The term project is designed to give the students an opportunity to work together in teams of two to three members. Starting with the specifications they will develop a complete plan for the management of the construction of a facility.

The project is divided into the following seven phases:

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<th>Phase</th>
<th>Description</th>
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<td>1</td>
<td>Scope</td>
<td>1.1. Develop an overview of the project.</td>
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| 2     | WBS & Activity List | 2.1. Identify construction methods.  
|       |             | 2.2. Develop a WBS.  
|       |             | 2.3. Design a Project Code System.  
|       |             | 2.3. Establish list of activities. |
| 3     | Activity Durations/Costs | 3.1. Perform quantity take-off for each activity.  
|       |             | 3.2. Select/design crew formation.  
|       |             | 3.3. Identify crew productivity and cost rates.  
|       |             | 3.4. Estimate activity duration.  
|       |             | 3.5. Estimate direct costs (material, labor, equip. & subs). |
| 4     | Scheduling | 4.1. Establish job logic relationships.  
|       |             | 4.2. Construct a project network.  
|       |             | 4.3. Perform scheduling calculations.  
|       |             | 4.4. Develop and analyze resource profiles.  
|       |             | 4.5. Implement resource allocation and leveling.  
| 5     | Cost Flow   | 5.1. Estimate project indirect costs.  
|       |             | 5.2. Prepare a cash flow for the project. |
| 6     | Updating    | 6.1. Update the project schedule based on actual data.  
|       |             | 6.2. Compare the current schedule with the target. |
| 7     | Presentation And Report | 7.1. Prepare a final written report.  
|       |             | 7.2. Present your plan for the rest of the class. |

Note: Use your engineering judgment and/or available references (e.g. Means references) in assuming any missing data including project indirect cost. List all your assumptions and include them in the final report.
Phase 1: SCOPE

The objective of this phase is to develop an overview of the project. Each team should study the plans and specifications to develop an understanding of the project scope.

Phase 2: WBS AND ACTIVITY LIST

The purpose of this phase is to develop for the project a Work Breakdown Structure (WBS) and identify the list of activities needed to construct the project. Each team should decide the construction methods to be used for the construction of project activities. This information should be used in developing the WBS. Develop a Project Code System for the project and assign a unique code for each activity. In addition, identify the list of construction activities for the project. This list will be used in the next phase to estimate the quantities of work and the associated costs and durations to accomplish those activities.

Phase 3: ACTIVITY DURATIONS/COSTS

The objective of this phase is to determine the duration, cost and resources needed to construct each activity. The quantities of work necessary in each work area should be determined for each activity. A crew should be also selected for each activity, and its productivity and cost rates should be identified. Accordingly, the duration and direct costs of each activity should be estimated. The activity report should be presented on a spreadsheet like Excel. This report should also include an explanation of the assumptions made in selecting the crews, productivities and the direct costs for each activity.

Phase 4: CONSTRUCTION SCHEDULING

1. From this point of view, establish the logical relationships between all of the activities on your list.

2. Use P3 to construct your project network and calculate the schedule. Be sure to show the early start, late start, early finish, late finish, total float, and free float for each activity, and also indicate the critical path.

3. Develop a tabular and/or graphical resource profile for the principal resources required to construct this project.

4. Determine any availability constraints upon the principal resources utilized to construct the project. Accordingly, perform resource allocation and leveling to develop a feasible and practical schedule. You should include a tabular and/or graphical resource profile (possibly indicating “before” and “after” cases) of some of the key resources. Be sure to document your methods and assumptions, and show the schedule before and after resource allocation and leveling.

5. Perform Time-Cost Trade-Off Analysis for the schedule developed in step 4. Propose alternative scenarios to reduce the project duration and analyze their impact on the project overall cost.
6. Your report for this phase should include: developed schedules; resource analysis and the resulting profiles; Time-Cost Trade-Off Analysis report;

**Phase 5: COST ANALYSIS**

1. Estimate the indirect costs for the project.

2. Using the cost estimated from Phase 3 and your schedule from Phase 4, prepare a month-by-month cash flow for the project showing financing and overdraft requirements. Use the following guidelines and assumptions:

   a. Show how you allocated your direct costs, indirect costs and markup for each month.

   b. Organize your data into a table and make the cash flow computations. It is recommended that a spreadsheet program be used for this phase.

   c. Use 5% for total markup (profit and contingency).

   d. Assume retainage is 10% on the first 50% of the worth and then 0% and that it is returned with the final progress payment.

   e. Assume that a request for a progress payment is sent in at the end of the month in which the work represented is performed, and the owner takes another month to process the request. The owner then subtracts the retainage (if any) and pays the contractor.

   f. Assume that interest on the overdraft (if any) is charged at 1% per month, but is not included in the costs in the payment request. Also, assume that the interest for a month is charged on the full amount of the debt incurred by the end of that month (i.e. the maximum overdraft for that month). If the overdraft is positive, that is no debt, then the interest should be assumed to be zero.

3. Prepare a graph which plots the following:
   a. Cumulative Cash Outflow.
   b. Cumulative Payment.
   c. Overdraft.

**Phase 6: UPDATING**

The purpose of this phase is to incorporate progress into your schedule and to provide a means of identifying changes when compared to the original plan. This will enable the scheduler and the project management team to make necessary changes and PLAN for the future. Assume a new data date 6 weeks later than the project start date and 4 to 6 changes to your schedule. Some of the changes will require schedule dates, some may require new duration, some will require changes in cost, and others may require changes to the relationships. This project will require that you input actual dates and resources for all activities occurring prior to the data date. Incorporate these changes, including log entries, and any other changes you choose to make to
rectify or alleviate problems created from the update change provided. Then reschedule the project incorporating the new data date. Run a few reports so that you can evaluate the results of the changes. Often times the project completion date is extended. Envision how you might change the work in order to bring the completion date back into line. You do not need to implement the changes, but you should describe your plans in the narrative.

Phase 7: PRESENTATION AND REPORT

At the end of the semester each team will be asked to present their plan for managing this project to the rest of the class. It is requested that every member of the team participate in this presentation. You will have approximately twenty minutes to explain what your plan is and how you developed it. You should allow some time for questions and be prepared to explain. The final report should be turned in on or before the last day of classes. This report should present results of your team project. It should indicate your assumptions for each phase, final activity list with quantities, duration, costs and sequence. The final schedule, cash flow, updating reports and summary should be included.

Project Evaluation

Each team should evaluate the presentation of the other teams. The evaluation should be constructive with a reasonable balance between positive and negative attributes. Some questions that might be considered are:

1. Is the duration of the activities reasonable, considering the resources used?
2. Is the activity description understandable?
3. Is the project duration acceptable?
4. Is the total float acceptable?
5. Are the activities on the critical path consistent with your experience?
6. Is the Sequencing logical? Can it be built in that sequence?
7. Is the total cost and cost distribution within range?
8. Does the project schedule allow for work continuity? Is the work done with reasonable sized crew and without major variations in crew size?
9. Is the presentation of the schedule clear and the explanation of assumptions reasonable?
10. Do you have enough information to control the project?

Rating:

If you are representing the owner, indicate on a scale from 0% to 100% your satisfaction with this plan for constructing and managing the project: __________%

Comments: