

CM 4900 SENIOR CAPSTONE STUDENT HANDBOOK

CONSTRUCTION MANAGEMENT DEPARTMENT
SOUTHERN POLYTECHNIC STATE UNIVERSITY
MARIETTA, GEORGIA

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Plan Approval Request

Minimum Requirements Checklists

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Capstone Notebook Table of Contents

B.S. CONSTRUCTION MANAGEMENT PROGRAM SOUTHERN POLYTECHNIC STATE UNIVERSITY SENIOR CAPSTONE

1.0 Course Administration for ALL Capstone Students

- 1.1 Turn in Project Proposals with plans and specifications on or before first class meeting to the Course Professor for approval.
- 1.2 The Capstone Project Lab is reserved for the use of CM 4900 students during scheduled class time and whenever the room is not otherwise scheduled. Other CM students may use the lab at the Capstone Professor's discretion.
- 1.3 Lab class time attendance is to be two continuous hours per class-day in the time period of scheduled class time. Timesheet/work logs for the previous week shall be electronically delivered.
- 1.4 The Project is due according to the schedule issued by the professor and dates indicated at the beginning of this Handbook. Capstone projects will not be accepted early unless scheduled by the course professor.
- 1.5 Project Defenses will be scheduled for the end of the semester as indicated by the syllabus. Senior Exit interviews with the Program Head will be scheduled for that afternoon. These are two different appointments: one with the Capstone Defense panel, one with the Program Head. Students shall confirm with the CM Department Secretary that they have properly entered their information on the Alumni system.
- 1.6 This course is comparable to industry employment. Attendance is presumed. A professional atmosphere of courtesy and cooperation is expected. Attendance at presentations and guest lectures are required.
- 1.7 Final grading for the Capstone Course will be determined by the Course Professor based on Defense Panel assessment and professionalism.
- 1.8 A one-hour "firm meeting" time is scheduled for the first hour of the first class meeting of the term. Firm meetings will be held in subsequent weeks at the discretion of the Course Professor--The schedule for these meetings, and milestone requirements, will be established during the first firm meeting or by syllabus. Students are expected to prepare a schedule that establishes milestones leading to the successful completion of the Capstone project in one semester. Student schedules are due by the second meeting of the semester. This latter schedule will be reviewed for acceptability by the Course Professor and used to assess student progress throughout the semester. The schedule must comply with the "Capstone Statement of Understanding".
- 1.9 Absence from required class meeting will only be considered with *prior* notice to

Professor.

- 1.10 The MS Excel timesheet workbook is to be kept current daily, completed fully and accurately, and transmitted on the day of the week and by the time specified by the Course Professor.
- 1.11 No food, no drinks, no cooking appliances, nor radios are permitted in the Capstone Project Laboratory. NO TOBACCO PRODUCTS, including chewing tobacco, are permitted in the Lab. You may use the CD feature of the computers with earphones for music.
- 1.12 The CM faculty feels strongly that the interaction between seniors working on their projects and shared knowledge leads to the development of better projects by each and every student in the class. This experience is uniquely designed to provide the opportunity for professional interaction of the participants in an automated construction office atmosphere. Up-to-date equipment; similar project work goals; adequate workspace; and, most importantly, a group of well-educated (soon to be practicing) professionals interacting in an office "team" setting are important elements of the course.
- 1.13 Faculty supervision should not be expected but is always available during class meeting times.
- 1.14 Do not change the "desktop" settings on the laboratory computers. Do not install any software/shareware on the laboratory computers. Do not put personal passwords on any program. You are not the exclusive users of the laboratory. Computers are subject to complete re-formatting by the Department at any time so you should maintain backup copies of your work.
- 1.15 Prior term Capstone projects are available for reference. They will be available for review during class times only and may not be removed from the capstone lab. Do NOT take papers from these project books.
- 1.16 Students are required to sign a contract with the instructor to meet all milestones established by the instructor for the semester within the deadlines announced in the syllabus or they will not be able to defend their project and receive a passing grade.
- 1.17 Each student is required to prepare a detailed time management schedule showing their plan for completing their Capstone Project. The minimum requirement checklist can be used as a guide in developing this schedule. If a student misses one milestone, that student will be put on "Probation" and must show adequate recovery by the following meeting (i.e., meet all required milestones). If recovery is not accomplished by the following week, the course professor may give the student a failing grade for the semester.
- 1.18 Students are not allowed to use projects they have worked or are currently working on at their jobs for capstone project.

2.0 General Guidelines for ALL Capstone Students

- 2.1 Academic honesty & integrity are vitally important to your successful completion of this Course. Students are expected to be very familiar with what constitutes plagiarism. Evidence of plagiarism in the Capstone Project may result in a grade of "F" and further disciplinary action.
- 2.2 Each student shall be neat, thorough, and original. Only clean copies of documents are acceptable.
- 2.3 **EACH STUDENT SHOULD HAVE SOMEONE PROOFREAD THE PROJECT FOR SPELLING, TYPING AND LOGIC ERRORS. A PROFESSIONAL QUALITY PRESENTATION IS EXPECTED!**
- 2.4 Each student should use a binder and include your name and semester on the cover sheet.
- 2.5 Each student must do his/her own work. Cooperation with fellow students, exchange of ideas and discussion of problems is encouraged; however, be careful not to be misled by a fellow student. Each student is encouraged to consult with members of the CM faculty when appropriate. Information may be gained from contractors, architects, suppliers, building officials, or anyone associated with the construction industry. The best sources for information should be those who are associated with your project. Include with your project, extra work that is of interest to you. Enhance your total project; for example, photographs and tailored digital video may add to the quality of the presentation. **Materials from prior capstone projects or directly from industry employers are not to be included in your project.**
- 2.6 Drawings and specifications may NOT be returned to the student at the end of the Capstone Defense.
- 2.7 Any proposal for changing the scope of the Student's project shall be submitted to the Course Professor for approval within the first ten calendar days of the semester.
- 2.8 Keys and security information for the capstone laboratory can be obtained from the Department Secretary at the beginning of the semester. They must be returned by on the date of Project Defenses. Failure to return keys will result in a grade of "Incomplete, (I)".
- 2.9 Students should plan to turn in an original of your project on the due date. At the Defense your original project may be kept by the Department, so you may want to prepare and keep a copy of the project for your records. *An electronic copy of your project must also be submitted on the day of project defenses.*
- 2.10 Each student shall maintain a "timecard and work log" for each day worked keeping track of office (and other) time and briefly indicating activities done by the student during office or other hours. Completed and signed timecards are to be included as part of the project.

- 2.11 The published minimum requirements must be submitted in order to receive a passing grade. Failure to fulfill a minimum requirement may be allowed by the Course Professor in rare cases. Both the request for and approval of deviation must be in writing.
- 2.12 Typed (word-processed) Projects are required; however, professional quality lettering is permissible in some parts of the Capstone Project. Quantity take-off sheets do not need to be typed. Any questions concerning the quality of your lettering may be resolved by checking with the Course Professor.
- 2.13 Organization of the Project is important. It must be in a logical order. The Projects are read and evaluated by several people in the brief time between due date and Project Defense. The degree of professionalism and legibility of your Capstone Project is a significant factor in the evaluation of your project. A Table of Contents and the Minimum Requirements Checklist are required.

2.14.0 **Basic Assumptions:**

- 2.14.1 All major equipment is rented.
- 2.14.2 All utilities are available. (exception for 'development' project)
- 2.14.3 No site access difficulties exist. (except as shown in 'development' projects)
- 2.14.4 Unless stated to the contrary in the contract documents, there is no rock on the site.
- 2.14.5 No difficulty will occur with any government authorities.
- 2.14.6 No union unrest will occur.
- 2.14.7 Your company is over 5 years old.

2.15.0 **Scheduling Considerations:**

- 2.15.1 All construction activities shall be shown at a level of detail appropriate to the type of construction.
- 2.15.2 The total number of activities shall be appropriate to size and complexity of the project being constructed.
- 2.15.3 All activities shall be coded so as to allow different displays of information for various project management and owner personnel.
- 2.15.4 Supplemental information showing activity floats and derivation of activity duration shall be provided.
- 2.15.5 Schedule calculations shall allow for holidays, weather, and alternates as appropriate. Recommended drawing size is size C (17"x22"); all schedules shall be

neatly folded and included in the project books.

2.16.0 Quantity Survey & Estimate Guidelines.

2.16.1 Quantity Sheets, Cost Analysis Sheets, and Summary Sheets may be designed by the student. It is advisable to have them reviewed by the Course Professor.

2.16.2 All quantity calculation sheets may be completed in pencil, but must be neat and legible. All estimating work should be self-explanatory.

2.16.3 Published cost data may be used for developing the material and labor prices; however, on major items students are encouraged to check the prices with the actual sub or supplier prices. All published cost data must reflect Project locale.

2.17.0 Business & Project Management Considerations.

2.17.1 All documents included in the Project shall be completed with all blank spaces filled in as appropriate. All documents shall be properly signed and sealed.

2.17.2 The organizational structure and company overhead should match with the Project size. Appropriate management principles shall be used in staffing the organization.

2.17.3 The financial statements for your organization shall be issued by the professor within the first two weeks of the academic term. Adjustments may be made by the student to match company profile.

2.17.4 Ensure consistency when assigning dates for your project. You may need to change bid date or data dates for your company financials to be consistent. You can do this by addenda to the contract documents or by statement in your list of assumptions. Company data dates, cash flow, contract execution, bid date, subcontract execution, change-order examples should be consistent with each other.

2.17.5 Prepare a narrative that describes how your company plans to minimize the project's impact on the environment (e.g. air, water, energy, soil, noise, etc.), and community.

2.18 Capstone Project Defense and Panels

2.18.1 Your Capstone Project is graded by panel members, with the chairperson presiding.

2.18.2 The final grade in the course is determined subsequent to the Project defense. The panel grade is submitted to the Course Professor who, considering your performance throughout the semester, assigns the final grade.

2.19 When the final Project is received by the Course Professor, the student shall show the Professor, or the Professor's designee, each item listed on the minimum requirements list. If minimum requirements have not been met, the student may receive an "I" for the course, as determined by the Course Professor for further action.

- 2.20 Once the student shows the course professor that the minimum requirements have been met, the student will be given contact information for his/her Capstone Panelists. The student is then responsible for transporting their own Capstone Project between Panelists as directed by the Capstone Professor. Each panel member will prepare questions (referencing the Project page number) to ask each student during the Capstone Defense.
- 2.21 Students should arrive early for their Defense dressed in professional attire: a business suit or sport coat & tie or dress, as appropriate.
- 2.22 Project Defenses shall commence promptly. The chairperson will introduce the panel members and the student. The student will brief the panel on the Project. The members of the panel will then take turns asking questions at the direction of the chairperson. At the end of the defense, the student will be excused. The panel will confer.
- 2.23 Panels may determine the grade for each student at the end of each defense or, after all defenses are complete, at the discretion of the panel chairperson. In the event of any disagreement about the grade the chairperson shall make the final determination. The chairperson of each panel will fill out the assessment form and submit.

3.0 Capstone Project Requirements General Concentration

3.1 General Requirements: The Capstone Project must be realistic. All assumptions should be reasonable. For example, most General Contractors subcontract much of the work. All work to be subcontracted should be estimated, totaled and marked-up as if done by a subcontractor. This can be done on the regular Cost Sheets and Summary Sheets under the Subcontractor's name. The marked-up price is entered under "Sub" on your Summary Sheet.

3.2 Oral Presentation: The student should have a presentation of approximately fifteen minutes prepared using PowerPoint and, optionally, presentation boards. The presentation will be of professional quality. Contractors/owners are required to convince clients, lenders, and public officials of the viability of their projects. This requires excellent presentation skills. The students should demonstrate that he or she has acquired these skills by beginning the Capstone Defense with the presentation. Copies of presentation slides should be included in the Capstone Binder.

3.3 Administrative Submittals: This section should include the following: Plan Request (approval) Time Cards Daily Activity Log Minimum Requirements Checklist with page numbers and all other administrative requirements set out in the Capstone Project Student Handbook

3.4 Table of Contents: Identified by the "tab" section with page numbers of the items included in each section.

3.5 Executive Summary: should be written to articulate what you want the reader to conclude after reading the rest of your submittal. An Executive Summary is the most important part of the submittal; should focus on the conclusion you want the evaluator to reach and not on summarizing everything in your proposal.

The student should provide a one or two page (maximum) summary at the beginning of the report that provides the significant findings of the student's research, analysis and compilation of material. The following should be included:

- Describe the project in terms of use, location, size and any other features that the reader needs as part of the executive summary to envision the project.
- Scope, objectives, and limiting conditions of report: Describe what is covered by the report, the purpose of the report and list the objectives to be achieved in the study.
- Summary of significant points; list all of the major findings.
- State the conclusion you have reached as to the pricing, scheduling, and profitability of this project from a contractor's or construction manager's perspective.

3.6 Business Organization and Financials

The student should focus on the organization of the firm, which may or may not include the following divisions: preconstruction, interiors, and project management. If these divisions are not part of the company, then a narrative explanation should be provided as to how the services are to be provided to the project. This section should also include a discussion of non-employee team members that are required to carry out the project

including their roles, duties and responsibilities. Among these are attorney, bankers, general contractors, developers, owners, building inspectors, engineer, architect, and environmental consultant. The ownership vehicle for the company should be described (L.L.C., S Corp., Inc., partnership, etc.) and the management control structure and decision making authority for the project should be detailed.

The balance sheets and income statements of the hypothetical company provided shall be analyzed to show a complete picture of the financial health of the company. Annual comparisons with industry standards shall be part of this analysis. Further, the estimate and proposal for the Capstone Project shall reflect the financial and cost structure of the hypothetical company. As part of the analysis of the hypothetical company, a narrative shall be provided which describes the present state of the company, the trends underway at the end of the last given year, and a financial and strategic plan of action for the next three years for the company.

- Organizational chart that reflects all key figures/departments in the company. State why this form of organization was chosen and describe the benefits and limitations of the chosen form.
- Listing of the major duties and responsibilities of each key employee.
- Professional Resumes of key personnel and should be brief (one half page each) but should cover the work and education qualifications of each key individual.
- Describe the projects completed (or currently underway) by the company and set out any strong capabilities that the organization has developed. If there is a strong specialty of the organization, bring that out.
- List of consultants for project Provide a complete listing of the consultants to be used and describe the services to be provided.
- Company financial statements past (example will be provided) and future projections (three years). Statements are to be consistent with industry standards. Balance Sheet, Income Statement, and Cash flow to include a detailed explanation of G&A is required including how it is recovered.
- Ratio Analysis and Trend Analysis on the company's operation should be provided to include a narrative that explains trends.

3.7 Corporate Strategy and Planning - This section should include at least the following:

- Company Size – (volume and number of projects per year) Identify key criteria such as project size, field overhead, location, other overhead, profit margin, etc. Any factor that will be considered in the decision to pursue projects should be listed and explained.
- Location of Project State the location of the project. How many states does your company work and why? Scope of Project? What does your company intend to self-perform and what was the rationale for selecting what scope of work to self-perform?
- Project Acquisition: Describe the strategy used to acquire the project. What percentage was won through a hard bidding process? Was the contract negotiated? Was the contract a public bid? Explain which type of contract (i.e., negotiated or competitive bid) your

company prefers and why?

- Source(s) of capital Describe how loans were structured (amounts, terms, costs, guarantees, etc.) and the sources of financing. Provide a detailed analysis of the minimum project loan desired for your capstone project.
- Bonding: What is the bonding capacity of your company and how was it determined? Was and what types of bond(s) are required for the project?
- Provide a corporate schedule in bar chart format for the next three years showing when projects will start and when they will be completed.

3.8 Construction Cost Estimate

- Included in the Capstone Project must be detailed estimates covering all work required for General Conditions, Sitework, Concrete, and Masonry. Show calculations and totals (include all work for quantity take-offs).
- All detailed estimates will be taken-off and priced using "bare" costs. Mark-up, taxes, labor burden, etc. will be applied on Summary Sheets. Crew breakdown plus labor and equipment rates will be developed and included. include a schedule of wage rates.
- All other subcontracted work will be taken-off in sufficient detail to permit costing by either "unit" or "assemblies" approach. You should ensure that the final subcontractor cost includes all appropriate subcontractor mark-up prior to entering totals on the Summary Sheet. The appropriate units of measure should be shown for each item (square foot, linear foot, etc.) along with the quantity and unit costs of each. These are totaled and other costs are added (permits, fees, indirect costs, overhead, profit, etc.) to arrive at the cost estimate of the project.
- Any unit prices or alternates required by the Bid Form shall be estimated separately and must include mark-up. Contract change orders shall also include mark-up.
- Be sure to include the following: General and Administrative expense allocation Cost Analyses for GC and Subcontractor Work Cost Summary and Bid Preparation Detailed take-off for General Conditions, Sitework, Concrete, and Masonry including material (quantity and price) and labor (hours and price)
- Provide a square-foot estimate cost for all other areas of scope. (MEP, Finishes, etc.)

