Lab Report 2 Guidelines

Format

- **Introduction**
- **Background**
  - Describe PCC as a construction material. Make sure you define terms (i.e. properties) clearly.
  - **Design**
    - Summarize your design requirements
    - Describe your design process and justify your decisions. Add any equations, etc. as you see fit.
    - Summarize your final design and complete Table 2.1.

TABLE 2.1. PCC Mix Designs (Absolute Volume Mtd.)

Group	
Description	
Design Strength f_c' (psi)	
Coarse aggregate (lb)	
Fine aggregate (lb)	
Portland cement (lb)	
Cement replacement material(lb)	
Water† (lb)	( )
Admixture	

† First value is theoretical to be used for water/cement ratio. Parenthetical value is the actual amount to add.

- **Materials and Methods**
  - **PCC Mixing**
    - Describe the mixing process: materials, apparatus, and methods.
    - Describe the curing of the specimens and why it is done.
  - **PCC Testing**
    - Describe the initial tests of fresh PCC: slump, air-entrainment, and unit weight.
    - Describe how the density (of cured concrete) was found
    - Describe the compression and split-cylinder tensile tests.

- **Data/Data Analysis**
  - **Data**
    - Include <u>all</u> relevant raw data (i.e. length, diameter, cross-sectional area) in a neat and orderly fashion. You don't need to print out any "data points" – they will be used for the plots.
    - For both the 7- and 28-day compressive strengths, you should plot the stress-strain curves in Excel (or similar program). You only need one graph that will have the curves for all six specimens. From this (or the results file), you can find the compressive strength (peak) for each specimen. Make sure to have graph labeled (with units) and specify each specimen in the legend. ***[Please do not use the color yellow in any part of your graph as it is hard to see.]***
    - In another graph, find the elastic modulus for all six specimens.
    - For the tensile test, you only have to include the peak load (or failure load).
    - Include any pictures that you took here.
  - **Data Analysis**
    - All relevant calculations should go here – include formulae.
    - Calculate the averages for the following quantities: density, 7-day compression strength, 7-day strain to failure, 28-day compression strength, 28-day strain to failure, elastic modulus (for 7 & 28-day), and the tensile strength.
    - Quantitatively compare the 7-day compressive strength to that of the 28-day.
    - Quantitatively compare the 7-day elastic modulus to that of the 28-day.
    - Quantitatively compare the tensile strength to the 28-day compressive strength.
      - For example: the three comparisons above could be something such as "the 7-day compressive strength is xx.x% of the 28-day."
    - Fill out Table 2.2.

Table 2.2. Final PCC Mix Data (All sections)

Group	
w/c	
Slump (in)	
Air Cont (%)	
Unit Weight (lb/ft^3)	
***Ave.* ρ (lb/ft^3)**	
Ave. 7-Day f_c' (psi)	
Ave. 7-Day ε_f	
Ave. 7- Day E_c (psi)	
Ave. 28-Day f_c' (psi)	
Ave. 28-Day ε_f	
Ave. 28- Day E_c (psi)	
Ave. f_{ct} (psi)	

  - **Discussion**

- Discuss the mixing process and any immediate problems or concerns.
- Discuss the initial test results (slump and air-entrainment) and how they compare to your design's expected values.
- Discuss overall mechanical properties: density, strengths, elastic moduli, etc.
- Discuss the types of compressive failure.
- Discuss age of specimen (relating to compressive strength and stiffness).
- Discuss tensile strength versus compressive strength.
- Discuss error.
- Overall, what did you learn? How did the actual strength of your specimens compare to expected strength of your design? What would you do differently if you had to design another mix for the same criteria?

o **Conclusion**

o **Appendix**

- Please attach the design homework assignment to the end of your report.

Civil Materials – PCC Lab Report Rubric – Spring 2008

DATE: _____ **SCORE:** _____/100

GROUP: _____

INTRODUCTION/CONCLUSION

Lab objectives are clearly stated.	0 1 2 3 4
Experiment is summarized.	0 1 2 3 4
Success of experiment is discussed.	0 1 2

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BACKGROUND

Engineering concepts are described in relation to the materials.	0 2 4 6 8
Applicable equations and figures are included.	0 1 2

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MATERIALS AND METHODS

Materials are clearly listed.	0 1 2
Concrete mix procedure is clearly outlined.	0 1 2 3
Curing of specimens is discussed.	0 1 2
Testing procedures are clearly outlined.	0 1 2 3

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DATA/DATA ANALYSIS

Data is included in an appropriate, efficient manner.	0 1 2
Appropriate formulae are used.	0 1 2 3
Appropriate and reasonable values are calculated.	0 1 2
Applicable figures and graphs are included.	0 1 2 3
Compressive strength at 7 and 28 days are quantitatively compared.	0 1 2 3
28 day compressive strength and tensile strength are quantitatively compared.	0 1 2 3
Correct significant figures and units are used.	0 1 2
Table of results is presented at end of section.	0 1 2

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DISCUSSION

Mixing process is discussed	0 1 2 3
Initial tests are discussed in relation to mix design.	0 2 4 6
Mechanical properties are discussed and correlated to initial mix properties.	0 2 4 6
Presents/discusses gain of strength and stiffness with age.	0 2 4 6
Compares and discusses tensile versus compressive strength.	0 2 4 6
Discusses failure modes.	0 1 2 3 4 5
Discusses sources of error.	0 1 2 3
Discusses what was learned and what could be improved.	0 1 2 3 4 5

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GENERAL

Paper is free of spelling or grammatical errors.	0 1 2 3 4 5
Paper follows appropriate format.	0 1 2 3 4 5

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COMMENTS: