

Franklin County Water District



Preliminary Engineering Report (PER)

Emergency Spillway

2/20/2018

DAVID HARKINS, P.E., PhD.

PHIL BULLOCK, P.E.

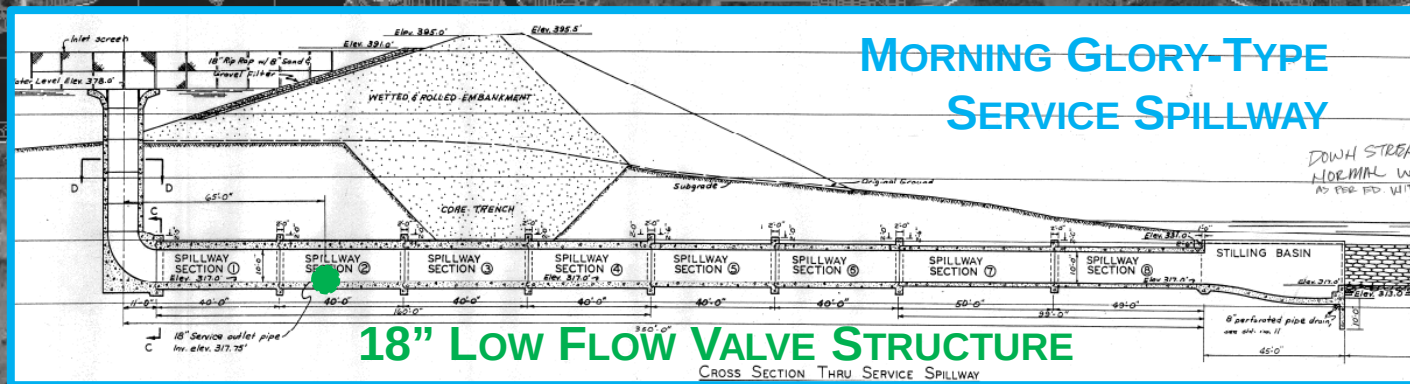
PATRICK BULLOCK

Carollo delivers national expertise specializing ONLY in water and wastewater

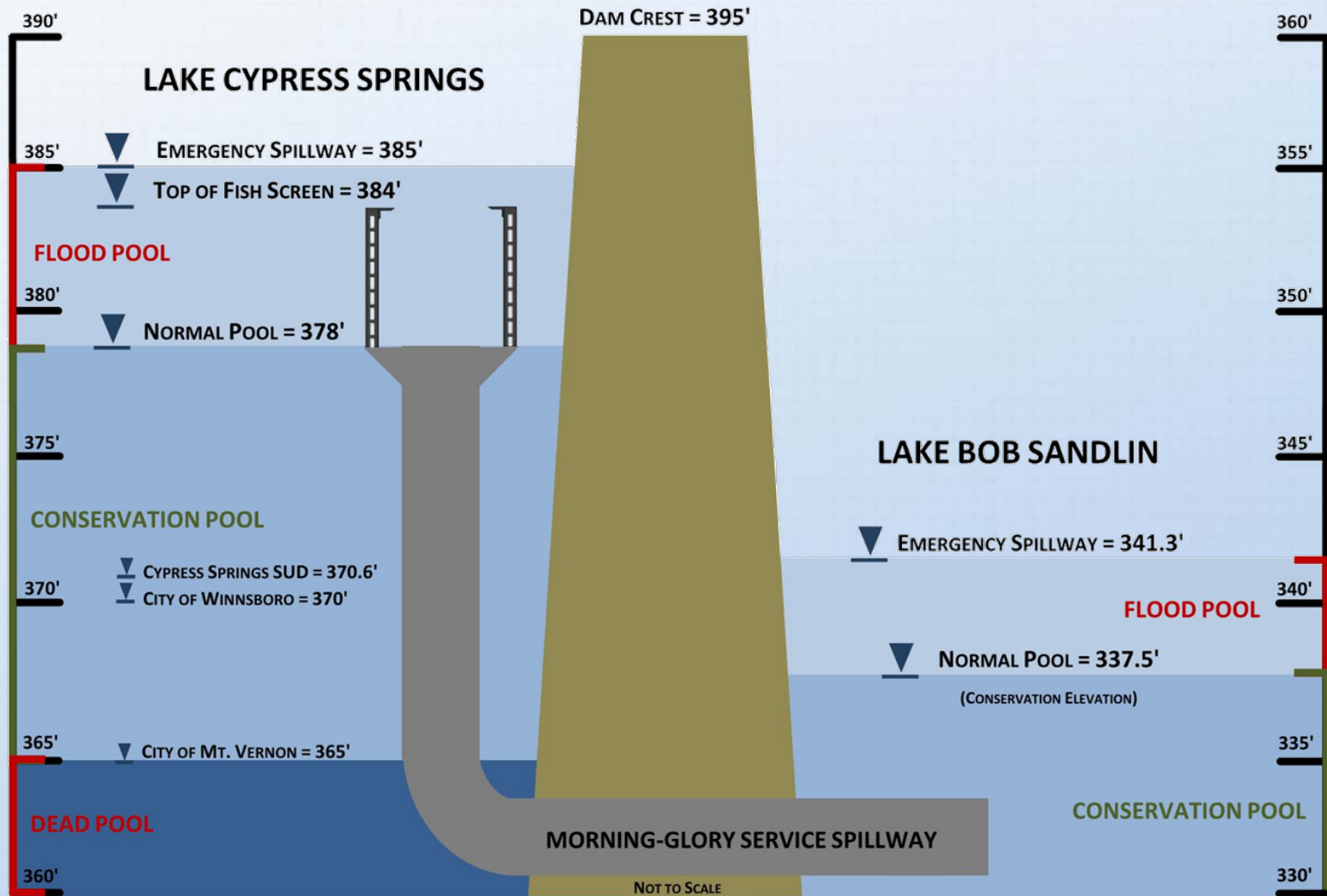


WATER
OUR FOCUS
OUR BUSINESS
OUR PASSION

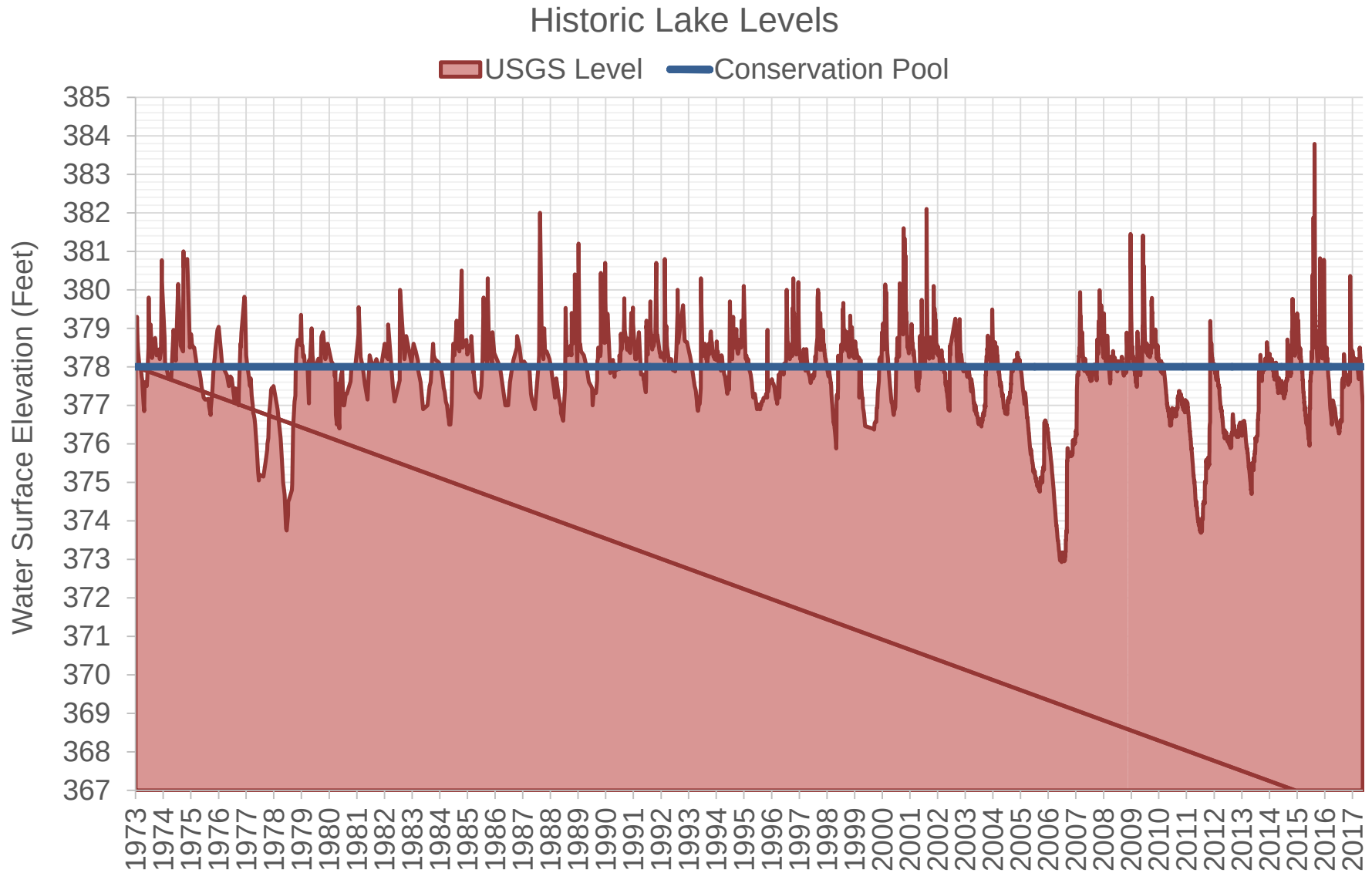
urley



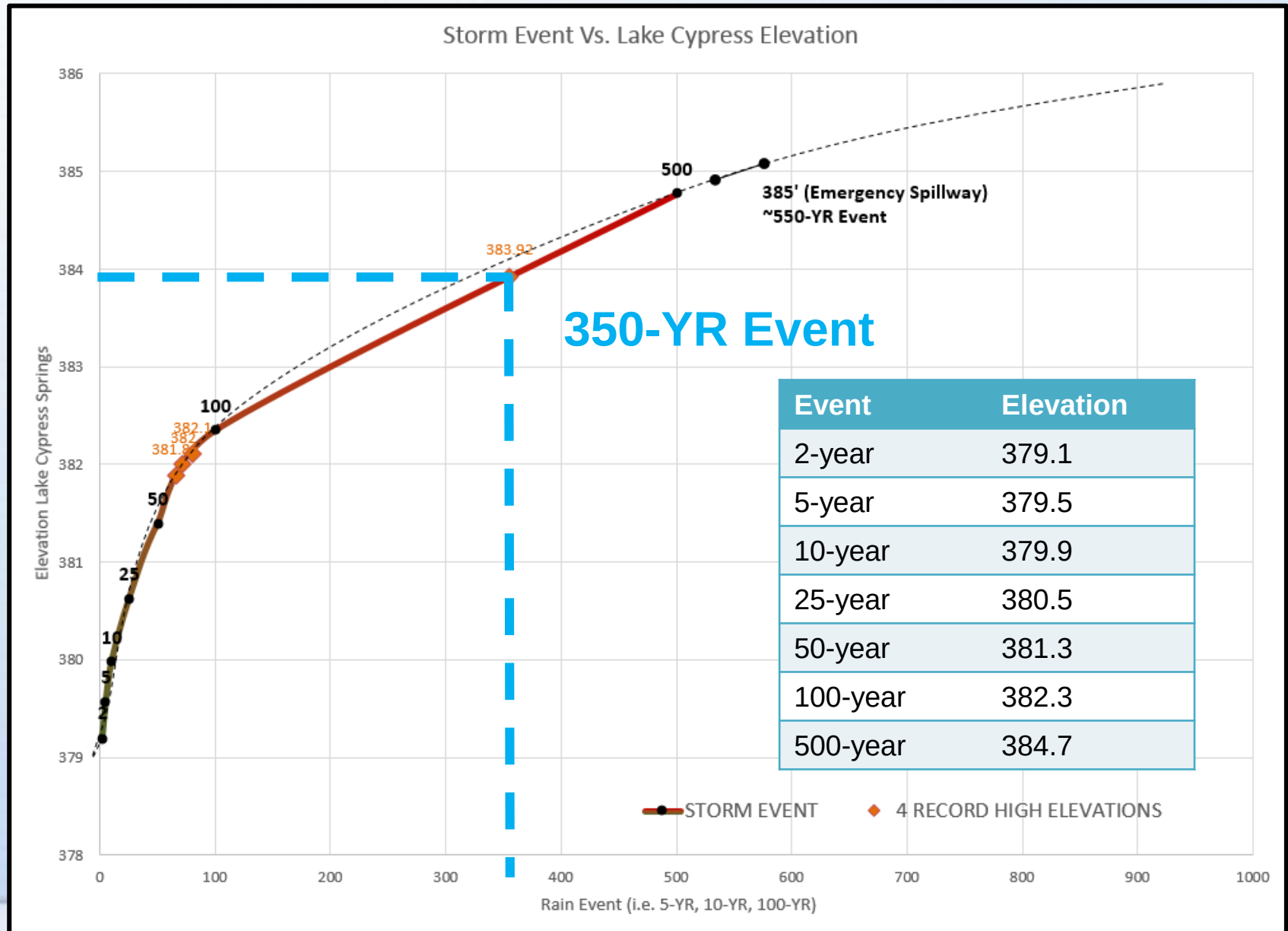
Lake Cypress Springs Spillway



December 2015 Event (383.92')

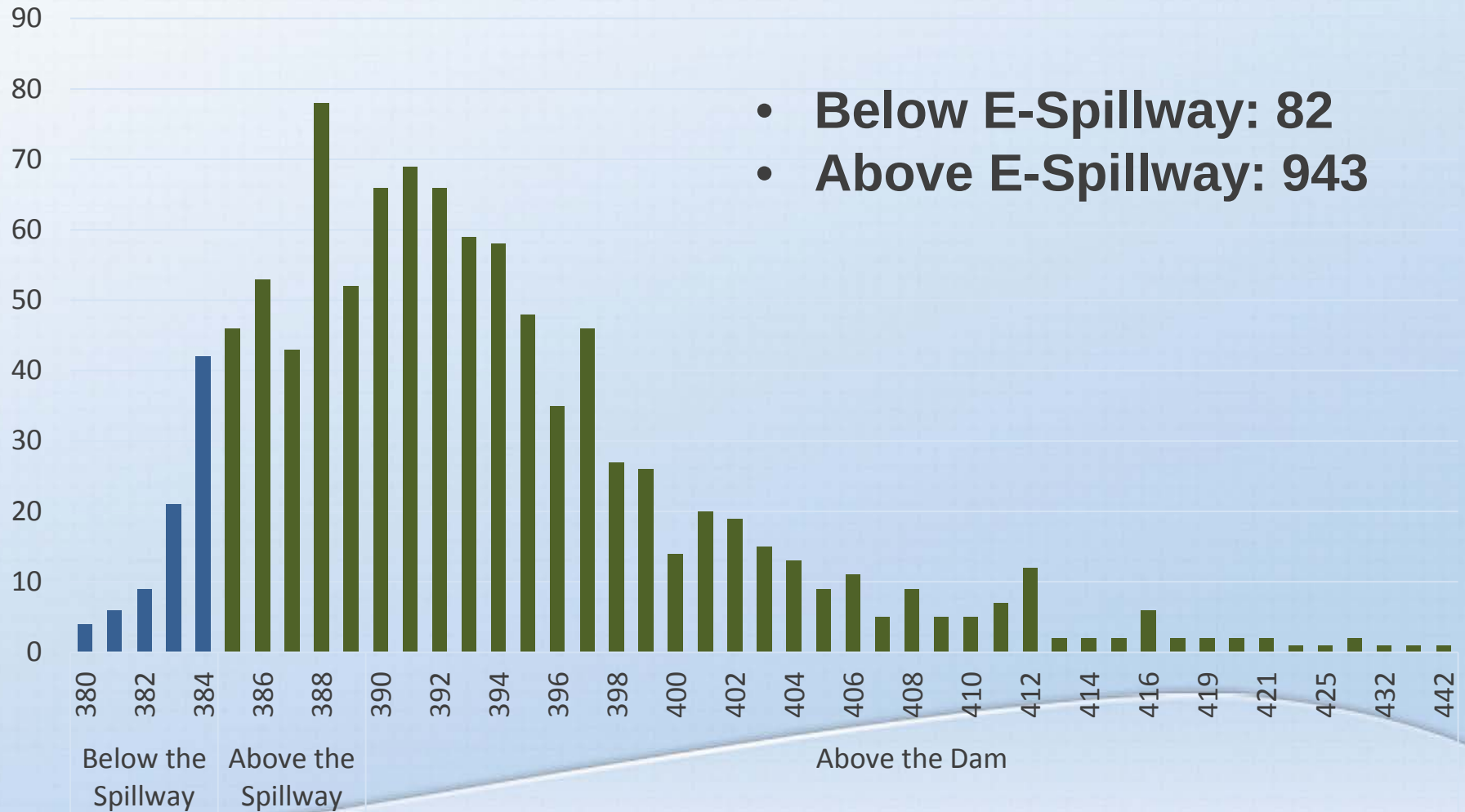


December 2015 Event (383.92')