3.9 Project Contract

- This section shall include a fully-executed standard contract between a GC or CM and an owner. Discuss the sections that pertain to contract dollar amount, payment schedule, final payment, start date, completion data, liquidated damages, termination, and extra work. Also, execute a Change Order and fully detail the scope (obtain prior CO approval from Professor).

- Include a fully-executed standard contract between your company and one of the subcontractors you intend to use on your project

3.10 Project Financials

- A monthly cash flow projection should be provided for the project separate from the corporate cash flow. This should include billing, retainage, amount received, amount paid to subcontractors, and general and administrative expenses. Provide three consecutive pay applications.
- Use the project schedule to estimate to prepare three (3) monthly draw requests, beginning with the first month of the project and ending with the third month of the project. Also, use the schedule and estimate to prepare a project cash flow projection. Assume on-time project and payments.

3.11 Site Utilization Plan: This section should include the following: Provide a three separate drawings and corresponding narrative descriptions of the site utilization plan. Illustrate on your drawing and explain in your narrative, the anticipated use of the site at the beginning, middle, and last part of the project. Include, *as a minimum*, temporary roads, barricades, field office(s), parking, dumpster, entrance/exit, fencing, lay-down and staging areas, and a crane.

3.12 Regulatory Issues: A complete discussion of permits required for your project should be provided. This should include building, demolition, and all forms of environmental permits. If special consideration for noise and dust control is required by the project or its location, this should be discussed along with planned mitigation. The licensing requirements, if any, for contractor employees should be discussed. The following should be covered: regulatory requirements, permits and approvals; prepare and include in your presentation all necessary permit applications and other legally required documentation and approvals required of contractors in the city or county in which it is located. (If the project is located outside the Atlanta Metro area, you may substitute forms from any urban building authority in the Atlanta area except Cobb County or the City of Marietta).

3.13 Subcontractor Selection and Bids: include any subcontractor employed by the contractor (MEP, etc.). You will develop and provide subcontractor selection criteria, a bid invitation and instructions to bidders, a bid form, and all required bond forms.

3.14 Project Start-up and Schedule

- The construction project team should be discussed in a narrative to include the role played by the general contractor, owner, architect, design engineers, and subcontractors. General construction issues should be discussed (such as site utilization plan (staging), safety program, etc.). Discuss the contractor's role and duties in providing oversight of the construction process (such as administering applications of payment to the owner/developer, providing for periodic inspections of work in progress, managing budget issues, additional work items, etc.).
- Develop and provide a job startup checklist for the project that lists specific tasks and

to whom those tasks are assigned. Include all requirements imposed by local building authorities, all elements necessary for efficient conduct of the project and the requirements imposed by contract.

- Schedule (Keep in mind that presentation is as important as logic-Readability = Credibility) Provide a CPM schedule showing sequence of construction. This diagram shall be displayed in such a way so that the overall sequence of construction is easily determined. The schedule shall show activities in ES/EF order as a minimum. Activities shown on the schedule shall also include submittal and procurement activities for key material items and owner-provided items. Training, inspections, and commissioning activities must also be reflected on the schedule.

3.15 Risk Management

- Identify all liability issues to be managed
- Insurance Analysis: The insurance requirements for the project should be discussed. This should include (but not necessarily be limited to) liability, all risk or other forms of property/building insurance, builder's risk, unemployment insurance and auto property and casualty.
- Amounts and types if insurance required should be stated
- Limited Environmental Assessment
- Develop a job site specific program safety including inspections and rules. Include a narrative that identifies safety precautions unique to this project. **Boilerplate safety programs will be considered unresponsive to this requirement.**
- Provide any other risk management issue relevant to the project

3.16 Environmental Protection Plan: Prepare a narrative that explains the measures that will be taken to protect any significant and unique environmental features of the project site (creeks, streams, trees, wildlife, etc.).

3.17 Conclusions and Recommendations

The student should provide a conclusion section at the end of the report that identifies all findings and conclusions relative to your project including profit and length of project schedule. Also include a statement of evaluation and recommendations for the capstone course that is a constructive critique.

3.18 References

- Provide all references in appropriate format (i.e., MLA or APA).
- Professional Interview: Students are required to interview at least one industry professional with over 10-years of experience with commercial construction project management. Questions asked during the interview by the student, and the answers provided. A narrative shall be prepared by the student, detailing how the interview results influenced the preparation of the student's Capstone Project.

4.0 Capstone Project Requirements Development Concentration

4.1 Oral Presentation: The student should have a presentation of approximately fifteen minutes prepared using PowerPoint and, optionally, presentation boards. The presentation should be of near professional quality. Developers are required to convince investors, lenders and public officials of the viability of their projects. This requires excellent presentation skills. The students should demonstrate that he or she has acquired these skills by beginning the Capstone Panel with the presentation. Copies of presentation slides should be included in the Capstone Binder.

4.2 Administrative Submittals: Administrative Submittals: This section should include the following: Plan Request (approval), Time Cards Daily Activity Log, Minimum Requirements Checklist with page numbers, and all other administrative requirements set out in the Capstone Project Student Handbook

4.3 Table of Contents: Identified by the “tab” section with page numbers of the items included in each section.

4.4 Executive Summary: should be written to articulate what you want the reader to conclude after reading the rest of your submittal. An Executive Summary is the most important part of the submittal and should focus on the conclusion you want the evaluator to reach and not on summarizing everything in your proposal.

The student should provide an executive summary at the beginning of the report that sets out, in paragraph form, the salient findings of the student’s research, analysis and compilation of material. The following should be included:

- Describe the project in terms of use, location, size and any other features that the reader needs as part of the executive summary to envision what is being proposed.
- Describe what is covered by the report, the purpose of the report and list the objectives to be achieved in the study.
- List all of the major findings that have led to the conclusion.
- State the conclusion you have reached as to the viability of the project and set out your recommendations in terms of timing, pricing, product mix, etc.

4.5 Company Organization and Financials

The student should focus on the organization of the developer’s firm, which may or may not include the following divisions: development, construction, leasing, property management and brokerage. If these divisions are not part of the developer’s organization, then a narrative explanation should be provided as to how the services are to be provided to the project. This section should also include a discussion of non-employee team members that are required to carry out the project including their roles, duties and responsibilities. Among these are attorney, appraiser, property manager, leasing agent, real estate broker, land planner, engineer, architect,

construction manager and environmental consultant. The ownership vehicle for the project should be described (L.L.C., C Corp., REIT, general partnership, limited partnership, etc.) and the management control structure and decision making authority for the project during the entire period of the developer's ownership should be set out. The section should include the following:

- Company Organizational chart that reflects all key figures/departments in the company as well as the legal form of the organization (sole proprietor, general or limited partnership, REIT, LLC, C- Corp. etc.). State why this form of organization was chosen and describe the benefits and limitations of the chosen form for your purpose.
- Overall project organizational chart that reflects all key figures/key consultants associated with the project.
- Listing of the major duties and responsibilities of each key company employees.
- Professional resumes of key personnel and should be brief (one half page each) but should cover the work and education qualifications of each key individual.
- Describe the projects completed (or currently underway) by the company and set out any particular strengths that the organization has developed. List of consultants for project
- Describe the services to be provided by each consultant as well as their method of compensation.
- Company financial statement is to be consistent with industry standards.
- Principal's personal financial statement is to be consistent with industry standards.
- Company balance sheet is to be consistent with industry standards. Company 3-year income and expense statement or budget projection statement is to be consistent with industry standards.
- Ratio analysis on the development company's operation should be provided in standard format.

4.6 Site Acquisition and Pre-development Planning

- Selection criteria: Set out key criteria such as parcel size range, yield of units per acre, location, zoning, etc., etc. Any factor that will be considered in the decision to purchase the site should be listed and explained.
- Location: State the location of the site and provide a location map. Describe the ownership of the site and how is (or was) acquired. Is (was) an assemblage required?
- Boundary survey: Provide a reduced copy (11x17 fold-out) of the boundary survey in the document that graphically describes the shape and size of the parcel.
- Legal description: Provide a traditional ALTA legal description of the site as an appendix and reference the appendix number in this section.
- Purchase strategy/technique: Describe the strategy used to acquire the site. Was an assemblage required? Was a purchase money mortgage utilized? Was the site acquired directly by your firm or through a nominee? What were the contingencies that had to be met before your firm was required to close? How much time was available to you under

the contract to complete due diligence? This is not a complete listing of items to be covered. You should provide all information that is relevant to your situation.

