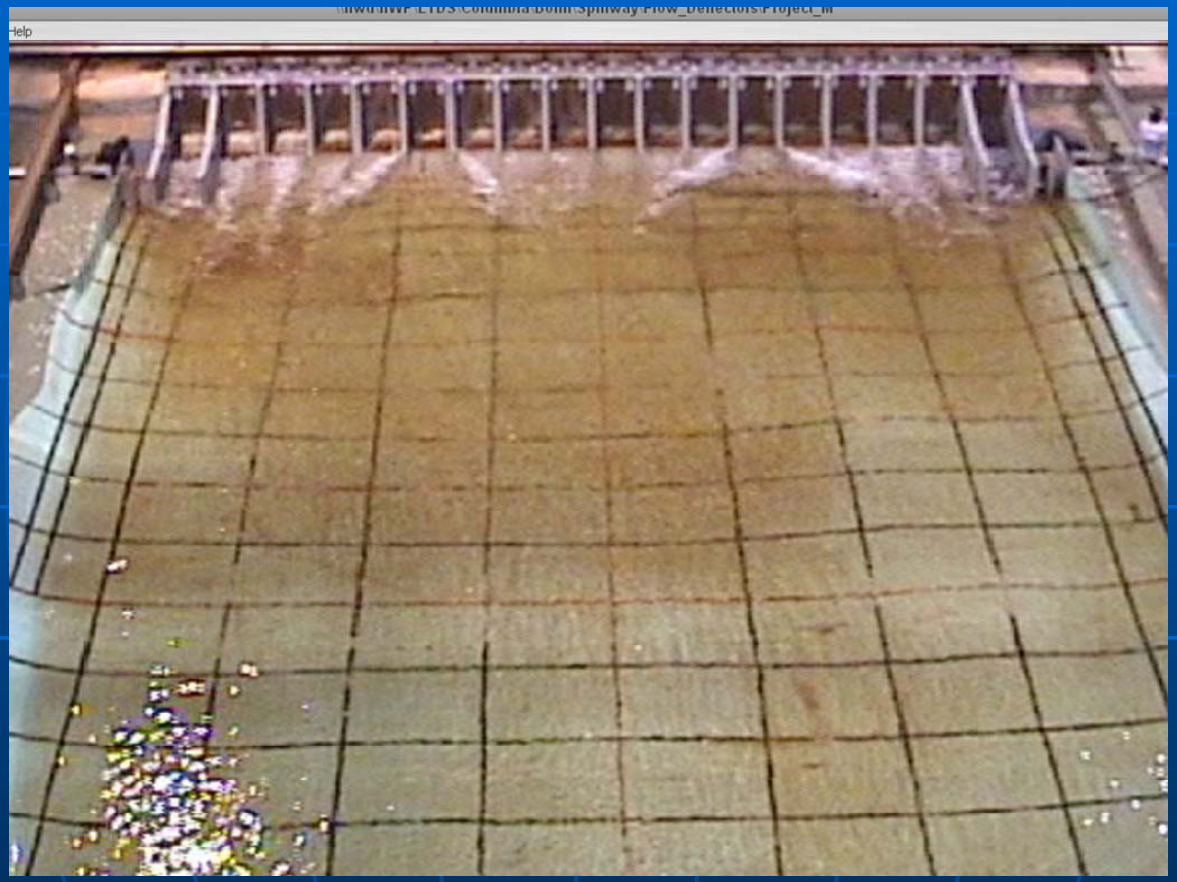
Bonneville Spill Pattern Development

Hydraulic Modeling

Bonneville Spill Patterns

- Traditional Method
  - Physical Hydraulic Models – ERDC (WES)
  - Observe Flow Pattern using Dye & Confetti
  - Guidelines
    - Shoreline Velocities
    - Flow Promotes Good Downstream Direction

Bonneville 1:55 Scale Spillway Model



Bonneville Spill Patterns

- 2006 New Pattern
  - Spring – 100 kcfs, 24 hr
  - Summer – 75 kcfs daytime, TDG Cap. Night
  - Actual volumes below target due to exceeding TDG cap
- 2007 Pattern Development
  - Establish new pattern between 75-100 kcfs considering TDG Production
  - Traditional Method (Physical Hydraulic Model)
  - Numerical model to estimate TDG exchange associated w/alternative spill patterns (Mike Schnieder)

