Senior Thesis Program
The Department of Architectural Engineering
Pennsylvania State University
University Park, PA

AE 481W

Comprehensive Architectural Engineering Senior Project I

Structural Requirements for Individual Senior Projects

Fall 2016

Table of Contents:

AE 481W Section 4, 8, 15
Fall Semester 2016
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Course Comprehensive Architectural Engineering Senior Project I (4)

Description Building project selection and preparation of overall plan; preliminary investigation of building design and construction issues; creation of individual Capstone Project Electronic Portfolio (CPEP) and project proposal required.

Prerequisites Fifth-Year Architectural Engineering Standing in the Structures Option
AE 430, AE 403, AE 431

Instructor

Section 4:
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Section 8:
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Section 15:
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Meeting Times MWF 3:35-5:30 This class will formally meet when announced.
Meetings may be called for all sections, specific sections by its instructor.

Office Hours As determined and communicated by specific section instructor.

Grading

Technical Grade: 75% of course grade
- Structural Existing Conditions Report: 20% of Technical grade
- Structural Calculations Notebook: 70% of Technical grade
  - (a) 20% of Technical grade
  - (b) 20% of Technical grade
  - (c) 30% of Technical grade
- Proposal: 10% of Technical grade

Project Management Grade: 25% of course grade
(Determined by Prof. Bowers and provided to Section Instructor)
Class and assignment schedule related to project management will be conveyed separately.

Technical Schedule/ Assignments

Structural Existing Conditions Report Submission	9/9/2016
Structural Calculations Notebook—ongoing assignment	
(a) Building Codes, Specifications, and Loads	9/26/2016
(b) Member Spot Checks/Alternative Systems Study	10/14/2016
Alternative Systems Study Presentations **(Mandatory Class Attendance)**	10/17/2016 & 10/19/2016
Faculty-led discussion of building modeling *Attendance strongly encouraged*	10/21/2016
(c) Lateral System Analysis Study	11/14/2016
Structural Technical Report 1 Re-submission and Proposal	12/9/2016

Notes

- Attendance at announced class meetings is MANDATORY unless it meets the requirements of an excused absence per Faculty Senate Policy 42-27 and AAPP E-11. In short, let your instructor know ASAP if you need to miss a class that is part of the technical component of the course.
- All technical reports must receive a grade of 60% or more (before applied late penalties) to pass the course.
- Use engineering/grid paper for all hand written calculation, one side only.
- Unreasonably messy and hard to follow assignments will be returned, ungraded.
- Turning in late assignments will be possible under only very extreme circumstances. Extreme is at the discretion of the Instructor. When in doubt, call before you have missed the assignment. ONE report can be submitted up to 24 hours late without penalty. After this, a penalty of 5% per 24 hour period will be assessed on any late submission. The late report is still required to submitted in order to earn a passing grade in AE 481W.
- Do your own work. Cheating will absolutely not be tolerated. All cases of cheating or perceived cheating will be dealt with according to PSU Policy 49-20, no breaks. Your personal integrity and morals should be more important than any grade.
- The University defines academic integrity as the pursuit of scholarly activity in an open, honest and responsible manner. All students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts (refer to Senate Policy 49-20. Dishonesty of any kind will not be tolerated in this course. Dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Students who are found to be dishonest will receive academic sanctions and will be reported to the University's Office of Student Conduct for possible further disciplinary sanctions (refer to Senate Policy G-9).
- Heavy reliance on prior year's materials is not an effective way to learn. Copying (even a small part) of any prior year's material is cheating.
- Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The Student Disability Resources Web site provides contact information for every Penn State campus. For further information, please visit the Student Disability Resources Web site.
- In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.

Educational Objectives for Architectural Engineering at Penn State

http://www.engr.psu.edu/AE/degree_programs/educational_objectives.asp The undergraduate program in Architectural Engineering is designed to produce graduates who will be:

- **Engaged in a professional career in the building industry.**
- **Qualified and competent to sit for the professional engineering exam.**
- Capable of meeting the challenges of the engineering work environment and assuming leadership responsibilities.
- **Capable of solving design and project related problems based on sound engineering principles as demanded by their work.**
- **Successful in conducting multi-disciplinary/inter-disciplinary interactions as required by their work.**
- Engaged in service activities in the public and professional realms.

ABET Expected Outcomes from AE 481W

The table below lists the "Outcomes" expected by ABET from our academic program. Every course is not expected to address every outcome, but rather each course plays a certain role in meeting the expected outcomes.

Expected Outcome	Emphasis in this course
(a) an ability to apply knowledge of mathematics, science and engineering	3
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs	3
(d) an ability to function on multi-disciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	3
(f) an understanding of professional and ethical responsibility	2
(g) an ability to communicate effectively	3
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	2
(i) a recognition of the need for, and ability to engage in life-long learning	3
(j) a knowledge of contemporary issues	2
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	3
(l) proficiency in mathematics through differential equations, probability and statistics, calculus based physics, and general chemistry.	
(m) proficiency in statics, strength of materials, thermodynamics, fluid mechanics, electric circuits, and engineering economics.	
(n) proficiency in a minimum of two (2) of the three (3) basic curriculum areas of structures, building mechanical and electrical systems, and construction/construction management.	3
(o) engineering design capabilities in at least two (2) of the three (3) basic curriculum areas of architectural engineering, and that design has been integrated across the breadth of the program.	2

Emphasis: 3 – Strong; 2 – Moderate; 1 – Little; Blank – Nothing specific expected

Structural Assignment 1
Structural Existing Conditions Report

The **Structural Concepts / Structural Existing Conditions Report** consists of a requirement to describe the physical existing conditions of your building with an emphasis on the structure. It should provide an overview of the building, in general terms, and a thorough description of the building structural systems including, but not limited to, the general floor framing, structural slabs, lateral resisting system, foundation system, bracing elements, expansion joints, secondary structural systems for equipment support etc. and support and bracing of the exterior envelope of the building. This description should address how the primary components work together as a system. In addition, a cover page, a Table of Contents, and an Executive Summary is expected for this report. If using appendices for additional information referred to in the main body of the report, they should be numbered for reference purposes but do not have to be consecutive with the main body of the report (Pages may be hand numbered or you can use A1, A2, etc.) A detailed checklist of items to include is provided at the end of this assignment description.

Submission Requirements

As part of the writing component of AE 481W, this report will be submitted to your consultant for review and comment. Students will then resubmit the report as part of their proposal at the end of the semester, responding to the faculty comments. The document should be written in Microsoft WORD and submitted to your consultant in electronic form. Each student will be assigned a folder on BOX to submit their assignments. Information on using the BOX folder for submissions and feedback will be communicated separately. The tracking function will be used to provide comments and corrections. Then the student should respond to those comments in a revision as part of Technical Assignment #5. Students should use tracking so the changes are highlighted. In addition to submitting a WORD document to your section instructor, a pdf of your report should be posted to your CPEP site at the same time as you submit. While this version is a draft under review to be revised at semester end, it is still considered a stand-alone assignment and should be posted to your CPEP as an Existing Conditions Report until it is revised and included as part of Technical Assignment #5.

Evaluation

The report should, above all else, demonstrate that you are becoming competent to practice as a structural engineer. The more correctly, clearly and succinctly this is demonstrated, the better the grade. Taking the consultant through what you understand about the building and its design provides the best opportunity for a good grade. Clarity and quality in writing is also essential.

The report will be graded on a 100 point scale with the technical quality of the report comprising 60% and the writing quality comprising 40%. For the first draft, submitted as Technical Assignment #1, a minimum grade will be assigned. Additionally, comments will be provided to understand how the report can be improved. A final draft of the Structural Existing Conditions report, addressing the comments provided for the first draft, should be included as part of Technical Assignment #5. The minimum grade provided for Technical Assignment #1 can be increased by up to 10 points, depending on the quality of the report after modifications and corrections are made. The Proposal portion of Technical Assignment #5 will be evaluated separately to assign a grade for Technical Assignment #5.

A grading rubric, used by the structural faculty to review this report, is posted on the ePortfolio website. You are encouraged to review the rubric prior to completing this report.

Structural Existing Conditions Report Checklist

Front Matter

- ☐ **Title Page.** (A nicely formatted cover should include building name, building location, student name, advisor name, option, report title, image or graphic of the building.)
- ☐ **Executive Summary at start of report.** (As is standard for most technical reports of any considerable length, an executive summary is required on the first page of your report. Make sure that the executive summary provides a mini snapshot of your findings, not just a relisting of the requirements of the assignment. **This should be an abbreviated version of the report, not a table of contents in paragraph form. Consider this a stand-alone document.)**
- ☐ **A table of contents is provided.**

Introduction (Executive Summary should not serve as Introduction)

- ☐ **Purpose and scope*** **(**Introduce the scope and purpose of the report. The report should be able to stand alone as a document. The contents should not rely on the assignment description to have purpose.)
- ☐ **General description of building*** (Provide a more thorough description of the building than the one in the Executive summary. Include some figures like a rendering or a picture, a typical architectural floor plan, etc.)
- ☐ **Structural framing system briefly described.** (Provide enough of a description to put the rest of the sections of the report into context.)

Body (Items below should be included, when appropriate, and should be presented in a logical order, not necessarily the order below. Unique aspects not listed below should also be included.)

- ☐ **Structural framing system fully described and evidence that the student understands the framing concepts involved.** (Students should include figures of typical framing plans, framing elevations and building or structural sections as necessary to completely describe the framing layout to your consultant in the report. Clearly identify those elements on the framing plan that are parts of the lateral force resisting system. Simplified original sketches, prepared by the student, showing basic framing elements are preferred to reduced size copies of the plans, particularly if reduced original plans are difficult to read at the reduced scale needed to fit in the reports. Alternately, augmented reduced size plans, highlighting typical bay dimensions, etc., work well. Copies of plans may be included as an appendix or in the body of the report if they provide additional information and clarity to the report.)
- ☐ **Fully describe a typical bay.** (Explain the framing in detail, including member sizes and/or bar layout. Figures should show dimensions, cross-sections, etc.)
- ☐ **Describe columns, including typical sizes and details, where appropriate.**
- ☐ **Lateral Load Resisting Elements identified in text and framing plan sketch /diagrams.** (shear walls, frames or combination. etc.)
- ☐ **Load paths fully described for all types of loads.** (Included in the discussion on lateral force resistance should be a description of the lateral load path and how the applied forces travel through the structure and are distributed to the various framing elements. You should discuss the impact that these concepts or issues will have on your work. Include sketches, diagrams etc. to help explain your system. Once again, students must be sure to clearly identify which structural elements are participating in the lateral load resisting (include a discussion of floor diaphragms, collector beams etc.) system providing sketches or framing plans that identify the system parts and components.)
- ☐ **Identification of other structural elements and design (roof uplift, basement walls have lateral soil pressure, uplift due to high water tables, canopies etc as appropriate. Minor or secondary elements need not be analyzed or designed for this report, just identified)**

- ☐ **Identify foundation system and any special impact on superstructure design or analysis.**
- ☐ **National Code for Live Loads and Lateral Loadings selected and described**
- ☐ **Description of loads and how they can be determined.** (The loads should not be numerically quantified, just described.)
    - Types of live loads and source for determining live loads had been identified.
    - Types of dead loads and sources for determining dead loads have been identified.
    - A source for determining wind loads had been identified.
    - A source for determining seismic loads had been identified.
    - Other general or special loadings have been identified (snow drift, major lateral soil loads, explosive, blast, or anti-terrorism loading requirements, temporary or construction loads, erection sequence loads, etc.
- ☐ **Identify design codes and standards used in the design** (ACI, British Standards, ASCE 7, AISC, AISI, etc. It is not necessary to list all the applicable ASTM standards. A table can be used for the codes and descriptions of their use on your building. The table should be introduced in the text with a description of its purpose.)
- ☐ **Describe joint details and how they work.** (Rebar details for concrete buildings, connections for steel buildings, etc.)

Closing

- ☐ **Summarize the most important details and how they will impact the future analysis and design assignments.**
- ☐ **Draw conclusions on things that may be challenging as you move forward in the tech assignments.**

Appendices

- ☐ **Appropriate materials included.** (The appendix is supplemental. The body of the report should not need the appendix to be understood. Do not put figures in the appendix that are essential to understanding the discussion. For example, a picture or rendering of the building is helpful to understanding the description as is a floor plan and should not be in the appendix.)
- ☐ **Inappropriate materials excluded.** (Do not put anything in the appendix that is not referred to in the body of the report. For example, one might show a typical floor plan in the body of the text and note that other plans are included in the appendix.)

Other Items

- ☐ **Document submitted via assigned BOX folder to consultant using Microsoft WORD.**
- ☐ **Document printed to PDF and posted on CPEP page.**
- ☐ **Number Pages for ease of reference by consultants in their comments.**
- ☐ **Refer to and label Figures similar to a textbook.** (Note that all figures, charts, sketches and photographs should be labeled, numbered and addressed in the body of the report text. It is recommended that you call all of these items "Figures" so that they can be successively numbered for convenience and organization purposes. Remember to properly cite all images that you did not generate.)
- ☐ **Each section of the report should have a purpose defined. (**For example, sections that include general information like codes, and materials, etc. should be introduced as having purpose in the remainder of the report or future calculations.)

Technical Grading Rubric for Technical Assignment #1: Name: _____

	Points					
Items:	**Excellent** All elements in the checklist have been included and descriptions are thorough and correct with little room for improvement.	**Good** Most or all elements in the checklist have been included and most descriptions are thorough and correct with some room for improvement as noted in the report.	**Fair** Several elements in the checklist are missing and/or several descriptions are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	**Poor** Many of the elements in the checklist are missing and/or many descriptions are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	Your points	
Executive Summary	4.5-5	3.5-4.5	2.5-3.5	0-2.5		Out of 5
	General Comments:					
Introduction	9-10	7-9	5-7	0-5		Out of 10
	General Comments:					
Body	36-40	28-36	0-28	0-20		Out of 40
	General Comments:					
Closing and Appendices	9-10	7-9	5-7	0-5		Out of 5
	General Comments:					
Technical Grade Subtotal	53-60	42-53	30-42	0-30		Out of 60
Writing Grade Subtotal (see separate page)	36-40	28-36	20-28	0-20		Out of 40
First Draft Grade						Out of 100
Revision Points						Out of 10
Final Grade						Out of 100

AE 481W – Writing Evaluation Rubric for Existing Conditions Report – 40% of Report Grade

( ) = Points	Excellent	Good	Fair	Poor	Points
Professional Appearance, Presentation, Documentation and Following Instructions (8)	Work product is of the highest quality. Makes frequent and excellent use of graphics, charts, photographs, etc., all of which are labeled as figures. All figures and tables are numbered, titled and referenced in the text. Report contains numbered pages, table of contents, and well organized and documented Appendices (as appropriate). Hand calculations are neatly prepared and easy to read and follow. Report heading or cover page contains all information noted in Thesis report format requirements. (7-8)	Work product is well prepared and presented and, with a few exceptions, would be well received in the AEC profession. Makes effective use of all types of figures and tables which are connected or referenced in the report. Report is organized with proper headings, table of contents, and numbered pages. Appendix is provided and adequately documented. Most hand calculations are neatly prepared and most information is easy to follow. (6-7)	Work product is average or inconsistent. Not likely acceptable in professional environment. May contain problems such as infrequent use of figures and tables, excessive description of items that can be covered by photos and graphics. Report may contain missing or poorly prepared items such as headings, table of contents, and Appendices. Example: Report may be printed in B&W but it references colored lines in a figure. Print quality is below average containing streaks, faded sections etc. Hand calculations need improvement in readability, organization, and completeness. (5-6)	Work product is of very low quality and would be rejected or frowned upon in a professional environment. Few figures and tables are used and are often not linked or discussed in the text. Many items such as headings, subsection titles, table of contents, figures, photographs, etc. are missing or not well executed in some fashion. Graphics and charts may be present in some areas but are poorly executed, sloppy, and hard to read or follow. (0-5)	(0-8)
Organization and Flow of Report (8)	Information is presented in a logical, interesting sequence. Organization and structure are very evident. Major categories of the report are divided into sub-sections that are connected with logically clear transitions between topics. Conclusions are effectively supported by the content of the report. Executive summary information matches the report conclusions and concisely captures the key elements of the study. (7-8)	Information presented in a logical sequence. Organization and structure are clear. Major points are separated into paragraphs and signaled by transitions. Paragraphs are built on related sentences that logically develop. Content is supportive of the conclusions. Executive summary is clearly stated. (6-7)	Organization and structure are mostly clear, but the reader may have some difficulty following the line of thought in a number of areas. Major points are separated into paragraphs and most sections are logically developed and documented. Minor digressions exist but do not overly detract from the overall flow of the report. Conclusions are somewhat vague and/or are not fully supported by the report documentation or calculations. Documentation may be hard to follow or find relative to specific sections or conclusion in the report. (5-6)	Sequence of information is generally difficult to follow. Organization and structure often must be inferred. Few major points are set off by paragraphs or subsections or connected by orderly transitions. Report contains few logically connected points. Major digressions exist. Conclusions are ineffective or misleading. Reports in this category often contain Executive Summaries (if present) that are essentially copies of the stated assignment in lieu of actual results and conclusions. (0-5)	(0-8)
Grammar and Style (24)	Full variety of sentence structures used correctly. Minimal use of sentences that begin with "The". Word choice is varied, interesting, and accurate and contributes to an understanding of the report. Few, if any, spelling errors. (22-24)	Variety of sentence structures used correctly despite an occasional flaw. Avoids excessive use of "The" to start sentences. Accurate and varied word choice. Only minor errors in sentence construction, usage, grammar, or mechanics. Minimal spelling mistakes. (19-22)	Predictable sentence and word choice, often with much use of passive voice. Occasional errors in sentence structure, usage and mechanics. Confusing or convoluted sentences. May include frequent use of sentences starting with "The". May include a number of spelling errors and/or word misuse. (15-19)	Errors in sentence structure, usage and mechanics sometimes interfere with the writer's ability to communicate the purpose. Writing is frequently not understandable. May include excessive use of sentences starting with "The". Reports often contain frequent spelling problems. (0-15)	(0-24)
Total (40)					

Overview of Structural Notebook Submissions A, B and C

Structural Notebook Submissions A, B, and C will comprise a comprehensive design evaluation of your building. The primary deliverable of these three assignments will be a notebook of well-organized calculations and descriptions that examine many of the specified members in the existing design. The Structural Notebook will ultimately exist in two formats: 1) Three ring binder with information and calculations organized with a table of contents and tabs separating the sections and 2) an electronic version (pdf) of the structural notebook with bookmarks for the individual sections added for navigation. Additionally, evaluation will include informal and formal presentations of your findings. This approach is intended to provide a design office simulation in both presentation and evaluation.

Grade Weighting and Due Dates: See Syllabus

Technical Assignments 2, 3, and 4

Notebook Submission A: Building Codes, Specifications, and Loads
This submission should identify all building codes and specifications used in the design of the building. Using these and other relevant documents, gravity, wind and seismic loads are determined and summarized in the Structural Notebook.

Notebook Submission B: Typical Member Spot Checks for Gravity Loads and Alternate Systems Typical Bay Design Study
This submission adds an evaluation of typical members for gravity loads and explores alternate gravity framing systems for the building to the Structural Notebook. The focus of this study, which addresses the relative merits of different systems, is on a typical bay of the building. In many cases, information from this report will provide a basis for the proposal of work in the Spring semester.

Notebook Submission C: Lateral System Analysis Study
This submission adds a full evaluation and assessment of the existing lateral system to the Structural Notebook. The supporting information for this submission will include both computer modeling and manual calculations with descriptions, as necessary, to walk your consultant through your process.

Details for Assignment 2: Structural Notebook Submission A Building Codes, Specifications, and Loads

Grade Weighting and Due Dates: See Syllabus for your section

This is the first of three technical notebook submissions that will comprise a comprehensive design evaluation of your building. Refer to the Overview document for the overall context of this assignment, as it relates to the other technical submissions. The primary deliverable of this and the next two assignments will be a notebook of well-organized calculations that examine some of the specified members in the existing design. Additionally, evaluation will include informal and formal presentations of your findings. This format is intended to provide a design office simulation in both presentation and evaluation.

The goal of this assignment is to identify and quantify the structural design loads used in the design of your building. This report should identify all building codes and specifications and other relevant documents used in the design loads of the building. Using these documents, complete a code analysis and a site-specific and building-specific determination of the design loads to be used in the design of your building. In particular gravity, wind and seismic loads should be determined and summarized. Because the loads determined will be used for further evaluation of the existing design, codes used for the *original* design should be used. Redesigns in the Spring semester will typically include an update to a more current code.

Deliverable: Notebook Progress Submission**,** see content checklist below.
Notebook submissions are a PDF document of scanned pages from your notebook submitted to your section instructor for their review and comment. Each submission should include a Letter of Transmittal as a cover sheet indicating the purpose of the submission and a detailed list of the contents. **You should also provide bookmarks for each of the major sections in the PDF document.** Unless otherwise noted by your section instructor, the submission should be uploaded to the designated location by 5pm on the due date and posted to your CPEP web site.

Note: An in-person review of your hardcopy notebook, with tabs separating the bookmarked sections, as part of an informal discussion of your findings may be requested by your section instructor. This format is intended to provide a design office simulation in both presentation and evaluation.

Structural Notebook Submission A Content Checklist:

General Requirements for Submission (5pts)

- ☐ Letter of Transmittal. Revise for each submission.
- ☐ A table of contents is provided. Expand for each submission.
- ☐ Number pages in document.
- ☐ PDF Bookmarks are provided. Expand for each submission.

General Information (5 pts)

- ☐ Building Abstract
- ☐ Executive Summary from Existing Conditions Report
- ☐ Site plan and location plan of your building.
- ☐ List of documents used in preparation of this report.

Gravity Loads (20 pts)

- ☐ Cross section of roof construction with calculation of typical roof bay loading, dead, live and snow in PSF. For live and snow load, identify the number noted for the design (if available) and compare to code minimum. (For example, in a steel building, the distributed dead load is comprised of roofing + insulation + deck + misc. DL that includes ceiling, lights, ductwork, etc.
- ☐ Cross section of floor construction with calculation of typical floor bay loading, dead and live in PSF. For live load, identify the number noted for the design (if available) and compare to code minimum.
- ☐ Cross-section of typical exterior wall detail with load path description and dead load.
- ☐ Listing or table of other non-typical dead and live floor and roof loads and locations, with justification for the values used.
- ☐ Snow load calculation, including drifting snow as appropriate to your project.

Wind Loads (35 pts)

- ☐ Determination and Summary of all factors used in calculating wind loads: topography, Exposure category, Occupancy Group, Importance Factors, Terrain factors, etc.
- ☐ Calculation of wind loads on entire building in two orthogonal directions. Additional wind load cases will be explored in Notebook Submission C.
- ☐ Calculation of wind load base shear.
- ☐ Graphic showing the wind pressure vs. height on the building and resulting base shear in each direction investigated.
- ☐ DO NOT distribute calculated wind loads horizontally to each element of the lateral force resisting system at this point. This will be completed as part of the upcoming Notebook Submission C assignment.

Seismic Loads (35 pts.)

- ☐ Determination of all factors used in calculating seismic loads: material, type of construction, type of lateral-force resisting system, approximate building period, building mass distribution.
- ☐ Calculation of seismic loads on entire building. (The dead loads used for this calculation should be clearly identified in the gravity load section above, including vertical elements and should include additional seismic mass loads as required by ASCE7-10. For steel buildings, do not use actual weights of each steel beam, instead estimate the weight of the steel per floor in PSF.)
- ☐ Calculation of seismic load base shear.
- ☐ Graphic showing the seismic loading vs. height on the building and resulting base shear at the base in each direction investigated.
- ☐ DO NOT distribute calculated seismic loads horizontally to each element of the lateral force resisting system at this point. This will be completed as part of the upcoming Notebook Submission C assignment.

Technical Grading Rubric for Technical Assignment #2 Name: _____
Structural Notebook Submission A

	Points					
Items:	**Excellent** All elements in the checklist have been included and descriptions and calculations are thorough and correct with little room for improvement.	**Good** Most or all elements in the checklist have been included and most descriptions and calculations are thorough and correct with some room for improvement as noted in the report.	**Fair** Several elements in the checklist are missing and/or several descriptions and calculations are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	**Poor** Many of the elements in the checklist are missing and/or many descriptions or calculations are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	Your points	
General Requirements for Submission	4.5-5	3.5-4.5	2.5-3.5	0-2.5		Out of 5
	General Comments:					
General Information Section	4.5-5	3.5-4.5	2.5-3.5	0-2.5		Out of 5
	General Comments:					
Gravity Loads Section	18-20	14-18	10-14	0-10		Out of 20
	General Comments:					
Wind Loads Section	31.5-35	24.5-31.5	17.5-24.5	0-17.5		Out of 35
	General Comments:					
Seismic Loads Section	31.5-35	24.5-31.5	17.5-24.5	0-17.5		Out of 35
	General Comments:					
Final Grade						Out of 100

Details for Assignment 3: Structural Notebook Submission B

Typical Member Spot Checks for Gravity Loads and Alternate Systems Typical Bay Design Study

Grade Weighting and Due Dates: See Syllabus for your section

This is the second of three technical notebook submissions that will comprise a comprehensive design evaluation of your building. Refer to the Overview document for the overall context of this submission, as it relates to the other technical assignments. The primary deliverable of the Structural Notebook submissions will be a notebook of well-organized calculations that examine some of the specified members in the existing design. Additionally, evaluation will include informal and formal presentations of your findings. This format is intended to provide a design office simulation in both presentation and evaluation.

As the title for this submission implies, this assignment has two primary goals.

The first goal is to evaluate several typical members in the existing design for gravity loads, including members in a typical floor bay. The gravity loads determined in Submission A should be used for this submission. To accomplish this goal, a typical floor bay should be selected for study. If the building does not have typical bays, discuss the selected bay with your section instructor. Once the typical bay is selected, evaluate the framing for gravity loads. For example, in a steel building, check the deck, beam and girder under gravity loads for strength and serviceability. For a two way slab, check the top and bottom reinforcement in the two directions for strength and serviceability under gravity loads. Additionally, at least two typical columns (one interior and one exterior) should be evaluated below the lowest framed floor for strength under gravity loads.

The second goal is to study and compare at least four different alternative gravity framing systems for your building (one must be the original system). When selecting the three alternatives, at least one must be a different framing material. In addition, no more than one system can be a variation of the same floor system (for example, changing beam spacing but keeping the same basic frame layout.) If possible, (this is important) select systems that have a reasonable chance of being considered as part of your end of the semester structural proposal. Design a bay of each of these systems for gravity loads and explore the advantages and disadvantages of each of these systems.

Deliverables: Notebook progress submission (75%) and oral PowerPoint presentation (25%), see content checklists below.

Notebook submissions are a PDF document of scanned pages from your notebook submitted to your section instructor for their review and comment. Submission B should expand Submission A by adding the new sections in the Checklist for Submission B. This submission should include a new Letter of Transmittal as a cover sheet indicating the purpose of the submission and a detailed list of the contents. The Transmittal should note sections added to Submission A and also note any changes/corrections made to the contents of Submission A. Unless otherwise noted by your section instructor, the submission should be uploaded to the location specified by your section instructor by 5pm on the due date and posted to your CPEP web site.

Oral presentations by each student will be given on the dates shown on the syllabus. The presentations should be 5-7 minutes and students are required to attend all presentations. Presentation slides (PowerPoint file) are due with the notebook submission and will be uploaded by the session instructor to a common drive. The order of presentations will be random. Additionally, the PowerPoint slides should be printed to PDF and posted on your CPEP web site.

Structural Notebook Submission B Content Checklist:

General Requirements for Submission

- ☐ Letter of Transmittal. Revise for each submission.
- ☐ A table of contents is provided. Expand for each submission.
- ☐ Number pages in document.
- ☐ PDF Bookmarks are provided. Expand for each submission.

General Information (From Submission A)

Gravity Loads (From Submission A)

Wind Loads (From Submission A)

Seismic Loads (From Submission A)

Typical Member Spot Checks for Gravity Loads (Submission B)

- ☐ Typical floor plan identifying bay being studied
- ☐ Evaluation of typical floor bay framing for gravity loads
- ☐ Evaluation of an interior and exterior column

Alternative Framing Systems for Gravity Loads (Submission B)

For 3 Systems:

(At least one alternate system must be a different material from other systems.)

- ☐ Make appropriate choices given the design conditions. If in doubt, discuss with your section instructor.
- ☐ Determine preliminary sizes of the framing members and slabs for the alternative framing systems. Be sure to show calculations that check strength, stress, and serviceability. Use computer programs and approximate methods as appropriate to save time. This is not intended to be an exhaustive analysis assignment. It is to be considered schematic/preliminary design so you can gather information for decisions.
- ☐ A sketch (hand drawn on grid paper is OK or CAD if you prefer) of the layout of each system labeled with typical sizes, dimensions, and appropriate notes (i.e. material strengths), etc.

Framing Systems Summary Comparison and Recommendations (Submission B)

- ☐ A summary comparison chart of features of the three systems (and a fourth listing which is that of the existing floor), including a category that indicates if the system has potential for more in depth investigation.
- ☐ Data used to substantiate non-structural features reported in the summary table (cost estimate calculations for each system, rated assembly description/section, etc.)

Submission B Presentation Content Checklist: (5 – 7 minutes)

- ☐ Introduce and generally describe your building, the existing structural system and the typical bay.
- ☐ Summarize the results of the spot checks of the existing system.
- ☐ Present a brief overview of each alternate system design and how they relate to your building. In addition to presenting preliminary typical bay framing sizes, you should describe a proposed lateral system and load path. Your description of each alternate should also include impact on things like fire protection and fire ratings, durability, weight, and cost. Note that we do not necessarily expect you to have all this information at this time but we do expect you to question everything and list it as a factor until proven otherwise.
- ☐ Make it clear in your overview of each alternate system if you feel the particular framing system is still viable for use in your building now that you have investigated it or if it should be eliminated from consideration, and why. Note: Opinion alone is not enough here. You need data to back up your decisions. Otherwise, you need to keep the system in the running.
- ☐ A summary comparison chart of features of the three systems (and a fourth listing which is that of the existing floor), including a category that indicates if the system has potential for more in depth investigation.

Technical Grading Rubric for Technical Assignment #3 Name: _____
Notebook Submission B

	Points					
Items:	**Excellent** All elements in the checklist have been included and descriptions and calculations are thorough and correct with little room for improvement.	**Good** Most or all elements in the checklist have been included and most descriptions and calculations are thorough and correct with some room for improvement as noted in the report.	**Fair** Several elements in the checklist are missing and/or several descriptions and calculations are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	**Poor** Many of the elements in the checklist are missing and/or many descriptions or calculations are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	Your points	
General Requirements for Submission	4.5-5	3.5-4.5	2.5-3.5	0-2.5		Out of 5
	General Comments:					
Existing System Checks	13.5-15	10.5-13.5	7.5-10.5	0-7.5		Out of 15
	General Comments:					
Alternate System 1	13.5-15	10.5-13.5	7.5-10.5	0-7.5		Out of 15
	General Comments:					
Alternate System 2	13.5-15	10.5-13.5	7.5-10.5	0-7.5		Out of 15
	General Comments:					
Alternate System 3	13.5-15	10.5-13.5	7.5-10.5	0-7.5		Out of 15
	General Comments:					
Framing Systems Summary: Comparison and Recommendations	9-10	7-9	5-7	0-5		Out of 10
	General Comments:					
Notebook Grade						Out of 75
Presentation Grade						Out of 25
Final Grade						Out of 100

Architectural Engineering Senior Thesis
Notebook Submission B
Presentation Evaluation Form

Fall 2016

Student Name: Length:

Presentation Content: Excellent; Good; Fair; Poor	
Presentation Skills: Excellent; Good; Fair; Poor	
Presentation Graphics: Excellent; Good; Fair; Poor	
Amount of Effort: Excellent; Good; Fair; Poor	
Tech 3 Presentation Grade (Out of 25)	
Some Additional Comments from Faculty:	

Note: This form will be used at the presentations to record feedback from all of the faculty in attendance. This feedback will be collated by the section instructor and given to the student In addition to the notebook grading rubric.

Details for Assignment 4: Structural Notebook Submission C Lateral System Analysis Study

Grade Weighting and Due Dates: See Syllabus for your section

This is the third of three technical notebook submissions that will comprise a comprehensive design evaluation of your building. Refer to the Overview document for the overall context of this assignment, as it relates to the other technical submissions. The primary deliverable of the structural notebook submission assignments will be a notebook of well-organized calculations that examine some of the specified members in the existing design. Additionally, evaluation will include informal and formal presentations of your findings. This format is intended to provide a design office simulation in both presentation and evaluation.

As the title implies, the primary goal of Notebook Submission C is to complete a lateral system analysis of your building. The primary question that should be answered: "is your lateral system adequate for the wind and seismic loads that you calculated in Submission A for strength and serviceability?" Most design offices use computer modeling to streamline analysis and speed up the overall project workflow and are looking for new graduates who are familiar with structural analysis software. Your Structural Notebook Submission C includes a computer modeling component to prepare you for this industry need. The purpose of your model is analyzing the *lateral system*, not the gravity system. The lateral load analysis should be comprised of computer analysis results and manual calculations that are presented in the Structural Notebook. There is extensive availability of structural modeling software available to students on AE laboratory computers (STAAD, RISA, SAP, RAM, ETABS, etc.). It is up to the student to select an appropriate modeling software and follow through with obtaining a working model. Keep in mind, computer modeling can be time consuming. **START YOUR MODEL EARLY!** A working model is essential to receiving a passing grade. Because each section instructor is proficient with different software programs and because students possess varied experiences with structural software through courses and internships, it is important for students to discuss their software choices with their section instructor before embarking on the development of a computer model to understand the level of assistance they might receive from their section instructor.

Deliverables: Notebook progress submission, see content Checklist below.
Notebook submissions are a PDF document of scanned pages from your notebook submitted to your section instructor for their review and comment. Each submission should include a Letter of Transmittal as a cover sheet indicating the purpose of the submission and a detailed list of the contents. **You should also provide bookmarks for each of the major sections in the PDF document.** Unless otherwise noted by your section instructor, the submission should be uploaded to the designated location by 5pm on the due date and posted to your CPEP web site.

Note: An in-person review of your hardcopy notebook, with tabs separating the bookmarked sections, as part of an informal discussion of your findings may be requested by your section instructor. Additionally, you may be requested to bring your computer modeling files to share with your consultant and/or to prepare animations of your modeled lateral system under controlling lateral load. This format is intended to provide a design office simulation in both presentation and evaluation.

Structural Notebook Submission C Content Checklist:

General Requirements for Submission

- ☐ Letter of Transmittal. Revise for each submission.
- ☐ A table of contents is provided. Expand for each submission.
- ☐ Number pages in document.
- ☐ PDF Bookmarks are provided. Expand for each submission.

General Information (From Submission A)
Gravity Loads (From Submission A)
Wind Loads (From Submission A)
Seismic Loads (From Submission A)
Typical Member Spot Checks for Gravity Loads (Submission B)
Alternative Framing Systems for Gravity Loads (Submission B)
Framing Systems Summary Comparison and Recommendations (Submission B)
Modeling Information for Lateral Load Analysis (Submission C)

- ☐ Typical floor plan identifying lateral resisting elements (frames, shear walls)
- ☐ Summary of modeling approach, including assumptions & limitations
- ☐ Choice of element/constraint types described: Floor diaphragm, Shear walls, Frame elements
- ☐ Boundary conditions
- ☐ Important factors are included; unimportant complicating factors are neglected

Model Validation (Submission C)

- ☐ Distribute lateral loads to individual frames and walls using clearly identified distribution method for both wind and seismic. Using a computer program as a "black box" is highly discouraged! Letting a computer model distribute the loads without any manual verification is unacceptable. The intent is to show the consultant that you understand how to distribute loads to individual frames and walls properly considering diaphragm type/configuration and type of lateral loading applied.
- ☐ Wind load comparison with loads calculated in Submission A
- ☐ Seismic load comparison with loads calculated in Submission A
- ☐ Incorporate overall building torsion issues as part of the design check.
- ☐ Comparison with member spot checks (below)
- ☐ Perform an equilibrium check at the base of the building or for some key element of your model under lateral loading.
- ☐ Appropriate computer generated output is submitted. We are more interested in your interpretation and summary of the analysis results than looking at bulk computer results. Support calculations should be neat and easy to follow, showing a logical thought progression.

Lateral System Checks (Submission C)

- ☐ Check strength, drift, story drift, stability, overturning, and impact on the foundations as appropriate, clearly indicating the controlling load combination for each condition.

- ☐ Compare drift values to allowable code or industry accepted values and comment on the results.
- ☐ Highlight any results that do not appear to match the existing building or that do not meet standard criteria for lateral systems. Explain why they might not match.

Member Spot Checks for Lateral Loads (Submission C)

- ☐ Typical floor plan and frame elevation (as appropriate) identifying lateral resisting elements that are being studied
- ☐ Find forces on important elements of lateral force-resisting system; verify sizes. Note: for braced frames and moment frames, evaluate all associated members at a story level, not just one member. For buildings with multiple lateral systems, spot check each type of lateral force resisting element (i.e., shear wall, braced frame, moment frame).
- ☐ Evaluation of wind and earthquake load cases on chosen element.
- ☐ Verification of element size(s) for lateral force resistance. Using a computer program as a "black box" is highly discouraged! Letting a computer do all of the member checks with no manual verification is unacceptable.
- ☐ Highlight any results that do not appear to match the existing building or that do not meet standard design criteria. Provide explanation for any discrepancies.

Technical Grading Rubric for Technical Assignment #4 Name: _____

Notebook Submission C

	Points					
Items:	**Excellent** All elements in the checklist have been included and descriptions and calculations are thorough and correct with little room for improvement.	**Good** Most or all elements in the checklist have been included and most descriptions and calculations are thorough and correct with some room for improvement as noted in the report.	**Fair** Several elements in the checklist are missing and/or several descriptions and calculations are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	**Poor** Many of the elements in the checklist are missing and/or many descriptions or calculations are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	Your points	
General Requirements for Submission	4.5-5	3.5-4.5	2.5-3.5	0-2.5		Out of 5
	General Comments:					
Evidence of a Working Computer Model	13.5-15	10.5-13.5	7.5-10.5	0-7.5		Out of 30
	General Comments:					
Modeling Information for Lateral Load Analysis	13.5-15	10.5-13.5	7.5-10.5	0-7.5		Out of 15
	General Comments:					
Model Validation	13.5-15	10.5-13.5	7.5-10.5	0-7.5		Out of 20
	General Comments:					
Lateral System Checks	13.5-15	10.5-13.5	7.5-10.5	0-7.5		Out of 15
	General Comments:					
Member Spot Checks for Lateral Loads	9-10	7-9	5-7	0-5		Out of 15
	General Comments:					
Notebook Grade						Out of 100

Senior Thesis Program
Department of Architectural Engineering
Pennsylvania State University
University Park, PA

Structural Existing Conditions Report and Proposal

Grade Weighting and Due Dates: See Syllabus for your section

This assignment combines a revised existing conditions report with new sections that comprise a proposal that describes your intentions for your Senior Project Investigation (thesis) to be conducted in the Spring Semester. It should read as a single narrative report and replace the original Structural Existing Conditions report on the student's CPEP page. In general, the proposal sections should address a rational structural design alternative for your building and the proposed method of solution for the design alternative. Additionally, every the proposal must contain a minimum of two breadth investigations. Finally, students enrolled in the MAE version of Senior Project (AE 897G) must include a description of how they will satisfy the MAE requirements.

Deliverables: A narrative report submitted in two forms, WORD and PDF. To highlight the changes made to the original submission, the original WORD document from Assignment 1 should be modified, **with the tracking function on**, to include corrections in the original submission and expanded to include proposal sections. Additionally, the WORD document should be printed to PDF with only the final corrected document showing ("No markups" in the drop down box). Unless otherwise noted by your section instructor, the submission should be uploaded to the designated location by 5pm on the due date and posted to your CPEP web site.

Evaluation: The report should, above all else, demonstrate that you are becoming competent to practice as a structural engineer. The more correctly, clearly and succinctly this is demonstrated, the better the grade. Thoroughly and correctly completing all items in the checklist by taking the consultant through what you understand about the building, its original design, and the proposed alternative provides the best opportunity for a good grade. Clarity and quality in writing is also essential.

The proposal portion of this report will be graded on a 100 point scale with the technical quality of the report comprising 60% and the writing quality comprising 40%. A grading rubric, used by the structural faculty to review this report, has been made available. You are encouraged to review the rubric prior to completing this report.

Structural Existing Conditions and Proposal Checklist:

- ☐ Cover page, including your name, option, name of your primary AE faculty Consultant (section instructor), building name, building location, date of submission, title of report.
- ☐ Executive summary – This section will need to be revised from Assignment 1 to include information added in the proposal section of the report. An executive summary is a stand-alone document. It should provide the information given in the body of the document, without requiring the reader to leaf through the full document! The only difference between the summary and the body of the report is that fewer details are furnished in the summary.

Don't say: Proposals are then given as to what I will be concentrating on for the coming semester

Say: The proposed thesis will include an investigation of a steel rigid frame structure, a steel frame with reinforced concrete masonry shear walls, and a monolithic cast in place reinforced concrete rigid frame structure.

- ☐ Table of contents (expanded to include new sections)
- ☐ Introduction, including purpose. This section will need to be modified from that submitted in assignment 1. Remember, the executive summary is not an introduction. Do not refer to it as part of your introduction. The report should be able to stand alone as a document. The contents should not rely on the assignment description to have purpose. Introduce the scope and purpose of the report.
- ☐ Existing Conditions: insert your revised Structural Existing Conditions Report. These sections will be graded as part of Assignment #1, thus resulting in a maximum of 10 extra points (out of 100) added to the original Technical Assignment 1 grade.
- ☐ Background: A sufficient discussion of the existing building, including its structural design, to put the rational design alternative into context.
- ☐ Problem Statement including Structural Design Alternative/Solution: A detailed statement of the structural design alternative, including a justification for the choice. All proposals should focus on a design alternative with a purpose. In your case, you can recognize a problem with the existing design, or a problem that faced the designers of the original system. Similarly, your design alternative can relax a design constraint that restricted certain options. Additionally, you can propose a learning or financial goal. Probably the most important component of the proposal is a clear, concise statement of the problem or goal that you are proposing to address. In general, most proposed design alternatives must address a complete redesign of both the gravity and lateral systems. Provide some preliminary details, typical member sizes, etc., about your design alternative. Results from Notebook submission B often provide some support for your choices. Finally, **it is a good idea for all students to consult with their instructor about their proposal ideas prior to submission.**
- ☐ Methods to be used and/or research to be conducted: This section will demonstrate whether you are qualified to solve the problem or achieve the goal you have presented. The reader must be provided with detailed, specific information on the proposed method of solving the problem you have outlined. This section will include a discussion both analysis and design methods. If computer programs are to be used, discuss how the inputs will be prepared and how the outputs will be presented.