- Source(s) of capital: Describe how loans were structured (amounts, terms, costs, guarantees, etc.) and the sources of financing for acquisition, development, construction and permanent loans. Set out the amounts and sources of equity capital and how acquired. If the developer's operating capital is used, the amounts and timing of application should be consistent with the company financials. If investor's capital is used, set out the parameters of the investment agreement(s) (timing for return of capital, returns and profit sharing).
- Pre-development budget: A pre-development budget should be provided to reflect the cost of acquisitions, rezoning, land planning, market analysis, architectural and engineering design, legal fees, etc. The predevelopment activities that are required before construction can commence should be discussed.

4.7 Site analysis and proposed master plan:

Provide a complete site analysis to include parcel size and configuration, any existing site improvements, ownership, current and past site uses, hazardous waste, access and traffic patterns at the site, zoning and rezoning requirements, aerial photo of the site, vegetation map, topographical map and slope analysis, drainage map and analysis, flood plain map, soils map and table, view inventory map and keyed photos, neighborhood zoning map and explanatory table, adjacent property land use map and key, neighborhood land use map and key, utilities map and utilities availability and table, neighborhood transportation map, site opportunities map, site constraints map, conceptual land use plan and schematic land use plan.

A narrative explanation of each of the above should be provided and the opportunities and constraints of the site should be discussed relative to the proposed conceptual and schematic plans. Since the typical Capstone Project is based on a development for which plans already exist, the student should prepare the above work as if these plans did not exist. The work, however, may be in support of this final set of plans from which the student is preparing the cost estimate. This should be the student's work and not copies of work previously prepared by a land planner as the basis for the final set of plans.

Provide a schematic master plan containing a development program (mix, density/yield, phasing, etc.) in a tabular format somewhere on the plan.

Prepare a development program summary table that reflects the units to be built, by type, size, etc. and the timing of the unit construction, the acreage allocated to each use category and the corresponding yields/densities.

4.8 Site Engineering and Construction Plans

- Site plan: Provide a narrative description of the site plan along with a reduced version of the drawing in the report document.
- Grading plan: Describe the important factors in the grading plan and how the plan is to be carried out. (rock and soil problems affecting the plan, high water table and

dewatering requirements, grading order or phases, steps, environmental issues addressed, etc).

- Erosion and sediment control plan: Set out the salient features of the plan to include methods used, phasing relative to grading and construction, special problems encountered and how addressed, etc.
 - Storm water management plan: Describe the storm water management infrastructure to be installed and discuss the approach taken; underground-hard pipe solution, surface swales, retention and detention ponds, combination of the above, etc. If part of the infrastructure was utilized as desirable design features (open space, ponds, etc) describe the approach used. Discuss phasing issues as appropriate.
 - Landscaping and tree preservation plan: discuss species used, placement, measures taken to preserve trees, etc.
 - Water and sewer plans: discuss materials used and construction issues to be encountered.
 - Street design: describe the type of street design, materials selected and why chosen.
- Building plans
- Describe the buildings to be constructed in terms of architecture, materials, sizes, unusual structural or mechanical features, etc.
 - Provide pre-development schedule to reflect the pre-development phase from site search through final regulatory approval of site civil engineering and architectural drawings (should correspond to the income and expense data reflected in the Performa).

4.9 Regulatory Issues

A complete discussion of permits required should be provided. This should include the following types of permits: building, demolition, clearing and grading, and all forms of environmental permits. If wetlands, endangered species, hazardous waste or any other environmental issues exist at the site, they should be discussed and a strategy for dealing with them should be set out. If special consideration for noise and dust control is required by the project or its location, this should be discussed along with planned mitigation.

The process for subdivision approval should be described for the political jurisdiction in question. A chart of the steps should be provided and the expected time requirements for each step and the process as a whole should be stated. Licensing requirements, if any, for developer's employees should be discussed (real estate broker, securities, etc.)

4.10 Development and Construction Cost Estimates:

The site cost estimate should include a cut and fill analysis prepared by the student using the grid method (the use of computer methods are to be discussed and approved by instructor) and should include the grid and table showing each calculation and totals. The cost estimate for the site grading and infrastructure should reflect labor, materials, equipment, overhead, etc. While the student may submit bid sheets as backup for the detailed cost estimate, costs should not be pulled from bid sheets as the basis of the estimate.

The building cost estimate should be a unit cost estimate (assemblies of work packages) that breaks the building down into components (assemblies) and estimates them separately. The type of project will determine the makeup of each assembly. Examples would be “linear feet of footing,” “square feet of poured foundation wall area,” etc. The appropriate units of measure should be shown for each assembly (square foot, linear foot, etc.) along with the quantity and unit costs of each. These are totaled and other costs are added (permits, fees, indirect costs, overhead, profit, etc.) to arrive at the cost estimate of the building.

Note: care must be taken in adding profit to the cost estimate. If the developer is acting as general contractor (GC) and taking a profit or fee for that service or is using a general contractor, then profit should be added. However, if the developer is acting as his own GC and using his own equity capital then you may elect to omit the profit as a cost item. The profit will, therefore, be reflected as an increase in the return calculations for the project as a whole. The student should explain the selected option and the reason for it.

If more than one building is included, the additional buildings can be estimated by way of a square foot estimate (preliminary estimate) taken from the unit cost estimate and adjusted by adding or subtracting differences in components (basement vs. no basement) to arrive at a cost estimate for additional buildings.

This section should also provide budgets for the following items and a tabular summary of all project costs should be prepared:

- Design costs
- Other soft costs (marketing, financing costs, etc)
- Permitting fees
- Site development cost estimate
- Building(s) cost estimate
- Land costs (including acquisition and financing costs)
- Forecast of project costs (land, hard construction costs, soft costs)

4.11 Market Analysis:

- Metropolitan area economic overview: provide an overview of the metropolitan area within which the project is to be developed. This should include an analysis of factors and conclusions as to how each of these impacts the feasibility of the project, location of the site, population, employment, housing, income, transportation, directions of growth and land use patterns and factors relative to the specific market within which the project will compete (office, single family homes, etc.)
- Neighborhood area economic overview: provide an overview of the neighborhood within which the project is to be developed. This should include an analysis of the following factors and conclusions as to how each of these impact the feasibility of the project:

location, population, employment, housing, income, transportation, directions of growth, land use patterns and quality of services (schools, etc) as well as any other factors that will affect the projects feasibility, such as property taxes, crime, etc.

- Market analysis: Definition of market area and map showing boundaries should be provided. An analysis of the following should also be provided: competitive properties, future supply/construction trends and demand for the development. The demand analysis should be documented with appropriate demographics and psychographics and should conclude with an absorption schedule for the project. The total demand for the market area should be projected and the capture rate of the project should be stated and supported by the data presented. Pricing of units should be clearly demonstrated from the market data. Comparables and their photographs should be provided. The market analysis should develop a conclusion that outlines the product type(s) and their applicable absorption schedule.

4.12 Project Financials and Pro Forma

A cash flow projection should be provided on the project. This should include a calculation of internal rate of return, project value, equity value and project net present value. It should be based on the absorption schedule derived from the student's market analysis. Include a discussion of the financing required for the project: land acquisition, development, construction and permanent loans. The sequencing and relationship of each loan to the other should be discussed. The amounts and terms of each loan should be stated and reflected in the cash flow analysis. For simplicity, the student may elect to assume a package loan for the acquisition, development and construction phases together. Permanent financing must be handled as a separate loan. The sources of equity capital should be reiterated. This section should include the following:

- Sources and amounts of equity capital: Financing sources and terms (acquisition, development, construction and permanent loans)
- Source and uses of funds budget: where did capital come from and how was it applied?
- Value schedule used for development and construction loan draws
- Forecasted operating statement (for a completed income producing commercial property)
- Cash flow projection (from pre-development through eventual sale of property) Profit analysis and return calculations
- Discounting to arrive at PV and NPV as well as IRR calculation

4.13 Construction and Project Management – discuss the following topics related to hiring the general contractor for the project:

- General contractor selection criteria (including safety program)
- Bid invitation and instructions to bidders
- Bid form and proposed fee

- Bonding requirements

The construction project team should be discussed to include the role played by the Developer (owner/principal who may or may not also be serving as his own general contractor) as well as subcontractors employed and by whom, construction manager (if applicable), etc.

The duties of the civil engineer, surveyor, site manager, and other consultants during construction should be stated. General construction issues should be discussed (such as site utilization plan (staging), safety program, etc.). Discuss the Developer's role and duties in providing oversight of the construction process (such as administering applications of payment by general contractor, providing for periodic inspections of work in progress, managing budget issues, additional work items, etc.).

If the selected property is a subdivision, builder selection criteria and restrictions placed on product and work activities should be addressed. It is to be remembered that the developer is the principal/owner who is managing the GC (or construction manager as the case may be) as well as consultants and builders selected to build in the subdivision (if that is the case).

Contractual fee arrangements with the general contractor, construction manager, architect, engineer, surveyor, etc. should be set out. In general, explain what the Developer's action plan is for carrying out the construction process. A budget for the construction phase of the project should be provided and should be consistent with, but in less detail than, the site and building estimates. A construction schedule (master schedule) should be provided for the installation of subdivision infrastructure (if applicable) and for the construction of buildings. If more than one building is to be constructed (residential subdivision for example), each building should be reflected separately on the master schedule.

4.14 Marketing and Property Management

Sales or leasing plan: The manner in which the project is to be marketed should be discussed. Develop and provide a marketing plan that covers sales and leasing personnel, a marketing budget and description of advertising and promotion to be used. A schedule of projected leasing or sales should be provided and a discussion of how the schedule is derived from the market analysis should also be provided.

Property management plan: The manner in which the property is to be managed should be discussed. The student should include a summary property management plan that covers the management organization (third party fee manager or in-house), management fees, management agreement contract, maintenance and capital improvements, management reports, insurance and legal, life-safety and environmental issues.

4.15 Legal Issues

If the project units are to be sold, then the proposed sales contract should be provided and discussed, including which cost will be borne by seller and buyer should be set out. If a broker is to be used in sales, this should be covered and a listing form should be provided and discussed.

Commission rates for sales and leases should be stated. If the property is to be leased, then the lease form should be provided and discussed and any cost to be borne by the landlord should be stated. The managing agent agreement should be provided and discussed for those projects that will require property management. Additionally, the following areas should be addressed and examples provided as applicable:

- Legal forms and documents required (construction and design related contracts, purchase and sale agreements, brokerage and sale agreements)
- Legal issues to be addressed
- Declaration of restrictions, easements, liens and covenants
- Associations (e.g. homeowners, merchants, etc.)
- Construction guidelines
- Architectural design guidelines

4.16 Risk Management

- Identify all liability issues to be managed
- Insurance Analysis: The insurance requirements for the project should be discussed. This should include (but not necessarily be limited to) liability, all risk or other forms of property/building insurance, builder's risk, unemployment insurance and auto property and casualty.
- Amounts and types if insurance required should be stated
- Identify/discuss types of environmental assessments required
- Provide any other risk management issue relevant to the project

4.17 Conclusions and Recommendation The student should provide a conclusion section at the end of the report that sets out findings and conclusion relative to the areas below. In short, a clear statement should be provided as to whether the project should be undertaken and why or why not based on the following considerations:

- Viability of proposed design
- Profit and rate(s) of return
- Proposed product characteristics, mix and quantity
- Projected market absorption
- Property management issues
- Miscellaneous legal/regulatory issues

Also include a statement of evaluation and recommendations for the capstone course that is a

constructive critique.

4.18 References

- References should be given in appropriate format (i.e., MLA or APA).
- Professional Interview: Students are required to interview at least one industry professional with over 10-years of experience in real estate development. Questions asked during the interview by the student, and the answers provided. A narrative shall be prepared by the student, detailing how the interview results influenced the preparation of the student's Capstone Project.

5.0 Capstone Project Requirements Specialty Concentration

5.1 Oral Presentation: The student should have a presentation of approximately fifteen minutes prepared using PowerPoint and, optionally, presentation boards. The presentation will be of professional quality. Contractors/owners are required to convince clients, lenders, and public officials of the viability of their projects. This requires excellent presentation skills. The students should demonstrate that he or she has acquired these skills by beginning the Capstone Defense with the presentation. Copies of presentation slides should be included in the Capstone Binder.

5.2 Administrative Submittals: This section should include the following: Plan Request (approval) Time Cards Daily Activity Log Minimum Requirements Checklist with page numbers and all other administrative requirements set out in the Capstone Project Student Handbook

5.3 Table of Contents: Identified by the “tab” section with page numbers of the items included in each section.

5.4 Executive Summary: be written to articulate what you want the reader to conclude after reading the rest of your submittal. An Executive Summary is the most important part of the submittal; should focus on the conclusion you want the evaluator to reach and not on summarizing everything in your proposal.

The student should provide a one or two page (maximum) summary at the beginning of the report that provides the significant findings of the student’s research, analysis and compilation of material. The following should be included:

- Describe the project in terms of use, location, size and any other features that the reader needs as part of the executive summary to envision the project.
- Scope, objectives, and limiting conditions of report: Describe what is covered by the report, the purpose of the report and list the objectives to be achieved in the study.
- Summary of significant points; list all of the major findings.
- State the conclusion you have reached as to the pricing, scheduling, and profitability of this project from a contractor’s or construction manager’s perspective.

5.5 Business Organization and Financials

The student should focus on the organization of the specialty firm, which may or may not include the following divisions: project management, fabrication, installation, and maintenance. If these divisions are not part of the specialty company, then a narrative explanation should be provided as to how the services are to be provided to the project.

This section should also include a discussion of non-employee team members that are required to carry out the project including their roles, duties and responsibilities. Among these are attorney, bankers, general contractors, developers, owners, building inspectors, engineer, architect, and

environmental consultant. The ownership vehicle for the company should be described (L.L.C., S Corp., Inc., partnership, etc.) and the management control structure and decision making authority for the project should be detailed. The section should include the following:

- Organizational chart and legal form Provide an organizational chart that reflects all key figures/departments in the company and state the legal form of the organization (sole proprietor, general or limited partnership, REIT, LLC, C- Corp. etc.). State why this form of organization was chosen and describe the benefits and limitations of the chosen form for your purpose.
- Organizational chart that reflects all key figures/departments in the company. State why this form of organization was chosen and describe the benefits and limitations of the chosen form.
- Listing of the major duties and responsibilities of each key employee.
- Professional Resumes of key personnel and should be brief (one half page each) but should cover the work and education qualifications of each key individual.
- Describe the projects completed (or currently underway) by the company and set out any strong capabilities that the organization has developed. If there is a strong specialty of the organization, bring that out.
- List of consultants for project Provide a complete listing of the consultants to be used and describe the services to be provided and the method of compensation.
- Company financial statement is to be consistent with industry standards.
- Principal's personal financial statement is to be consistent with industry standards.
- Company balance sheet is to be consistent with industry standards. Company 3-year income and expense statement or budget projection statement is to be consistent with industry standards.
- Scope of Projects: Will your company be providing all MEP subcontracted work? Explain which MEP functions will be provided and why they were selected by your company.
- Project Acquisition: Describe the strategy used to acquire the projects. What percentage was won through a hard bidding process? What percentage was negotiated? What percentage was design/build? Were any other methods employed? Which method does your company prefer and why?
- Source(s) of capital: Describe how loans were structured (amounts, terms, costs, guarantees, etc.) and the sources of financing. Provide a detailed analysis of the minimum project loan desired for your capstone project.
- Bonding: What is the bonding capacity of your company and how was it determined? Was a bond required for the project?
- Provide a corporate schedule (bar chart) for the next three years showing when projects will start and when they will be completed.

5.7 Specialty and Construction Cost Estimates

The specialty cost estimate should include all specialty areas (HVAC, plumbing, and electrical—including control systems). Show calculations and totals (include scratch papers used for the takeoff). The cost estimate for the specialty should reflect labor, materials, equipment, overhead, etc. While the student may submit bid sheets as backup for the detailed cost estimate, costs should not be pulled from bid sheets as the basis of the estimate.

The remainder of the building cost estimate may be a square foot cost estimate. The appropriate units of measure should be shown for each item (square foot, linear foot, etc.) along with the quantity and unit costs of each. These are totaled and other costs are added (permits, fees, indirect costs, overhead, profit, etc.) to arrive at the cost estimate of the project. Note: Care must be taken in adding profit to the cost estimate. If the specialty contractor is acting as the prime contractor (PC) and taking a profit or fee for that service it should be noted and explained in detail.

Include:

- Plan and Specification take-off for building specialty systems including material quantity and prices and labor hours and price.
- Square-foot estimate for the remainder of the project.
- General and Administrative expense allocation. Estimate summary sheet showing markup etc.

5.8 Analysis of the Building Specialty Systems

- Provide a detailed list of all codes that apply to the specialty systems for this project.
- Conservation and Energy Efficiency: Is the building in your project LEED certified? If not what changes in the MEP systems would you recommend that might contribute to a minimum LEED certification?
- Plumbing: provide an overview of the installation and operation of the building's plumbing systems. This should include an estimate of water usage and the size of the required sewage system. What sizes and types of materials are used in the building piping systems and why? Are any unusual plumbing materials or equipment used on this project? Explain why they were used. Explain how the construction of this system is integrated into the overall construction project.
- HVAC: Provide an overview of the installation and operation of the building's air conditioning systems (heating, cooling, dehumidification, humidification, and ventilation). This should include an estimate of cooling capacity and demand. What sizes and types of materials are used in the building air conditioning systems and why? Are any unusual/interesting air conditioning materials or equipment used on this project? Explain why they were used. Explain how the construction of this system is integrated into the overall construction project.
- Electrical Provide an overview of the installation and operation of the building's electrical systems (power, lighting, and energy management). This should include an

estimate of electrical usage and demand. Explain the control strategy for the air conditioning and lighting systems. What sizes and types of materials are used in the building electrical systems and why? Are any unusual/interesting electrical materials or equipment used on this project? Explain why they were used. Explain how the construction of these systems is integrated into the overall construction project.

5.9 Project Contracts

Provide an executed contract that is used for agreements between the general contractor and the specialty contractor. Discuss the sections that pertain to contract dollar amount, payment schedule, final payment, start date, completion data, liquidated damages and extra work.

Provide an executed contract that is used for agreements between the specialty contractor and a subcontractor. Discuss the sections that pertain to contract dollar amount, payment schedule, final payment, start date, completion data, liquidated damages and extra work.

5.10 Project Financials

- A monthly cash flow projection should be provided for the project separate from the corporate cash flow. This should include billing, retainage, amount received, amount paid to subcontractors, and general and administrative expenses. Provide three consecutive pay applications.
- Use the project schedule to estimate to prepare three (3) monthly draw requests, beginning with the first month of the project and ending with the third month of the project. Also, use the schedule and estimate to prepare a project cash flow projection. Assume on-time project and payments.

5.11 Specialty Engineering and Construction Plans

Site plans: Provide a narrative description of the site plan and how the MEP services are provided to the site and building.

Mechanical plans: Highlight the location of the major mechanical systems (air conditioning, ventilation, waste interceptors, hot water heaters, etc.)

Electrical plans: Highlight the location of the major electrical systems (transformers, main electrical distribution panel and sub-panels, energy management).

5.12 Regulatory Issues

A complete discussion of permits required for your project should be provided. This should include building, demolition, and all forms of environmental permits. If special consideration for noise and dust control is required by the project or its location, this should be discussed along with planned mitigation. The licensing requirements, if any, for contractor employees should be discussed. The following should be covered: regulatory requirements, permits and approvals;

prepare and include in your presentation all necessary permit applications and other legally required documentation and approvals required of contractors in the city or county in which it is located. (If the project is located outside the Atlanta Metro area, you may substitute forms from any urban building authority in the Atlanta area except Cobb County or the City of Marietta).

5.13 Subcontractor Selection and Bids: includes any subcontractor employed by the MEP contractor (controls, etc.). You will develop and provide subcontractor selection criteria, a bid invitation and instructions to bidders, a bid form, and all required bond forms.

5.14 Construction and Project Management

The construction project team should be discussed to include the role played by the Specialty contractor as well as the general contractor, owner, architect, design engineers, and other subcontractors. General construction issues should be discussed (such as site utilization plan (staging), safety program, etc.). Discuss the Specialty contractor's role and duties in providing oversight of the construction process (such as administering applications of payment to the general contractor, providing for periodic inspections of work in progress, managing budget issues, additional work items, etc.).

5.15 Project Schedule

- A schedule for the entire project (summary overall schedule)
- A detailed schedule for the MEP portion of the project
- An explanation of how the MEP portions of the project will be integrated into the overall project schedule.
- An explanation of how the MEP work might influence the critical path of the entire project schedule.

5.16 Risk Management

- Identify all liability issues to be managed
- Insurance Analysis: The insurance requirements for the project should be discussed. This should include (but not necessarily be limited to) liability, all risk or other forms of property/building insurance, builder's risk, unemployment insurance and auto property and casualty.
- Amounts and types if insurance required should be stated
- Limited Environmental Assessment
- Develop a job site specific program safety including inspections and rules. Include a narrative that identifies safety precautions unique to this project. **Boilerplate safety programs will be considered unresponsive to this requirement.**
- Provide any other risk management issue relevant to the project

5.17 Conclusions and Recommendations The student should provide a conclusion section at the end of the report that identifies all findings and conclusions relative to your project including profit, length of project schedule, MEP schedule, and energy conservation issues. In addition, a clear statement should be provided as to whether the project should be undertaken and why or why not. Also include a statement of evaluation and recommendations for the capstone course that is a constructive critique.

5.18 References

- References should be given in appropriate format (i.e., MLA or APA).
- Professional Interview: Students are required to interview at least one industry professional with over 10-years of experience in HVAC, electrical, or plumbing. Questions asked during the interview by the student, and the answers provided. A narrative shall be prepared by the student, detailing how the interview results influenced the preparation of the student's Capstone Project.

6.0 CAPSTONE - SIGN OFF EXPECTATIONS

(Subject to change with notice)

If you have specific questions concerning the following, you are to communicate directly with the faculty member that will be signing off for each requirement.

| | |
|--|---|
| Contracts 50% | <ul style="list-style-type: none"> ▪ Determination of your Project Delivery method and the appropriate contract type ▪ Reviewed draft of agreement between Owner & Contractor (general and development) ▪ Reviewed draft of agreement between Contractor and MEP (specialty) ▪ Reviewed draft of General conditions (all) ▪ Reviewed draft of agreement between subcontractor and contractor (general) ▪ Reviewed draft of agreement between a design professional and developer (development) ▪ Reviewed draft of agreement between MEP and a subcontractor (specialty) ▪ Contractor or subcontractor Selection criteria (all) ▪ Bid invitation and instructions (all) ▪ Example of Bid form (all) ▪ Draft of Payment/Performance Bond, Bid Bond, and any other bonding requirements as specified |
| Estimate 75% | <ul style="list-style-type: none"> ▪ Required detailed quantity take-offs completed (all concentrations) ▪ Pricing for at least sitework/concrete/masonry (general) ▪ Pricing for at least HVAC/plumbing/control systems (specialty) ▪ Cut-fill analysis, site development take-offs & costs (development) ▪ Detailed line items for general conditions identified (listed) ▪ Preliminary total budget (to assist in creating preliminary project financials) |
| Company Organization & Financials 30% & 75% | <p>30% - company financials complete 75% - project financials substantially complete</p> <ul style="list-style-type: none"> ▪ Organization chart, legal form of business, resumes and responsibilities of key personnel, qualification statement, ▪ personal financial statement ▪ company financials of assets & liabilities (1 year past (2008); current year (2009) 1 year future (2010)) ▪ Preliminary company balance sheet (assets, liabilities, owner's equity) |

-
- Preliminary cash flow projection
 - Sources/amounts of equity capital (development)
 - Financing sources and terms (development)
 - Preliminary master budget (development)
-

Safety
75%

- You are the PM/Superintendent of about \$1-\$2 Million project. The safety manual is very important for you and your company to prevent accidents and also to reduce OSHA penalties and citations.
 - In your safety manual, you may need to incorporate all the required elements so that employee of your company and sub contractors can find the information regarding your project safety when it is needed.
 - Provide a final draft: Site/project specific safety manual; you may need to include the following:
 - Company Goal and Mission
 - Project Goal and Scope
 - Site manager's (superintendents, PMs and safety officers) responsibilities (who will be responsible for your project safety, whom he/she is going to report, how)
 - Employee responsibilities and participations
 - Accident investigations, record keeping and reporting (log 300, 301 and 301 A)
 - New hire policy and orientation
 - Training and tool box meeting
 - Alcohol and Drug abuse policy
 - Safety hazard analysis
 - Safety budget
 - Sub contractor coordination
 - Job Start-up
 - Safety incentives and disincentives
 - Emergency plans
 - Material Safety Data Sheet (MSDS) and so on.
 - You may need to incorporate most of the important subparts such as fall, excavation, fire, PPE, Tools, electrical, house keeping, cranes, equipments, confined space and so on.
 - Most importantly, the manual should **be your own works** rather than copying from other sources.
-

Schedule
75%

- List all activities
 - Finalize the activity durations
 - Prepare list of activities and their durations using scheduling software
 - Assign successors and predecessors and prepare the schedule using scheduling software
 - Determine the critical path
 - Create WBS and group the activities using WBS.
 - Include at least two milestones
-

**Senior Capstone PPROJECT APPROVAL REQUEST
CM 4900**

This form is to be submitted with the drawings and specifications to the Course Professor or Designee.

Term / Year of Capstone Project: _____ Student Name: _____

Date submitted for review & approval: _____ Date on Plans: _____

Exact title on plans: _____

Location of Building--State: _____ City: _____

PLEASE Check The Appropriate Box Below to Indicate Your Concentration & Complete Section:

GENERAL Concentration -BS Construction

Anticipated Cost of Project (It is recommended that the project shall cost between \$850,000 and \$2,500,000. Use actual bid amounts or an A/E's or GC's estimate) \$ _____

DEVELOPMENT Concentration -BS Construction

Anticipated Cost of Project may be significantly higher than suggested above. Scope of capstone project work should include infrastructure development (complete), and amenities (possibly including model) meeting the minimum finish area requirements below.

For **SPECIALTY** Concentration -BS Construction

Anticipated Cost of Project (It is recommended that the project shall cost between \$850,000 and \$2,500,000. Approximately 40% of the Total Project Cost shall be for MEP Systems. Use the actual bid amount or an A/E's or GC's estimate)

\$ _____

For All Projects: In general, warehouses, pre-engineered "Butler" type buildings, renovations, and tenant build-out are not appropriate for the Capstone Project. Usually such projects will not be approved. A minimum floor area of 3500 s.f. must include finished floors, ceilings and partition walls.

Student Checklist to be Completed Prior to Submission:

Does the Project include concrete form work design? (General Only) _____

Does the Project include earthwork (cut and fill)? _____

Are the Specifications adequate for a detailed estimate? _____

Do the Drawings include Site, Architectural, Structural, Mechanical, Electrical, and Plumbing? _____

Remarks or Addenda with this submittal: _____

FACULTY REVIEW:

Date: _____

_____ ACCEPTABLE _____ UNACCEPTABLE (see comments) _____ ACCEPTABLE AS NOTED

Course Professor Signature: _____

Comment: _____

Minimum Requirements CHECKLIST – GENERAL

√ = complete

n/a = not applicable (note: if n/a you must identify reason in comment section)

| √ | Page Number | Item | Comment |
|---|-------------|---|---------|
| | | Oral Presentation slides | |
| | | Title page | |
| | | Letter of Submittal | |
| | | Project Approval Request (signed original) | |
| | | Time Cards / Daily Activity Log | |
| | | Page numbers on all pages | |
| | | Table of contents (complete with page numbers) | |
| | | Executive summary | |
| | | Organization chart and legal form of business | |
| | | Responsibilities of key personnel | |
| | | Resumes of key personnel including principal | |
| | | Company size and qualifications | |
| | | List of consultants for project | |
| | | Discussion of non-employee team | |
| | | Company financial statement | |
| | | Personal financial statement | |
| | | Company balance sheet | |
| | | Company projected 3-year income and expense statement | |
| | | Ratio and trend analysis | |
| | | Project acquisition | |
| | | Source(s) of capital | |
| | | Bonding | |
| | | Schedule of all projects | |
| | | Cost Summary and Bid Preparation | |
| | | Cost Analysis for GC Work | |

| | | | |
|--|--|---|--|
| | | Cost Analysis for Subcontractor Work | |
| | | Take-off for General Conditions | |
| | | Take-off for sitework | |
| | | Take-off for concrete | |
| | | Take-off for masonry | |
| | | Building square foot cost for all other divisions | |
| | | Scratch sheets | |
| | | Contracts narrative: discussion of terms | |
| | | Project proposal form | |
| | | Copy of executed contract between general contractor and owner/developer | |
| | | Copy of executed contract between general contractor and subcontractor | |
| | | Monthly analysis of billings, payments received, allocation of G&A, payments to subcontractors, and retainage | |
| | | Cash flow projections | |
| | | Three (3) consecutive pay applications including lien releases | |
| | | Three (3) site utilization plans | |
| | | Discussion of permits | |
| | | Executed permit applications | |
| | | Subcontractor selection criteria | |
| | | Bid invitation and instructions to bidders | |
| | | Bid form | |
| | | Bond forms | |
| | | Project start-up checklist | |
| | | Schedule narrative | |
| | | CPM schedule | |
| | | Insurance analysis / discussion of insurance requirements for the project | |
| | | Amounts and types of insurance | |
| | | Certificate of insurance | |

| | | | |
|--|--|--|--|
| | | Environmental assessment | |
| | | Site specific safety program | |
| | | Any other risk management issues relevant to the project | |
| | | Environmental protection plan | |
| | | Conclusions and recommendations | |
| | | Professional interview | |
| | | References | |

Minimum Requirements CHECKLIST – DEVELOPMENT

√ = complete

n/a = not applicable (note: if n/a you must identify reason in comment section)

| √ | Page Number | Item | Comment |
|---|-------------|--|---------|
| | | Oral Presentation slides | |
| | | Title page | |
| | | Letter of Submittal | |
| | | Project Approval Request (signed original) | |
| | | Time Cards / Daily Activity Log | |
| | | Page numbers on all pages | |
| | | Table of contents (complete with page numbers) | |
| | | Executive summary | |
| | | Organization chart and legal form of business | |
| | | Responsibilities of key personnel | |
| | | Resumes of key personnel including principal | |
| | | Company size and qualifications | |
| | | List of consultants for project | |
| | | Discussion of all consultants for the project | |
| | | Company 3-year income and expense statement | |
| | | Personal financial statement | |
| | | Company balance sheet | |
| | | Ratio and trend analysis | |
| | | <i>Site Selection Criteria</i> | |
| | | Location, ownership and assembly | |
| | | Boundary survey | |
| | | Legal description | |
| | | Purchase strategy / technique | |
| | | Source(s) of capital | |

| | | | |
|--|--|--|--|
| | | Pre-development budget | |
| | | Master schedule | |
| | | Cut and fill analysis | |
| | | Detailed take-offs for site development | |
| | | Summary of costs for building(s) | |
| | | Land costs (including acquisition and financing costs) | |
| | | Total development budget | |
| | | Metropolitan area economic overview | |
| | | Neighborhood economic overview | |
| | | Market analysis | |
| | | Site analysis | |
| | | Conceptual master development plan | |
| | | Development program (mix, density/yield, phasing, etc.) | |
| | | Sources and amounts of equity capital | |
| | | Financing sources and terms (acquisition, development, construction and permanent loans) | |
| | | Sources and uses of funds | |
| | | Schedule of values for development and construction load draws | |
| | | Forecasted operating statement (for a completed commercial property) | |
| | | Cash flow projection (predevelopment through sale of property) | |
| | | Profit analysis and return calculations (discounting to arrive at PV) | |
| | | NPV | |
| | | IRR | |
| | | <i>Site plans and narratives</i> | |
| | | Grading | |
| | | Erosion and sediment control | |
| | | Stormwater management | |
| | | Landscaping and tree preservation | |

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| | | Water and sewer | |
| | | Building(s) | |
| | | Discussion of permit requirements and approvals | |
| | | General contractor selection criteria (including bonding requirements) | |
| | | Bid invitation and instructions to bidders | |
| | | Bid form | |
| | | Proposed fee (as a percentage and dollar amount) | |
| | | Construction project team/construction issues discussion and action plan for construction process | |
| | | Site utilization/staging plan | |
| | | Summary of safety program (project/site specific) | |
| | | Developer role, duties, and responsibilities in providing construction oversight | |
| | | If property is a subdivision: builder selection criteria; restrictions placed on builder's product and work activities | |
| | | Fee arrangements with general contractor and all consultants | |
| | | Budget recap for the construction phase (building(s)) | |
| | | Construction schedule: detailed breakdown for development construction and milestone schedule for building construction (if more than one building, each building to be shown separately) | |
| | | Marketing plan that discusses sales and/or leasing including sales and/or leasing personnel and fees | |
| | | Schedule of projected leasing and/or sales | |
| | | Property management plan including the management organization (third party or in-house) | |
| | | Executed or sample of property management agreement | |
| | | Maintenance and capital improvements budget | |
| | | Required management reports | |
| | | Property insurance and legal issues | |
| | | Life-safety and environmental issues | |
| | | Exit strategy and/or sale | |