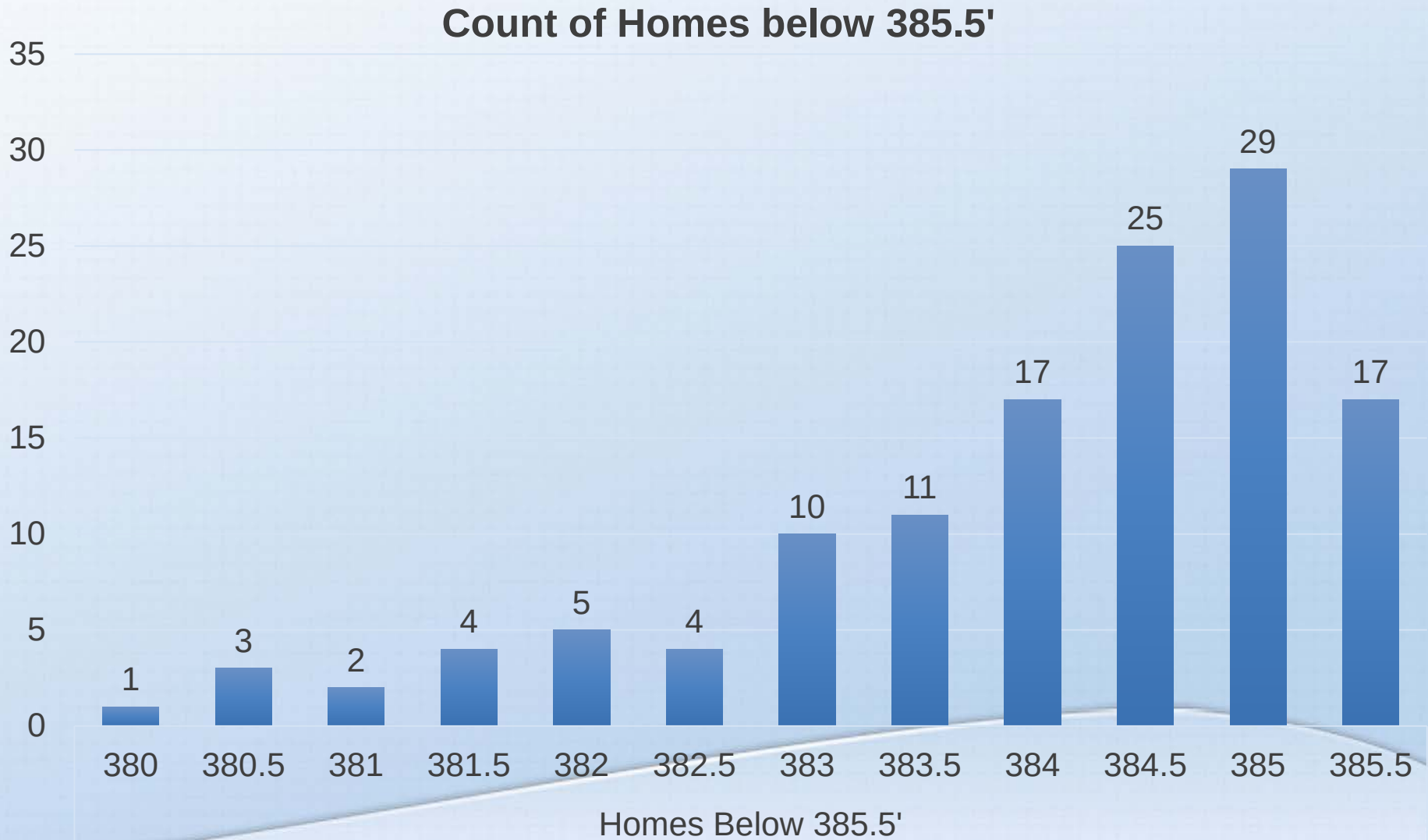


Data Gathering for Analysis – Elevations

Lake Cypress Springs Home Elevation Survey Results

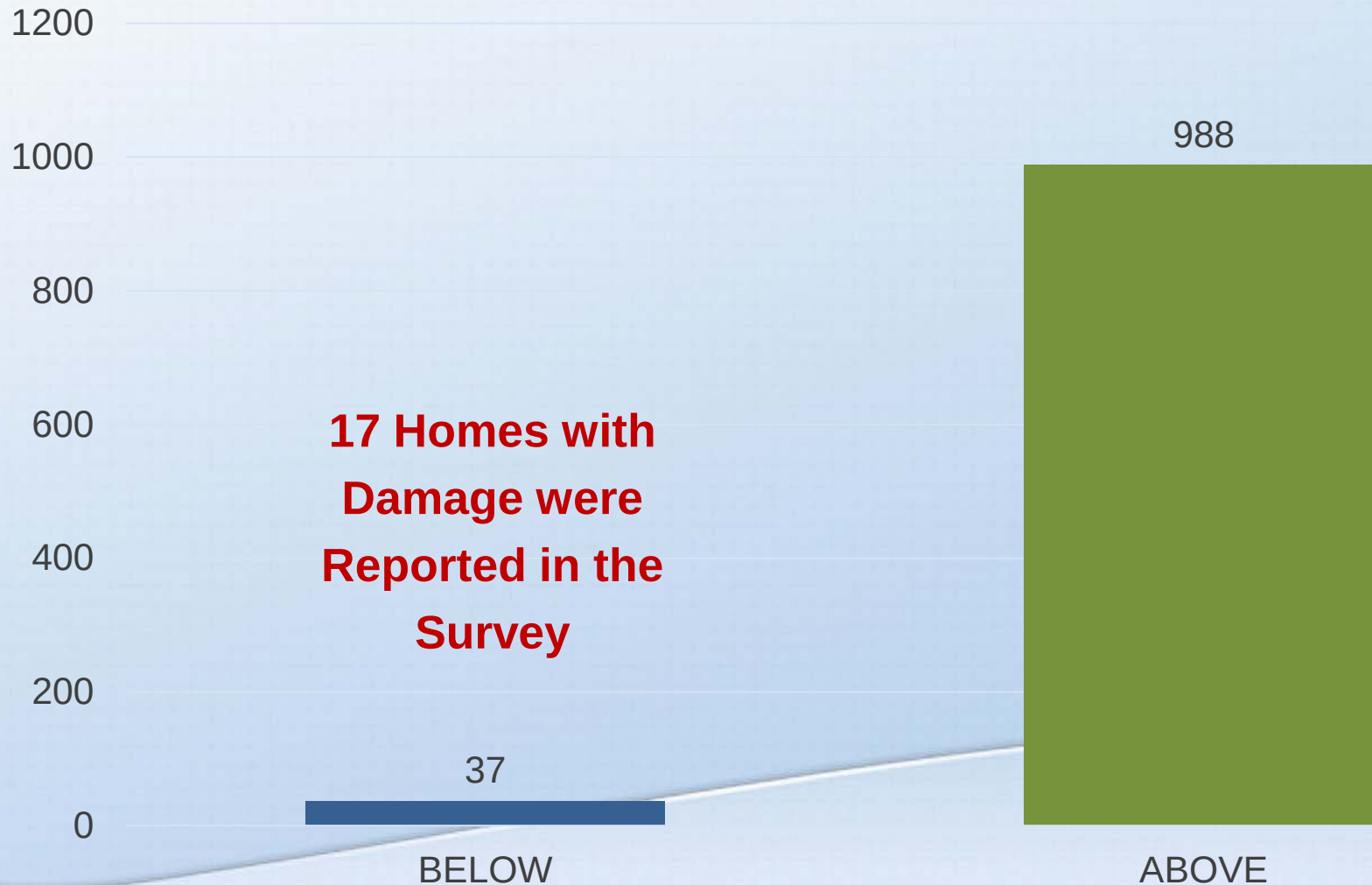


Data Gathering for Analysis – Elevations



Data Gathering for Analysis – Elevations

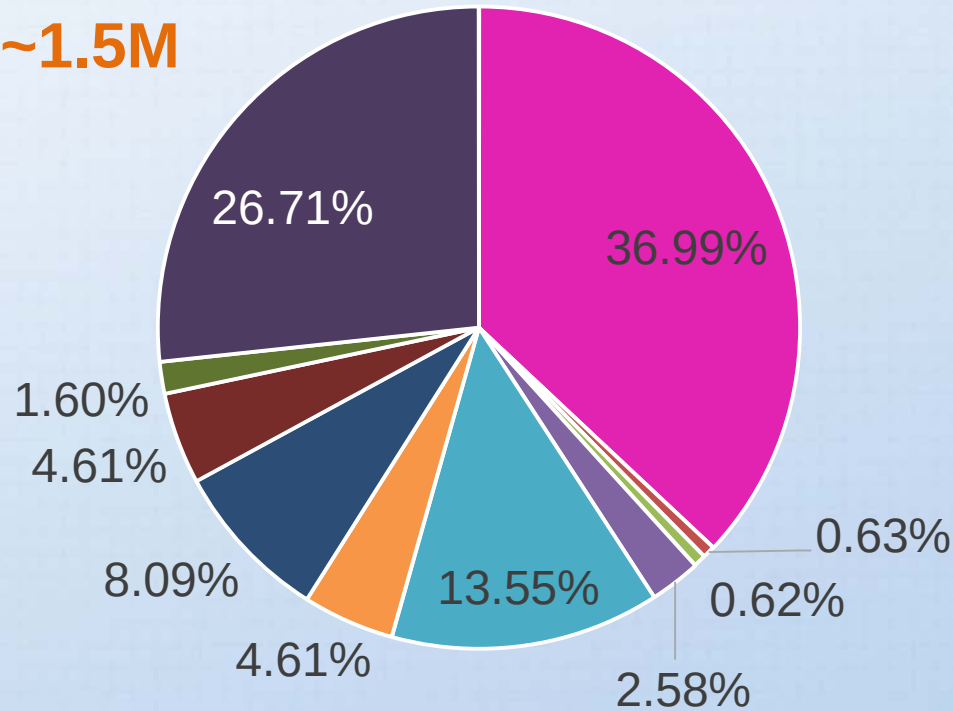
Count of Homes for December 2015 Event (383.92')



Data Gathering for Analysis – Online Survey

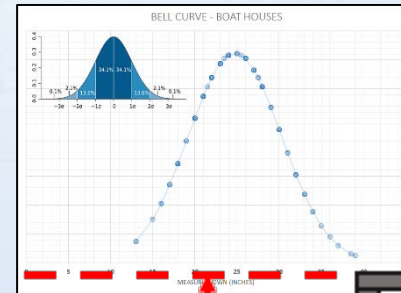
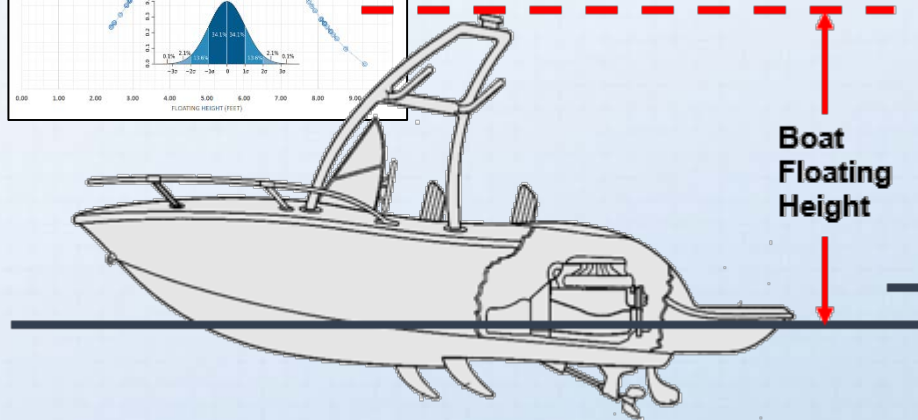
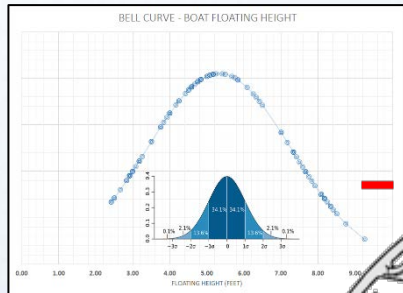
Percentage of Total Damage Cost

Total Damage ~1.5M

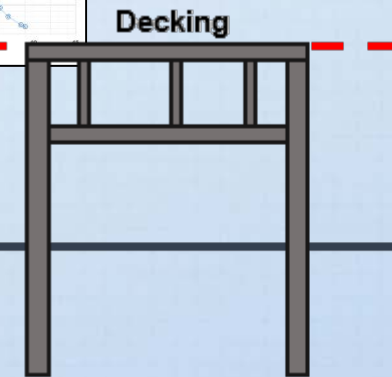


- House
- Boat-house
- Vehicles
- Guest House
- Retaining Wall
- Boats
- Garage
- Deck or Dock
- Storage Building
- Water Pump

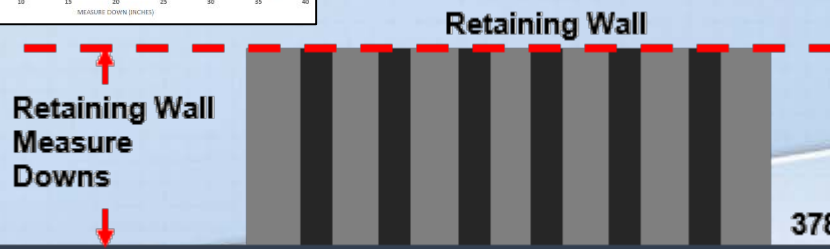
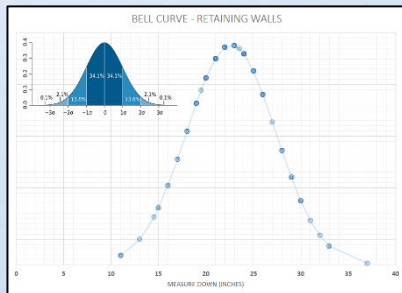
Data Gathering for Analysis - Samples



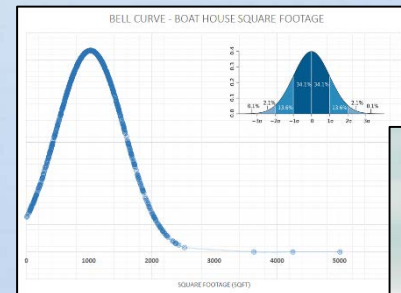
Boathouse
Measure
Downs



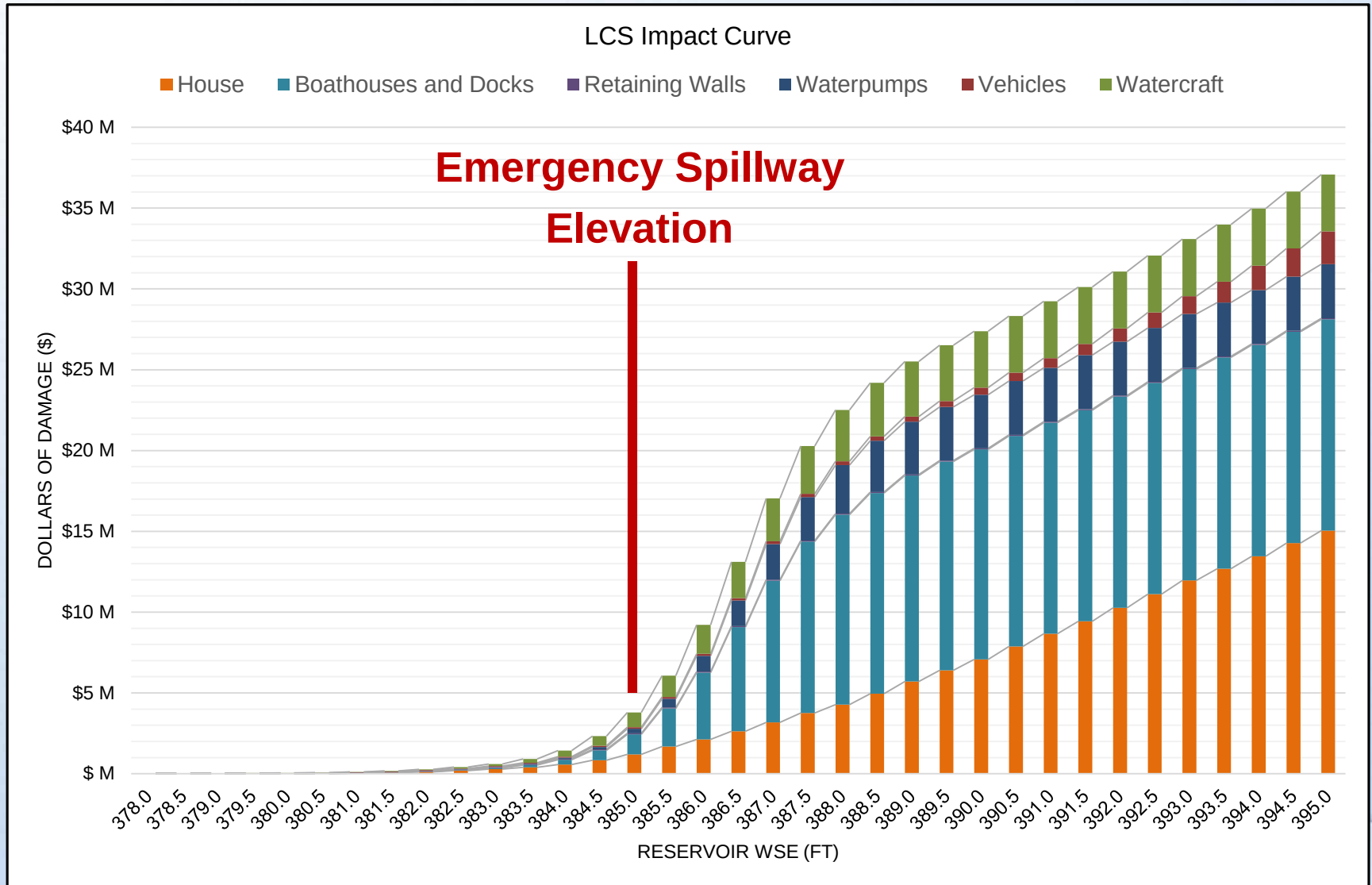
378'



