

CIVIL AND ENVIRONMENTAL ENGINEERING
University of California, Berkeley

Berkeley
Engineering



www.ce.berkeley.edu

CIVIL AND ENVIRONMENTAL ENGINEERING AT BERKELEY

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COMMUNITY COLLEGE DAY
COLLEGE OF ENGINEERING
NOVEMBER 2, 2007

CEE Carries out the Social Contract

- Provide the infrastructure for society to function
- Protect human health and the environment
- Balance risk and resources

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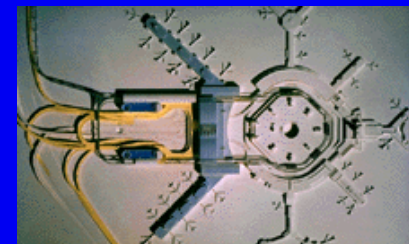
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Fields of CEE Practice

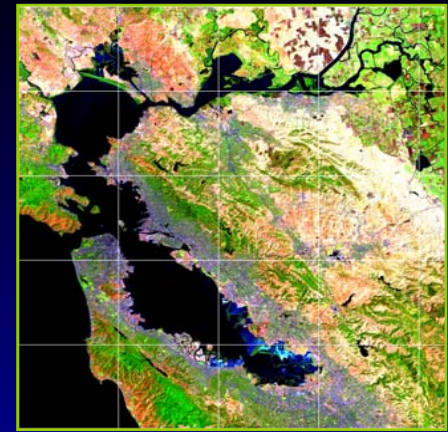


- **Structural Engineering** - *build above the ground and understand structural/mechanical components*
- **GeoEngineering** - *build below the ground and work with geological systems*
- **Environmental Engineering** - *provide quality and quantity of air, water, land, and ecological systems*
- **Transportation Engineering** – *move people, goods, and information*
- **Engineering and Project Management** – *make human organizations on projects work*
- **Systems Engineering** – *tie complex pieces together*



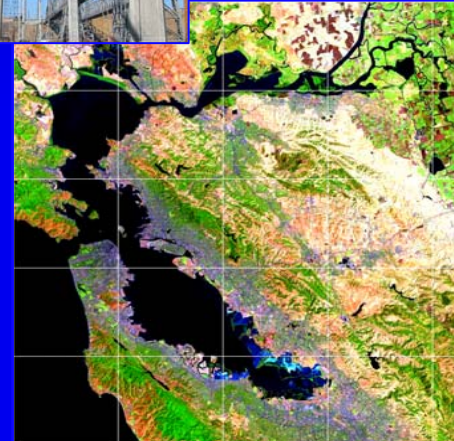
CEE @ Berkeley

- Berkeley undergraduate program in CE is ranked **FIRST** by *U.S. News and World Report*. The graduate program is also ranked **FIRST**.
- 45 Faculty, 440 Undergrads, 350 Grads
- Faculty and students address current problems:
 - renewal of the civil infrastructure
 - transportation systems
 - environmental systems
 - seismic safety
 - water resources
- The programs provide the preeminent education in CEE through:
 - Wide range of courses
 - Numerous research opportunities
 - Active student organizations



Why CEE Berkeley?

6. Top-rated program in CEE nationally
5. Berkeley is one of the most outstanding universities in the world: 35 departments across campus ranked in U.S. top 10
4. Faculty reputation & leadership
3. Caliber of fellow students - student groups!
2. Bay Area has many professional CEE opportunities and Berkeley connections
1. Berkeley is a GREAT place to live!



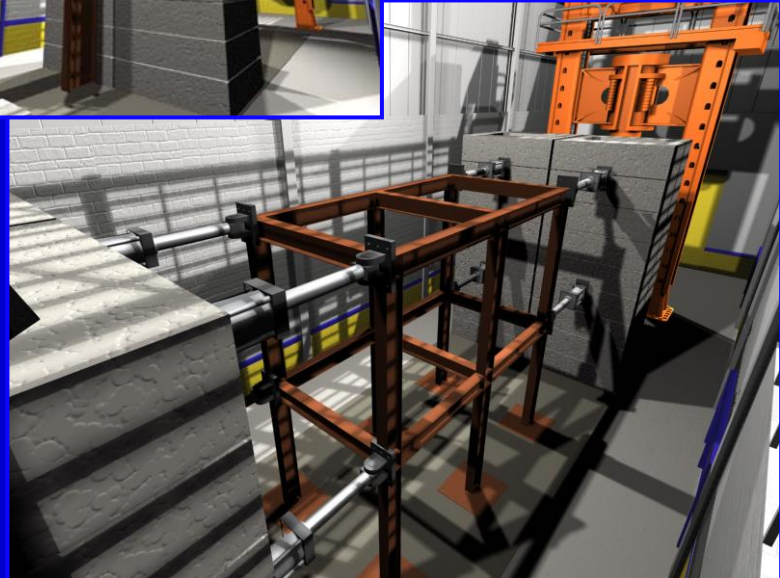
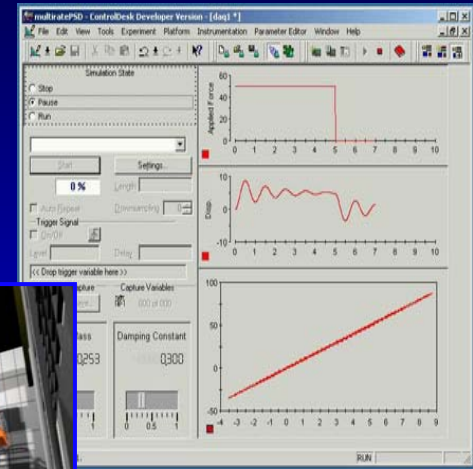
The Unstable Earth



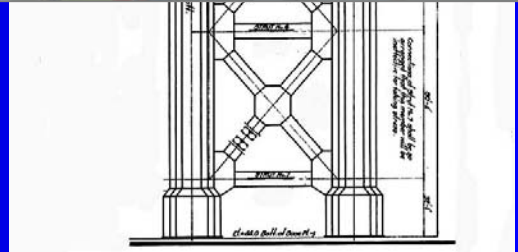
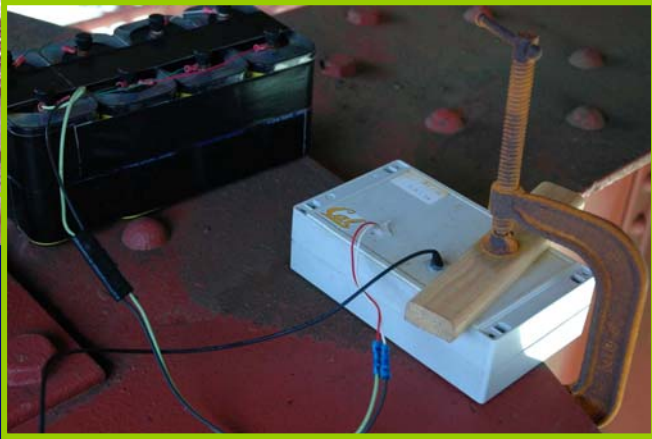
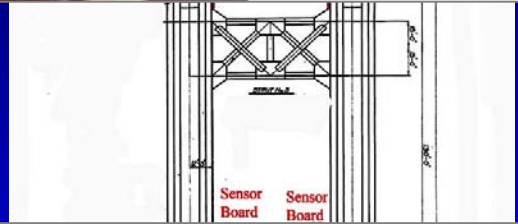
USGS
science for a changing world

Earthquake Experimental Facilities

- Equipment Site for NSF's *Network for Earthquake Engineering Simulation*
- NEES is a national collaboratory that enables development of new technology
- NEES brings improvements and new equipment for our laboratory at Richmond Field Station
- Berkeley faculty are leading in the development of new experimental and simulation methods



