San Francisquito Creek Flood Control Long-term Options and CAP 205 Potential

Goal: A long-term solution with significant benefits starting within 5 years

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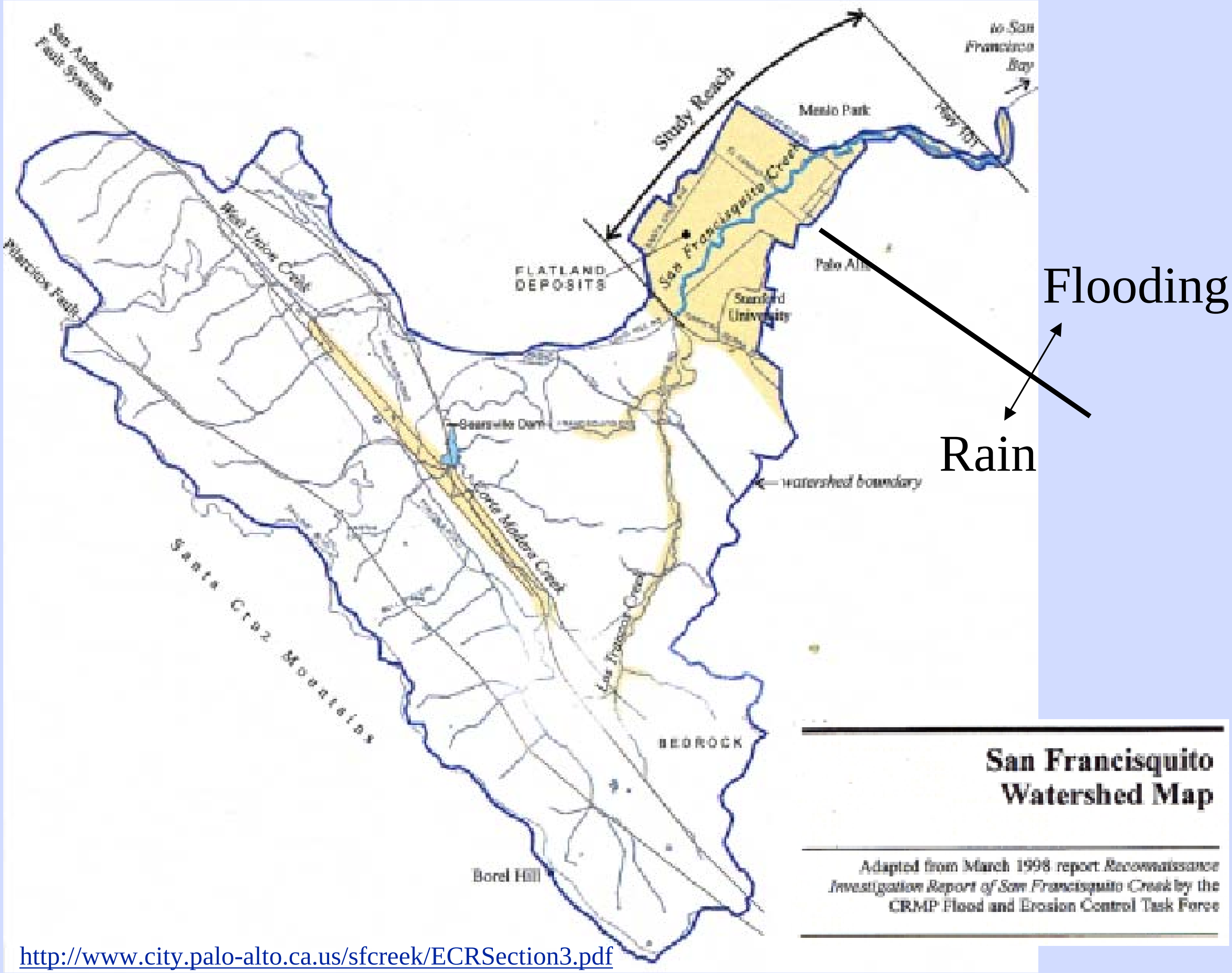
Outline

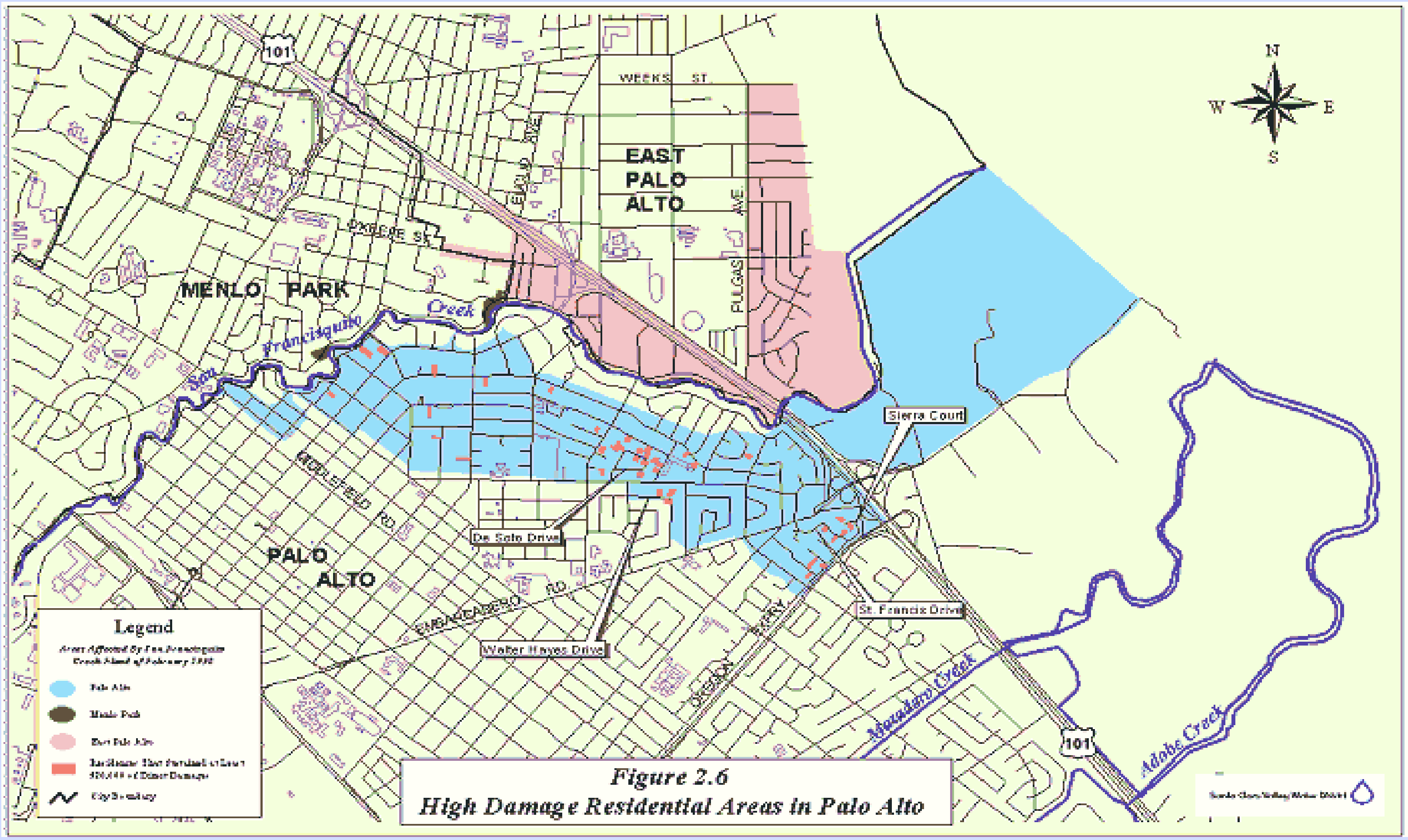
- Nature of the SF Creek flooding problem
- Opportunity and approach to solution
- Creek simulation methodology
- Simulation results and steps needed
- Long-term plan and CAP 205 example
- What do we do next?

