Embankment Load Tests on an Active Coal Ash Basin

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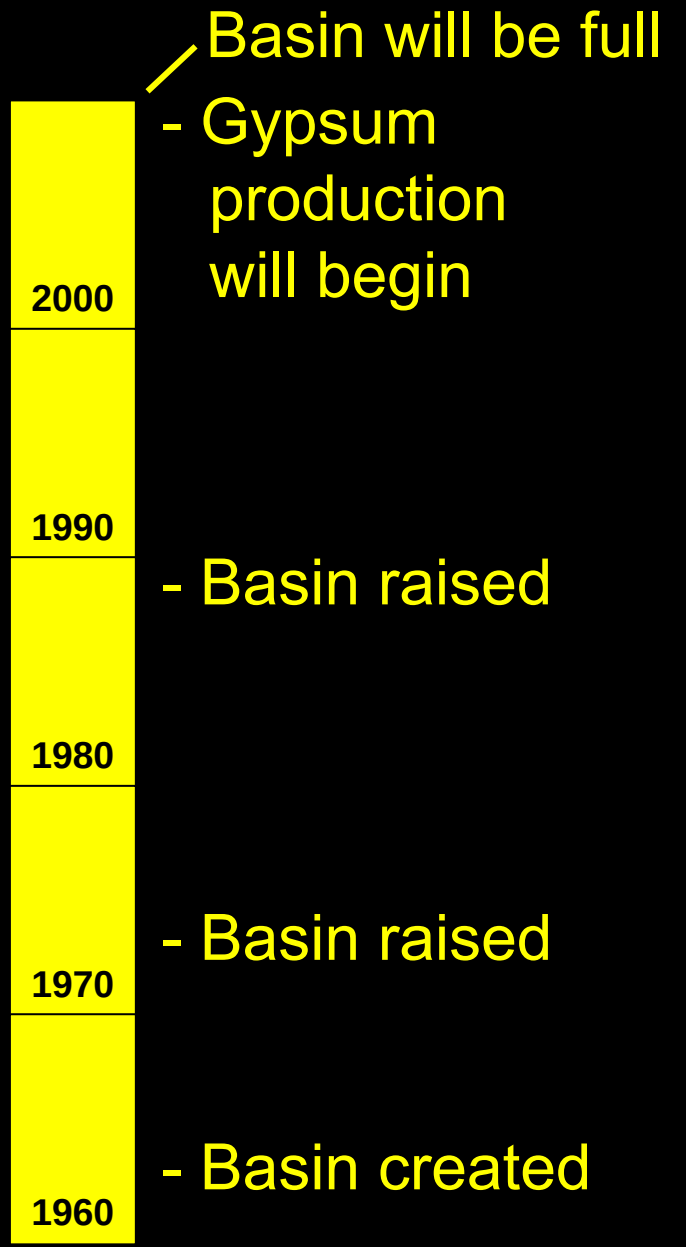
Ash Treatment Basin

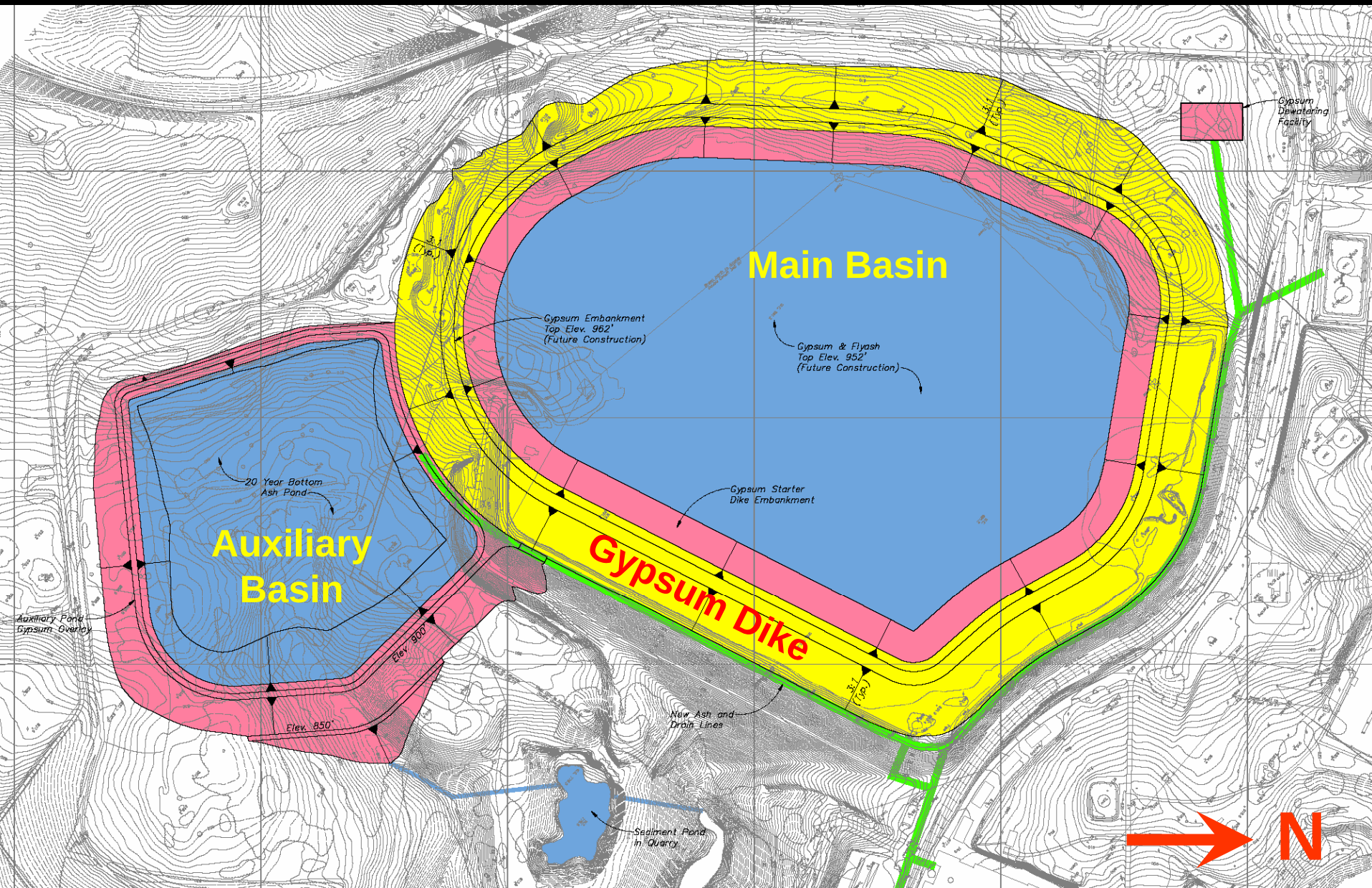
E. W. Brown Generating Station

KU an e·on company

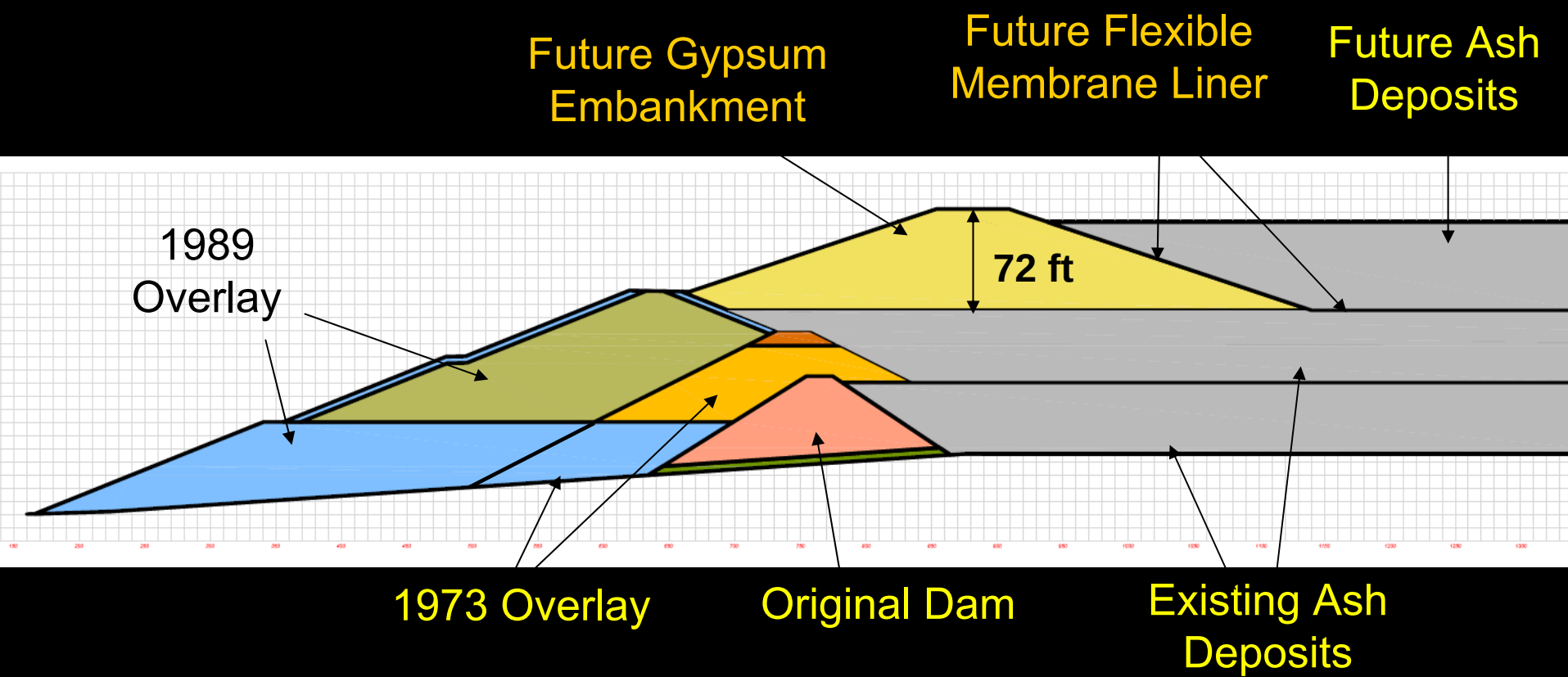
e·on U.S.



Planned Expansion 2007-2030

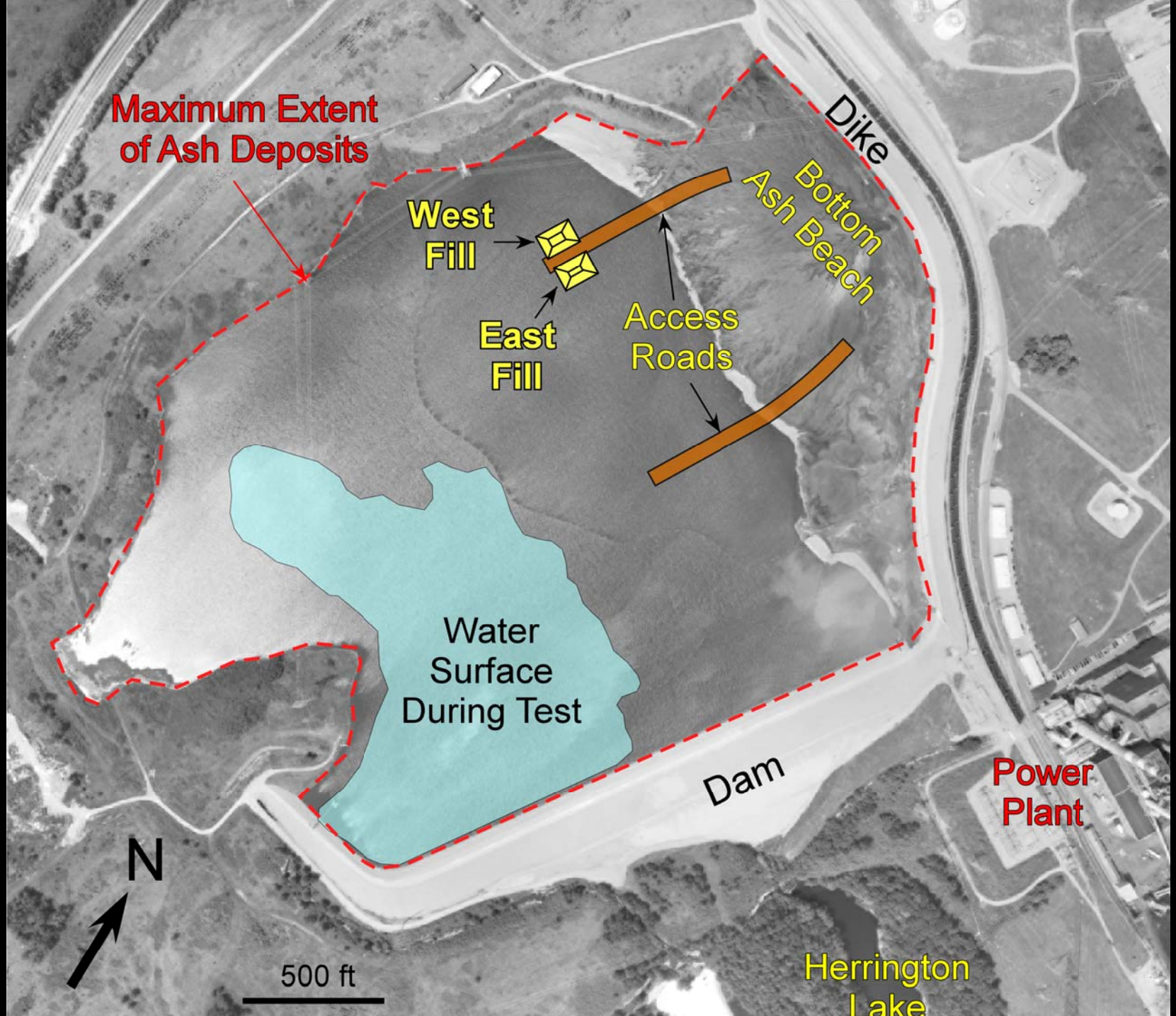


Cross Section Through Planned Gypsum Embankment



2005 Field Tests on Dewatered Basin

- Objective:
  - Characterize properties of ash deposits
  - During unscheduled, partial shutdown of plant
- Challenges:
  - 1 month to prepare, 1 month to conduct test
  - Coordination of construction, drillers, subcontractors
  - Weather - wind, cold, wind, wind
  - Safety
- *Aggressive plan to obtain maximum data*


Maximum Extent of Ash Deposits
Dike
West Fill
East Fill
Bottom Ash Beach
Access Roads
Water Surface During Test
Dam
Power Plant
N
500 ft
Herrington Lake


Clamshell Placement on East Fill
Testing on Alternate Access Road
Data Acquisition Station
Access Road
Installation of Instruments for West Fill
11/22/2005 11:32

Construction of Access Road

Filter fabric across area of soft ash

Pushing initial lift of fill over fabric

Biaxial Geogrid

Ash Boil through Initial 2-ft of Fill

Excavated Vent

Consolidation
Water


Crane moving over area of soft ash
11/18/2005

In-situ Testing

- Vane shear
- Cone penetrometer
- T-bar penetrometer
- Downhole seismic
- Nuclear density probe
- Neutron probe

East Test Fill

First 12 ft placed with dozer

Fill completed with clamshell

Completed Height ~ 23 ft

Vibrocompaction

Spacing = 3 pile diameters

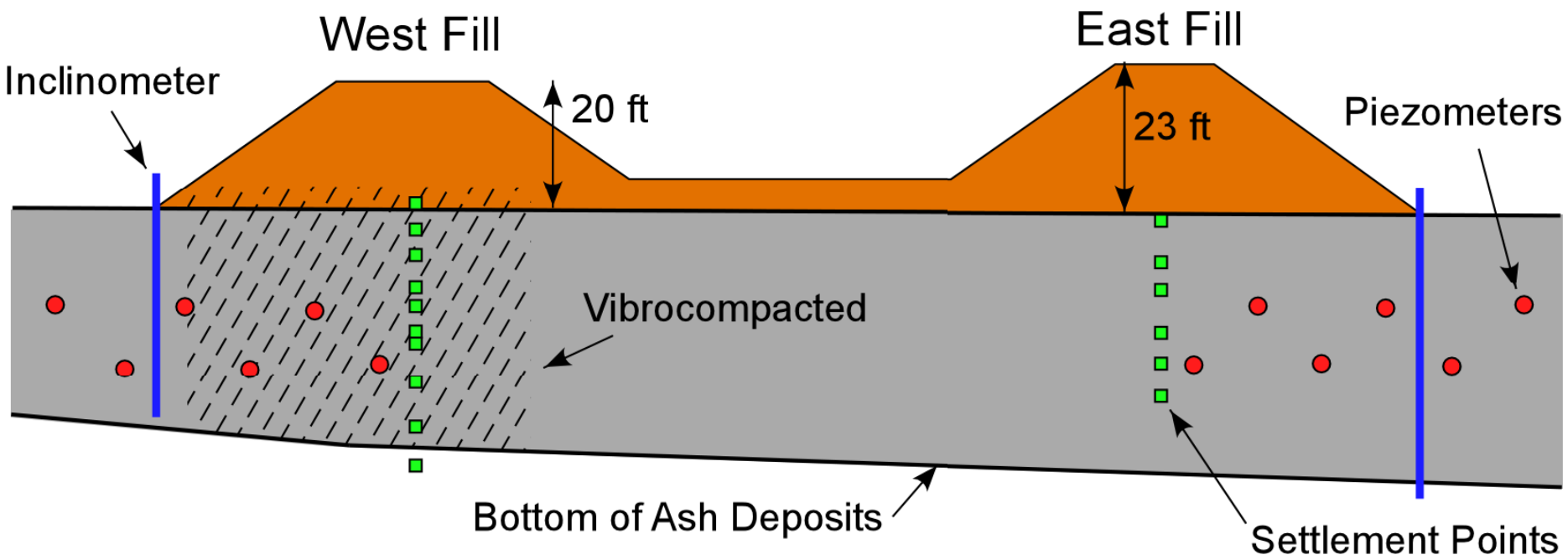
Treated ash deposits before construction of West Test Fill

West Test Fill

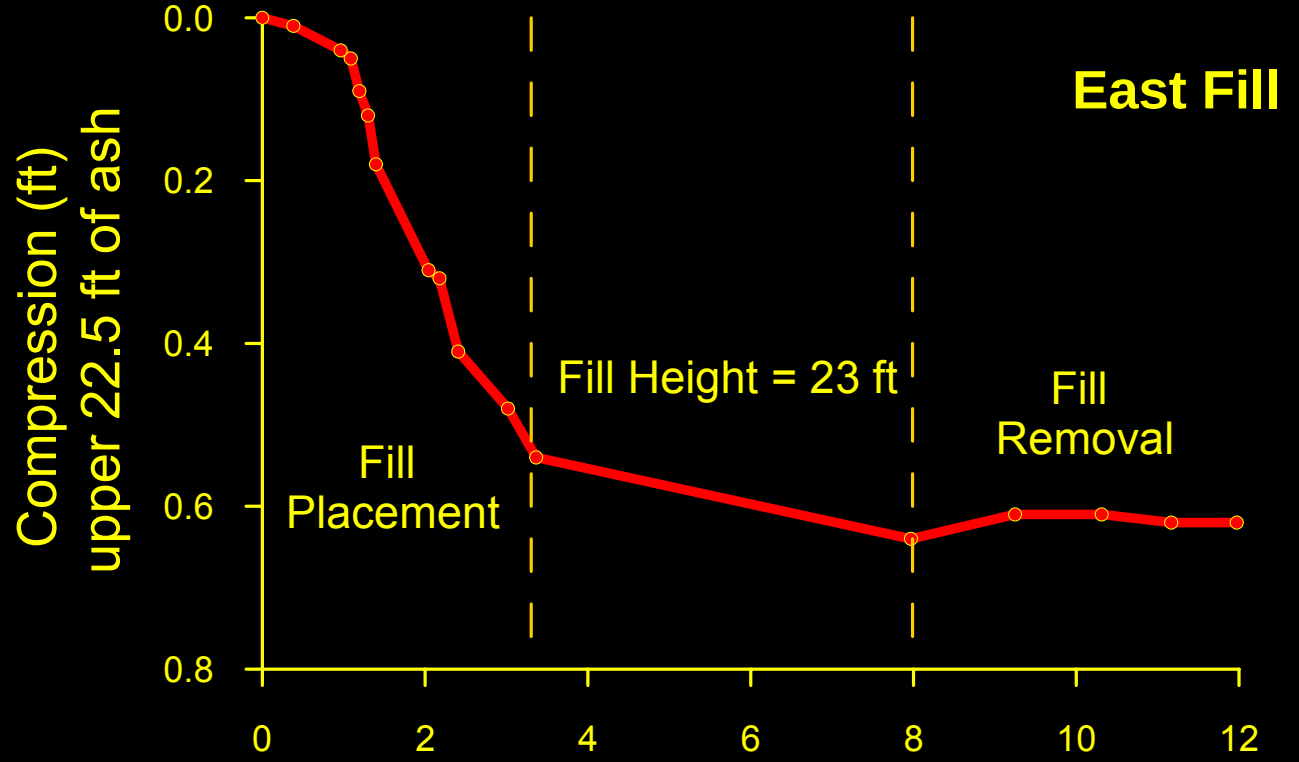
Footprint of each embankment ~ 80 by 120 ft

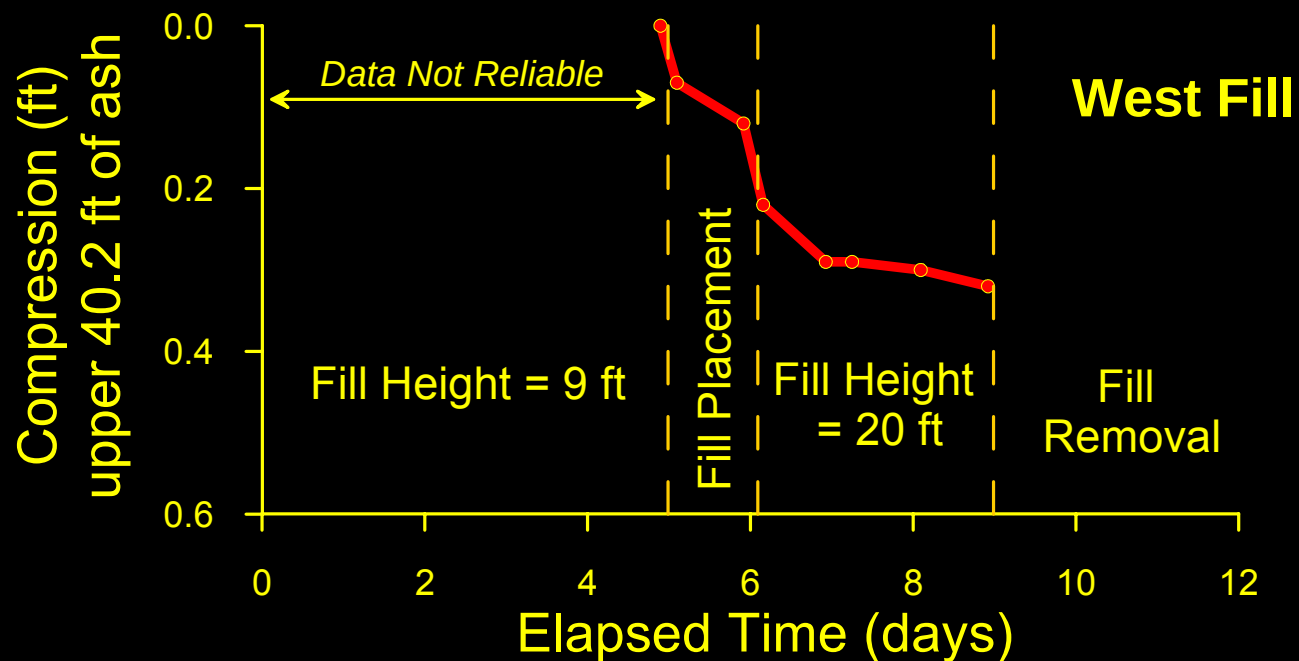
Instrumentation

Test fills built upon
~ 35 ft of fly ash

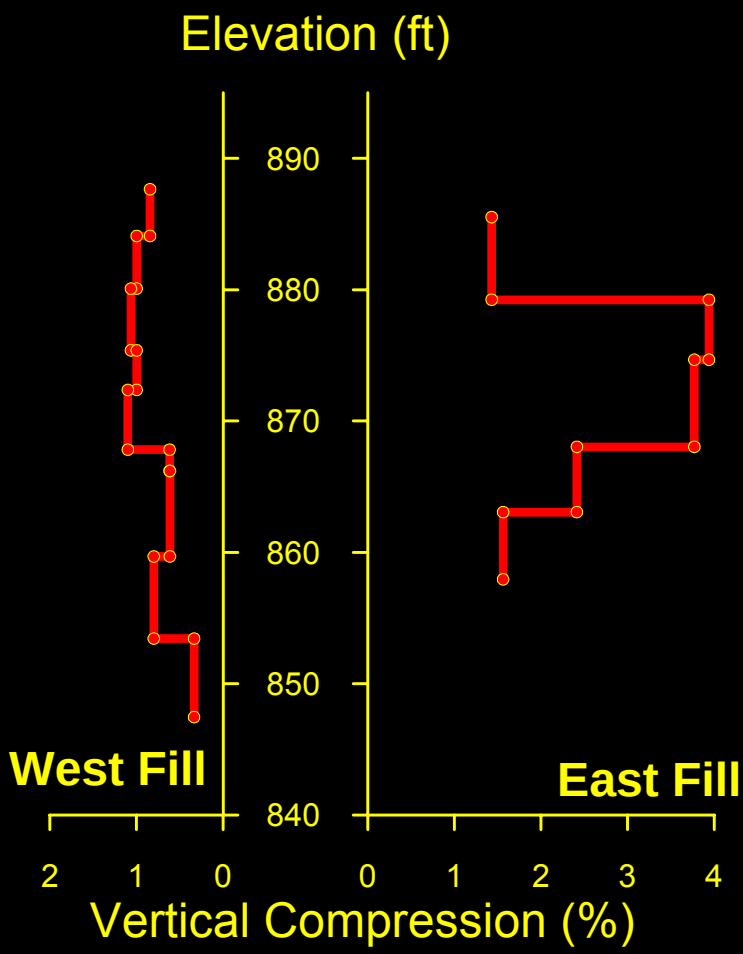


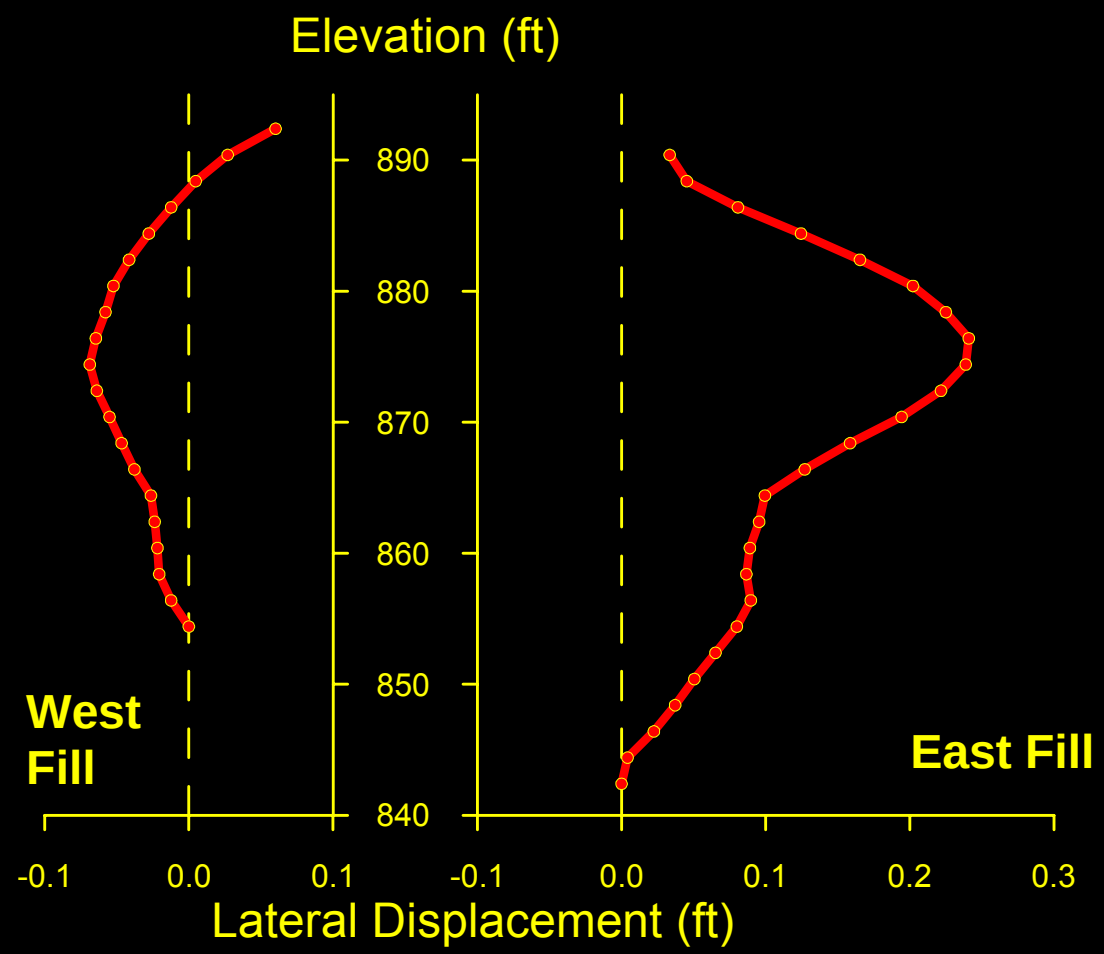
Settlements





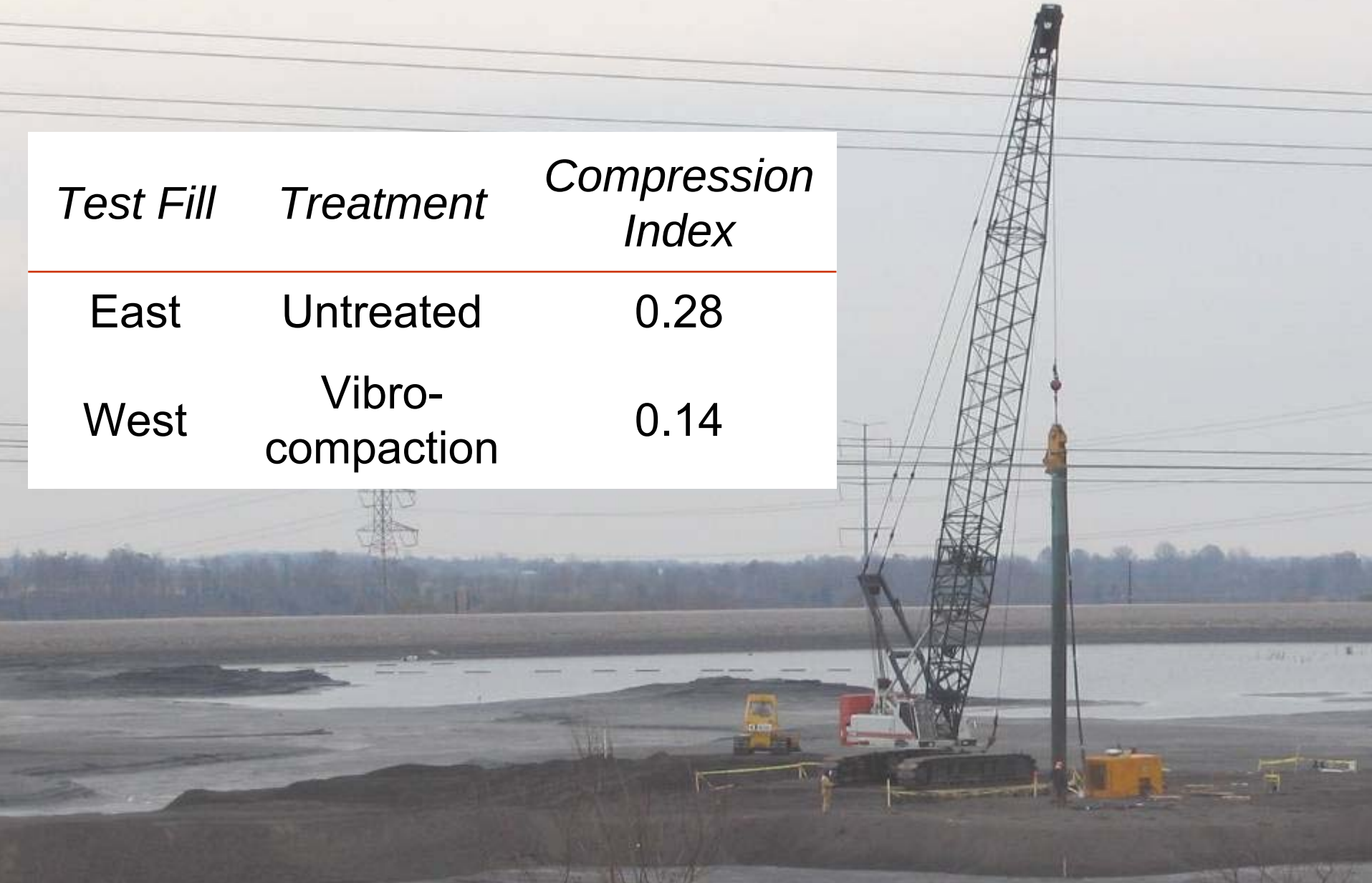
Deformations in Ash under Embankments

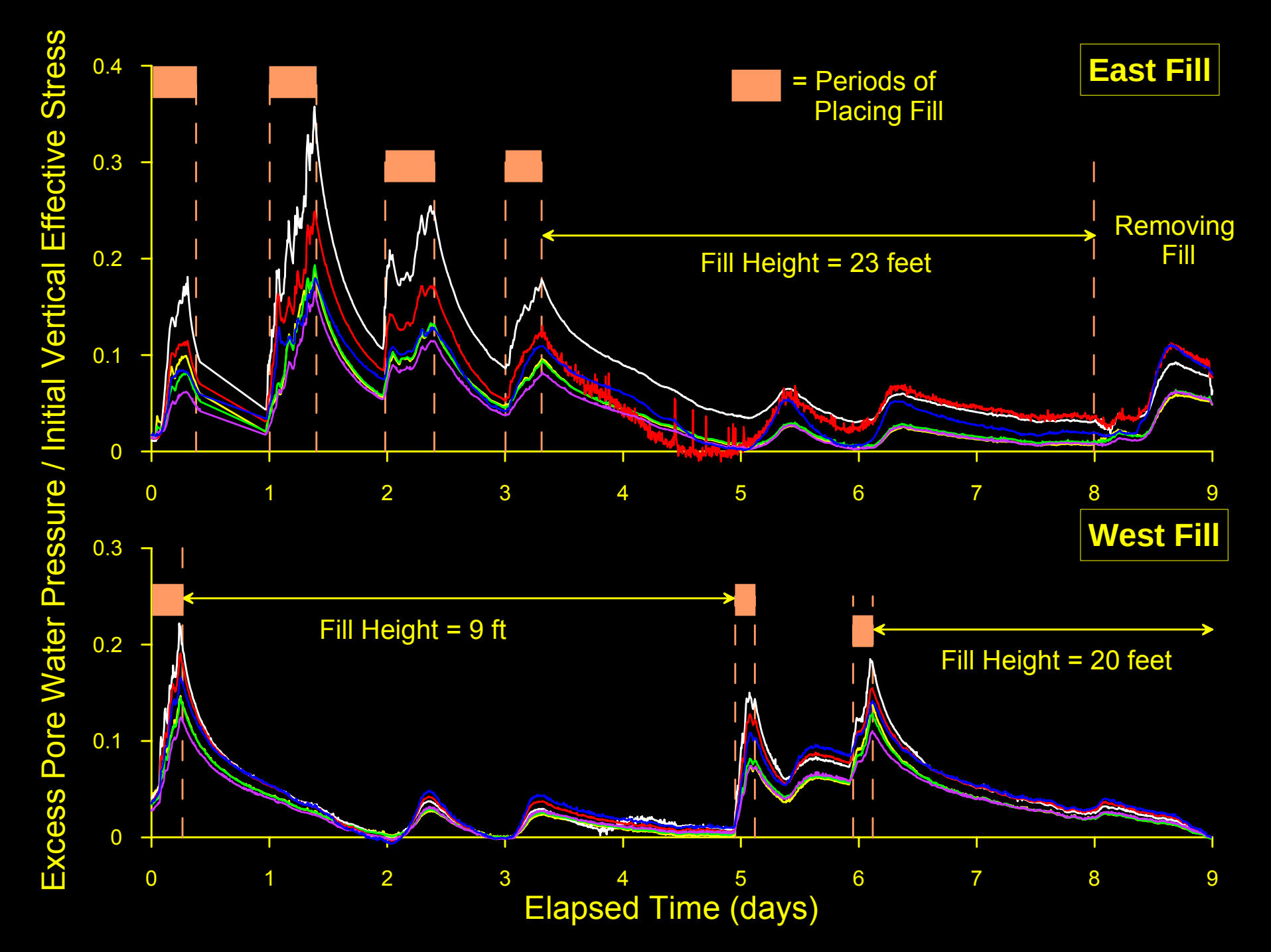




Effectiveness of Vibrocompaction

Test Fill	*Treatment*	*Compression Index*
East	Untreated	0.28
West	Vibro-compaction	0.14




East Fill
= Periods of Placing Fill
Fill Height = 23 feet
Removing Fill
West Fill
Fill Height = 9 ft
Fill Height = 20 feet
Excess Pore Water Pressure / Initial Vertical Effective Stress
Elapsed Time (days)
0.4
0.3
0.2
0.1
0
0
1
2
3
4
5
6
7
8
9

Findings

- Vibrocompaction reduced settlements
- Ash deposits dissipate excess pore pressures rapidly (within days)
- Staged construction feasible
  - LGP dozer can push out few feet of fill
  - Geogrid needed only under heavy loads
- Savings ~ 50 times cost of field tests
  - Less conservative foundation design
  - Expecting better construction bids