Bonneville Spill Patterns

- Results
  - TDG Model – Gates 2-4 ft open<TDG Production Cap
  - Satisfactory single pattern for TW 13-27 ft.
  - Satisfactory single pattern for spill of 85 kcfs

Bonneville Spill Patterns

- Recommended Pattern (100 kcfs)

Forebay El. (ft) 75

Tailwater El.(ft) 24

Spill Q (kcfs) 100

Spillway Bay	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
Feet Open	3	3	3	2.5	2.5	2	2	2	2.5	2	2	2.5	2	2.5	2.5	3	3	3	45

Bonneville Spill Patterns

- Recommended Pattern (85 kcfs)

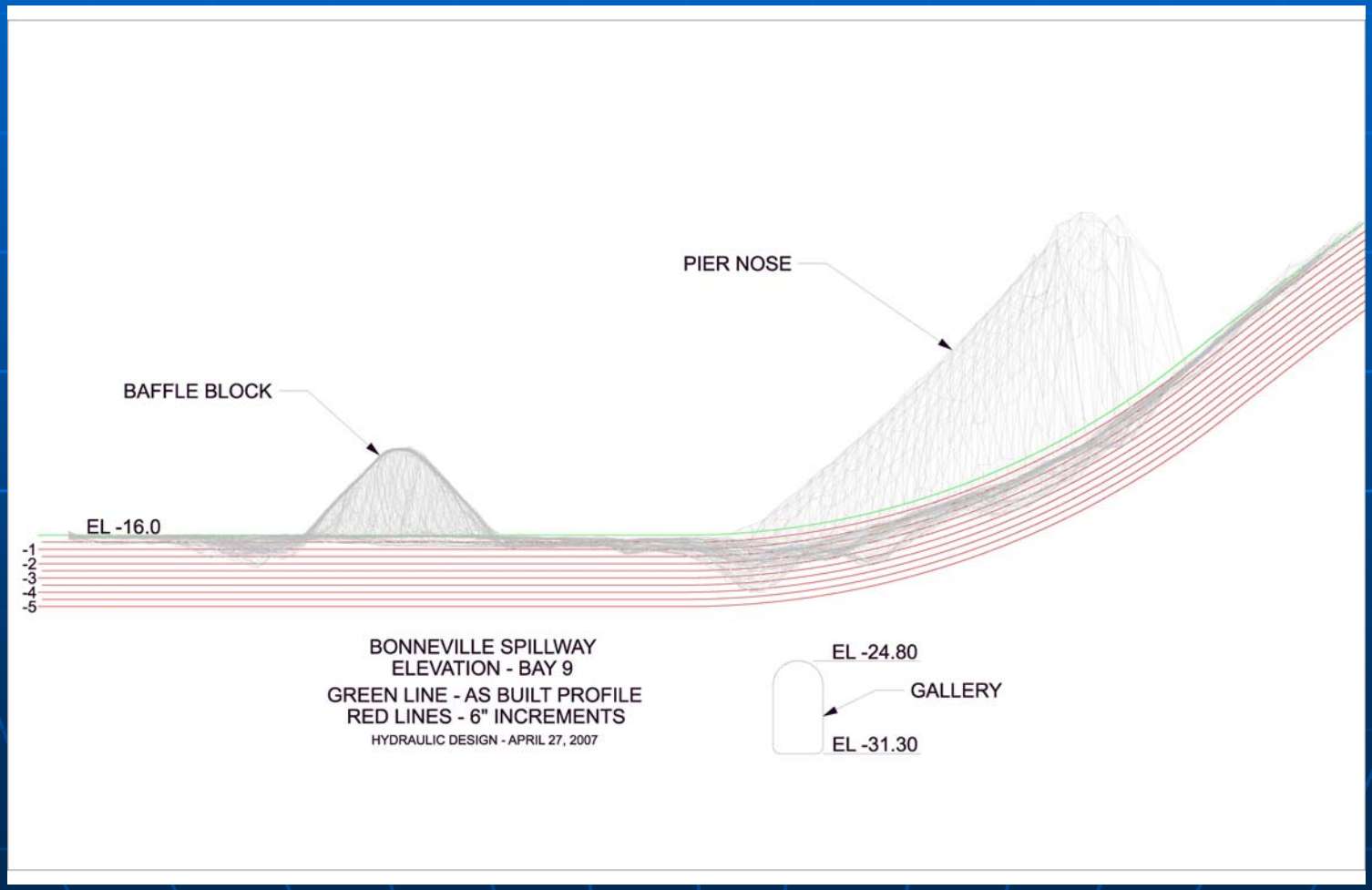
Forebay El. (ft)	75
Tailwater El.(ft)	15
Spill Q (kcfs)	85