378'



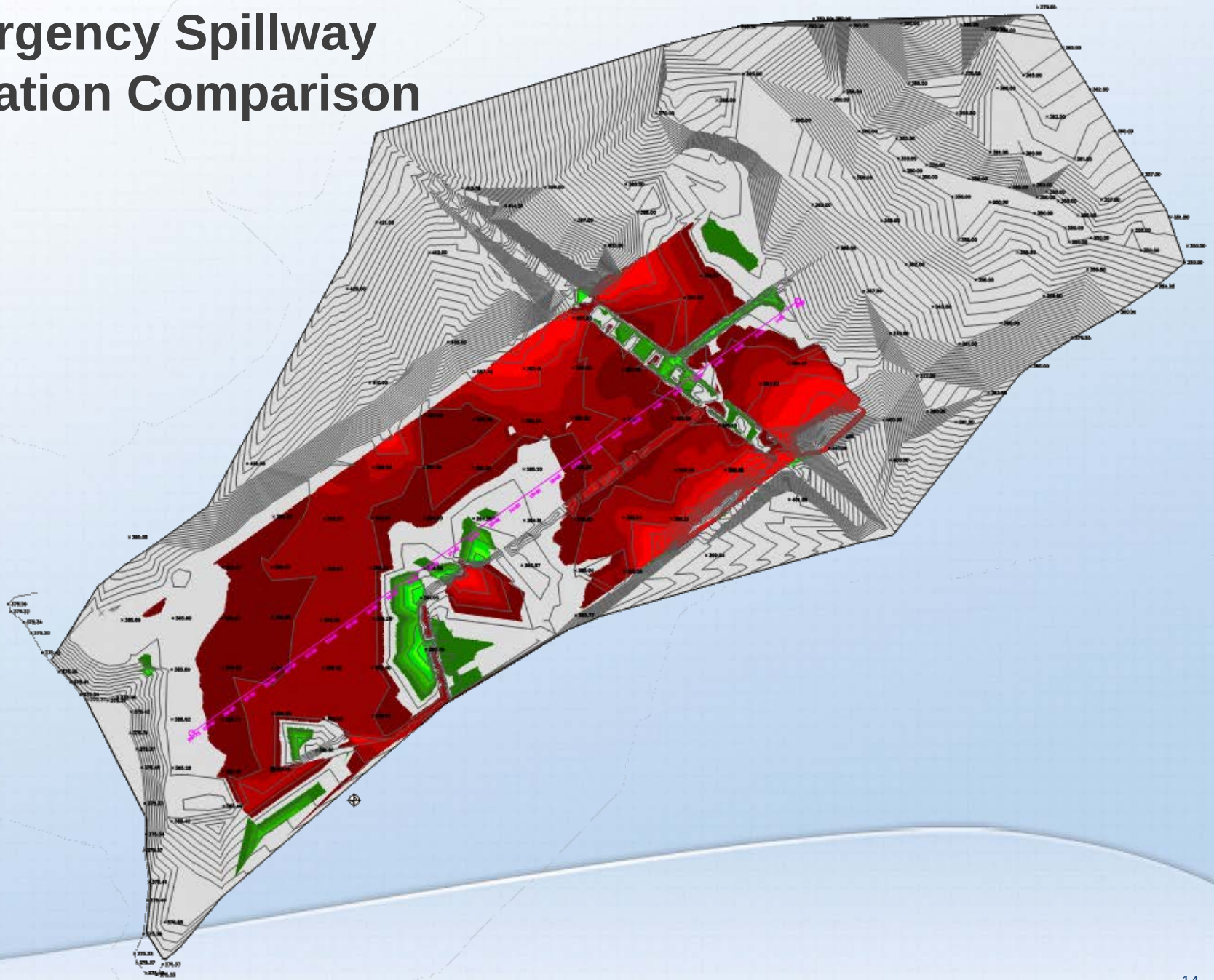
Total Lake Cypress Springs Impact Curve



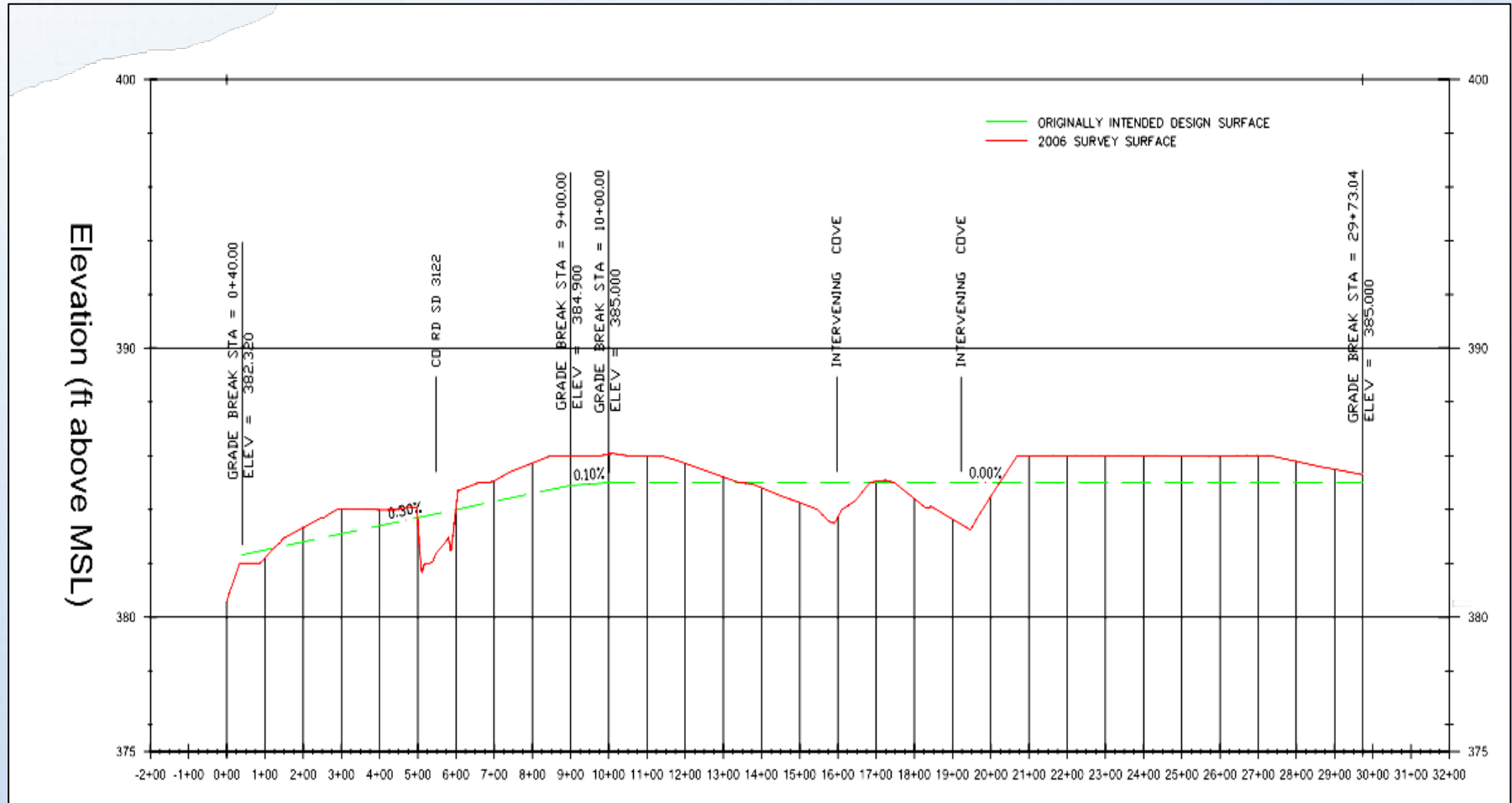
Emergency Spillway

Hydraulic Analysis

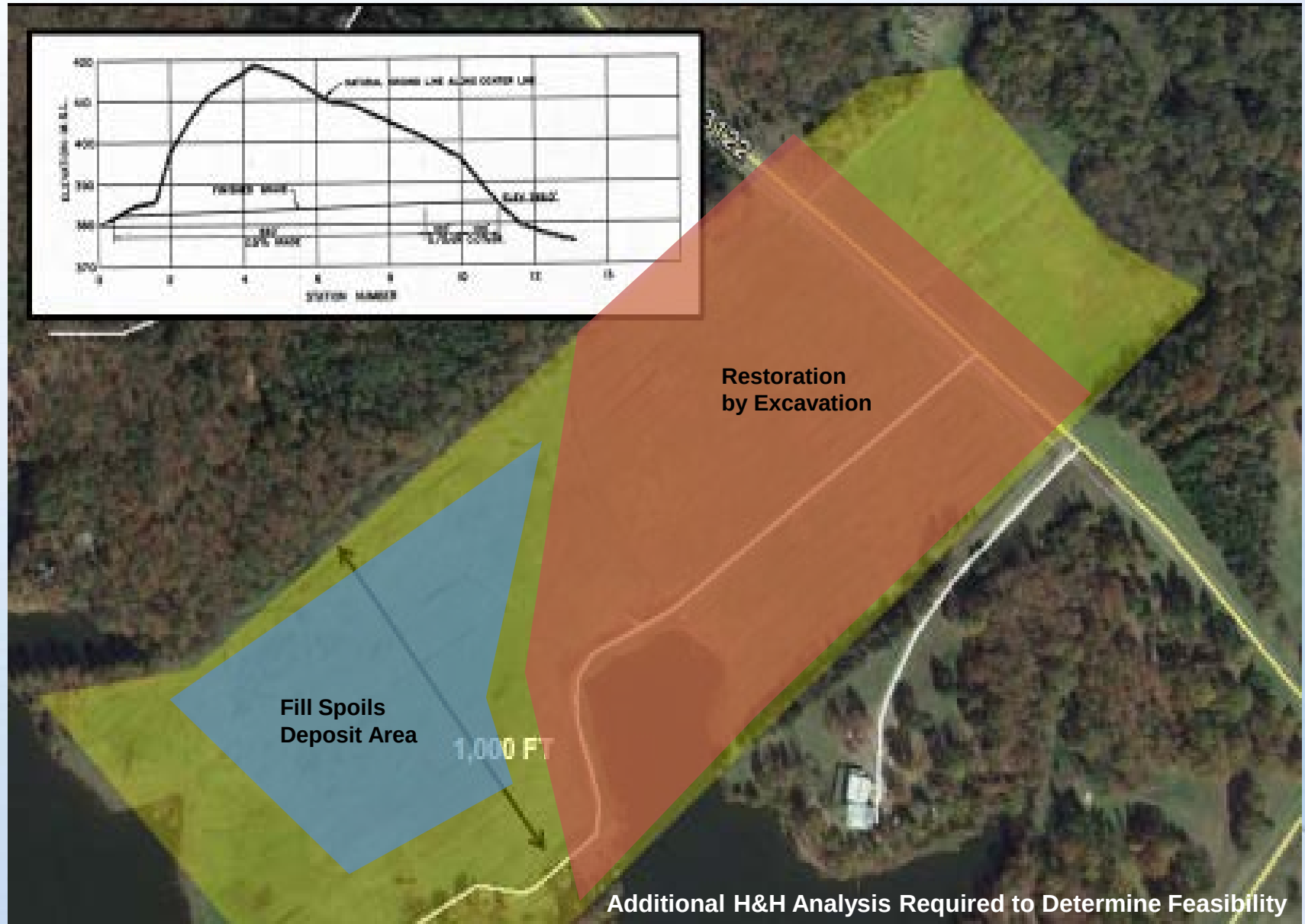
Emergency Spillway Elevation Comparison



LCS Emergency Spillway Cross Section

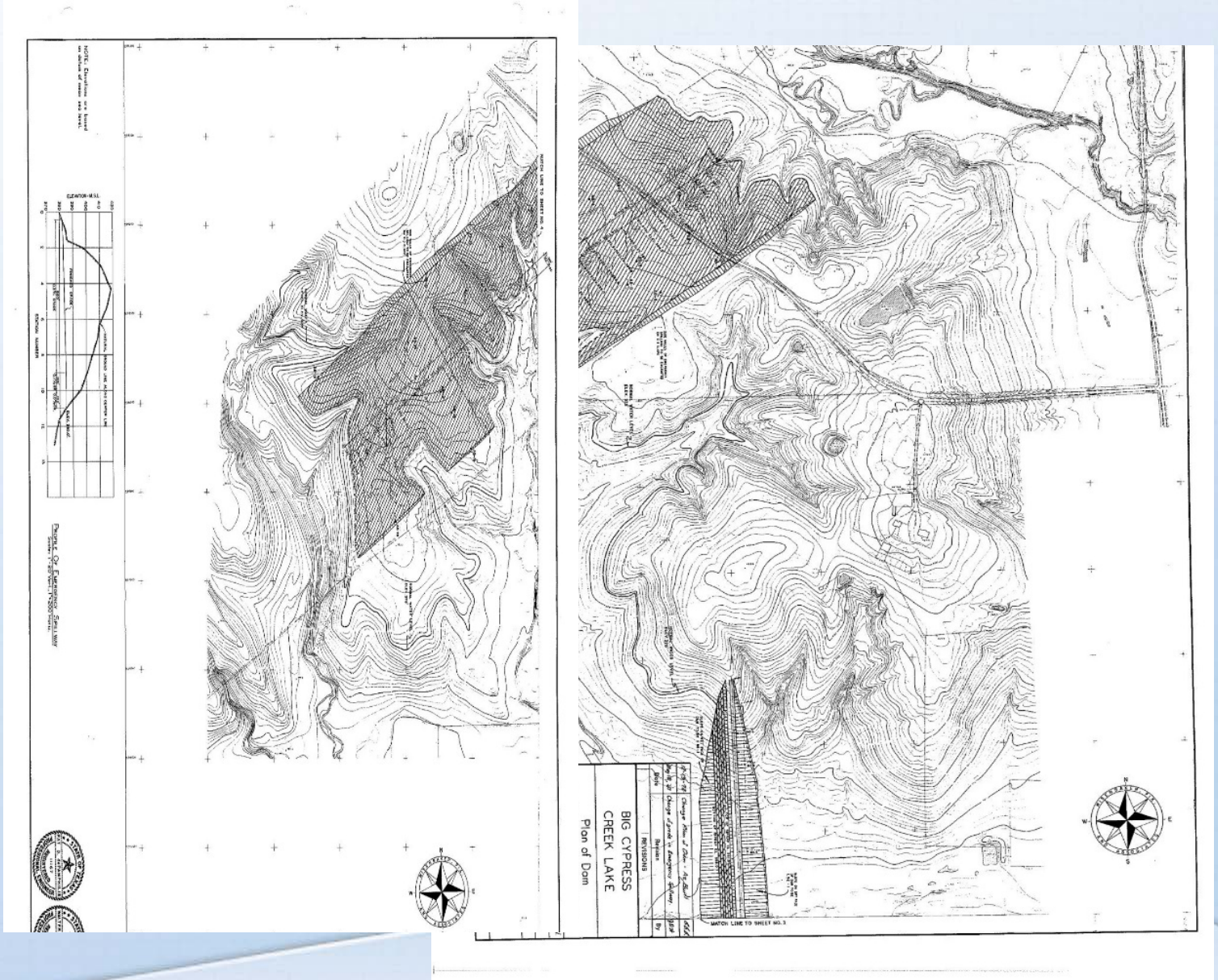


Emergency Spillway Restoration Possibility

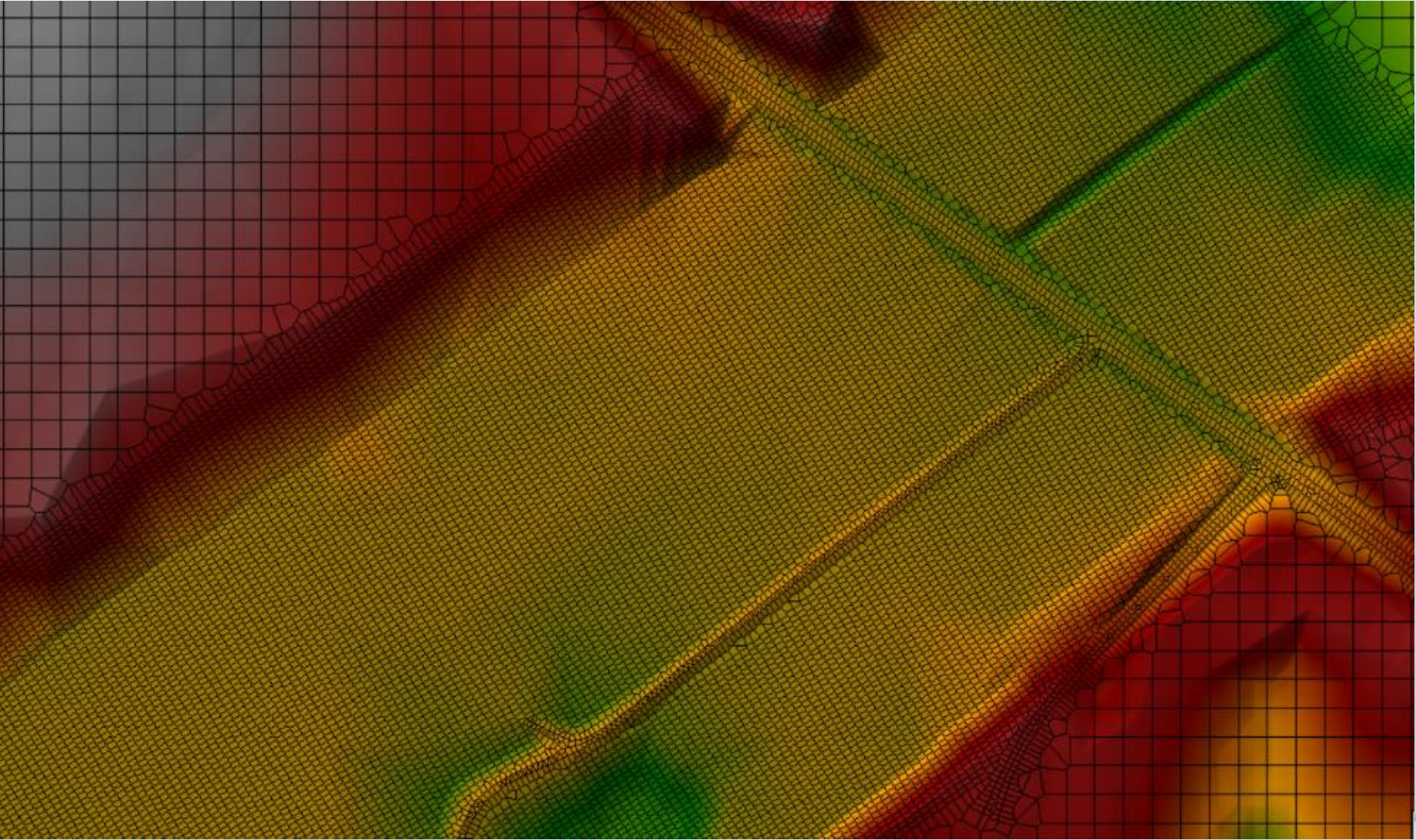


Additional H&H Analysis Required to Determine Feasibility

Original Design



2D Hydraulic Mesh



Alternatives

- **Alternative 1**

- Leave the spillway as it is

- **Alternative 2**

- Renovate the spillway back to original design
 - Includes lowering of FM3122
 - Removal of all fill materials offsite

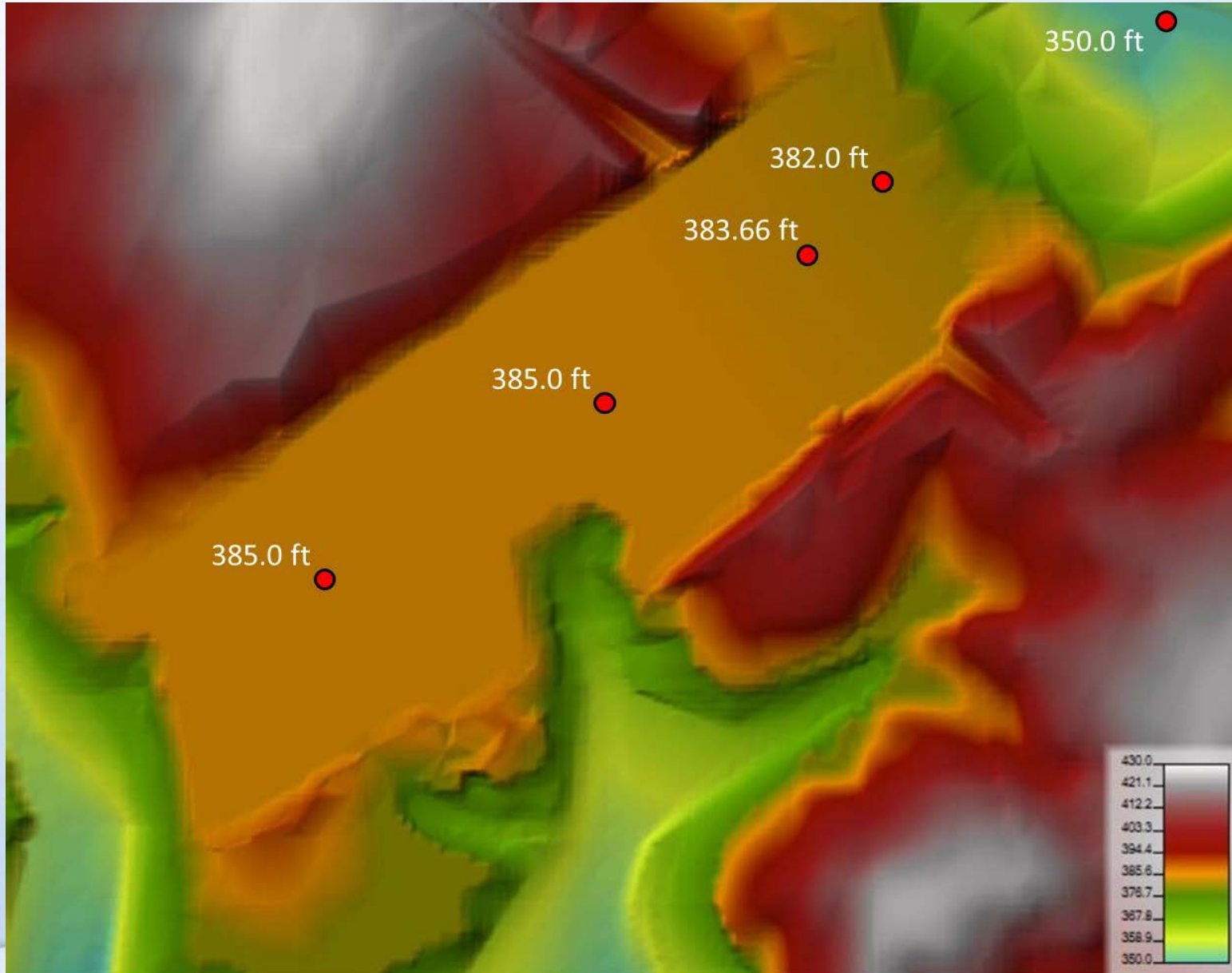
- **Alternative 3A**

- Includes lowering of FM3122
- Re-deposition of material throughout the emergency spillway corridor.

