UCLA Samueli School of Engineering

LABORATORY COMPONENT OF NEXT GENERATION LIQUEFACTION DATABASE

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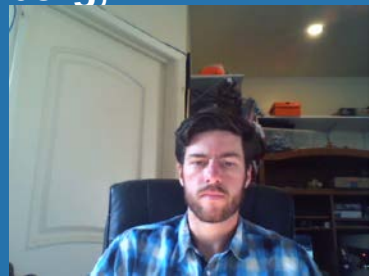
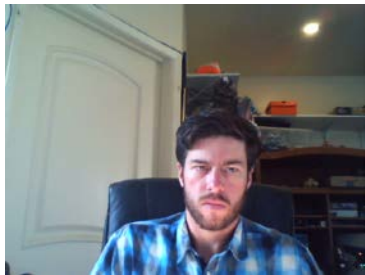


What is NGL?

The Next Generation Liquefaction (NGL) project has developed an online relational database of liquefaction case histories to support model development

http://nextgenerationliquefaction.org/



NGL Laboratory Component Motivation

- The goal of NGL is to provide a dataset with a wide parameter space to enable more accurate model development
- The field testing database was recently expanded to include laboratory test program results
- Laboratory results can inform aspects of liquefaction models that are poorly constrained by case histories alone
  - K_σ, K_α, Liquefaction Susceptibility

Example Application: Liquefaction Susceptibility

There are 3 phases of a liquefact

1. **Assessment of soil suscep**
2. Evaluation of expected groun strength (resistance)
3. Assessment of expected defo

The difficulty with using case hist potential for *false negatives* and behavior in low-plasticity fine-gra fines content

This makes susceptibility poorly history data and laboratory test d

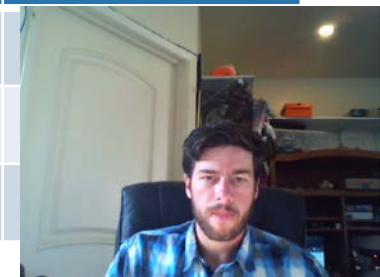
Punched footings and intermediate slab heaving due to cyclic softening of high-plasticity clay in Wufang, Taiwan. Photo by R. Seed (1999)

Database Structure

- A thorough description of the NGL database structure can be found in Brandenberg et al. [4].
- The Lab component is built into the NGL framework as a relational database that can be queried using structured query language (SQL).
- A relational database comprises tables linked to one another by means of identifiers called keys. Each table has a primary key that uniquely identifies table entries. If two tables are linked, the primary key of a table is used as a foreign key in another table. This structure is called schema.

Person_ID	Person_Name
1	Ken
2	Scott
3	Jon

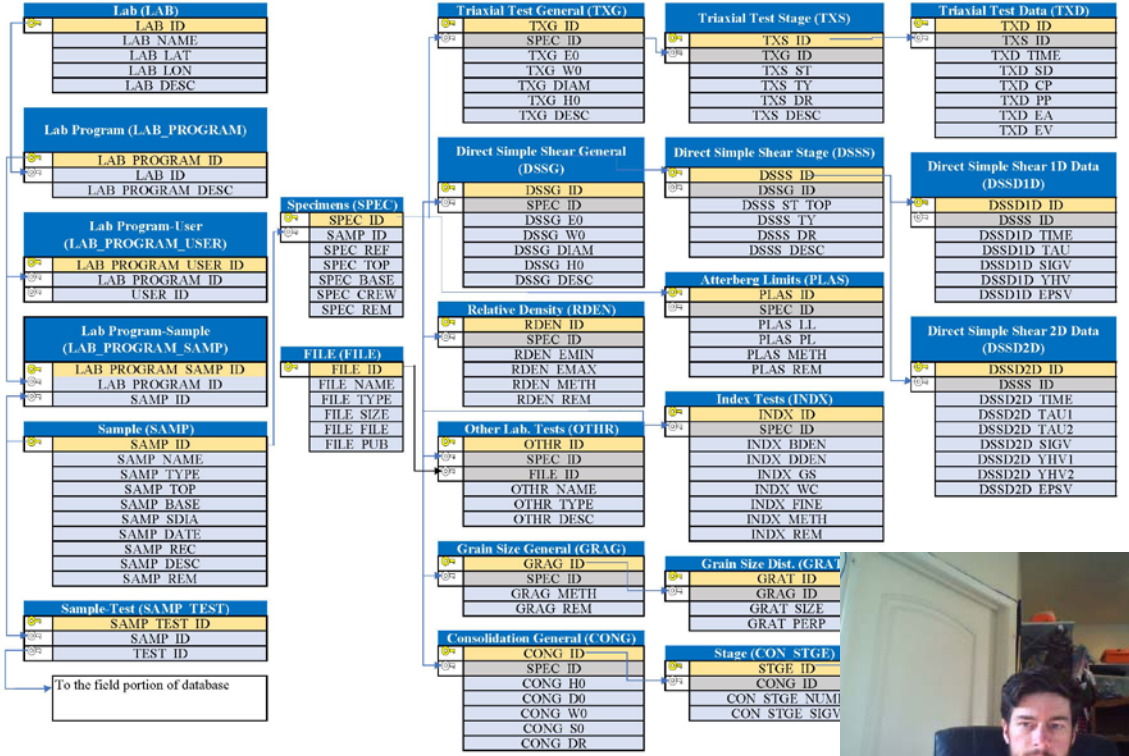
Fruit_ID	Person_ID	Number_Fruits
1	3	
2	1	
3	2	

