/ft	ft	ft	ft	ft	NA	NA	ft	ft/ft	ft²	ft	ft	cfs
	0	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	0	20	0.00	0.00
	1	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	21	22.83	0.92	32.77
	2	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	44	25.66	1.71	104.02
	3	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	69	28.49	2.42	205.35
	4	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	96	31.31	3.07	334.29
	5	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	125	34.14	3.66	489.94
	6	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	156	36.97	4.22	672.14
	7	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	189	39.80	4.75	881.07
	8	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	224	42.63	5.25	1117.14
	9	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	261	45.46	5.74	1380.90
	10	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	300	48.28	6.21	1672.96
	11	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	341	51.11	6.67	1994.00
	12	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	384	53.94	7.12	2344.73
	13	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	429	56.77	7.56	2725.88
	14	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	476	59.60	7.99	3138.19
	15	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	525	62.43	8.41	3582.41
	16	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	576	65.25	8.83	4059.29
	17	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	629	68.08	9.24	4569.61
	18	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	684	70.91	9.65	5114.11
	19	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	741	73.74	10.05	5693.54
	20	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	800	76.57	10.45	6308.67
	21	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	861	79.40	10.84	6960.24
	22	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	924	82.23	11.24	7648.99
	23	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	989	85.05	11.63	8375.67
	24	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1056	87.88	12.02	9141.00
	25	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1125	90.71	12.40	9945.73
	26	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1196	93.54	12.79	10790.58
	27	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1269	96.37	13.17	11676.26
	28	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1344	99.20	13.55	12603.49
	29	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1421	102.02	13.93	13572.99
	30	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1500	104.85	14.31	14585.46
	31	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1581	107.68	14.68	15641.60
	32	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1664	110.51	15.06	16742.11
	33	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1749	113.34	15.43	17887.67
	34	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1836	116.17	15.80	19078.98
	35	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	1925	118.99	16.18	20316.72
	36	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2016	121.82	16.55	21601.57
	37	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2109	124.65	16.92	22934.19
	38	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2204	127.48	17.29	24315.26
	39	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2301	130.31	17.66	25745.44
	40	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2400	133.14	18.03	27225.39
	41	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2501	135.97	18.39	28755.78
	42	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2604	138.79	18.76	30337.24
	43	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2709	141.62	19.13	31970.44
	44	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2816	144.45	19.49	33656.01
	45	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	2925	147.28	19.86	35394.59
	46	20.00	1	6970	83.74	6956.56	9030.37	1.49	0.035	8946.63	0.0015	3036	150.11	20.23	37186.83

L=Sd-Su

Slope: (Eu-Ed)/L

$A = (bh) + (zh^2)$

$P = b + 2h\sqrt{1 + z^2}$

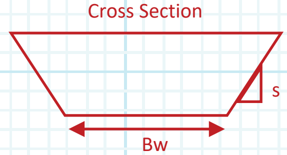
$R = \frac{A}{P}$

$Q = \frac{K}{n} A R^{\frac{2}{3}} Z^{\frac{1}{2}}$

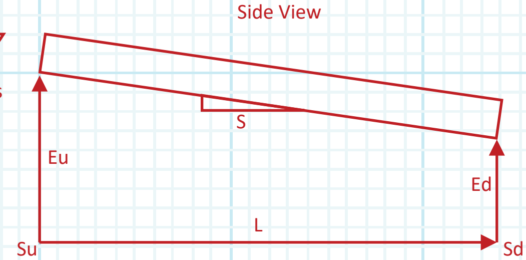
Where:

A=Cross-sectional area (sqft)
D= Depth (ft)
Bw= Bottom width (ft)
s= Side Slope (ft/ft)
P=Wetted perimeter (ft)
R=Hydraulic Radius (ft)
Q= Flow though channel (CFS)

Cross Section

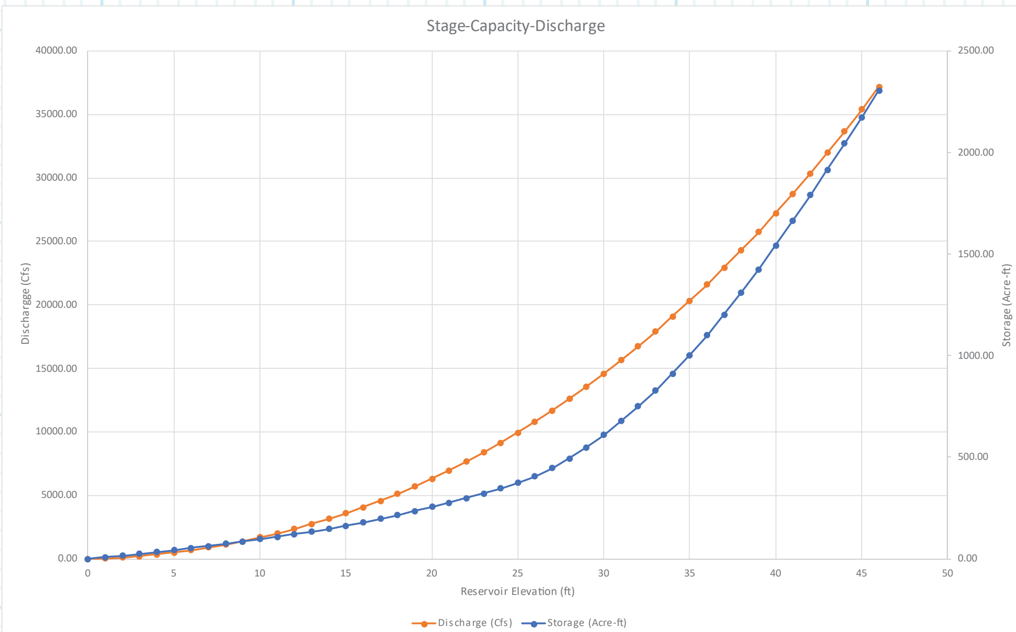


Side View



Calculations Cont'd:

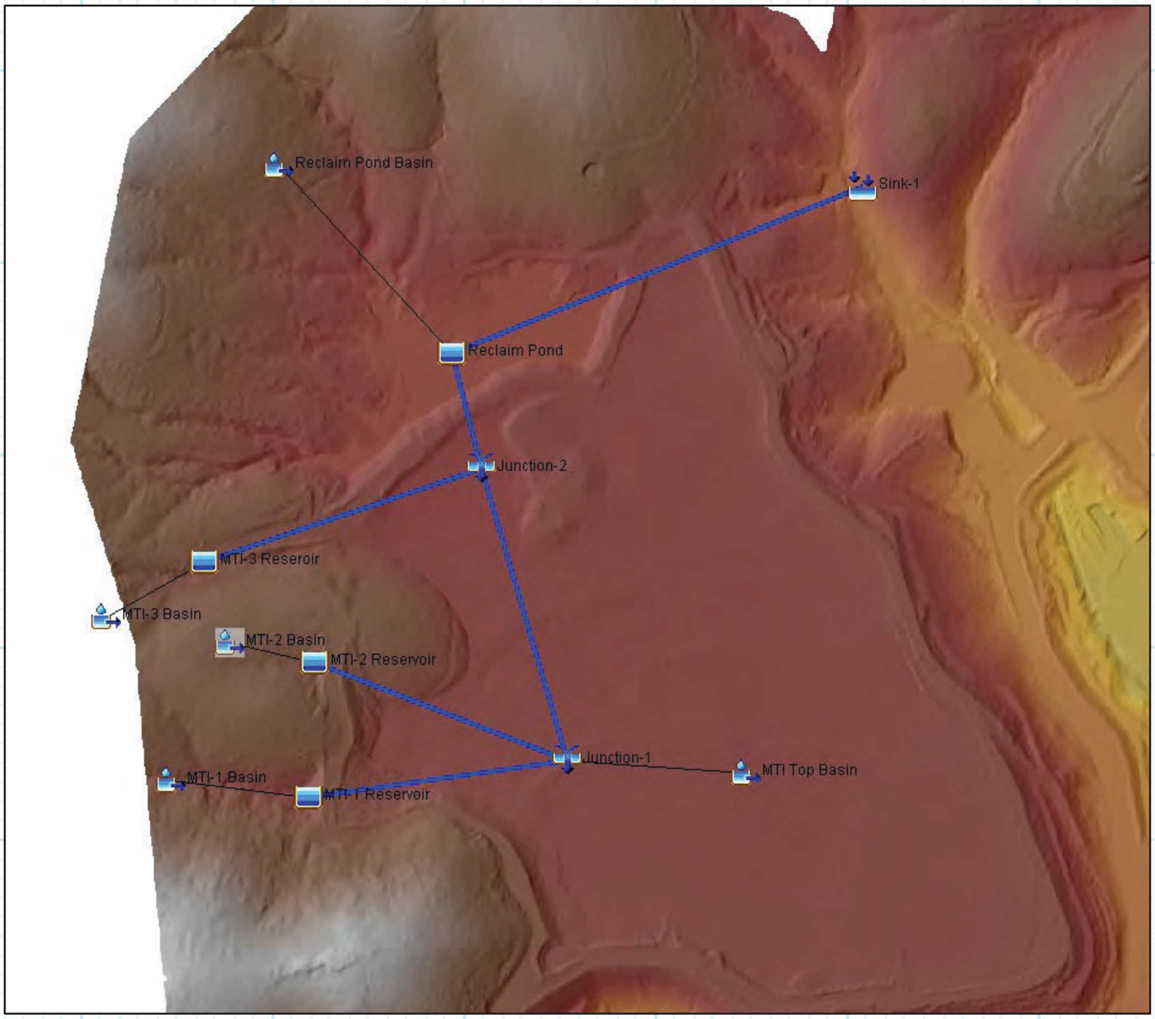
3. Determine proposed outlet channel stage-capacity
   a. Excel
      ii. Develop stage-capacity-discharge relationship for RRP and outlet



Stage-Capacity-Discharge			
Elevation (ft)	Reservoir Elevation (ft)	Storage (Acre-ft)	Discharge (Cfs)
6,970	0	0.00	0.00
6971	1	7.70	32.77
6972	2	15.84	104.02
6973	3	24.41	205.35
6974	4	33.41	334.29
6975	5	42.84	489.94
6976	6	52.70	672.14
6977	7	62.97	881.07
6978	8	73.65	1117.14
6979	9	84.74	1380.90
6980	10	96.20	1672.96
6981	11	108.10	1994.00
6982	12	120.50	2344.73
6983	13	133.48	2725.88
6984	14	147.12	3138.19
6985	15	162.01	3582.41
6986	16	178.40	4059.29
6987	17	195.87	4569.61
6988	18	214.39	5114.11
6989	19	233.98	5693.54
6990	20	254.55	6308.67
6991	21	276.10	6960.24
6992	22	298.61	7648.99
6993	23	322.11	8375.67
6994	24	346.66	9141.00
6995	25	373.71	9945.73
6996	26	404.92	10790.58
6997	27	445.63	11676.26
6998	28	493.63	12603.49
6999	29	548.63	13572.99
7000	30	610.02	14585.46
7001	31	677.20	15641.60
7002	32	749.70	16742.11
7003	33	827.74	17887.67
7004	34	912.44	19078.98
7005	35	1003.54	20316.72
7006	36	1100.46	21601.57
7007	37	1203.36	22934.19
7008	38	1311.93	24315.26
7009	39	1425.41	25745.44
7010	40	1543.25	27225.39
7011	41	1664.78	28755.78
7012	42	1789.27	30337.24
7013	43	1916.12	31970.44
7014	44	2044.73	33656.01
7015	45	2174.86	35394.59
7016	46	2306.23	37186.83

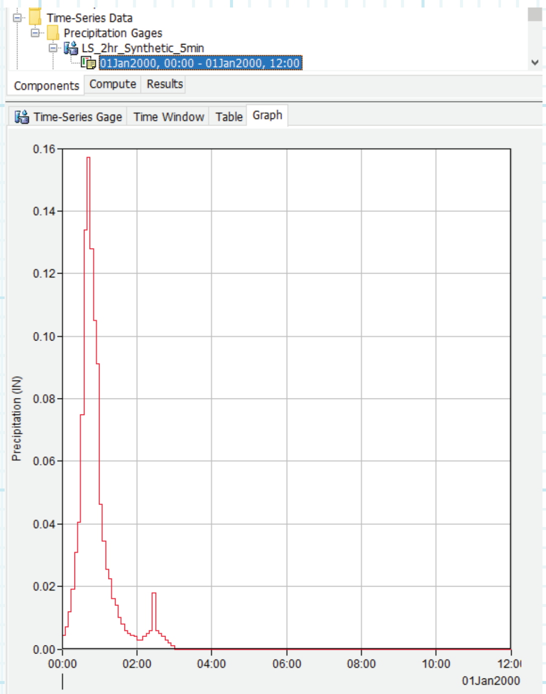
Calculations Cont'd:

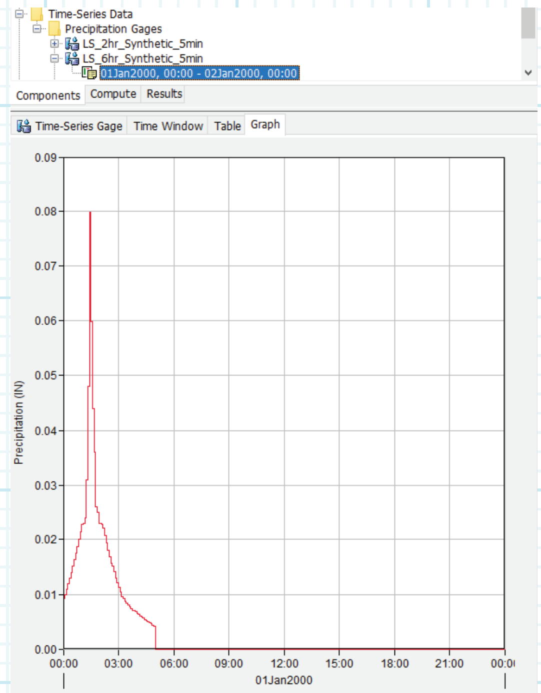
4. Determine peak stormwater inflow to RRP (OSE, 2021)
   b. HEC-HMS Model
      i. Input basin data, routing data, and reservoir data

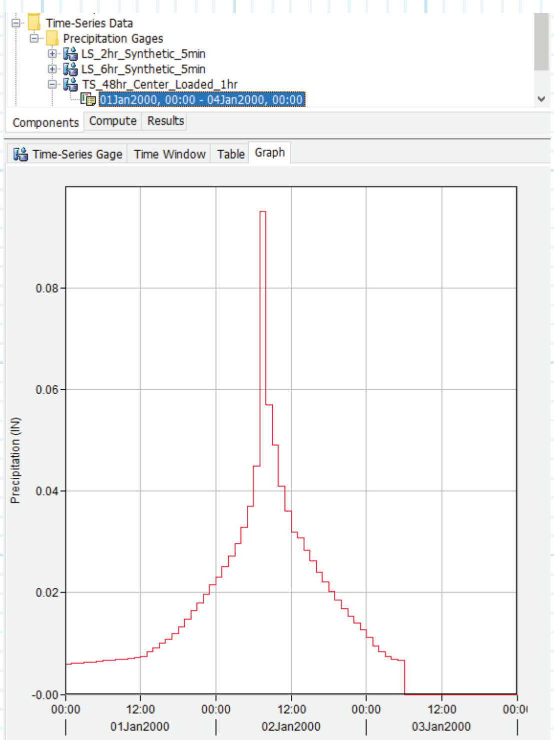


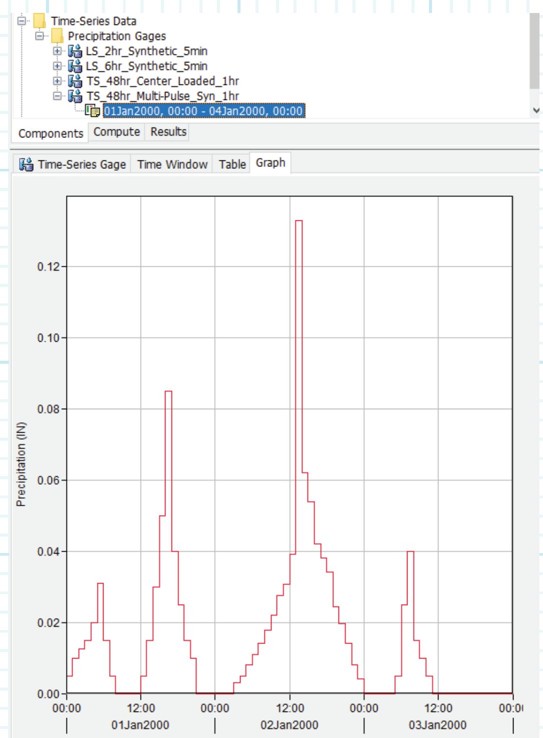
Calculations Cont'd:

4. Determine peak stormwater inflow to RRP
    b. HEC-HMS Model
        ii. Input storm unit hyetographs as precipitation gages



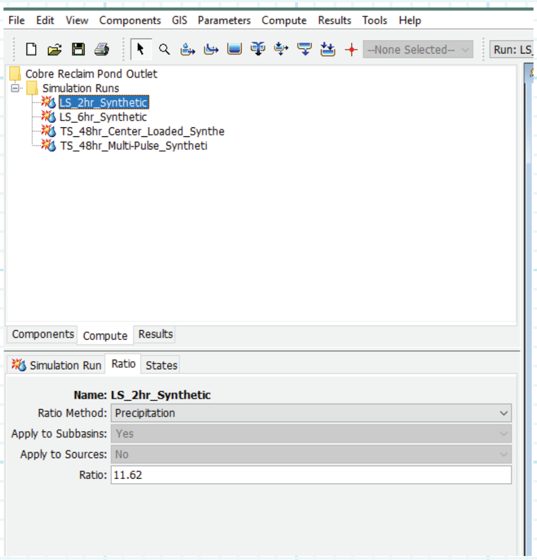


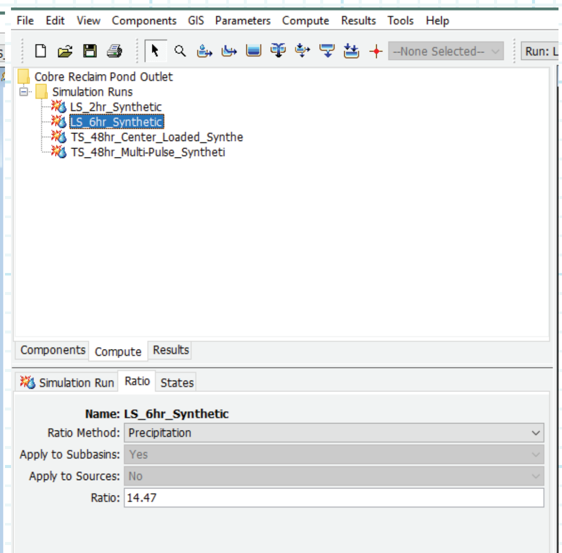


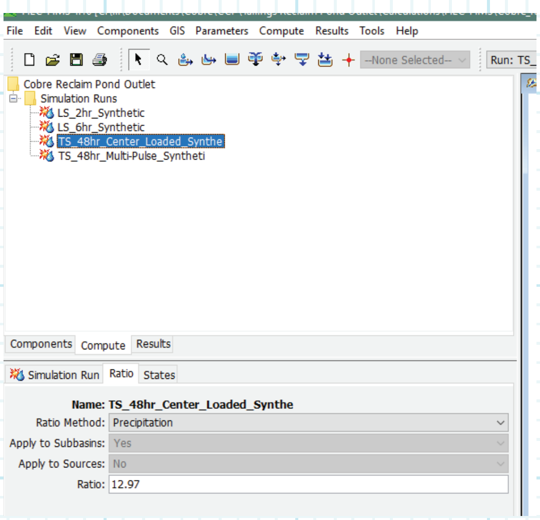


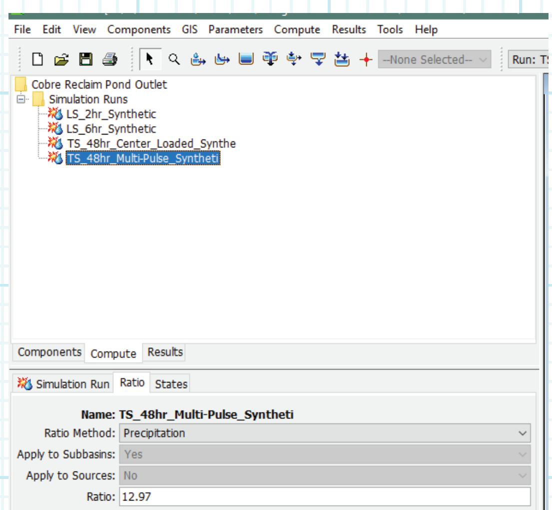
Calculations Cont'd:

4. Determine peak stormwater inflow to RRP
   b. HEC-HMS model
      iii. Set compute ratio for precipitation equivalent to calculated PMP rainfall for each storm event









Calculations Cont'd:

4. Determine peak stormwater inflow to RRP
   b. HEC-HMS model
      iv. Run model for each storm scenario
      v. Determine PMF to RRP

PMF inflow

Summary Results for Reservoir "Reclaim Pond"

Project: Cobre Reclaim Pond Outlet Simulation Run: LS_2hr_Synthetic
Reservoir: Reclaim Pond

Start of Run:	01Jan2000, 00:00	Basin Model:	Cobre
End of Run:	02Jan2000, 00:00	Meteorologic Model:	LS_2hr_Synthetic
Compute Time:	08May2023, 14:54:58	Control Specifications:	24hr

Volume Units: ○ IN ◉ ACRE-FT

Computed Results

Peak Inflow:	5363.8 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 01:05
Peak Discharge:	2719.1 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 01:25
Inflow Volume:	338.9 (ACRE-FT)	Peak Storage:	152.4 (ACRE-FT)
Discharge Volume:	338.8 (ACRE-FT)	Peak Elevation:	14.4 (FT)

Summary Results for Reservoir "Reclaim Pond"

Project: Cobre Reclaim Pond Outlet Simulation Run: LS_6hr_Synthetic
Reservoir: Reclaim Pond

Start of Run:	01Jan2000, 00:00	Basin Model:	Cobre
End of Run:	02Jan2000, 00:00	Meteorologic Model:	LS_6hr_Synthetic
Compute Time:	08May2023, 14:55:02	Control Specifications:	24hr

Volume Units: ○ IN ◉ ACRE-FT

Computed Results

Peak Inflow:	3243.1 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 01:45
Peak Discharge:	1918.2 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 02:15
Inflow Volume:	413.9 (ACRE-FT)	Peak Storage:	112.8 (ACRE-FT)
Discharge Volume:	413.6 (ACRE-FT)	Peak Elevation:	11.4 (FT)

Summary Results for Reservoir "Reclaim Pond"

Project: Cobre Reclaim Pond Outlet Simulation Run: TS_48hr_Center_Loaded_Synthe
Reservoir: Reclaim Pond

Start of Run:	01Jan2000, 00:00	Basin Model:	Cobre
End of Run:	03Jan2000, 00:00	Meteorologic Model:	TS_48hr_Center_Loaded_Synthe
Compute Time:	08May2023, 14:55:07	Control Specifications:	72hr

Volume Units: ○ IN ◉ ACRE-FT

Computed Results

Peak Inflow:	396.1 (CFS)	Date/Time of Peak Inflow:	02Jan2000, 08:00
Peak Discharge:	340.5 (CFS)	Date/Time of Peak Discharge:	02Jan2000, 09:00
Inflow Volume:	356.4 (ACRE-FT)	Peak Storage:	29.7 (ACRE-FT)
Discharge Volume:	345.3 (ACRE-FT)	Peak Elevation:	3.6 (FT)

Summary Results for Reservoir "Reclaim Pond"

Project: Cobre Reclaim Pond Outlet Simulation Run: TS_48hr_Multi-Pulse_Syntheti
Reservoir: Reclaim Pond

Start of Run:	01Jan2000, 00:00	Basin Model:	Cobre
End of Run:	03Jan2000, 00:00	Meteorologic Model:	TS_48hr_Multi-Pulse_Syntheti
Compute Time:	08May2023, 14:55:11	Control Specifications:	72hr

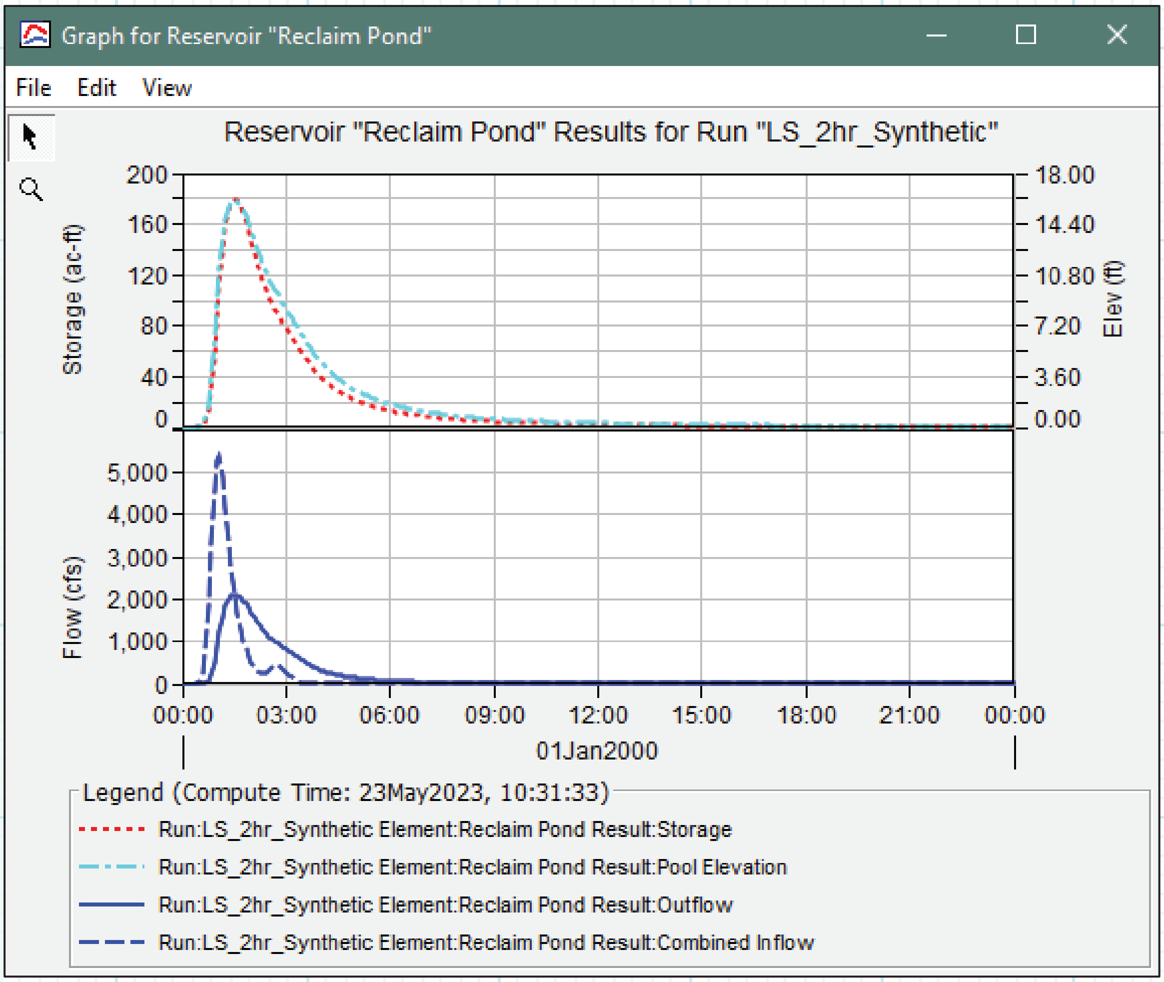
Volume Units: ○ IN ◉ ACRE-FT

Computed Results

Peak Inflow:	540.8 (CFS)	Date/Time of Peak Inflow:	02Jan2000, 14:00
Peak Discharge:	434.9 (CFS)	Date/Time of Peak Discharge:	02Jan2000, 15:00
Inflow Volume:	359.5 (ACRE-FT)	Peak Storage:	35.6 (ACRE-FT)
Discharge Volume:	350.6 (ACRE-FT)	Peak Elevation:	4.2 (FT)

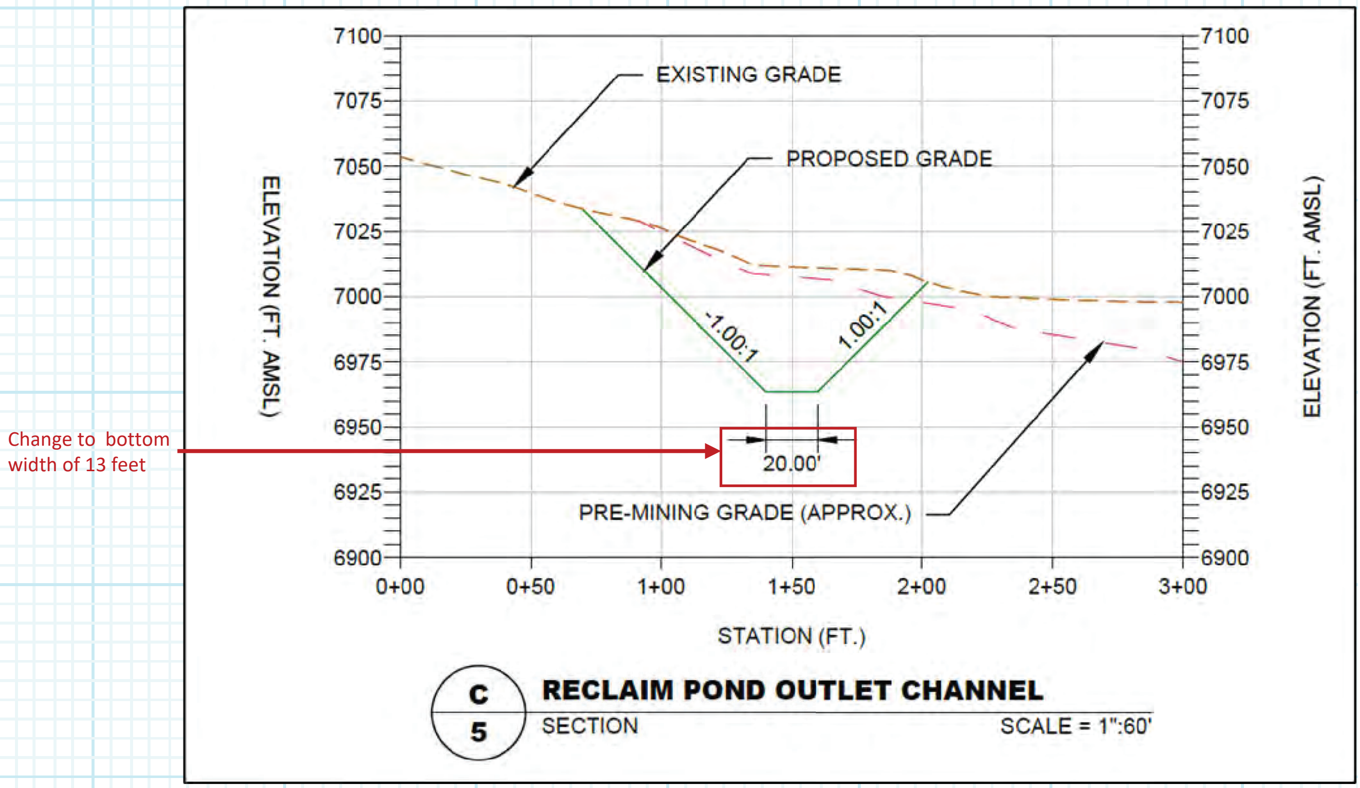
Calculations Cont'd:

4. Determine peak stormwater inflow to RRP
   b. HEC-HMS model
      vi. Develop inflow/outflow relationship of RRP with proposed outlet design under PMF conditions



Calculations Cont'd:

5. Minimum feasible bottom width
   a. Change bottom width of channel
      i. Use minimum feasible bottom width for channel construction to reduce time under construction and costs of construction. Assume use of CAT D10 Dozer for bottom width (13ft) channel construction.



Repeat Manning's equation for outlet channel capacity and develop stage-capacity-discharge relationship

TELESTO SOLUTIONS INCORPORATED

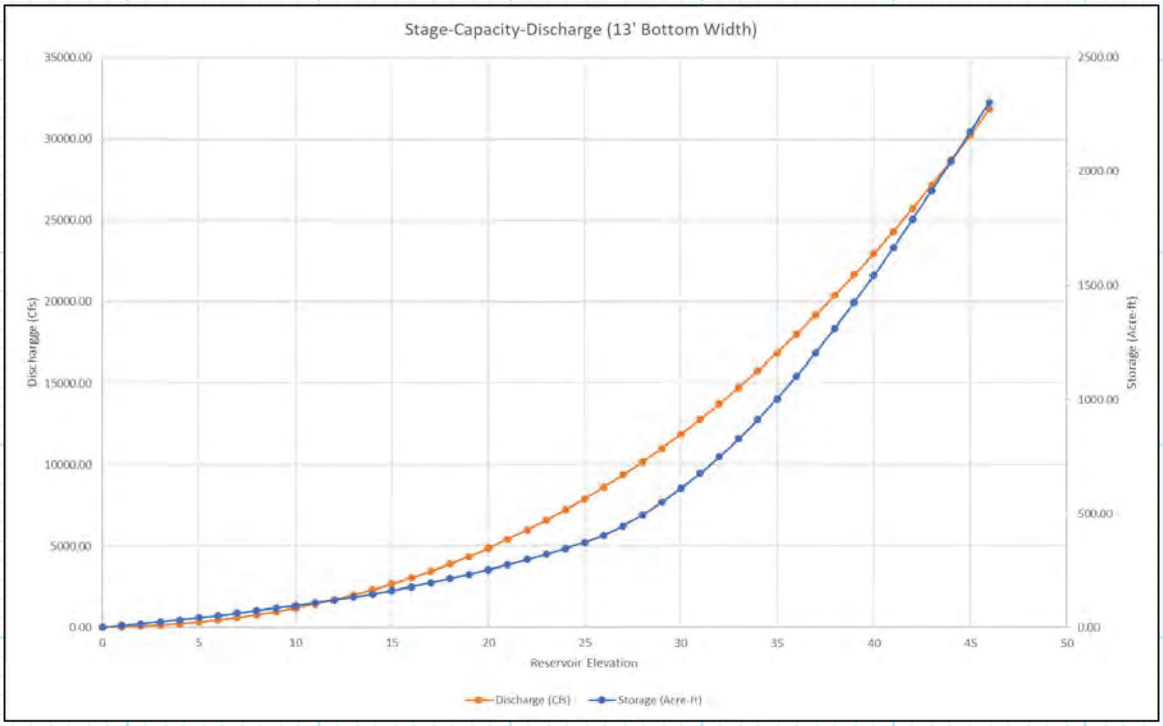
Job No: 200189h-001-01 Client: Chino Mines Company Page 24 of 28

Task: Reclaim Pond Computed By: G. Laney Date: 05/23/23

Outlet Channel Sizing Checked By: J. Cullor Date: 05/31/23

Calculations Cont'd:

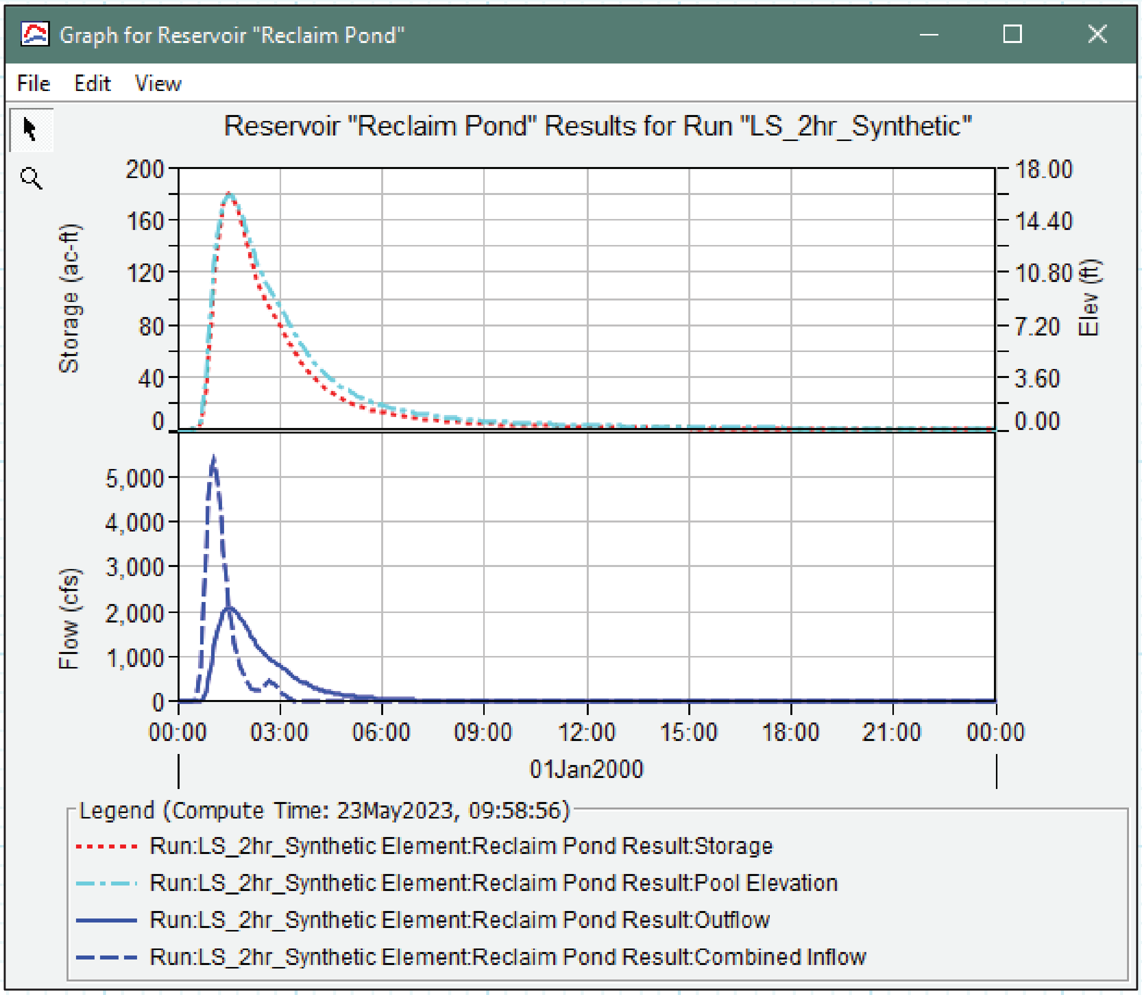
5. Minimum feasible bottom width
   a. Change bottom width of channel
      ii. Repeat Manning's equation for outlet channel capacity and develop stage-capacity-discharge relationship



Stage-Capacity-Discharge (13' Bottom Width)			
Elevation (ft)	Reservoir Elevation (ft)	Storage (Acre-ft)	Discharge (Cfs)
6,970	0	0.00	0.00
6971	1	7.70	21.29
6972	2	15.84	67.94
6973	3	24.41	135.35
6974	4	33.41	222.72
6975	5	42.84	330.21
6976	6	52.70	458.35
6977	7	62.97	607.85
6978	8	73.65	779.50
6979	9	84.74	974.14
6980	10	96.20	1192.65
6981	11	108.10	1435.88
6982	12	120.50	1704.73
6983	13	133.48	2000.05
6984	14	147.12	2322.71
6985	15	162.01	2673.58
6986	16	178.40	3053.49
6987	17	195.87	3463.30
6988	18	214.39	3903.84
6989	19	233.98	4375.92
6990	20	254.55	4880.37
6991	21	276.10	5417.99
6992	22	298.61	5989.58
6993	23	322.11	6595.93
6994	24	346.66	7237.82
6995	25	373.71	7916.02
6996	26	404.92	8631.30
6997	27	445.63	9384.43
6998	28	493.63	10176.15
6999	29	548.63	11007.20
7000	30	610.02	11878.33
7001	31	677.20	12790.27
7002	32	749.70	13743.74
7003	33	827.74	14739.47
7004	34	912.44	15778.16
7005	35	1003.54	16860.53
7006	36	1100.46	17987.28
7007	37	1203.36	19159.11
7008	38	1311.93	20376.70
7009	39	1425.41	21640.75
7010	40	1543.25	22951.94
7011	41	1664.78	24310.94
7012	42	1789.27	25718.43
7013	43	1916.12	27175.08
7014	44	2044.73	28681.54
7015	45	2174.86	30238.49
7016	46	2306.23	31846.57

Calculations Cont'd:

5. Minimum feasible bottom width
    a. Change bottom width of channel
        iii. Update HEC-HMS model and rerun with outlet channel bottom width of 13 feet



Calculation Documentation

Results and Discussion:

PMP/PMF

1. As determined in Calculation 4.b.v, the PMF resulting from all four PMP scenarios was the 2-hour Local Storm with synthetic distribution. It generated a peak inflow of 5363.8 cubic feet per second of stormwater runoff into the RRP.

Proposed outlet channel

1. As shown in Calculation 4.b.vi, the outlet channel is capable of conveying flow from the RRP with no spilling of stormwater from the RRP. The RRP pool elevation only reaches a maximum of 16.1 feet and a storage of 179.5 acre-ft. This is equivalent to 7.8% of the overall capacity of the RRP.
2. The pool elevation drains away from the crest just after reaching its peak elevation. The pool elevation returns to less than 0.1 feet at 15 hours after its peak.
3. However, the bottom width of the channel could be smaller in an effort to reduce construction costs and time spent in construction.

Changed channel bottom width to blade width of CAT D10 dozer

1. As shown in Calculation 5.a.iii, the outlet, when the bottom width is adjusted to 13 feet, still only allows for a maximum storage of 179.5 Acre-ft and a pool elevation of 16.1 feet. This is equivalent to 7.8% of the overall capacity of the RRP.
2. The pool elevation still returns to less than 0.1 feet in 15 hours after its peak.

Calculation Documentation

Recommendations:

1. The outlet should be designed as shown in Data and Assumptions, Section 5.a (Profiles and Sections, Telesto, 2023), but the bottom width of the channel should be changed to 13 feet as opposed to the proposed 20 feet bottom width.

Calculation Documentation

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