Spillway Bay	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**Total**
Feet Open	2	2.5	2.5	2	2	2	2	2	2	2	2	2	2	2	2.5	2	2.5	2	38

Bonneville Spill Patterns

- Erosion Issues
  - Bays 9, 12 and 14
  - North End d/s of Basin Apron
  - South End on Basin Apron
- Limited Hydraulic Investigations w/bays closed
  - Recirculation Cells
  - Stagnant Areas

Bonneville Spill Patterns



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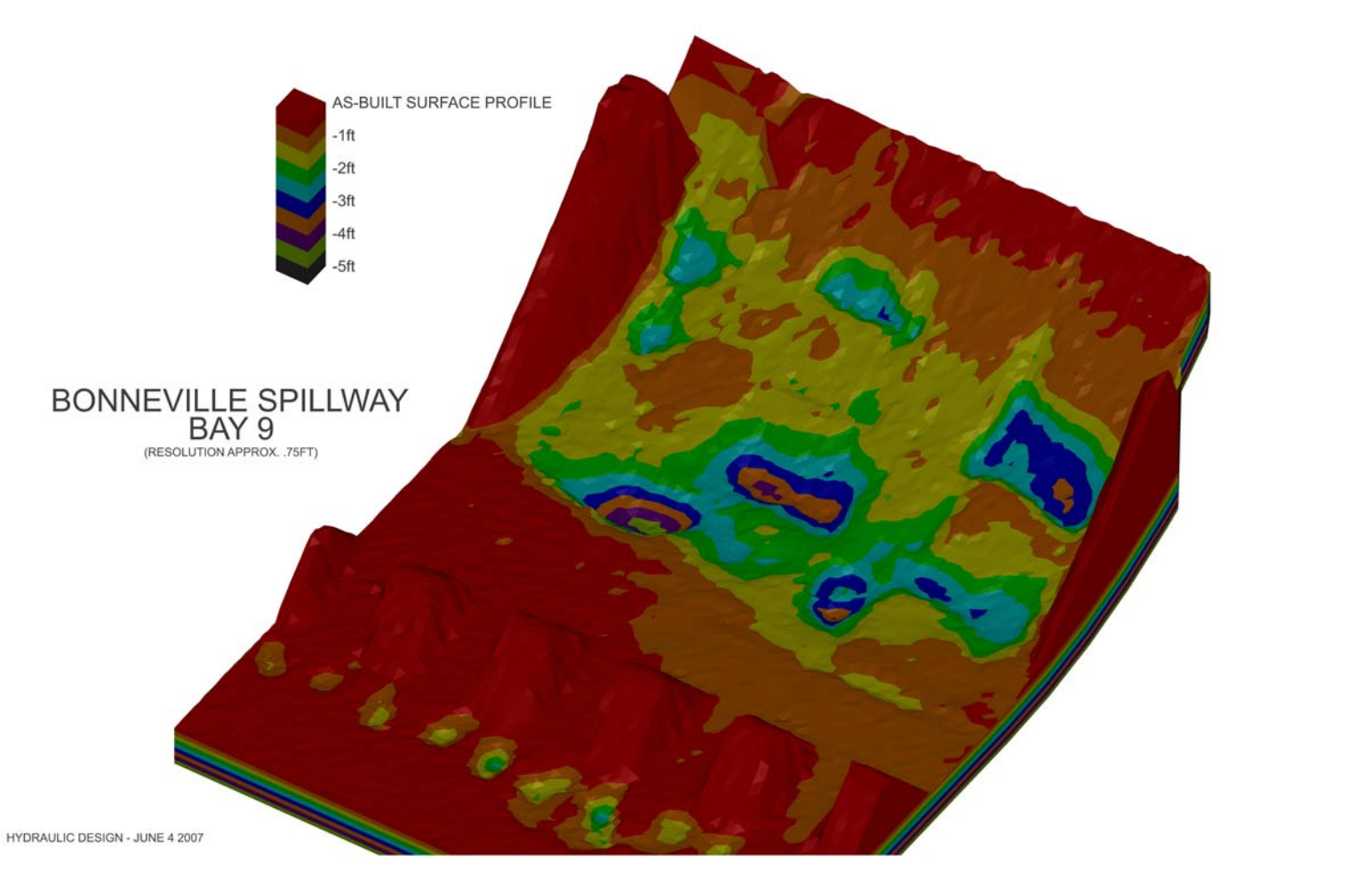
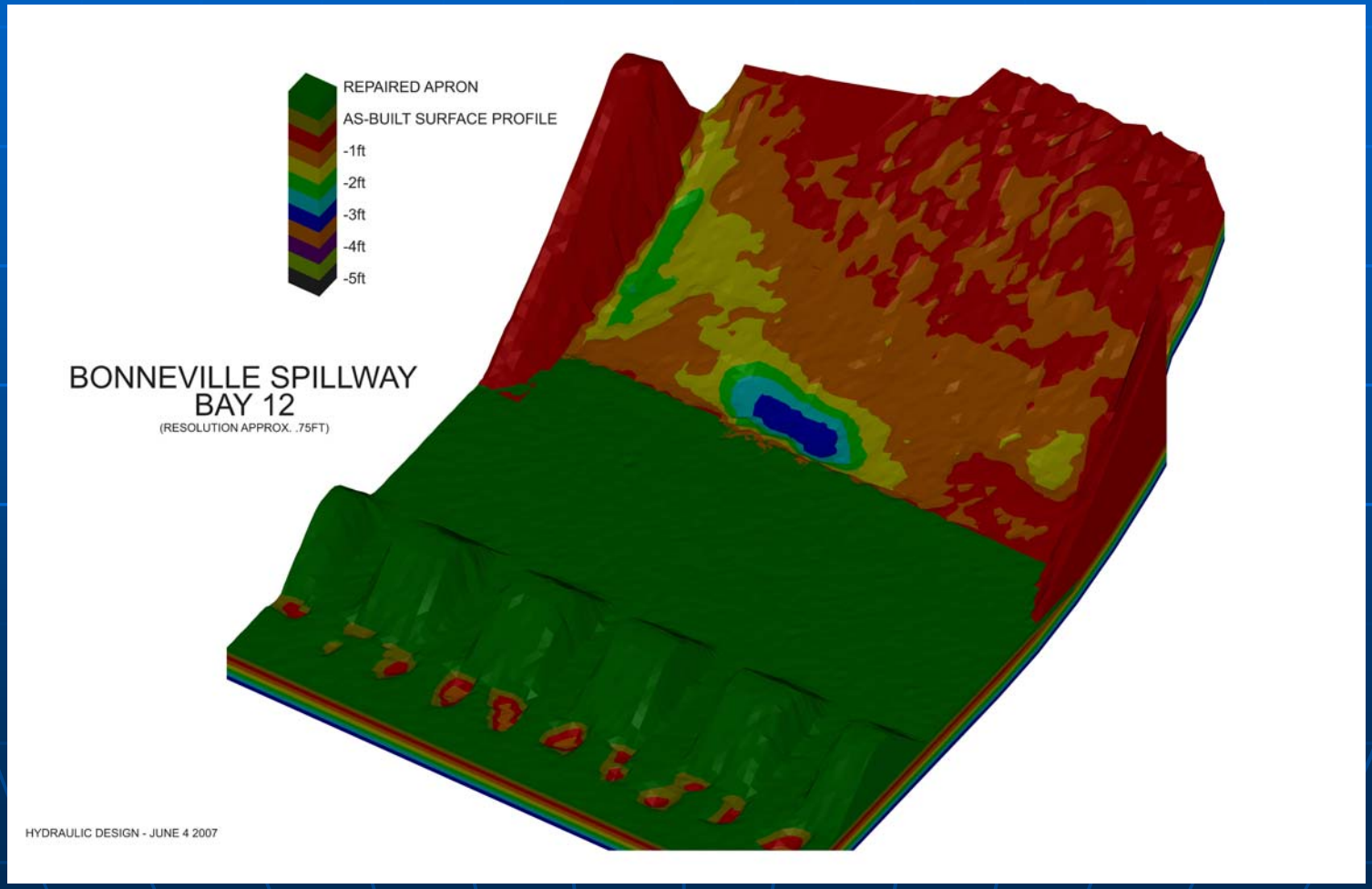
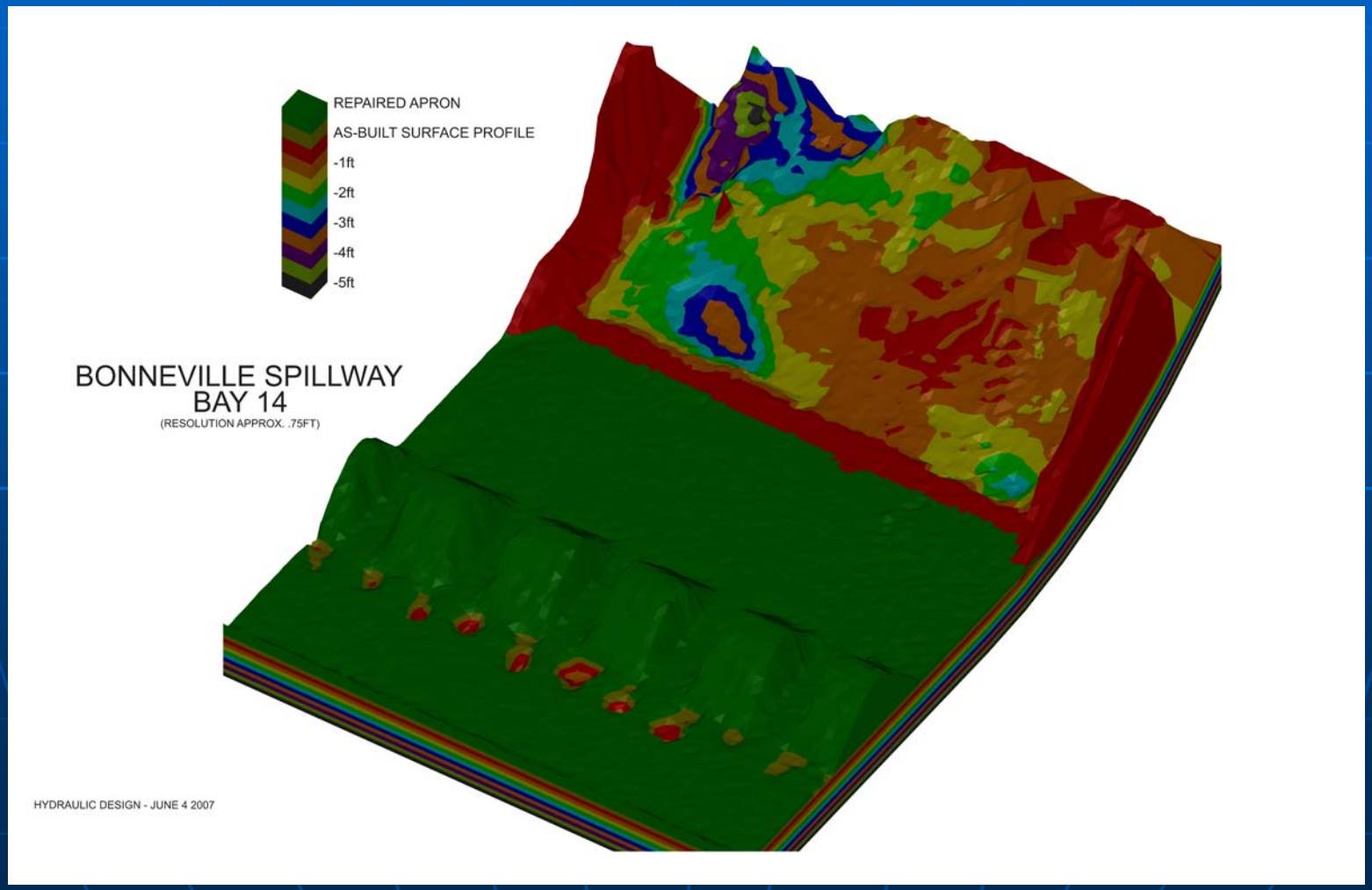


Bonneville Spill Patterns



Bonneville Spill Patterns



Bonneville Spill Patterns

- Short Term
  - Hydrosurveys to Monitor Erosion
  - Fill Erosion Holes at 9,12 and 14 with tremie concrete (after spill season)
- Long Term
  - Alternative Study to Address Erosion Concerns
  - Design Documents
  - Plans and Specifications

Bonneville Spill Patterns Summary

- Recommended Patterns Developed
  - 100 kcfs
  - 85 kcfs
- Erosion Issues
  - Short Term Plan
    - Periodic Hydosurveys
    - Fill in holes at Spillbay 9,12 and 14
  - Long Term Plan
    - Alternative Study
    - Design Document
    - Plans and Specifications