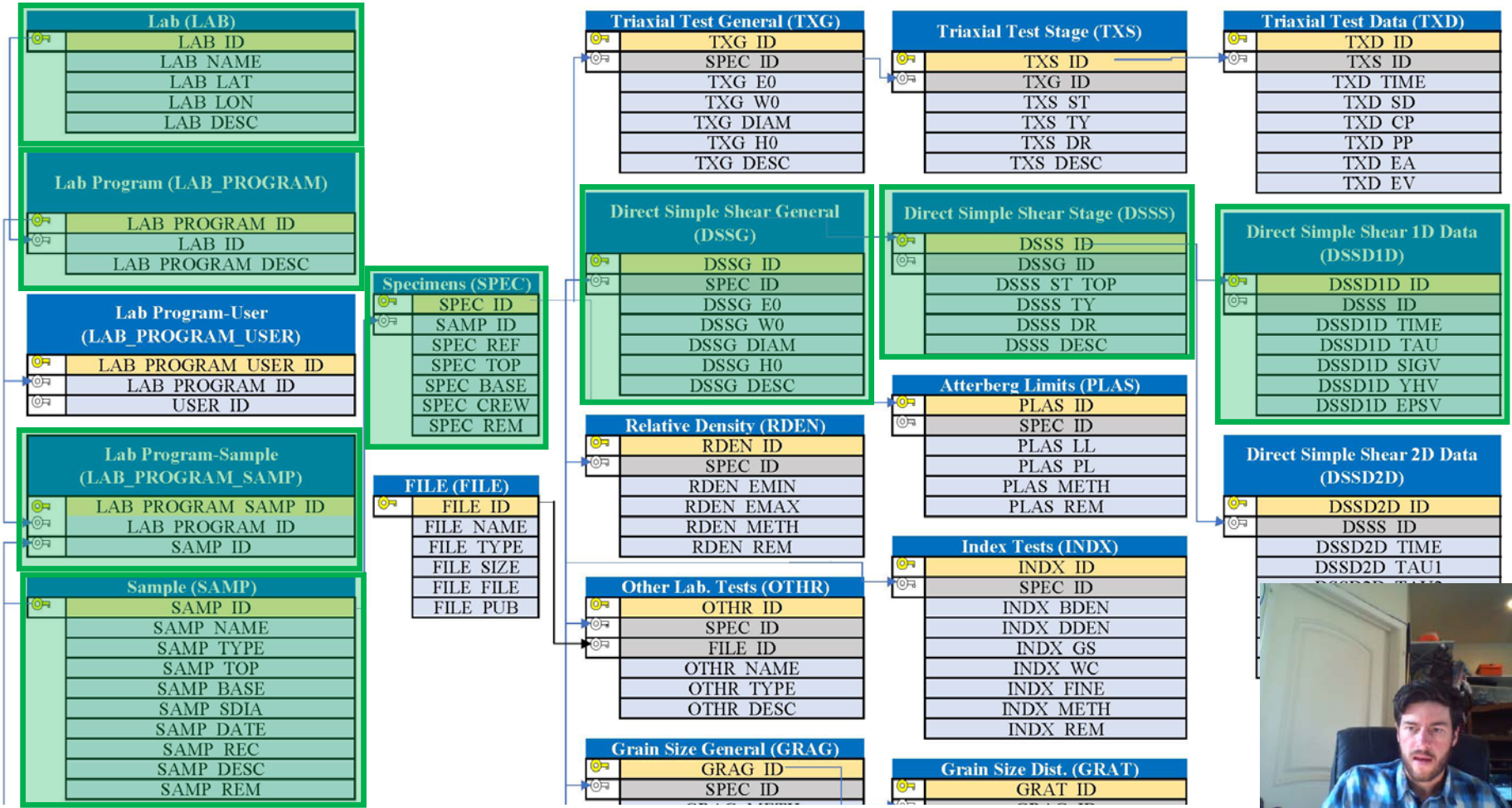


Database Structure

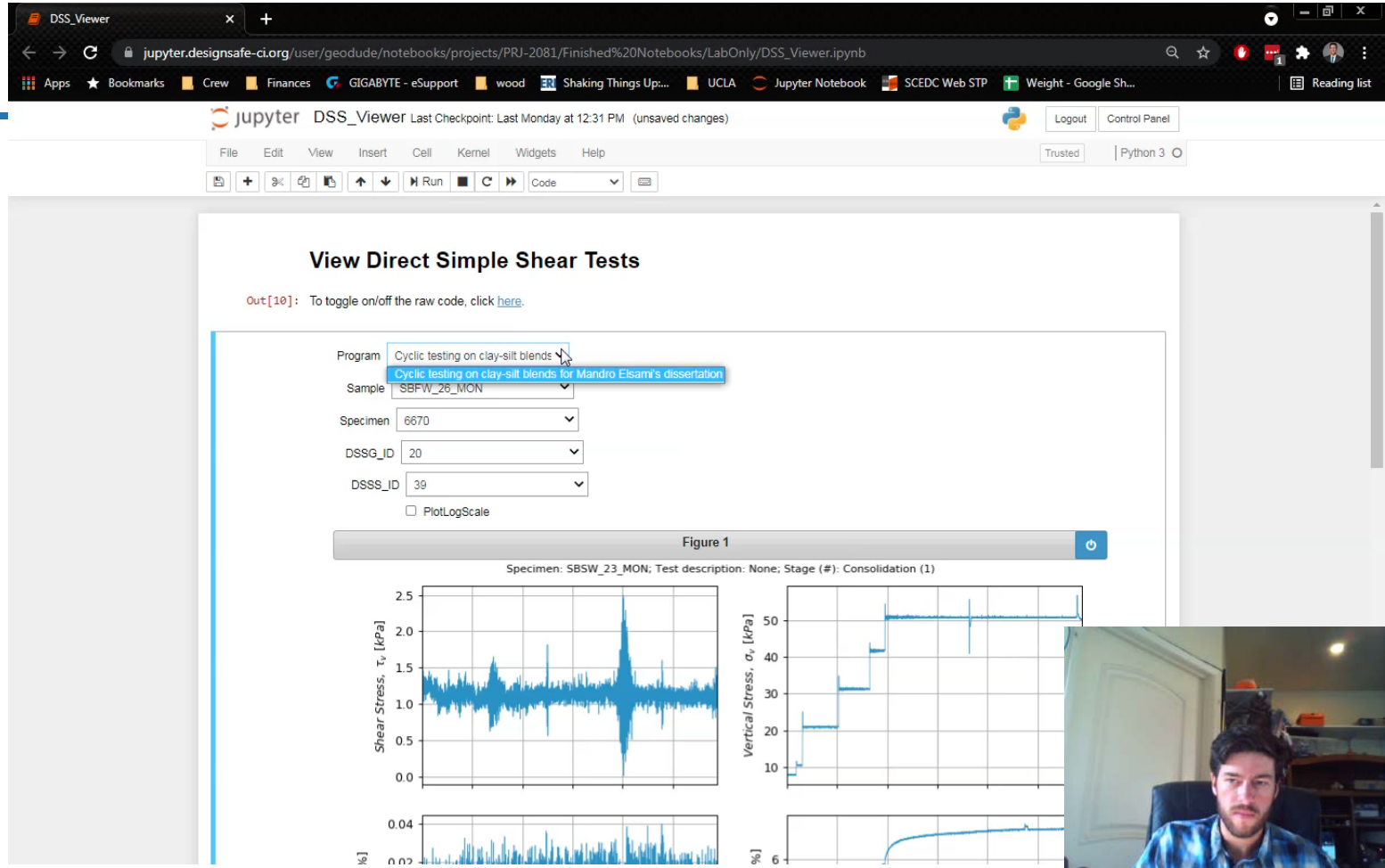
Tests that can be input into the database

