Unit 2 Homework 6 – Mini Project (250 pts)
Exploration of Alternative Building Materials

Your group will be (i) researching, (ii) preparing, (iii) and configuring a non-conventional building material and (iv) submitting a report on your work. The materials are: adobe, Papercrete, rammed earth, and straw bale. All will be used to build a wall that is 4 ft high, 4 ft wide, and 2 ft wide (although the straw bale wall may be wider).

Phase I – Brief Preparation

Research: The first stage of this assignment will be to prepare a "brief" on the material you are going to work with. Divide the brief into sections that describe

(a) an introduction to the material that describes

(i) its composition, key components or "ingredients";

(ii) its history (is it a relatively new concept or an old traditional one?)

(iii) Its best applications? i.e. walls? floors? whole buildings? bridges? Is it used mainly in certain regions of the world or country? Why? temperature, moisture, wind, etc?

(iv) Any other interesting information that helps us understand this material; and

(b) example applications/cases where its been or is being used as shown by images with captions;

(c) sources you found that give instructions and/or tips for making the material **and a brief summary of the method you plan to use**. Section (c) can be presented as a "web portal" with links to web site sources and a short paragraph accompanying each link saying what is special about the site or who sponsors it, or other highlights that led you to choose to present it. Be sure to clearly identify the procedure you plan to use for your own version of the material.

You can use books, the web, personal interviews, and the like. Journals ranging from Mother Earth News to sophisticated architecture journals will cover structures made out of novel materials. **Keep a log of all resources used and report them in a bibliography using proper referencing technique.**

This research will alert you to the pitfalls of working with your material and will help you avoid making unnecessary novice mistakes. You will also use parts a-c to write an introduction for your final report. Imagine your audience is the senior design class.

Phase IIa – to be done in coordination with Mike Moss (emmoss@uncc.edu)

Sample Preparation: Assemble the materials needed to make your building material and construct a sample. If you are making walls from blocks, make 2 or more samples. You should consult with Mike Moss about molds for your blocks and block sizes. They will not all be the same size. If there are alternative mixes or methods, you can make each sample differently to arrive at the one that will function best. If not, make replicates. If you are making walls of a single unit, work with Mike to make sure it will fit on the bases he is preparing.

Check to see if curing time is needed and plan ahead for pre-trials and then final product. Everyone in the group should participate in the sample preparation, i.e. everyone should get their hands dirty or wet!

Document the sample preparation with photos or a video, and include photos that show all group members at work. You will also need a written description of your methods, including supplies,

proportions and curing time. This should be prepared as you would any procedure section for a laboratory report.

Phase IIb

Sample Inspection and Approval to Continue After your product has been inspected by Mike Moss and me, and you have been approved to continue, you can move into the final production phase.

Final Product. Your material should be configured into a wall on a support base with a protective roof covering. All of the walls will be kept outside to observe their weathering ability. They will be evaluated by next year's class.

Discussion: Before you write this section, **all** group members should be **familiar with the research** described in the introduction of the report **and with your material product**. You should meet together to brainstorm as engineers about what you can say about your material in the discussion of your report. Consider things like your opinions about whether it has significant potential for use in construction – why or why not? What types of construction uses would it be suitable for? Will there likely be geographical limitations to its use? Do you see opportunities for modifications to improve it? Do you see opportunities to incorporate what are now "wastes" into it as amendments? Substitutions? What is public reaction likely to be? Are there synergistic advantages to its use such as improved insulation value to lower heating/cooling costs? Strength in hurricanes/tornadoes? Maintenance costs? Think, think, think in this section. This is the section where engineers earn their money.

Grading Criteria

		Points out of 200
Material Brief Due 2/19/09	Includes all items requested; is thorough, clear, organized, and accurate. Shows good effort collecting information and including the most appropriate information.	50
Sample Prep Due 3/5/09	Quality of sample to the degree it shows thorough preparation, timeliness, care and attention to detail	30
Final Product Due 3/21/09	Evidence of timely completion of pilot and engagement in final product. Evidence of consultation with instructor and/or Mike Moss. Care and attention to detail in construction. Product looks like it was build by upper level college students and not high school students.	60
Report Due 4/9/09	The report will be graded on quality, thoroughness, clarity, and appropriateness of the information. Introduction should provide background on your material and your project objective. Method Section should describe how you created your pilot unit, what lessons were learned and adjustments made; and description of any things done differently in the final production phase. Discussion section should offer a sophisticated and thoughtful consideration and analysis of the material. Should reflect a creative and expert exploration of the potential and pitfalls of the material you studied (see above).	50
Professionalism	report format and appearance, neatness, attention to detail	10
Note: Individual final grades may differ from group grade based on peer evaluations.		