Golden Gate Bridge Monitoring



Eastern Span of the SF-Oakland Bay Bridge



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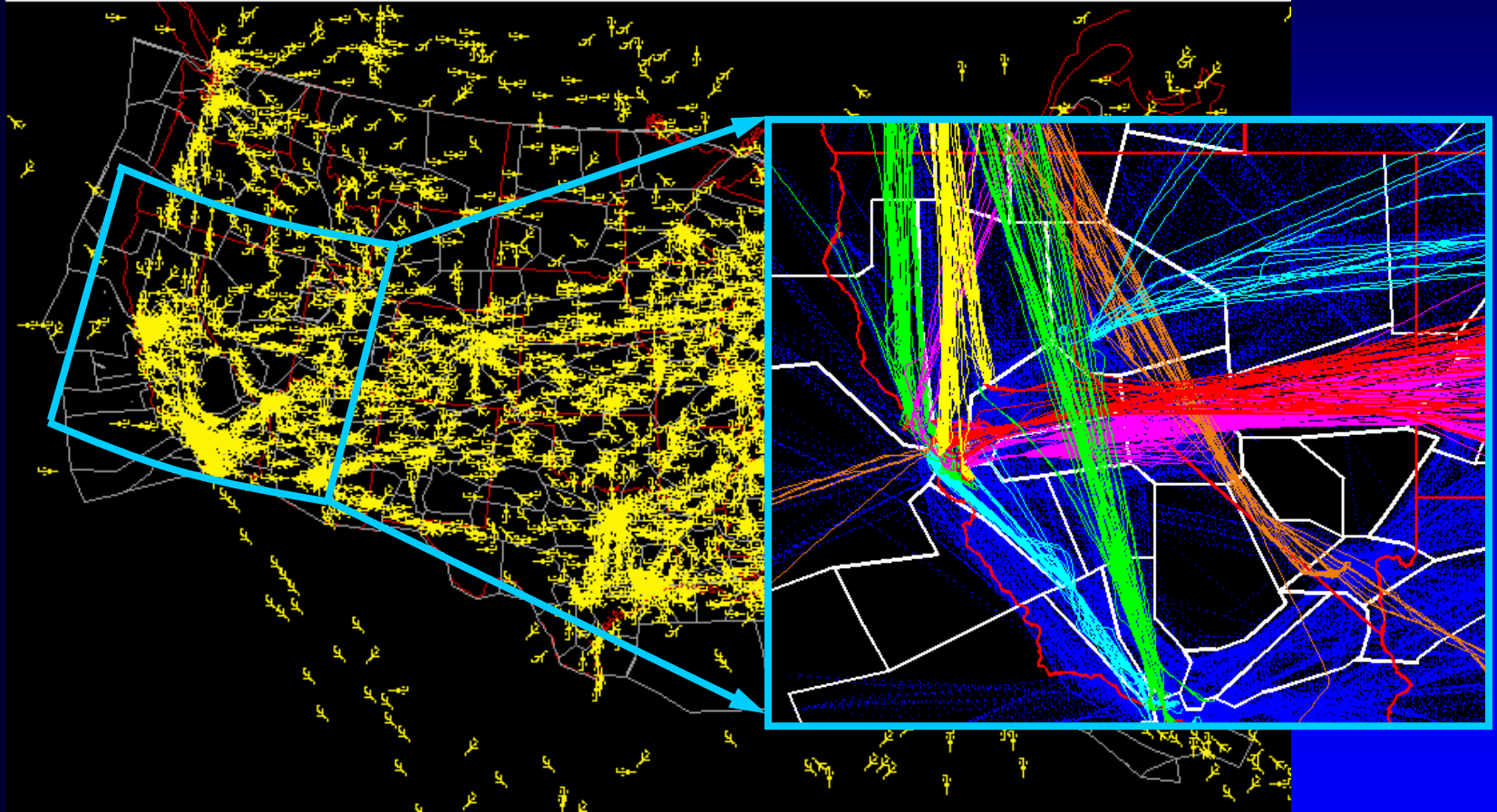


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• See <http://www.mtc.ca.gov/publications/baybridge.htm>

Improving the National Airspace System

Status: Running ASDI_20050124 (pbk) Number Flying: 5039 1/24/2005 20:25:13 UTC



Combined Optimization Scheduling, Control and Communication

Unmanned Air Vehicles for Infrastructure Assessment



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- Control the plane to deliver a quality image of the structure
- Vision in the loop
- Complement GPS waypoint navigation
- Lock on target using vision for accurate imaging

When they autonomously navigate they can be used for:

- Threat surveillance
- Infrastructure and environmental modeling
- Search and rescue
- Emergency recovery

Water Quality and Quantity

Innovative Water Development Solutions

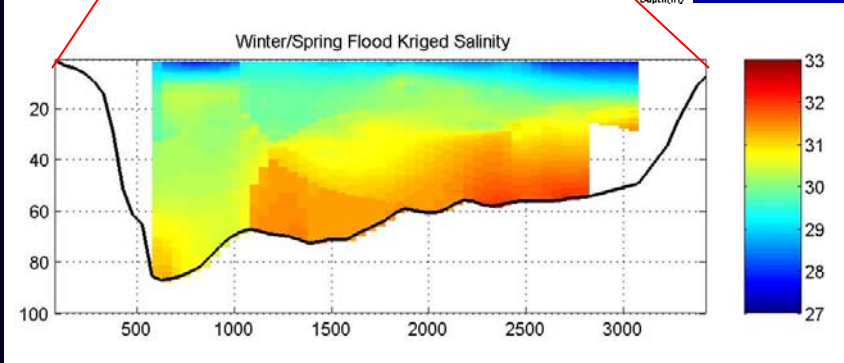
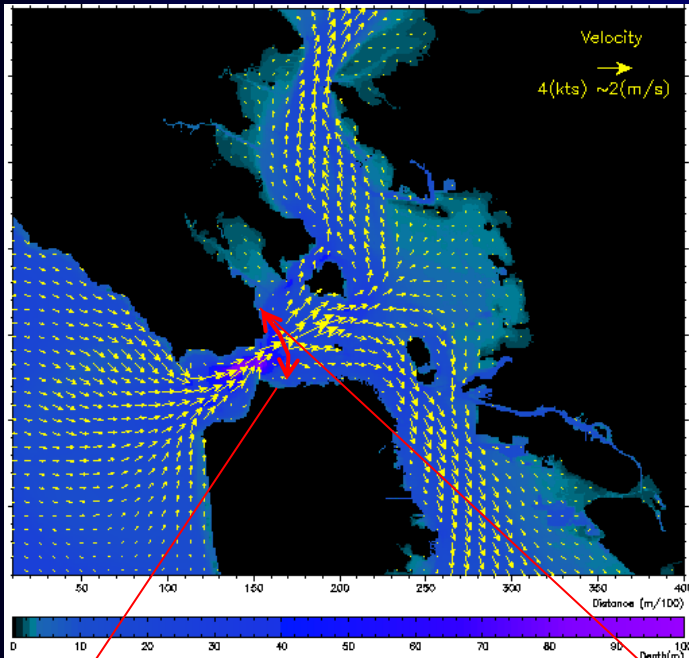
- Advanced water treatment technologies
- Water for developing countries
- Aquifer remediation
- Management and protection of freshwater and estuarine systems
- Precision agriculture
- Advanced technology



Ocean-Estuary Exchanges under the Golden Gate

Simulation of flood tide currents
from SFPORTS.wr.usgs.gov

- Tidal flows exchange water, salt, contaminants, nutrients and biota between the estuary and the ocean
- Net exchange set by subtle asymmetries between ebb tides and flood tides
- Observations of fluxes rely on measurements of flows and concentrations
 - Numerical modeling leads to extrapolation of conditions and timescales



Observed cross-section of salt concentration, Flood Tide

Where Will Energy Come From?

- Current petroleum economy is not sustainable over the next 50 to 100 years
- Many proposals for future energy sources, petroleum-based and renewables
- Nearly all energy requires conversion which has environmental effects
- Biofuels and nuclear energy will be part of the solution
- A massive energy infrastructure needs to be built

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Future Leaders in CEE



UC Undergraduate Experience Survey

Spring 2006

	CEE	College of Engr	All UCB undergrad
Satisfied with overall academic experience	<u>64%</u>	51%	56%
Satisfied with quality of faculty instruction	<u>73%</u>	59%	70%
Satisfied with overall social experience	<u>44%</u>	38%	46%
Satisfied with access to faculty outside of class	<u>61%</u>	48%	52%
Quality of major's upper division courses	<u>78%</u>	64%	69%
Value of education	<u>66%</u>	61%	59%

xx% Highest percentage for large COE departments (CEE, ME, EECS, BIO)

The Future for CEE

- Infrastructure problems hard to solve: technically, economically, and politically. Cal CEE graduates learn how to integrate knowledge and innovate to solve hard problems.
- Future directions:
 - New materials, technology, methods
 - Integration of information technology
 - Sustainability and safety
 - Project delivery
- Berkeley educates CEE leaders in a global context:
 - Professional practice
 - Graduate education in engineering
 - Engineering education for other fields

Civil Lifeline Systems

- Transportation network
- Water supply systems
- Electrical grid
- Communication network and Internet
- Fuel supply, refining & distribution
- Food supply