Watershed dynamics

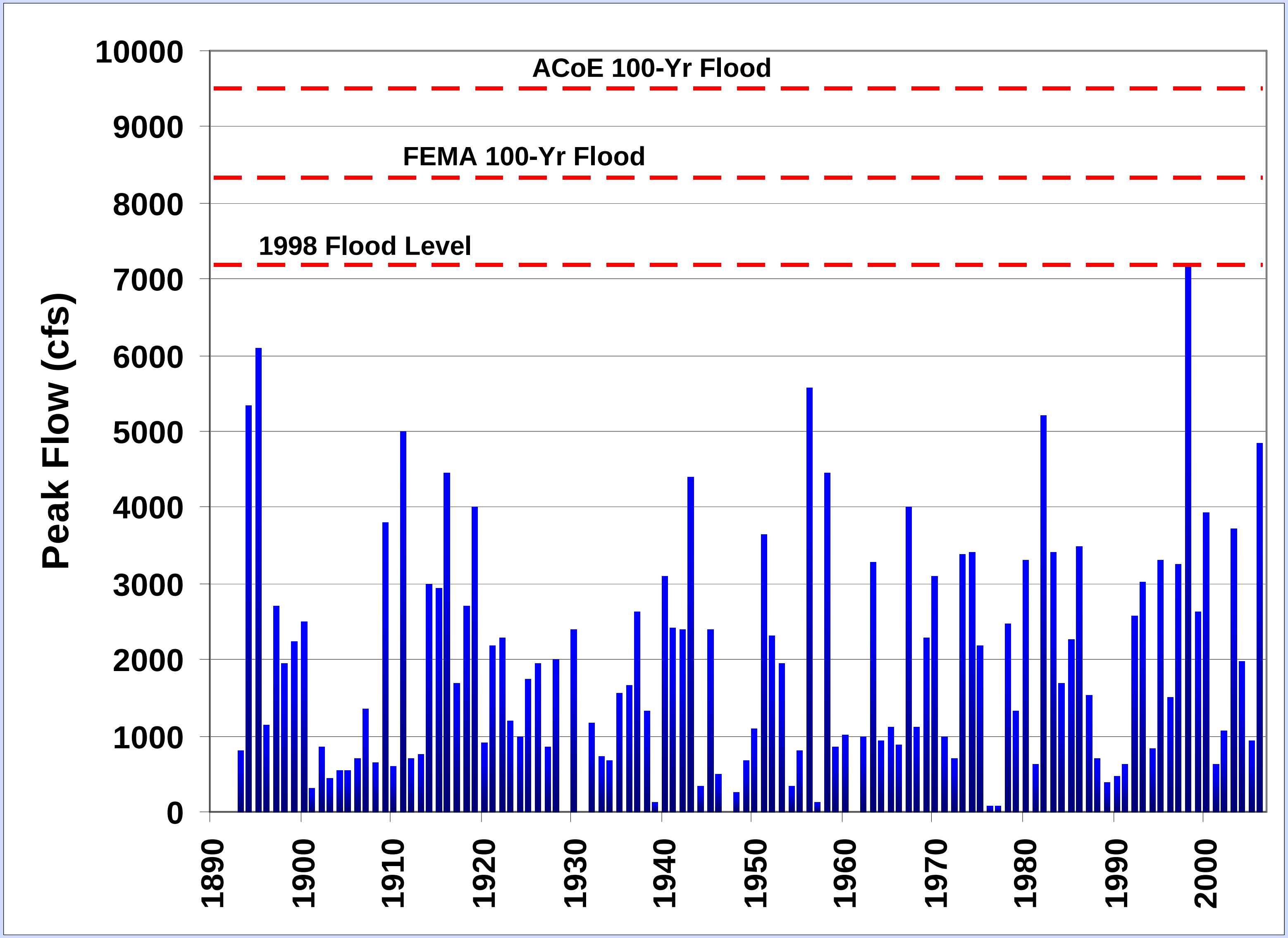


http://www.city.palo-alto.ca.us/sfcreek/ECRSection3.pdf

Flooding in 1998



SF Creek Flooding History



SF Creek Flow Frequencies

Frequency (yrs)	Flow Rate (cfs)
2	1,500 ± 350
5	3,300 ± 900
10	4,500 ± 1,400
25	6,000 ± 2,000
50	7,200 ± 2,600
100	8,300* ± 3,000

*** FEMA 100-yr level – determines need for flood insurance**

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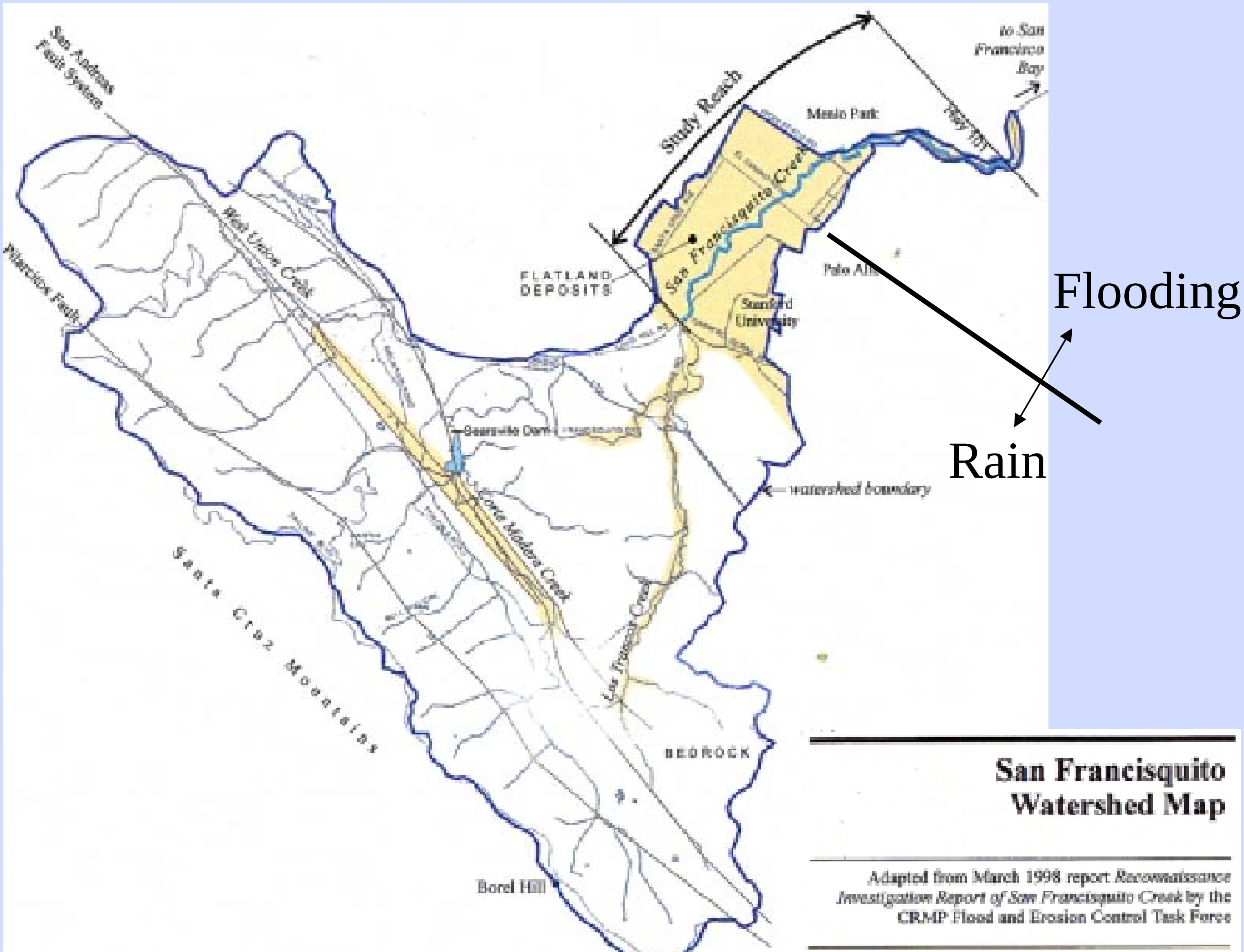
Criteria for flood control plans

- Prevent 100-year floods
- No transfer of flood risk
  - » From one backyard to another
  - » During any stage of project
- No negative environmental impact
- Strong community support
- Additional CAP 205 criteria
  - » Fits $10M budget
  - » Is first component of the long-term plan

Watershed dynamics



http://www.city.palo-alto.ca.us/sfcreek/ECRSection3.pdf

How can we control flood water?