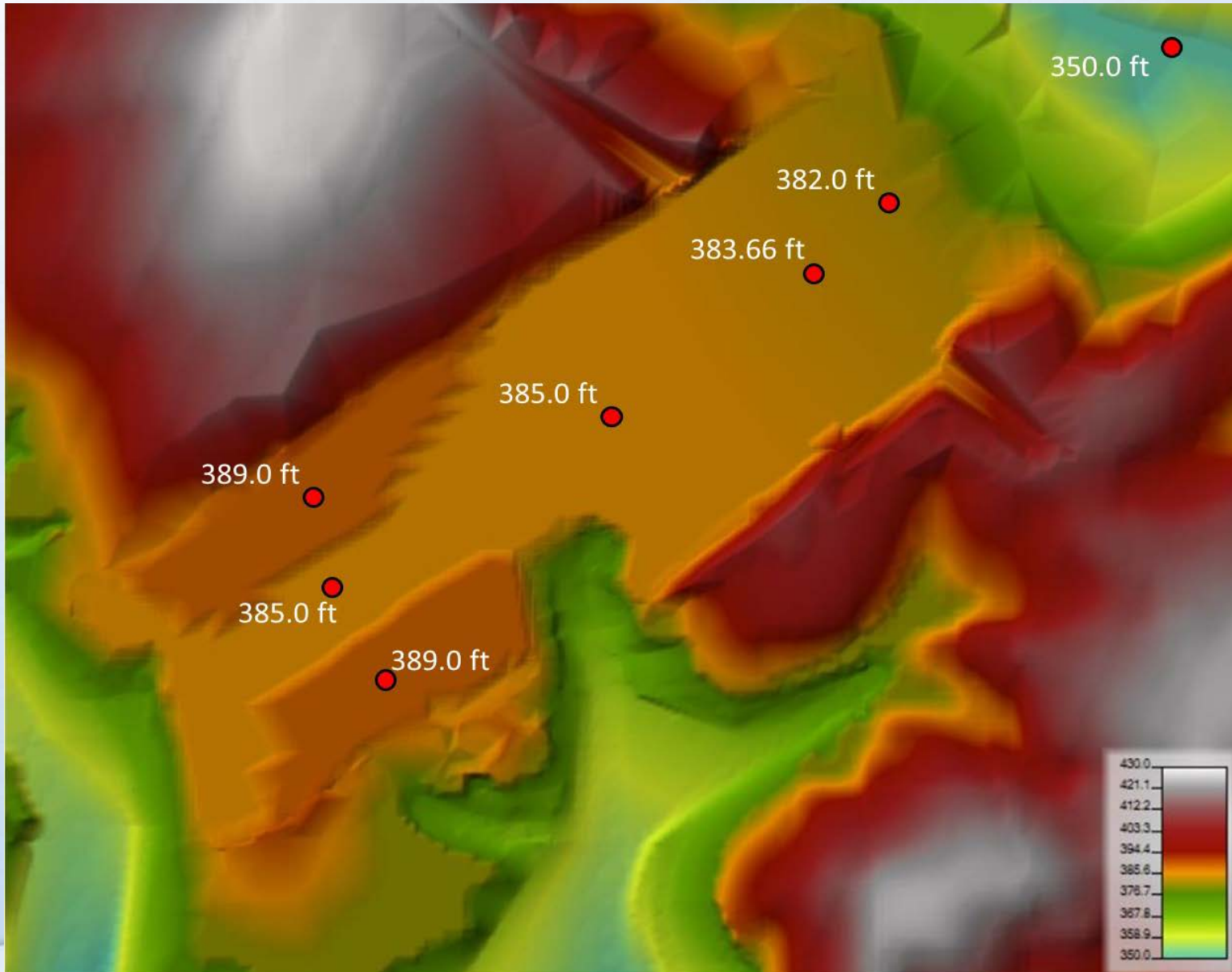
- **Alternative 3B**

- Leaving FM3122 as it is
- Re-deposition of material throughout the emergency spillway corridor.

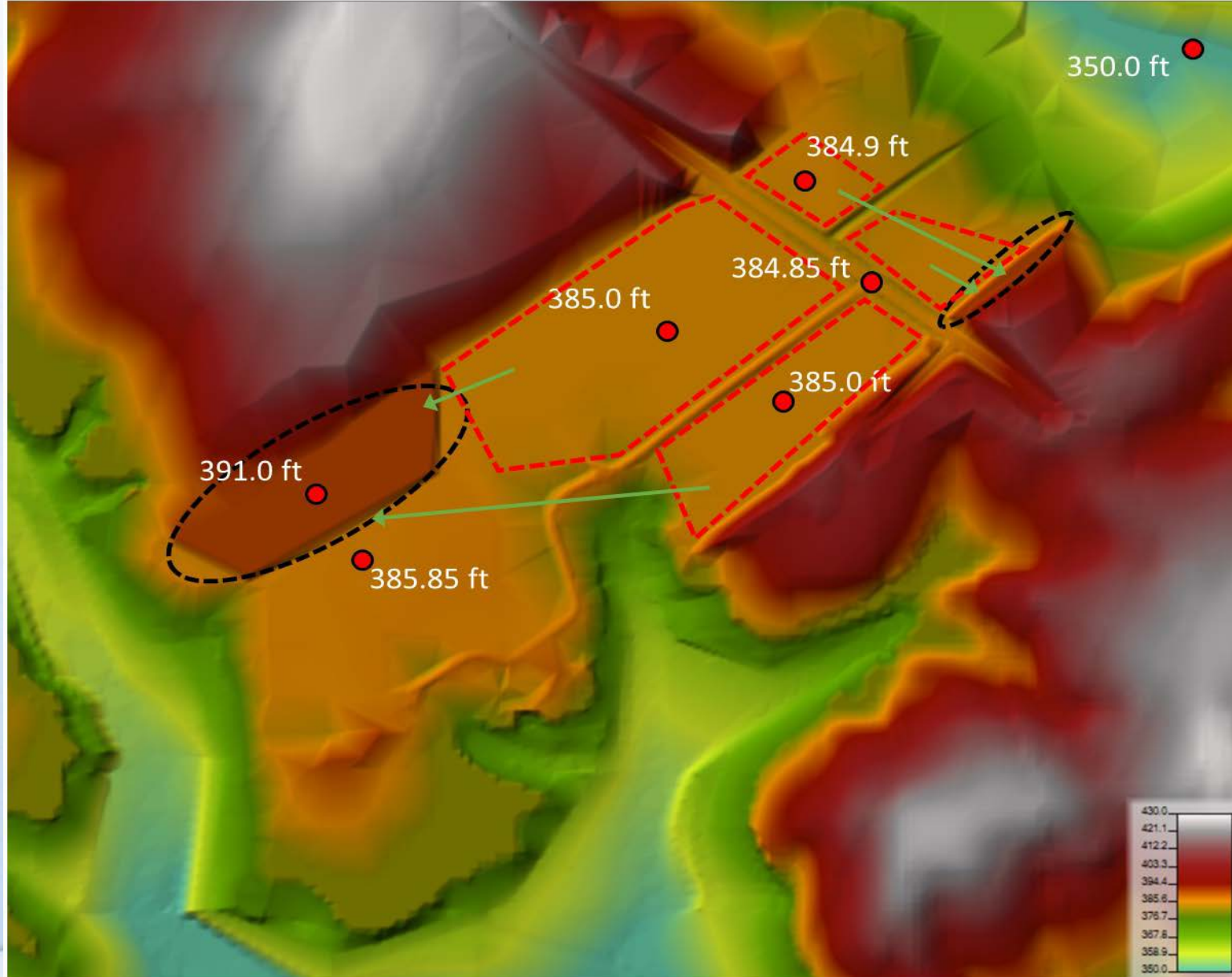
Alternative 2



Alternative 3A



Alternative 3B



Video Links

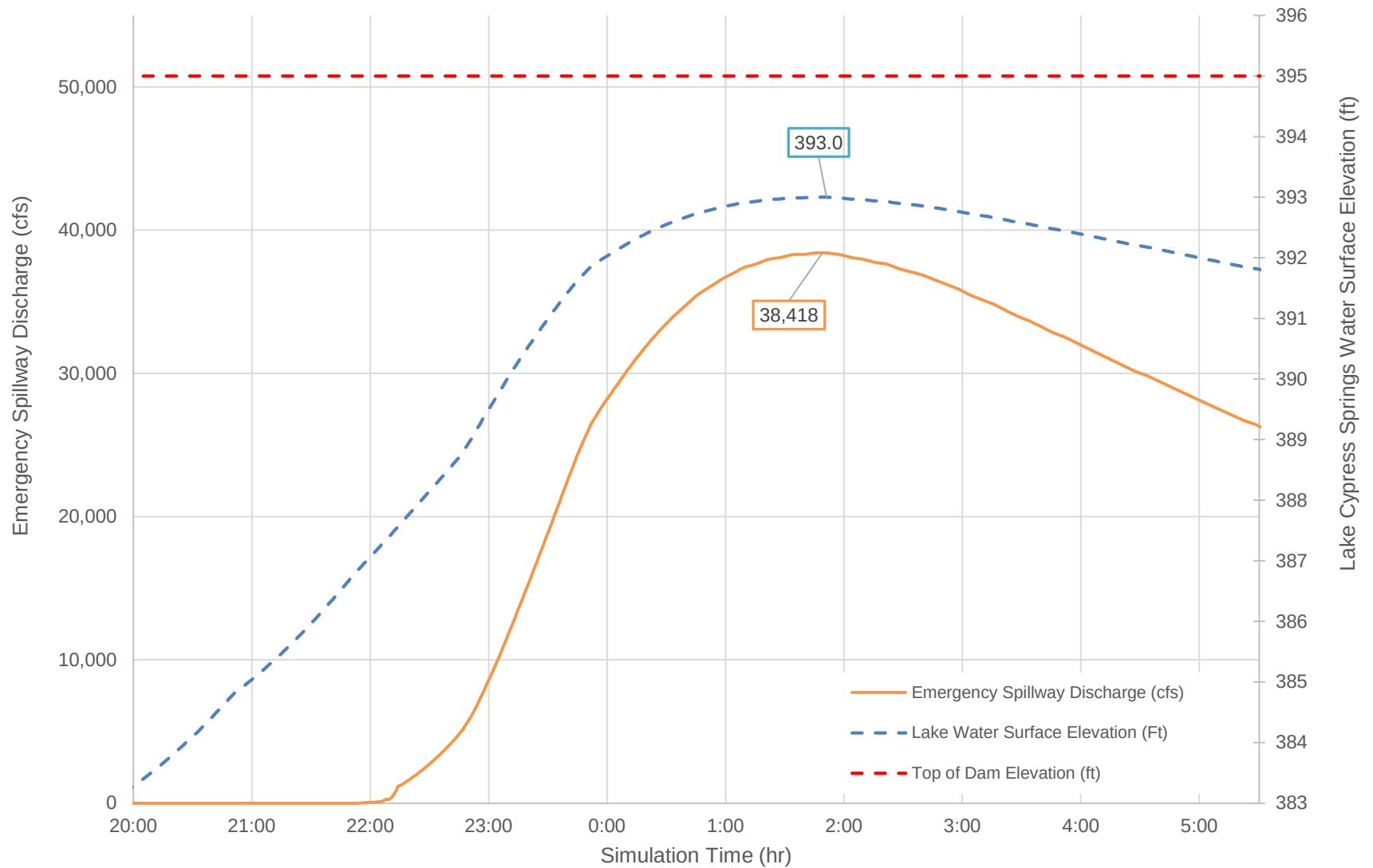
Alternative1 Timeseries Depth Aerial

Alternative1 Qpeak Velocity Aerial

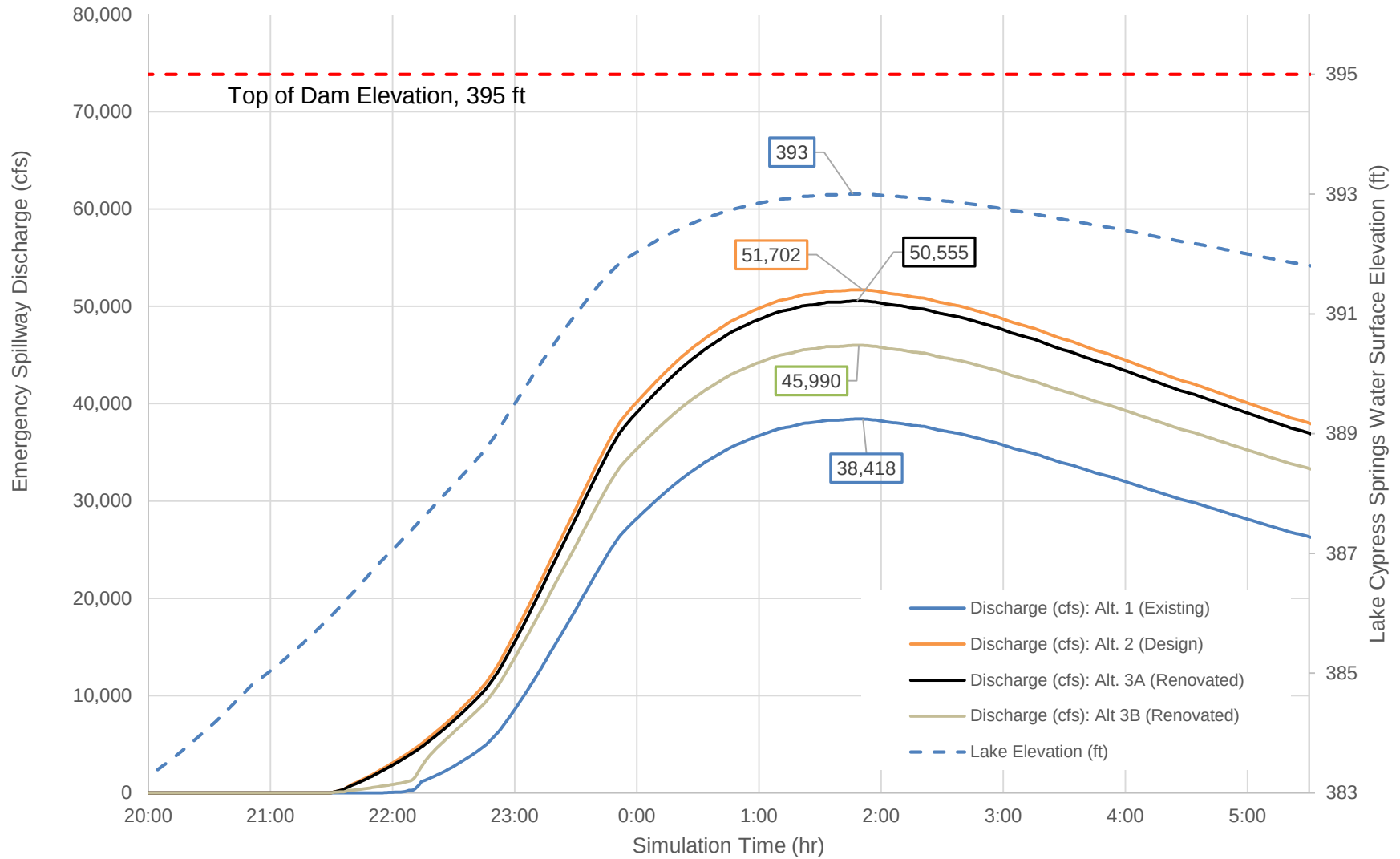
Alternative3B Timeseries Depth Aerial

Alternative3B Qpeak Velocity Aerial

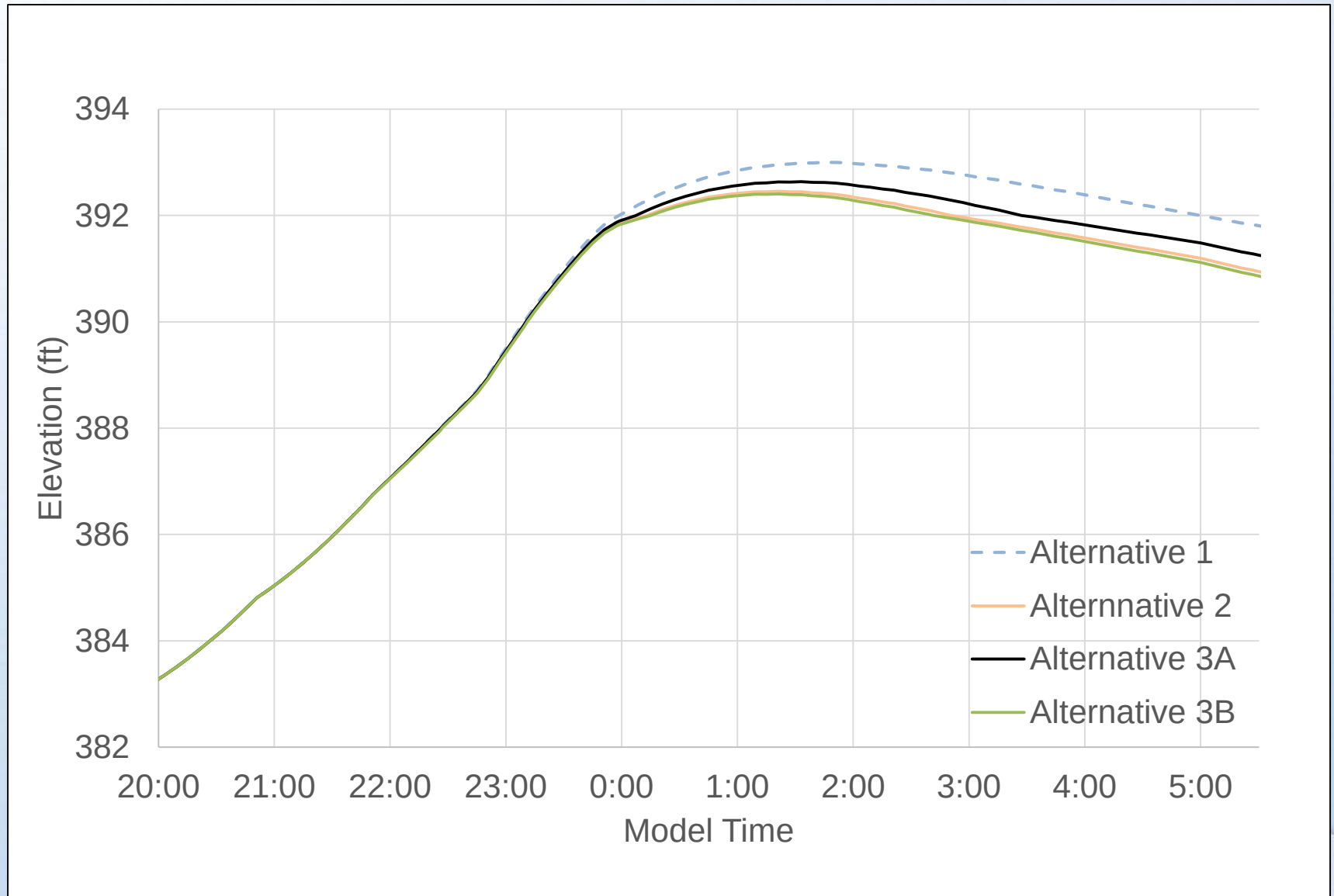
Alternative 1



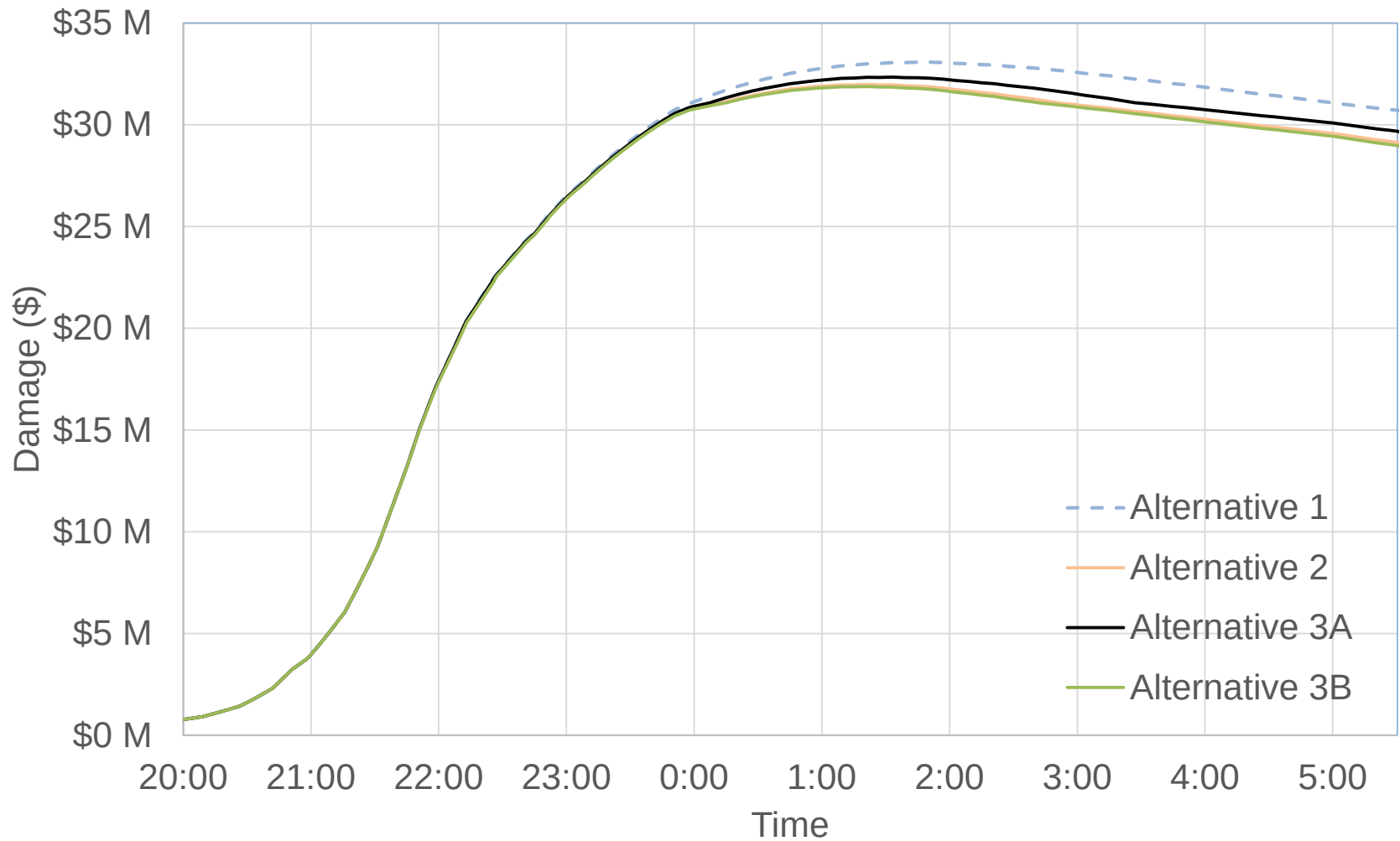
Discharge vs. Model Time



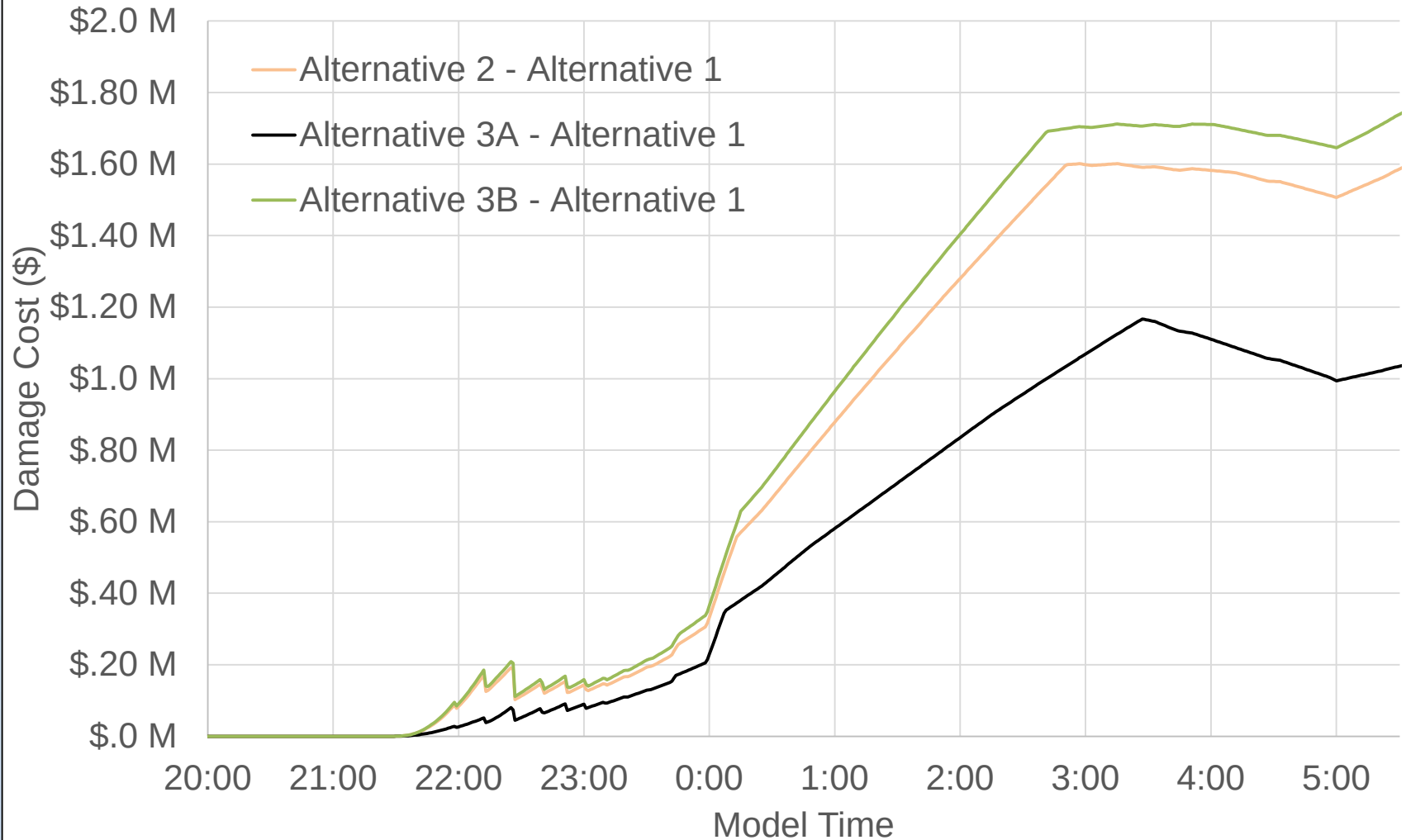
Elevation vs. Model Time



Damage Cost vs. Model Time



Damage Cost Differentials vs. Time



Timestep (hrs)	Water Surface Elevation (ft)				Notes
	Alternative No. 1 (Existing)	Alternative No. 2 (Design)	Alternative No. 3A (Renovated)	Alternative No. 3B (Renovated)	
0.00	382.82	382.83 0.00	382.83 0.00	382.83 0.00	No Engagement of Emergency Spillway
1.00	384.39	384.39 0.00	384.39 0.00	384.39 0.00	
2.00	386.29	386.29 0.00	386.29 0.00	386.29 0.01	Water Rising