    Don't say: I will use spSLAB to determine reinforcement in the flat slab system.

    Say: The design of the flat slab system will be based on Chapter 13 of ACI 318-11 Building Code Requirements for Reinforced Concrete, Equivalent Frame Method. Analysis for gravity loads will be completed on the computer program spSLAB, an implementation of the Equivalent Frame Method. Trial sizes, as outlined above will be input into the computer program. Live load patterns, including full live load on all spans, full and half live load on adjacent spans, and 75% full load and no load on adjacent spans will be investigated....
- ☐ Tasks and tools to be used: In this section, provide the reader with further evidence of your qualifications to solve the problem by showing detailed understanding of all steps necessary to arrive at a satisfactory solution. This section will also lay the groundwork

for the timetable that follows by identifying and elaborating the items that will be shown on the schedule. This section is best kept in outline form.

Example:

I. Concrete Beam and Two Way Slab Alternative

Task 1. Establish trial member sizes

a) Determine beam sizes based on ceiling height requirements and ACI 318-95 Table 9.5(a). Determine whether detailed deflection calculations will be necessary

b) Establish slab thickness by ACI 318-95; Section 9.5.3.3

c) Determine most economical balance between beam and slab thickness based on costs in Means Building Construction Cost Data

Task 2. Determine floor loads

a) Find self-weight based on member sizes from Task 1

b) Find superimposed dead loads based on building plans

c) Find live loads on the basis of BOCA National Building Code; Table 1606

d) Find wind loads based on BOCA National Building Code; Section 1609

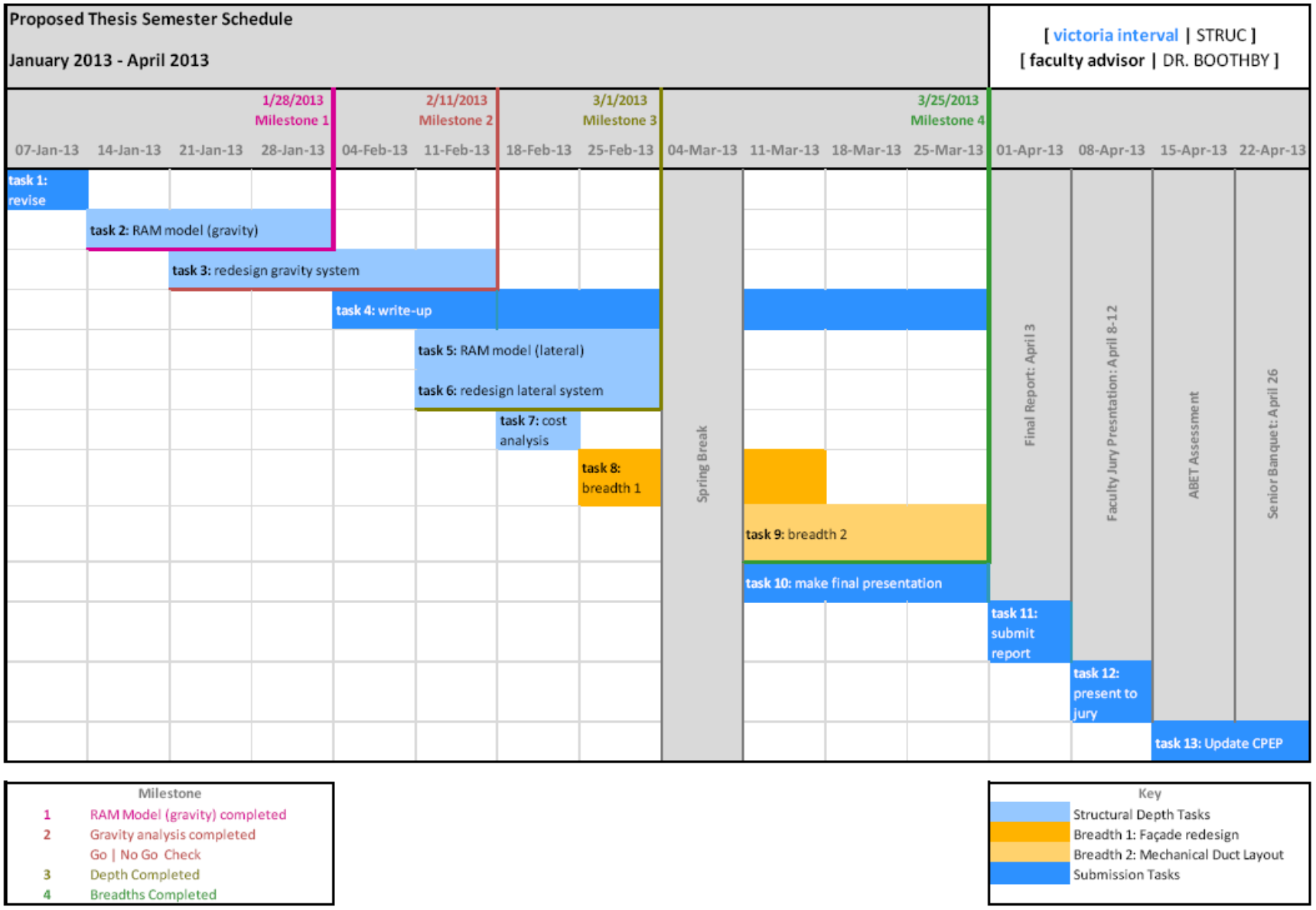
Task 3. Complete initial frame analysis

etc.

- ☐ Schedule to be followed clearly indicating anticipated project milestones: Using the task numbers assigned above, develop a week by week summary of the remaining semester and target dates for the completion of each of the tasks discussed above. This should be presented in graphic form, as a bar chart, a flow chart, or a calendar with benchmark dates. See example timeline attached.
- ☐ Description of breadth topics to be studied, minimum of two: See the Breadth Proposal Ideas for CM, LE, ME linked on the Senior Thesis Web Site: http://www.engr.psu.edu/ae/thesis/course.htm
- ☐ Discussion of meeting MAE requirements (if applicable): Provide a section describing how graduate level coursework will be incorporated into your work. This section only applies to students registered for AE 897G in the Spring.
- ☐ Discussion of Honor's requirements (if applicable): If your report from your work in the Spring will be utilized to satisfy the Honor's thesis requirement, the statement as to how you will satisfy the Honor's College requirements be incorporated into the proposal.
- ☐ Concluding remarks
- ☐ References and appendices, as necessary.

Other Items

- ☐ Document submitted to section instructor using Microsoft WORD using tracking.
- ☐ Document printed to PDF and posted on CPEP page AND submitted to section instructor.
- ☐ Number Pages for ease of reference by consultants in their comments.
- ☐ Refer to and label Figures similar to a textbook. (Note that all figures, charts, sketches and photographs should be labeled, numbered and addressed in the body of the report text. It is recommended that you call all of these items "Figures" so that they can be successively numbered for convenience and organization purposes. Remember to properly cite all images that you did not generate.)
- ☐ Each section of the report should have a purpose defined. (For example, sections that include general information like codes, and materials, etc. should be introduced as having purpose in the remainder of the report or future calculations.)


Proposed Thesis Semester Schedule
January 2013 - April 2013
[victoria interval | STRUC]
[faculty advisor | DR. BOOTHBY]
1/28/2013 Milestone 1
2/11/2013 Milestone 2
3/1/2013 Milestone 3
3/25/2013 Milestone 4
07-Jan-13
14-Jan-13
21-Jan-13
28-Jan-13
04-Feb-13
11-Feb-13
18-Feb-13
25-Feb-13
04-Mar-13
11-Mar-13
18-Mar-13
25-Mar-13
01-Apr-13
08-Apr-13
15-Apr-13
22-Apr-13
task 1: revise
task 2: RAM model (gravity)
task 3: redesign gravity system
task 4: write-up
task 5: RAM model (lateral)
task 6: redesign lateral system
task 7: cost analysis
task 8: breadth 1
Spring Break
task 9: breadth 2
task 10: make final presentation
task 11: submit report
task 12: present to jury
task 13: Update CPEP
Final Report: April 3
Faculty Jury Presntation: April 8-12
ABET Assessment
Senior Banquet: April 26
Milestone
1 RAM Model (gravity) completed
2 Gravity analysis completed
Go | No Go Check
3 Depth Completed
4 Breadths Completed
Key
Structural Depth Tasks
Breadth 1: Façade redesign
Breadth 2: Mechanical Duct Layout
Submission Tasks

Technical Grading Rubric for Technical Assignment #5: Name: _____

	Points					
Items:	**Excellent** All elements in the checklist have been included and descriptions are thorough and correct with little room for improvement.	**Good** Most or all elements in the checklist have been included and most descriptions are thorough and correct with some room for improvement as noted in the report.	**Fair** Several elements in the checklist are missing and/or several descriptions are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	**Poor** Many of the elements in the checklist are missing and/or many descriptions are not thorough and/or not correct leaving considerable room for improvement as noted in the report.	Your points	
Executive Summary	4.5-5	3.5-4.5	2.5-3.5	0-2.5		Out of 5
Introduction	4.5-5	3.5-4.5	2.5-3.5	0-2.5		Out of 5
	General Comments:					
Background, problem statement/alternative, methods to be used	9-10	7-9	5-7	0-5		Out of 30
	General Comments:					
Tasks and Schedule	36-40	28-36	0-28	0-20		Out of 15
	General Comments:					
Breadth, MAE, Honors, Closing and Appendices	9-10	7-9	5-7	0-5		Out of 5
	General Comments:					
Technical Grade Subtotal	53-60	42-53	30-42	0-30		Out of 60
Writing Grade Subtotal (see separate page)	36-40	28-36	20-28	0-20		Out of 40
Final Grade						Out of 100

Note: Revised Sections from the Structural Existing Conditions report will be graded as part of Assignment 1.

AE 481W – Writing Evaluation Rubric for Existing Conditions Report – 40% of Report Grade

( ) = Points	Excellent	Good	Fair	Poor	Points
Professional Appearance, Presentation, Documentation and Following Instructions (8)	Work product is of the highest quality. Makes frequent and excellent use of graphics, charts, photographs, etc., all of which are labeled as figures. All figures and tables are numbered, titled and referenced in the text. Report contains numbered pages, table of contents, and well organized and documented Appendices (as appropriate). Hand calculations are neatly prepared and easy to read and follow. Report heading or cover page contains all information noted in Thesis report format requirements. (7-8)	Work product is well prepared and presented and, with a few exceptions, would be well received in the AEC profession. Makes effective use of all types of figures and tables which are connected or referenced in the report. Report is organized with proper headings, table of contents, and numbered pages. Appendix is provided and adequately documented. Most hand calculations are neatly prepared and most information is easy to follow. (6-7)	Work product is average or inconsistent. Not likely acceptable in professional environment. May contain problems such as infrequent use of figures and tables, excessive description of items that can be covered by photos and graphics. Report may contain missing or poorly prepared items such as headings, table of contents, and Appendices. Example: Report may be printed in B&W but it references colored lines in a figure. Print quality is below average containing streaks, faded sections etc. Hand calculations need improvement in readability, organization, and completeness. (5-6)	Work product is of very low quality and would be rejected or frowned upon in a professional environment. Few figures and tables are used and are often not linked or discussed in the text. Many items such as headings, subsection titles, table of contents, figures, photographs, etc. are missing or not well executed in some fashion. Graphics and charts may be present in some areas but are poorly executed, sloppy, and hard to read or follow. (0-5)	(0-8)
Organization and Flow of Report (8)	Information is presented in a logical, interesting sequence. Organization and structure are very evident. Major categories of the report are divided into sub-sections that are connected with logically clear transitions between topics. Conclusions are effectively supported by the content of the report. Executive summary information matches the report conclusions and concisely captures the key elements of the study. (7-8)	Information presented in a logical sequence. Organization and structure are clear. Major points are separated into paragraphs and signaled by transitions. Paragraphs are built on related sentences that logically develop. Content is supportive of the conclusions. Executive summary is clearly stated. (6-7)	Organization and structure are mostly clear, but the reader may have some difficulty following the line of thought in a number of areas. Major points are separated into paragraphs and most sections are logically developed and documented. Minor digressions exist but do not overly detract from the overall flow of the report. Conclusions are somewhat vague and/or are not fully supported by the report documentation or calculations. Documentation may be hard to follow or find relative to specific sections or conclusion in the report. (5-6)	Sequence of information is generally difficult to follow. Organization and structure often must be inferred. Few major points are set off by paragraphs or subsections or connected by orderly transitions. Report contains few logically connected points. Major digressions exist. Conclusions are ineffective or misleading. Reports in this category often contain Executive Summaries (if present) that are essentially copies of the stated assignment in lieu of actual results and conclusions. (0-5)	(0-8)
Grammar and Style (24)	Full variety of sentence structures used correctly. Minimal use of sentences that begin with "The". Word choice is varied, interesting, and accurate and contributes to an understanding of the report. Few, if any, spelling errors. (22-24)	Variety of sentence structures used correctly despite an occasional flaw. Avoids excessive use of "The" to start sentences. Accurate and varied word choice. Only minor errors in sentence construction, usage, grammar, or mechanics. Minimal spelling mistakes. (19-22)	Predictable sentence and word choice, often with much use of passive voice. Occasional errors in sentence structure, usage and mechanics. Confusing or convoluted sentences. May include frequent use of sentences starting with "The". May include a number of spelling errors and/or word misuse. (15-19)	Errors in sentence structure, usage and mechanics sometimes interfere with the writer's ability to communicate the purpose. Writing is frequently not understandable. May include excessive use of sentences starting with "The". Reports often contain frequent spelling problems. (0-15)	(0-24)
Total (40)					