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|--|--|---|--|
| | | Proposed sales contract (if project units are to be sold) | |
| | | Costs borne by seller and buyer | |
| | | Listing form (if a broker used) | |
| | | Commission rates for sales and leases | |
| | | Lease form (if property is to be leased) | |
| | | Costs borne by the landlord and tenant | |
| | | Declaration of restrictions, easements, liens and covenants | |
| | | Association agreements (homeowners, merchants, etc) | |
| | | Architectural and construction guidelines | |
| | | Insurance analysis / discussion of insurance requirements for the project | |
| | | Amounts and types of insurance | |
| | | Certificate of insurance | |
| | | Environmental assessment | |
| | | Site specific safety program | |
| | | Any other risk management issues relevant to the project | |
| | | Conclusions and recommendation: should the project be undertaken? Why or Why not? Project viability from each area of report. | |
| | | Recommendations as to product characteristics, mix, and quantity. | |
| | | Recommendations as to timing and phasing | |
| | | Marketing and property management recommendations | |
| | | Holding period and exit strategy recommendations | |
| | | Professional interview | |
| | | References | |

Minimum Requirements CHECKLIST – GENERAL

√ = complete

n/a = not applicable (note: if n/a you must identify reason in comment section)

| √ | Page Number | Item | Comment |
|---|-------------|---|---------|
| | | Oral Presentation slides | |
| | | Title page | |
| | | Letter of Submittal | |
| | | Project Approval Request (signed original) | |
| | | Time Cards / Daily Activity Log | |
| | | Page numbers on all pages | |
| | | Table of contents (complete with page numbers) | |
| | | Executive summary | |
| | | Organization chart and legal form of business | |
| | | Responsibilities of key personnel | |
| | | Resumes of key personnel including principal | |
| | | Company size and qualifications | |
| | | List of consultants for project | |
| | | Discussion of non-employee team | |
| | | Company financial statement | |
| | | Personal financial statement | |
| | | Company balance sheet | |
| | | Company projected 3-year income and expense statement | |
| | | Ratio and trend analysis | |
| | | Project acquisition | |
| | | Source(s) of capital | |
| | | Bonding | |
| | | Schedule of all projects | |
| | | Summary sheet for MEP estimate | |

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| | | Take-off for HVAC systems | |
| | | Take-off for plumbing systems | |
| | | Take-off for electrical systems | |
| | | Take-off for control systems | |
| | | Building square foot cost for all other divisions | |
| | | Scratch sheets | |
| | | List of all applicable MEP codes | |
| | | LEED certification statement | |
| | | Plumbing systems analysis | |
| | | HVAC systems analysis | |
| | | Electrical systems analysis | |
| | | Contracts narrative: discussion of terms | |
| | | Project proposal form | |
| | | Copy of executed contract between specialty contractor and general contractor | |
| | | Copy of executed contract between specialty contractor and a subcontractor | |
| | | Monthly analysis of billings, payments received, allocation of G&A, payments to subcontractors, and retainage | |
| | | Cash flow projections | |
| | | Three (3) consecutive pay applications including lien releases | |
| | | Explanation of how MEP services are provided to the site (transverse the site and enter the building) | |
| | | Discussion of permits and requirements | |
| | | Executed permit applications | |
| | | Subcontractor selection criteria | |
| | | Bid invitation and instructions to bidders | |
| | | Bid form | |
| | | Bond forms | |
| | | Discussion of project team | |
| | | Specialty construction issues discussion | |

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| | | Site utilization/staging plan | |
| | | Site specific safety program summary | |
| | | Specialty contractor's role and responsibilities in providing oversight of the installation process of MEP systems | |
| | | Specialty contractor's project start-up checklist | |
| | | Schedule narrative | |
| | | CPM schedule: detailed breakdown of MEP scope of work and milestone for balance of the scope | |
| | | Insurance analysis / discussion of insurance requirements for the project | |
| | | Amounts and types of insurance | |
| | | Certificate of insurance | |
| | | Environmental assessment | |
| | | Site specific safety program | |
| | | Any other risk management issues relevant to the project | |
| | | Environmental protection plan | |
| | | Conclusions and recommendations including profit, project schedule, MEP schedule, conservation issues | |
| | | Professional interview | |
| | | References | |

Additional Items for Consideration

The following items may/should be considered and possibly incorporated when preparing the Capstone Project. This is not to be considered a complete list of additional considerations.

A-E's Emergency Field Order

A-E or Owner's Letter of Acceptance

Alternates pricing

Assumptions

Building Permit issued by jurisdiction overseeing project

Builder's Risk with Extended Coverage Policy

Certificate of Occupancy or Occupancy Permit

Certificate of Substantial Completion AIA-G704

Change Orders

Change Order included in Schedule of Values

Change Order Submittal and process

Completed Operations Coverage

Concrete Pouring Sequence

Concrete Tests

Consent of the surety for Final Payment AIA-G707

Contract exhibits

Contractor's Affidavit AIA-G706

Contractor's qualification statement (if required by specifications-Instruction to Bidders)

Equal Opportunity Agreement and/or Statement

Equipment

Exclusions, Qualifications, Clarifications

Field Completion Reports with profit or loss calculations.

Formwork Design

Guarantees: Termite, Acoustical Tile, Mechanical Equipment, Roof, Resilient Flooring, Ceramic Tile, etc.

Job overhead calculation: supervision, field office, field office insurance, equipment shed, material storage shed, office supplies, utilities, telephone, building permits, temporary lighting, temporary power, temporary toilets, job sign, water and cups, first-aid supplies, clean-up, small tools, OSHA, progress photos, etc.

Labor Burden Derivation
Letter of Intent
List of Figures (or Tables), etc.
List of Subs
Mechanical and Electrical Assembly Pricing
Minutes of Progress Meetings
Notice to Proceed
Office Overhead Budget: Salaries, rent, utilities, telephone, supplies, postage, travel, legal, accounting, licensing, advertising, promotion, insurance, etc.
Pricing strategies
Project Management team resumes
Punch list form example
Purchase Order Form
Release of Lien AIA-G706A
Request for Change Order log
Request for Pricing
RFI log form
Schedule Costs
Schedule of Values (which is usually to be approved by the A-E)
Shop Drawing or catalog cut submittal example
Standard Addenda Sheet
Temporary structures
Transmittal Form
Value Analysis and Alternates
Vehicles List
Wage Rates
Worker Compensation coverage and rates

Table of Contents Tabs for GENERAL

The minimum number tabs shown below are to be **labeled** (not numbered) and in the order as listed. It is your decision as to which items are appropriate to include in each section. Page numbers are to be designated for each section. It is your decision if additional tabs are needed.

The first page of your notebook should be a well designed title page followed by the table of contents. The letter of submittal will be placed in the pocket of the notebook.

| | |
|---------|--|
| Tab #1 | Executive Summary |
| Tab #2 | Company Organization & Financials |
| Tab #3 | Estimate |
| Tab #4 | Schedule |
| Tab #5 | Contracts |
| Tab #6 | Project Financials |
| Tab #7 | Regulatory and Environmental |
| Tab #8 | Risk Management |
| Tab #9 | Site Logistics |
| Tab #10 | Conclusions & Recommendations |
| Tab #11 | References |
| Tab #12 | Administrative Submittals & Presentation |

Table of Contents Tabs for DEVELOPMENT

The minimum number tabs shown below are to be **labeled** (not numbered) and in the order as listed. It is your decision as to which items are appropriate to include in each section. Page numbers are to be designated for each section. It is your decision if additional tabs are needed.

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| | |
|---------|---|
| Tab #1 | Executive Summary |
| Tab #2 | Company Organization & Financials |
| Tab #3 | Site Acquisition & Pre-Development Planning |
| Tab #4 | Proposed Master Plan |
| Tab #5 | Site Engineering & Construction Plans |
| Tab #6 | Regulatory Issues |
| Tab #7 | Development & Construction Estimates |
| Tab #8 | Market Analysis |
| Tab #9 | Project Financials & Pro Forma |
| Tab #10 | Construction & Project Management |
| Tab #11 | Marketing & Property Management Plan |
| Tab #12 | Legal Issues |
| Tab #13 | Risk Management |
| Tab #14 | Conclusions & Recommendations |
| Tab #15 | References |
| Tab #16 | Administrative Submittals & Presentation |

Table of Contents Tabs for SPECIALTY

The minimum number tabs shown below are to be **labeled** (not numbered) and in the order as listed. It is your decision as to which items are appropriate to include in each section. Page numbers are to be designated for each section. It is your decision if additional tabs are needed.

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| Tab #6 | MEP Systems Analysis |
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