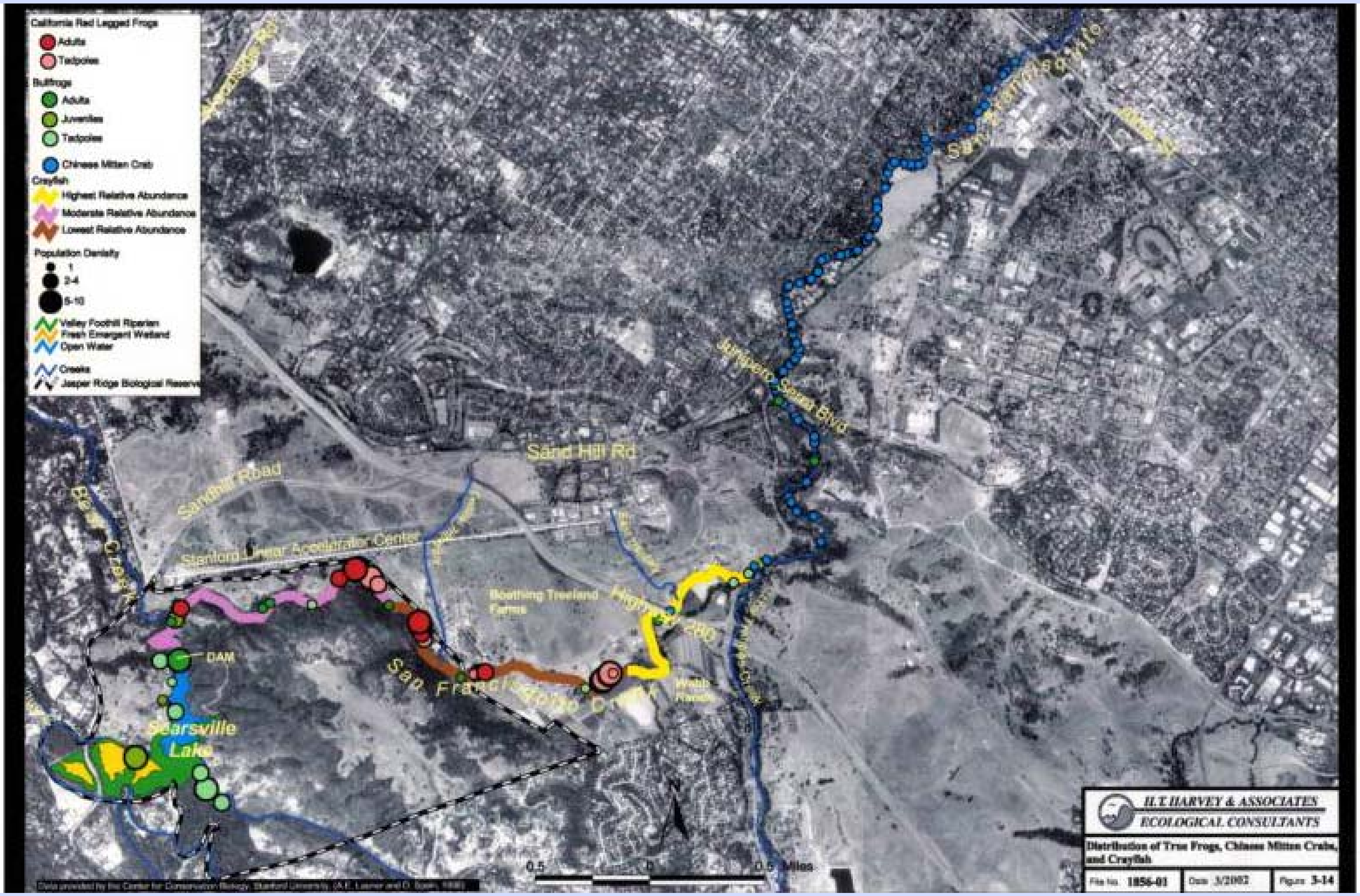
- Three flood-control alternatives:
  - » Reduce the peak flow using upstream retention devices
  - » Increase downstream flow capacity
  - » Some of each of these approaches
- Upstream retentions are:
  - » Very expensive (>~ $100 M)
  - » Environmentally problematic
  - » Difficult to secure funding
    - – Soaring federal deficit and security/war expenses
    - – ~50% local match required

Upstream estimates (CRMP* Report)

Option	Est Cost $M	JPA Community Cost $M	Timeframe	Environmental Impact
1) Ladera retention dam (Webb Ranch Flood Basin High Dam): cap downstream flow at 4000 cfs	$135.0	$67.5	10-20 yrs	Negative
2) Expand Searsville Lake: add 20 ft to dam, cap downstream flow at 6000 cfs				
• Searsville portion	$47.0	$23.5		Negative
• Upgrade downstream capacity to 6000 cfs	$50.0	$25.0		Positive
Total Searsville Project	$97.0	$48.5	10-20 yrs	Negative

* CRMP = Coordinated Resource Management and Planning
(now the Watershed Council)

Upstream environmental challenges



Opportunity restatement

- Are there viable downstream solutions that keep the water in the creek at higher flow rates?
- The CAP 205 is the community's best chance to begin work toward an integrated long-term solution in an acceptable timeframe
- The data and tools exist to define a viable long-term solution with a FY 2003 CAP 205 project as its first step
- We believe a full 100-year flood protection solution is possible
  - » Initial significant benefits within 5 years (CAP 205)
  - » Full project could be completed within 10-15 years

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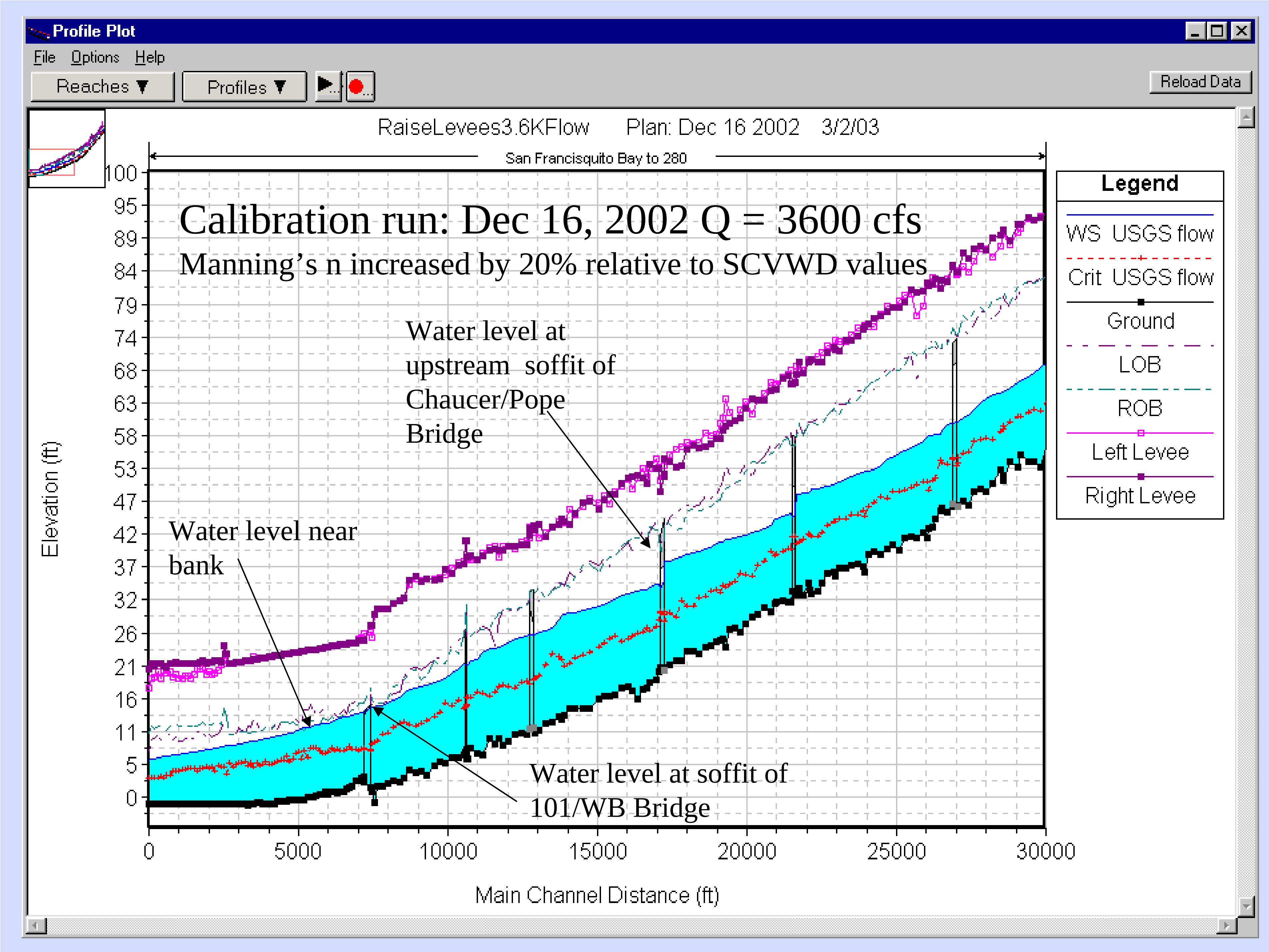
Simulation methodology

- Model-based analysis enables system-wide approach
  - » Identify where creek fails under increasing flow rates
  - » Hypothesize fixes and test them for effectiveness
- Corps of Engineers HEC-RAS 3.1 hydraulic analysis code – current standard for analysis
- Latest creek survey data by SCVWD, updated for 2002 levee/floodwall project
- Model calibrated to 1955, 1982, and 2002 events – also correlated with 1998 anecdotal data



Profile Plot
File Options Help
Reaches
Profiles
Reload Data
RaiseLevees3.6KFlow Plan: Dec 16 2002 3/2/03
San Francisquito Bay to 280
Calibration run: Dec 16, 2002 Q = 3600 cfs
Manning's n increased by 20% relative to SCVWD values
Water level at upstream soffit of Chaucer/Pope Bridge
Water level near bank
Water level at soffit of 101/WB Bridge
Legend
WS USGS flow
Crit USGS flow
Ground
LOB
ROB
Left Levee
Right Levee
Elevation (ft)
Main Channel Distance (ft)
100
95
89
84
79
74
68
63
58
53
47
42
37
32
26
21
16
11
5
0
0
5000
10000
15000
20000
25000
30000

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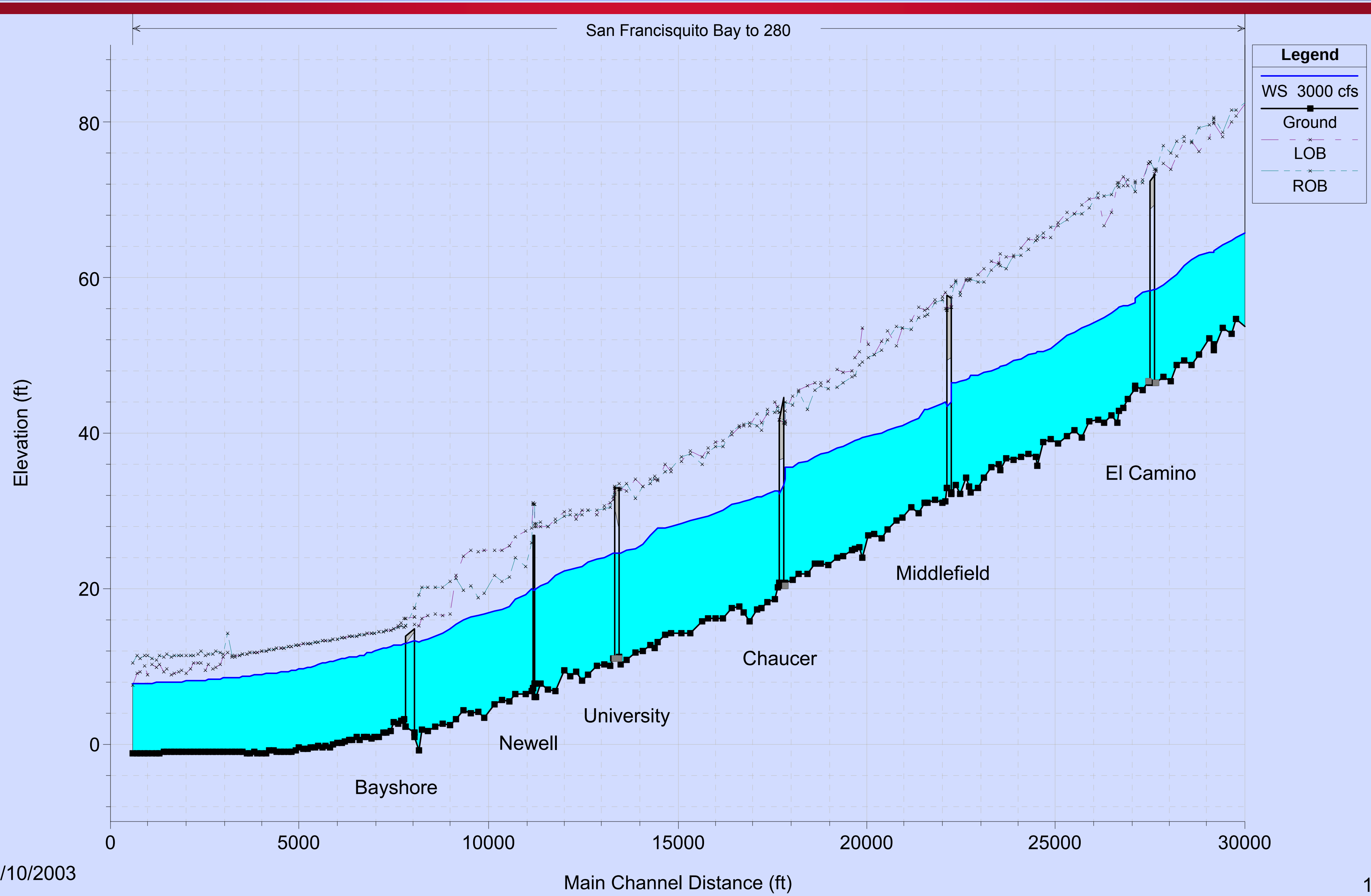
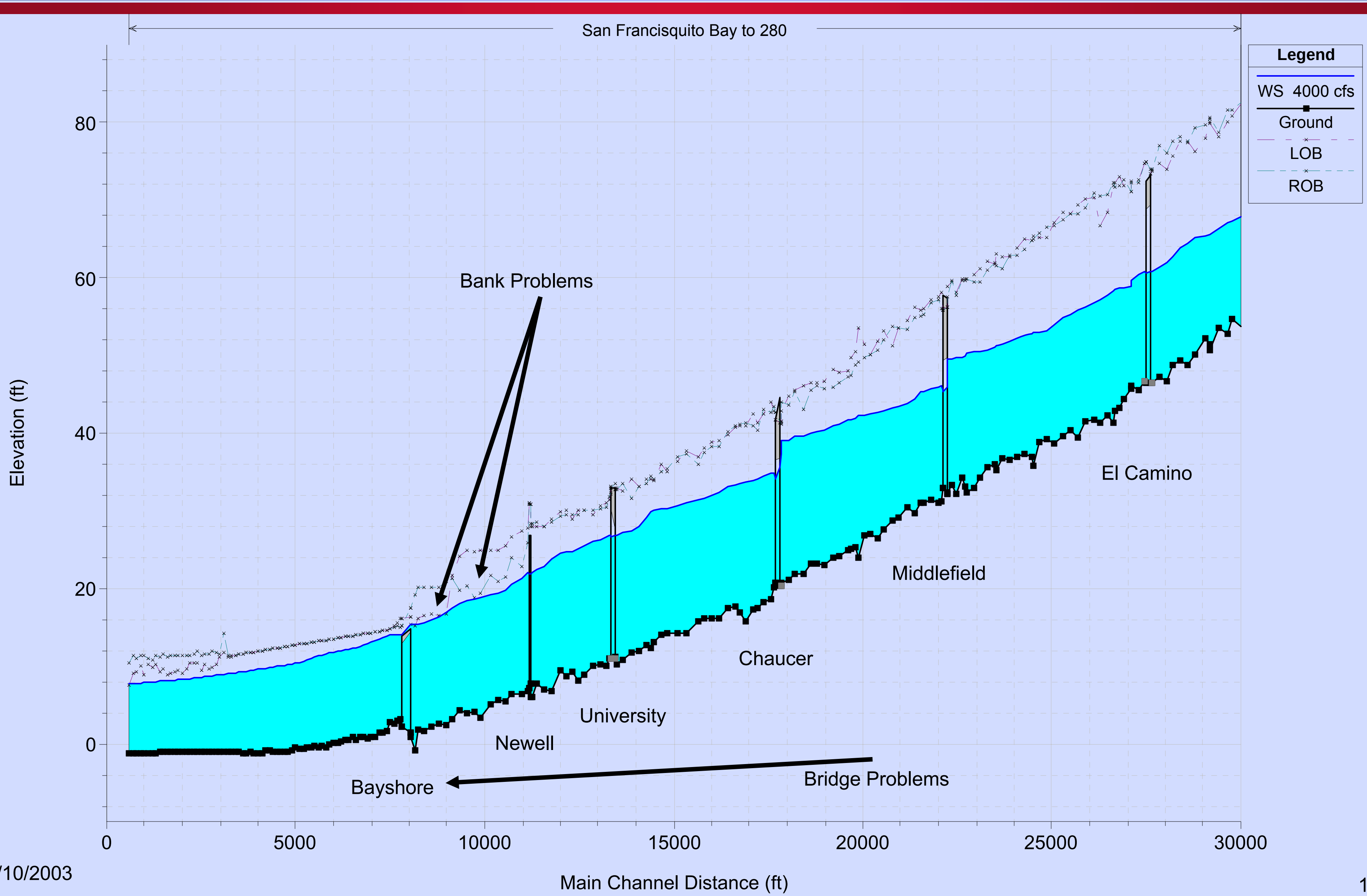
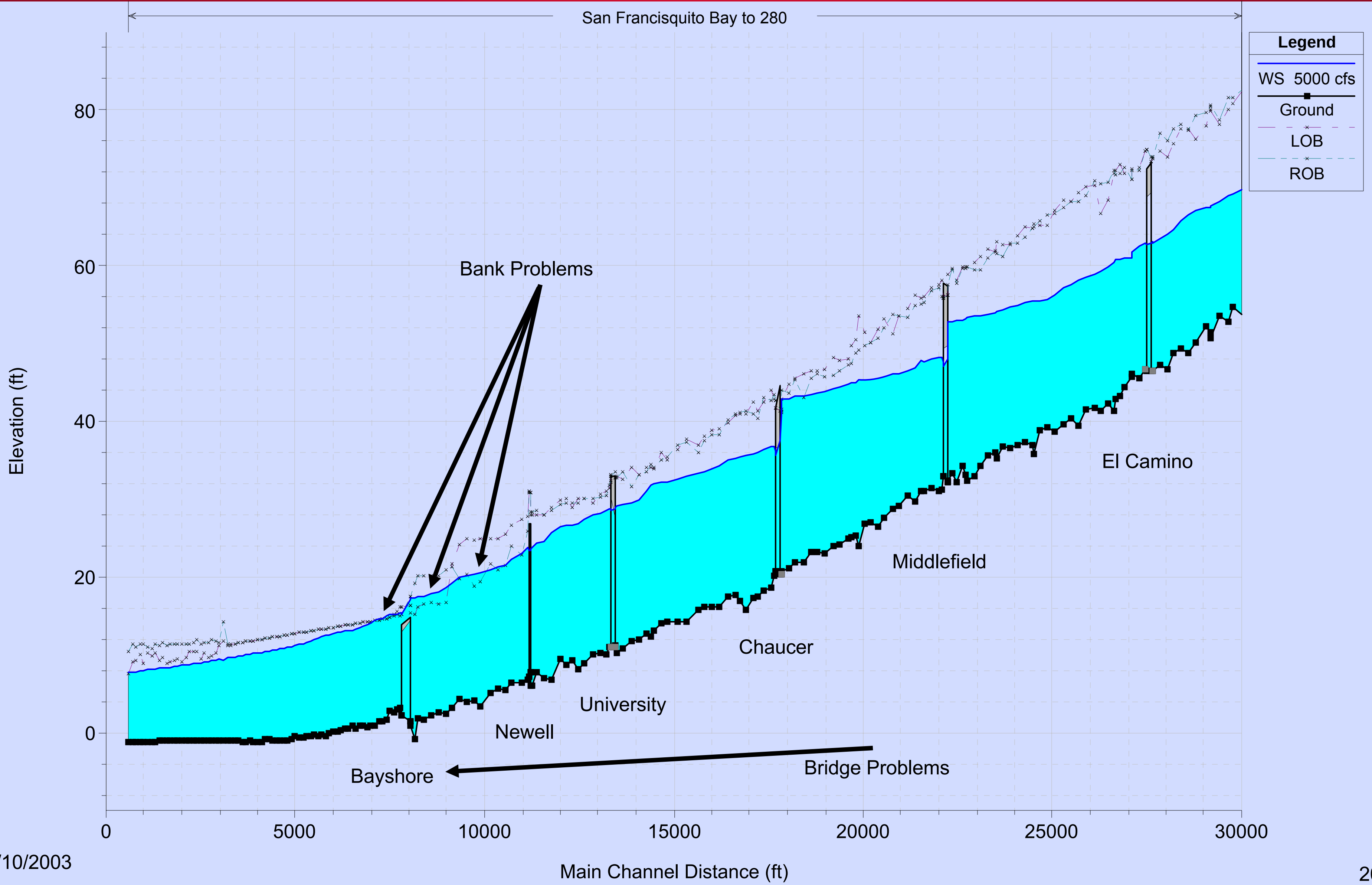
3000 cfs Flow (every 5 yrs)



