DEEP FOUNDATIONS
Course Work Topics

UTAH STATE UNIVERSITY
J.A. CALIENDO
GRADUATE COURSE
CEE 6320

- ONE SEMESTER COURSE, “DEEP FOUNDATIONS”

- PRE-REQUISITE = FOUNDATION ENGINEERING
  - Coduto
  - Das
TEXTS

- ADSC, FHWA, “Drilled Shafts” 2 – Volume
- Design of Pile Foundations NCHRP Synthesis Report #42
- “Guidelines for the Interpretation and Analysis of the Static Loading Test”, DFI
- “Standard Guidelines for Design and Installation of Pile Foundations”, ASCE
- Analysis & Design of Shallow & Deep Foundations, Reese et al
WEEK ONE

- Design Considerations
- Field Investigations
- Shear Strength Review
- LRFD vs. ASD
WEEK TWO

- Overview – Design and Construction sequence, (FHWA chapt 2)
- Pile Types, advantage / disadvantage (FHWA chapt 8)
WEEK THREE

- Static Analysis – Meyerhoff, Nordlund methods
- Static Analysis – Alpha, Beta methods
- Static Analysis – CPT methods
- Static Analysis – API methods
WEEK FOUR

- Economics and time effects – Chapt 3
- Computer Software – Static Analysis
  - DRIVEN (no more !)
  - Spreadsheets
  - BSI (University of Florida)
- Static Load Tests – Chapt 18, 19, & 20
  - Conventional
  - Osterberg
  - Statnamic
WEEK FIVE

- Static Load Tests – Continued (use PDPI field results)
- Design of Pile Groups – Axial Loads
Instrumented Static Load Tests
  ◦ Load Distribution Curves
  ◦ Load Transfer Curves (t–z) (q–w)

Settlement Predictions from t–z and q–w curves
  ◦ tzpile software – Ensoft
WEEK SEVEN

- Load Settlement Relationships – cont’d
- Settlement – Pile Groups
- Wave Mechanics
WEEK EIGHT

- Pile Dynamics – PDA Testing Chapt 17

- Wave Equation Analysis – Chapt 16
  - Example problems

- GRLWEAP Software Introduction
WEEK NINE

- GRLWEAP (Contact GRL / student license)
  - Bearing Graph
  - Inspector Chart
  - Drivability
FIELD TRIP

Lateral Load Analyses
- Hand solutions
- Broms’ Method – Chapt 9
- py Curves
WEEK 11

- Lateral Load Analysis – Numerical Solution (py curves from PDPI field tests)
- LPILE Software (Ensoft)
- Group Response – py multiplier
WEEK TWELVE

- FLPIER Software – Academic Version

- Begin Drilled Shaft Construction & Design
  - Note Differences between Driven Piles and Drilled Shafts
  - Advantages / Disadvantages of each
Drilled Shaft Construction & Design
  ◦ Field Trip #2
  ◦ Use ADSC Support
  ◦ Design Software (USU Spread Sheet)
USEFUL WEB SITES

- http://piledrivers.org/pdca/index.cfm
- http://www.fhwa.dot.gov/bridge/
- http://web.pile.com/
- http://cee.engr.ucdavis.edu/faculty/boulanger/geo_photo_album/index.html
- http://www.loadtest.com/
- http://www.eng.usf.edu/~gmullins/Statnamic_intro.htm
- http://www.adsc-iafd.com/
Some Teaching Aids

- Wave Speed vs. Particle Velocity
- Undrained vs. Drained Shear Strength
- Positive vs. Negative Pore Pressure
Wave Speed vs. Particle Velocity
Undrained vs. Drained Response
Loose / Medium Dense Soil - Setup

Particles densify
Pore pressure goes up and dissipates with time = Setup
Particles dilate and negative pore pressure goes down and dissipate w/time = Relaxation
THANKS TO PDCA FOR MAKING THIS PROGRAM POSSIBLE AND TO ALL OF YOU FOR BEING HERE WITH US AT UTAH STATE UNIVERSITY!!