3.00	388.48	388.44 0.48	388.46 0.24	388.43 0.60	
4.00	391.39	391.27 1.44	391.31 0.96	391.25 1.68	
5.00	392.66	392.29 4.44	392.42 2.88	392.26 4.80	Peak Timestep
6.00	392.99	392.43 6.72	392.62 4.44	392.37 7.44	
7.00	392.86	392.10 9.12	392.37 5.88	392.02 10.08	Water Falling
8.00	392.52	391.71 9.72	391.94 6.96	391.65 10.44	
9.00	392.14	391.33 9.72	391.60 6.48	391.26 10.56	

Inches of Difference

ALTERNATIVE 2 PROPOSED COSTS

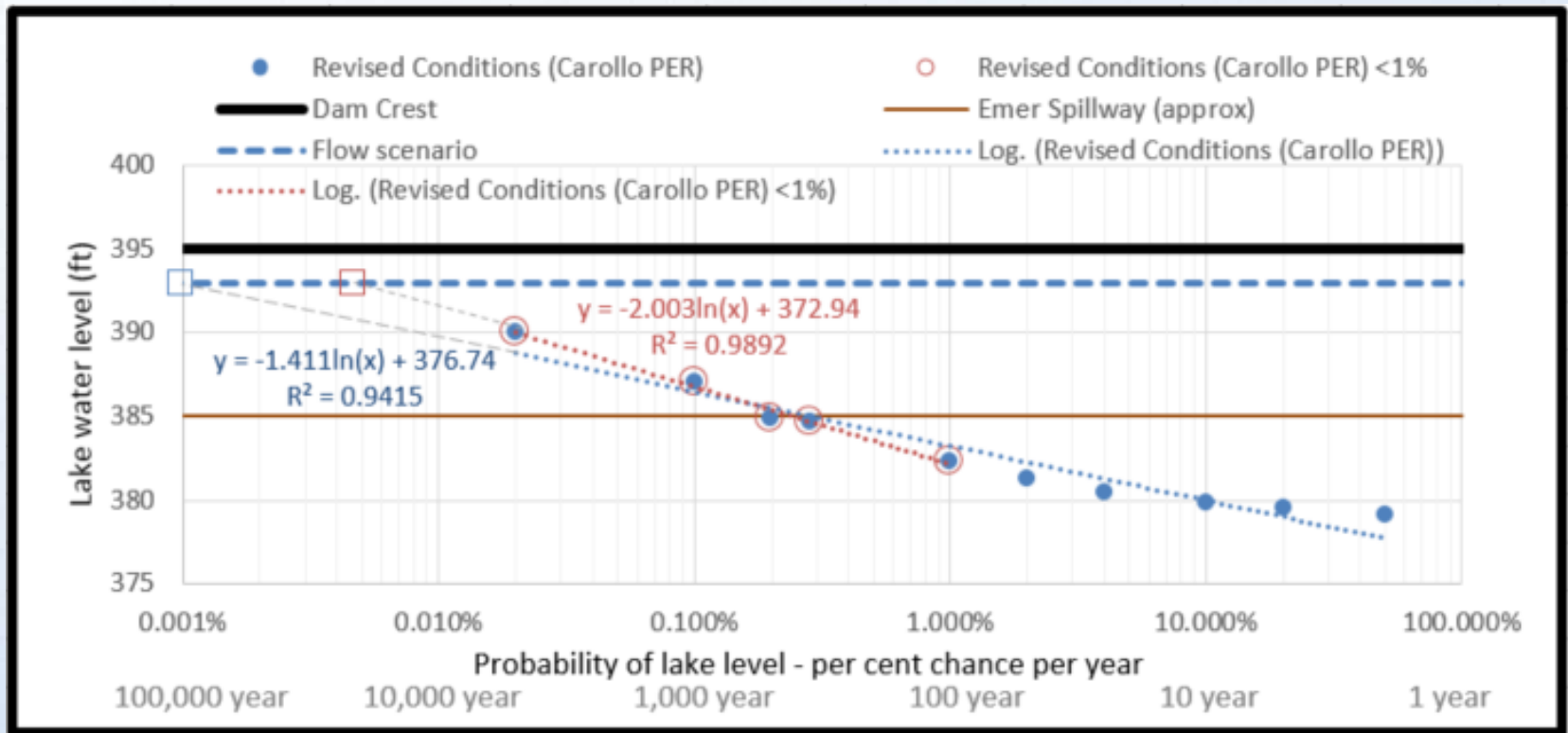
START-UP, MOBILIZATION, SECURITY, & SW3P ITEMS	\$85,050	
EMERGENCY SPILLWAY DIRT WORK ITEMS	\$870,000	
FM 3122 ROAD RENOVATION ITEMS	\$162,500	
DESIGN FEES (SURVEY, GEOTECH, ENGINEERING, ETC.)	\$187,633	
CONTINGENCY	20%	\$261,037
TOTAL:	\$1,566,000	

ALTERNATIVE 3A PROPOSED COSTS

START-UP, MOBILIZATION, SECURITY, & SW3P ITEMS	\$74,288	
EMERGENCY SPILLWAY DIRT WORK ITEMS	\$511,250	
FM 3122 ROAD RENOVATION ITEMS	\$162,500	
DESIGN FEES (SURVEY, GEOTECH, ENGINEERING, ETC.)	\$132,206	
CONTINGENCY	20%	\$176,049
	\$1,056,000	

ALTERNATIVE 3B PROPOSED COSTS