- Triaxial
- Direct Simple Shear (1D and 2D)
- Relative Density
- Atterberg Limits
- Grain Size
- “Index” (G_s, w_c, % Fines)
- Consolidation

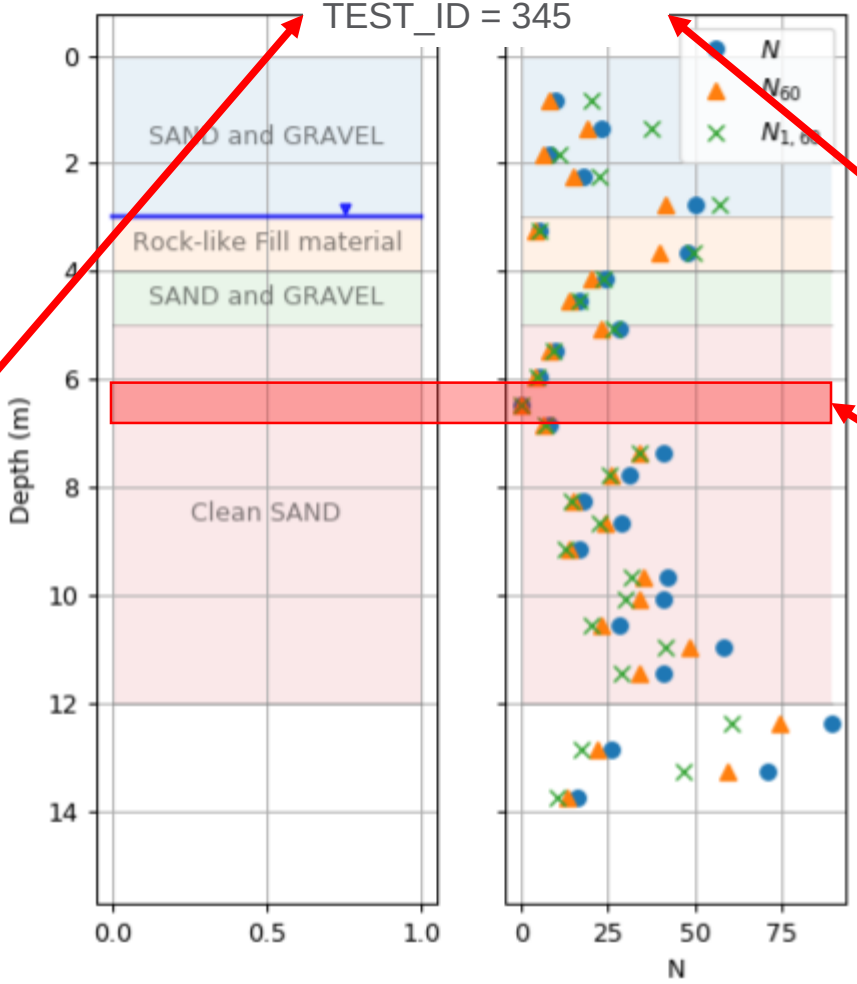


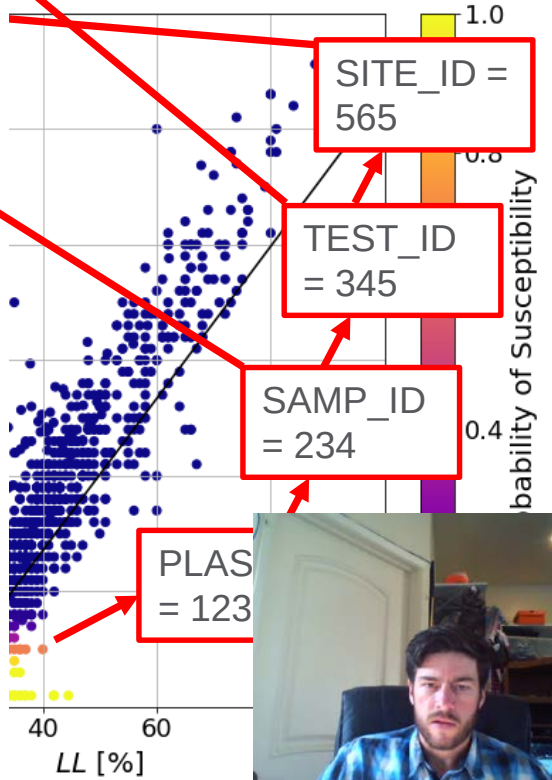

Lab (LAB)
LAB_ID
LAB_NAME
LAB_LAT
LAB_LON
LAB_DESC
Lab Program (LAB_PROGRAM)
LAB_PROGRAM_ID
LAB_ID
LAB_PROGRAM_DESC
Lab Program-User (LAB_PROGRAM_USER)
LAB_PROGRAM_USER_ID
LAB_PROGRAM_ID
USER_ID
Lab Program-Sample (LAB_PROGRAM_SAMP)
LAB_PROGRAM_SAMP_ID
LAB_PROGRAM_ID
SAMP_ID
Sample (SAMP)
SAMP_ID
SAMP_NAME
SAMP_TYPE
SAMP_TOP
SAMP_BASE
SAMP_SDIA
SAMP_DATE
SAMP_REC
SAMP_DESC
SAMP_REM
Specimens (SPEC)
SPEC_ID
SAMP_ID
SPEC_REF
SPEC_TOP
SPEC_BASE
SPEC_CREW
SPEC_REM
FILE (FILE)
FILE_ID
FILE_NAME
FILE_TYPE
FILE_SIZE
FILE_FILE
FILE_PUB
Triaxial Test General (TXG)
TXG_ID
SPEC_ID
TXG_E0
TXG_W0
TXG_DIAM
TXG_H0
TXG_DESC
Triaxial Test Stage (TXS)
TXS_ID
TXG_ID
TXS_ST
TXS_TY
TXS_DR
TXS_DESC
Triaxial Test Data (TXD)
