

Underground Structures Session

Co-Chairs

Prof. Towhata
Prof. Hashash

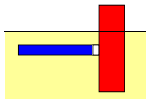
NEES/E-Defense Planning Meeting
Saturday Aug 27, 2011
Kobe, Japan

E-Defense Plans

Current Research Targets

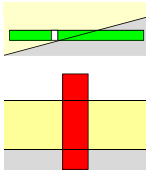
- Damage Development at Structural Joints

- Difference of seismic behavior between different components
- Effects of flexible joint



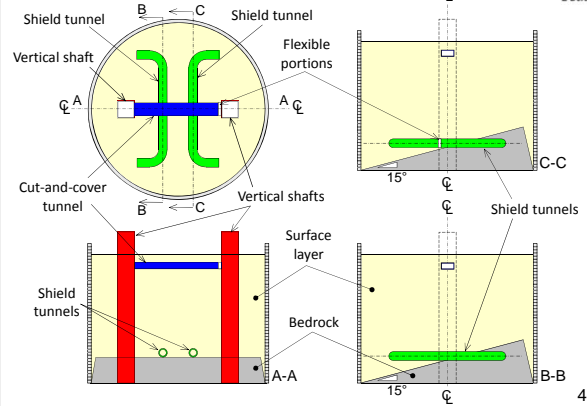
- Seismic Behavior of Underground Structures

- Inclined bedrock
- Effects of flexible segment
- Localized behavior around boundary of different soil strata



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Current Test Setup Plan



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Schedule - Short Term

Fiscal Year	Contents
2011 (2011/4 ~ 2012/3)	2011
	June : Finalized specifications of the first large-scale test (Some details are not determined yet)
	- Period for Open Tender: approximately 3 months - At the end Sep. : Determine the contractor
	October : Perform numerical analysis (Fix all details)
	Nov. & Dec. : Build the instrumented structure models
2012	Jan. & Feb: Construct the specimen at E-Defense
	At the end of Feb. : Perform the series of large-scale underground structure experiments
	March: Dismantle the specimen

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The 9th NEES/E-Defense Planning Meeting

Introduction of Numerical Analysis Competition for E-Defense Geotechnical Engineering Test

Hyogo Earthquake Engineering Research Center, NIED

Breakout Session #2, August 27, 2011

Background



As a part of NIED-NEES joint research works, a competition of numerical analysis for the large-scale geotechnical experiments in FY2011 will be held.

Steering committee of the competition was established at the beginning of August.

Chair: Professor Uzuoka at Tokushima University

Cooperation of NEED members is necessary for smooth management and great success on this competition.

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Schedule



In early September:

A webpage or a file server for this competition will be opened.

By the middle of February, 2012:

Class A numerical results need to be submitted from participants.

At the end of February, 2012:

The series of shaking table tests will be performed.

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NEESR Project

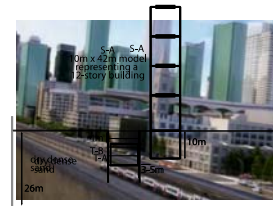
Motivation and Objectives

To investigate the seismic response of cut-and-cover underground structures adjacent to mid- to high-rise buildings via:

- Centrifuge testing
- Numerical Simulations

Variables:

- Ground Motion
- Adjacent Structure
- Permanent vs. Temporary Box Structure



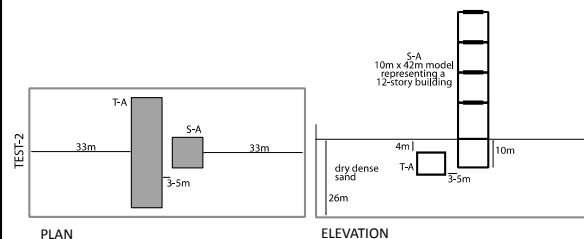
Research Plan – Centrifuge and Numerical Simulations

TEST	Soil Condition	Structural Building Model	Tunnel	Tentative Date
		S-A: 12 Stories S-B: 50 Stories	T-A: Permanent Box Structure T-B: Braced Excavation	
1	Dry Nevada Sand*	None	T-A and T-B	Sept. 2012
2	Dry Nevada Sand	S-A	T-A	Dec. 2012
3	Dry Nevada Sand	S-B	T-A	March 2013
4	Dry Nevada Sand	S-A	T-B	July 2013
5	Dry Nevada Sand	S-B	T-B	Oct. 2013

*Relative Density to be decided

TEST-2

Goal: Study the seismic response of the permanent box structure adjacent to a building on dense, dry sand under a series of 2-D motions.



Schedule

Task	Task Description	Timeline											
		Year 1	Year 2	Year 3									
1	Detailed Design and Development of Centrifuge Testing Program	█	█	█	█	█	█	█	█	█	█	█	█
2	Construction and Execution of Centrifuge Experiments				█	█	█	█	█	█	█	█	█
3	Interpretation of Test Results				█	█	█	█	█	█	█	█	█
4	Numerical Parametric Study										█	█	█
5	Design Recommendations										█	█	█
6	Outreach Program Development and Execution	█	█	█	█	█	█	█	█	█	█	█	█

Sept. 2011
 Dec. 2011
 March 2012
 June 2012
 Sept. 2012
 Dec. 2012
 March 2013
 June 2013
 Sept. 2013
 Dec. 2013
 March 2014
 June 2014
 Sept. 2014

Start date: September 1st, 2011

Possibilities for Collaboration and Synergy between E-Defense & NEES

- Can the experiments be made more complimentary?
- Payload - Instrumentation
- Design of structural models
- Chosen ground motions
- Soil properties
- Simulation competition
- New NEESR proposals for E-defense collaboration?
- Contract for data exchange (Formal process)