4000 cfs Flow (every 8 yrs)

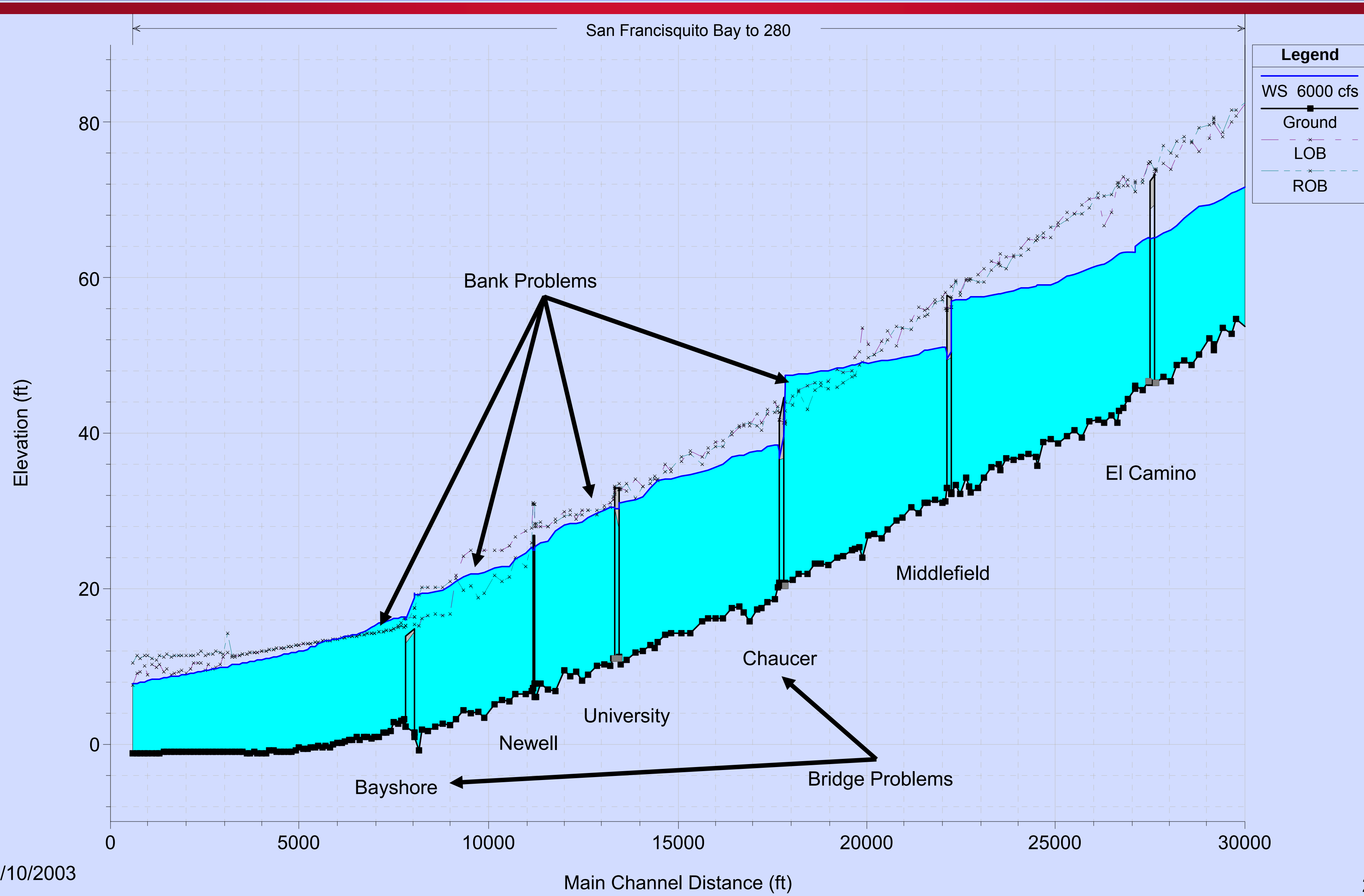


5000 cfs Flow (every 15 yrs)



4/10/2003

6000 cfs Flow (every 25 yrs)



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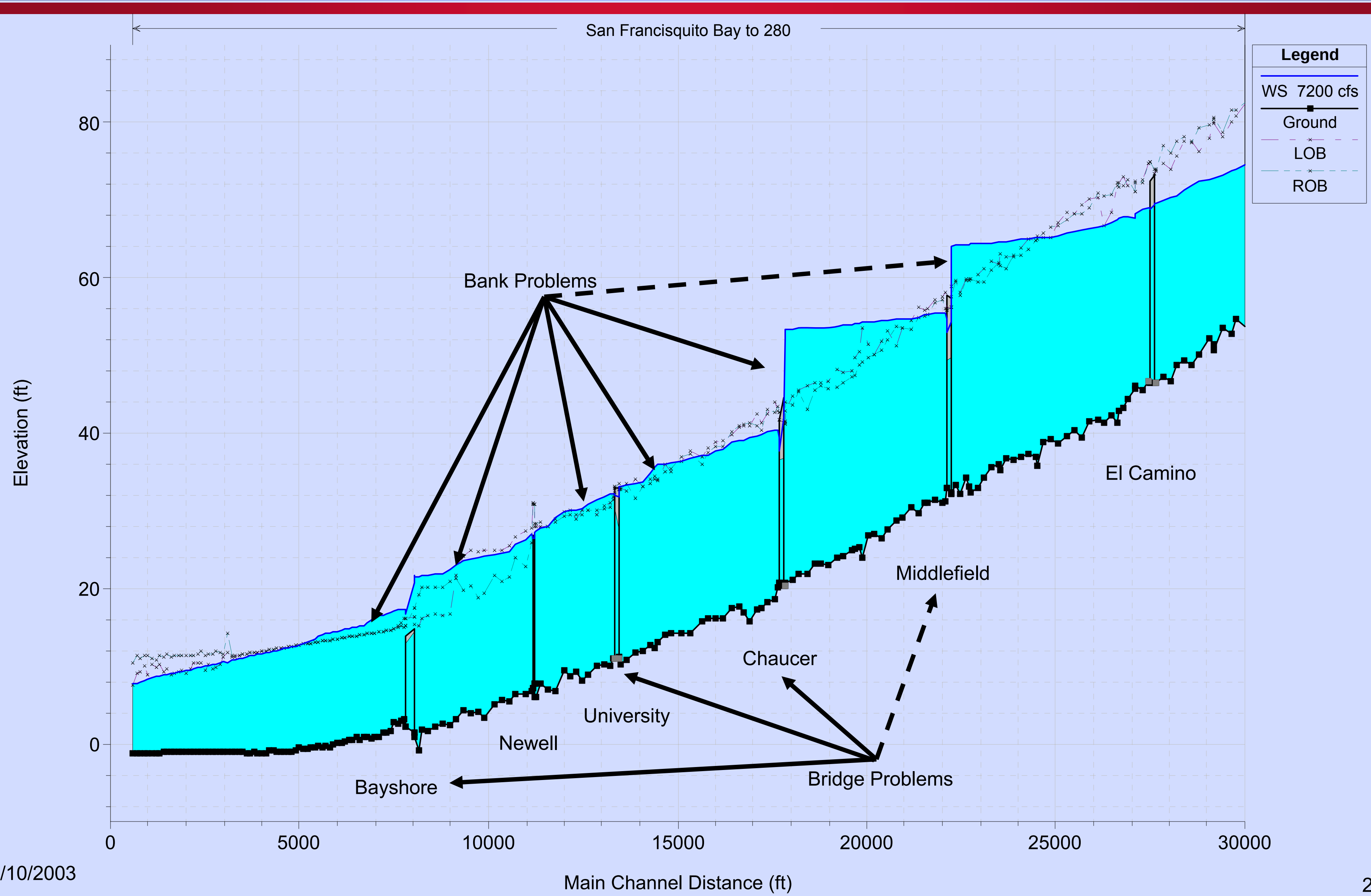
7200 cfs Flow (1998 – 50 yrs)

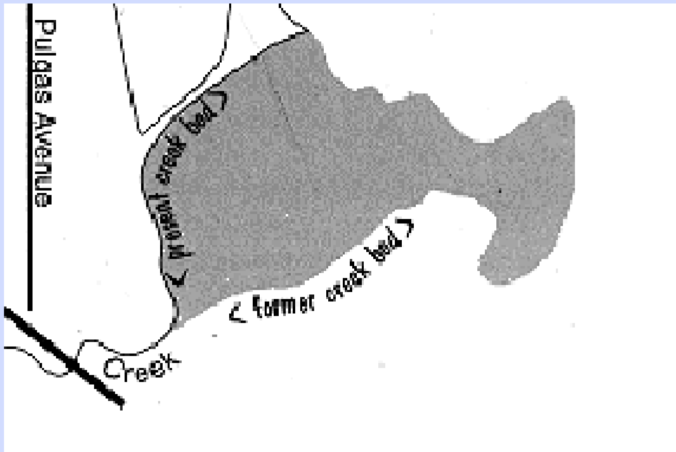


4/10/2003

Problems from man-made structures

- Creek rerouting – City of PA ~1928
- Bayshore/101 bridge – State of CA ~1960
- Chaucer/Pope bridge – City of PA 1948
- Middlefield bridge – City of PA 1932

~1928 creek re-routing



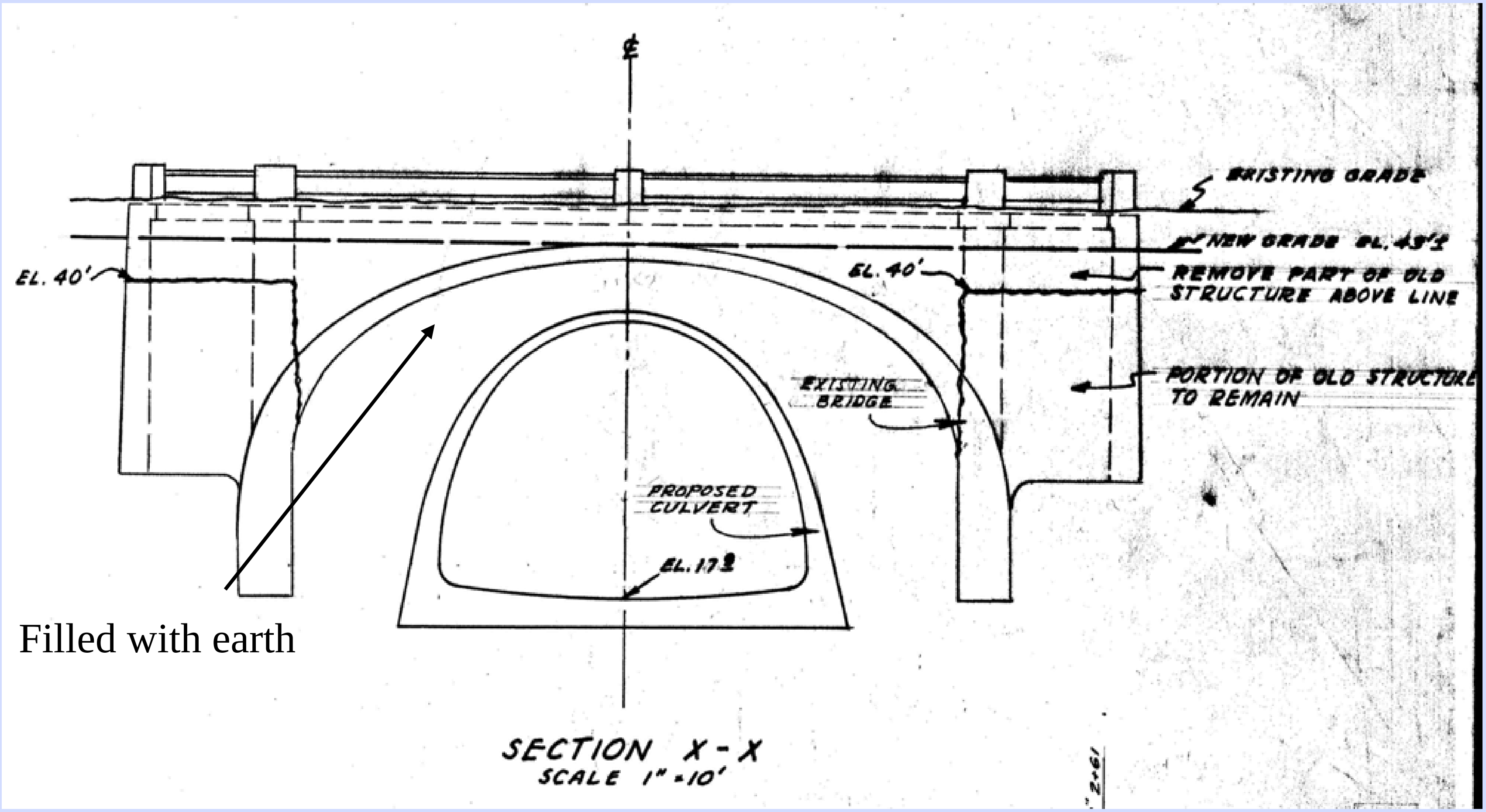

NO TRESPASSING
VIOLATORS SUBJECT TO PROSECUTION
DEC 16 2002


Yeaman AUTO BODY
DEC 16 2002

Chaucer/Pope in 1907

Chaucer/Pope rebuilt in 1948

Chaucer/Pope before & after



Chaucer St. Bridge as designed in 1946.

Original height on centerline (invert to soffit) = 19.5 ft; current height ≈ 16.5 ft

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Project elements to prevent 100-year floods

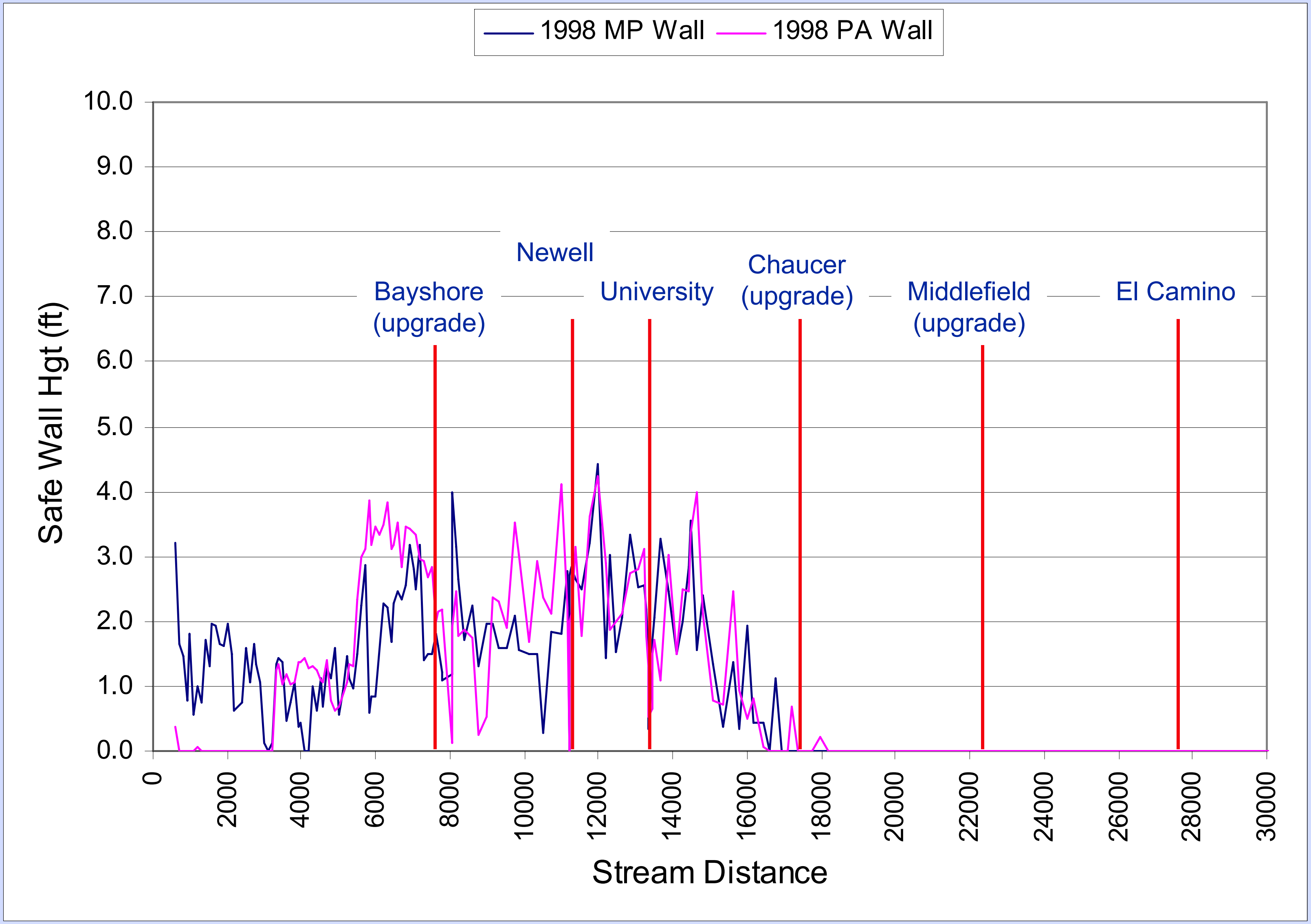
- Increase channel capacity bay to hwy 101
- Increase 101 bridge capacity
- Increase channel capacity 101 to Middlefield
- Prevent bank erosion hwy 101 to El Camino
- Replace Middlefield and Chaucer bridges
- Replace University and Newell Bridges if necessary

Example long-term plan to prevent 100-year floods

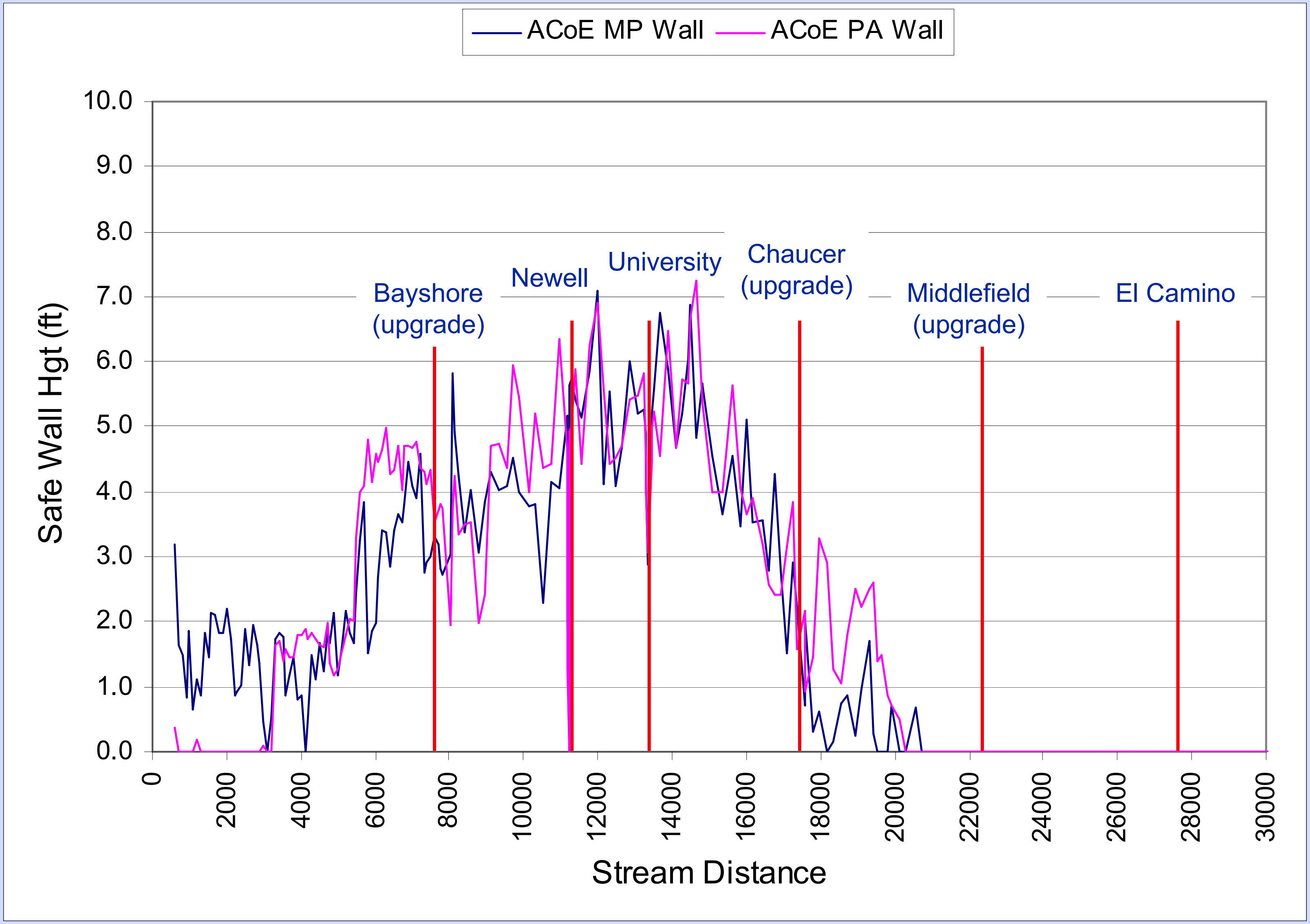
	Cost $M		
Project Elements	**Low**	**Mid**	**High**
Bay-101: Enhance channel capacity in region of golf course. Reduces water level below 101 and enhances protection for EPA, golf course, and airport from 4000 cfs to 9500 cfs	**$2.5**	**$5.0**	**$7.5**
101 Bridge: Add 4th barrel and dredge sediment to expand capacity to 9500 cfs (possible Caltrans support)	**$4.0***	**$5.0***	**$6.0***
101 to Chaucer Berm/Floodwall Work: Raise channel capacity uniformly to 9500 cfs, using berms where feasible and enhanced floodwalls, often where walls already exist.	**$5.0**	**$10.0**	**$15.0**
101 to El Camino Erosion Control: Bring creek into conformance with the SF Creek Bank Stabilization & Revegetation Plan.	**$5.0**	**$10.0**	**$20.0**
Middlefield and Chaucer Bridges: Replace bridges with non-obstructing spans	**$2.5**	**$3.0**	**$3.5**
University and Newell Bridges: Replace if necessary for 9500 cfs (minor headwall enhancement may suffice, budget for University bridge replacement only.	**$1.5**	**$2.5**	**$3.5**
Total Cost	**$20.5**	**$35.5**	**$55.5**

* Cost may be offset by Caltrans funding for bridge upgrade

Bank Hgt Mods (+3 Ft) for 1998 Flood



Bank Hgt Mods (+3 Ft) ACoE 1% Flood



Outcomes of Long-Term Plan

- 100-year flooding eliminated for East Palo Alto, Menlo Park, and Palo Alto
- Environmental impact:
  - » Temporary construction impact during summers
  - » Habitat and public access impact positive at completion
- Improved flood protection for golf course and airport

Example of CAP 205 Subproject

	Cost $M		
CAP Project Elements	**Low**	**Mid**	**High**
Bay-101: Enhance channel capacity in region of golf course. Reduces water level below 101 and enhances protection for EPA, golf course, and airport from 4000 cfs to 9500 cfs	**$2.5**	**$5.0**	**$7.5**
101 Bridge: Add 4th barrel and dredge sediment to expand capacity to 9500 cfs (possible Caltrans support)	**$4.0***	**$5.0***	**$6.0***
Total CAP Cost	**$6.5**	**$10.0**	**$13.5**
Outcomes of CAP			
100-year flooding eliminated for East Palo Alto, golf course, airport, and 101			
Flooding risk remains for Palo Alto and Menlo Park >~5400 cfs			
Compatible with later upstream retention alternative if appropriate			
Remaining Cost for 100-Year Solution	**$14.0**	**$25.5**	**$42.0**

* Cost may be offset by Caltrans funding for bridge upgrade

CAP 205 outcome vs. 1998 flood

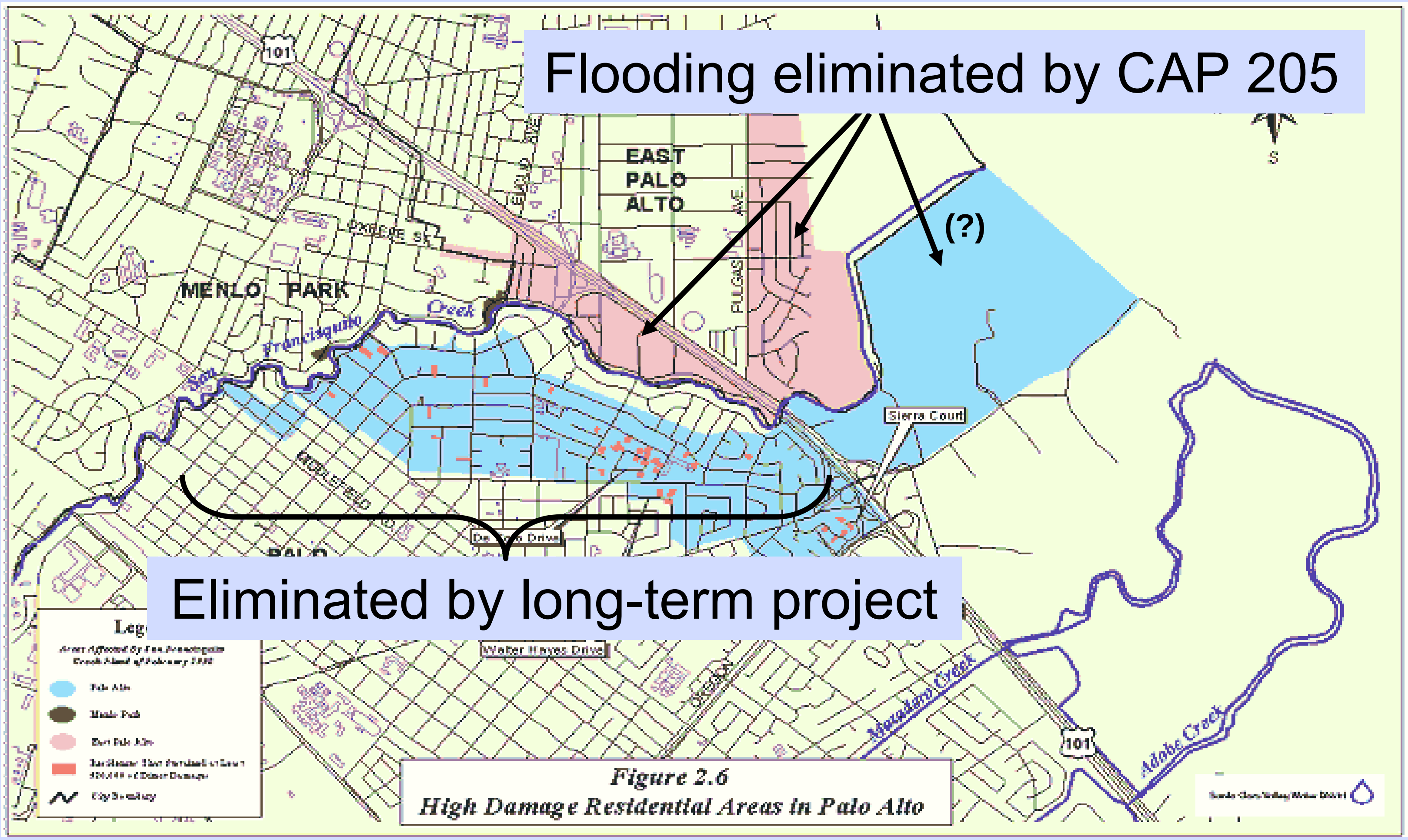


Figure 2.6
High Damage Residential Areas in Palo Alto

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Crucial Strategy Decision

- **There is no good reason to delay applying for a FY2003 CAP 205 project**
  - » **Tools and data exist to analyze 100-yr flood control measures**
  - » **A CAP 205 will help/complement a possible GI project**
    - – **The GI authorization is already pending in Bush's FY 2004 budget proposal to congress**
    - – **Meantime start the FY 2003 CAP 205 – the early phase is a CoE study of alternatives that is needed in any case**
    - – **By time GI fate is decided (likely well into CY 2004):**
      - **If GI approved: merge the CAP 205 with the GI full project**
      - **If GI not approved: keep the CAP 205 going – the real question then becomes, how do we fund the necessary project(s) to complete the 100-year goal (more CAPs, SCVWD funding, local funding, …)**
    - – **In either case, do not lose time toward a solution**

Crucial Actions Needed

- **SUBMIT A FY 2003 CAP PROPOSAL NOW!**
- **We must maintain forward momentum to meet July CAP proposal deadline**
  - » **The political scene is complex (multiple jurisdictions involved)**
  - » **Attend PA Council study session 5/19**
  - » **Attend JPA board and community meetings (see handout)**
  - » **Be heard and spread the word**