TXD_ID
TXS_ID
TXD_TIME
TXD_SD
TXD_CP
TXD_PP
TXD_EA
TXD_EV
Direct Simple Shear General (DSSG)
DSSG_ID
SPEC_ID
DSSG_E0
DSSG_W0
DSSG_DIAM
DSSG_H0
DSSG_DESC
Direct Simple Shear Stage (DSSS)
DSSS_ID
DSSG_ID
DSSS_ST_TOP
DSSS_TY
DSSS_DR
DSSS_DESC
Direct Simple Shear 1D Data (DSSD1D)
DSSD1D_ID
DSSS_ID
DSSD1D_TIME
DSSD1D_TAU
DSSD1D_SIGV
DSSD1D_YHV
DSSD1D_EPSV
Relative Density (RDEN)
RDEN_ID
SPEC_ID
RDEN_EMIN
RDEN_EMAX
RDEN_METH
RDEN_REM
Atterberg Limits (PLAS)
PLAS_ID
SPEC_ID
PLAS_LL
PLAS_PL
PLAS_METH
PLAS_REM
Direct Simple Shear 2D Data (DSSD2D)
DSSD2D_ID
DSSS_ID
DSSD2D_TIME
DSSD2D_TAU1
Other Lab. Tests (OTHR)
OTHR_ID
SPEC_ID
FILE_ID
OTHR_NAME
OTHR_TYPE
OTHR_DESC
Index Tests (INDX)
INDX_ID
SPEC_ID
INDX_BDEN
INDX_DDEN
INDX_GS
INDX_WC
INDX_FINE
INDX_METH
INDX_REM
Grain Size General (GRAG)
GRAG_ID
SPEC_ID
Grain Size Dist. (GRAT)
GRAT_ID

Data Querying and Visualization



Plasticity





er, Personal communication

Thank you