START-UP, MOBILIZATION, SECURITY, & SW3P ITEMS	\$69,150	
EMERGENCY SPILLWAY DIRT WORK ITEMS	\$502,500	
FM 3122 ROAD RENOVATION ITEMS	\$0	
DESIGN FEES (SURVEY, GEOTECH, ENGINEERING, ETC.)	\$105,748	
CONTINGENCY	20%	\$135,480
	\$813,000	



Extrapolating the trendlines of probability results in a calculated probability of reaching 393' between 0.005% annual chance **(20,000-year)** and 0.001% annual chance **(100,000-year)**.

Alternatives	OPCC Cost	Damage Difference at Peak	BC-Ratio
		Timestep = 10.77 hr.	
Alternative 1 (Existing)	\$0	N/A	N/A
Alternative 2 (Design)	\$1,566,000	\$1,104,445	0.71
Alternative 3A (Renovated)	\$1,056,000	\$741,397	0.70
Alternative 3B (Renovated)	\$813,000	\$1,203,963	1.48

* It takes between a 20,000-year and 100,000-year storm event to break even on the capital investment of the emergency spillway project

Lake Cypress Springs E-Spillway

Key Board-Decision Elements

**Project
Cost**

**Storm
Frequency (Risk)**

**Property
Damages**

Questions

