**This Old House Project**

Your objective for this assignment is develop a Work Breakdown Structure (WBS) using Micro-Soft Project for remodeling and renovation of your old home you inherited from your great aunt. The house needs significant renovation and expansion. Given the amount of work that needs to be done one might consider building a new home. However, earlier you conducted a cost benefit analysis and concluded it made financial sense to move forward with a renovation.

**Specification Guidance**

Use the activities below to create a schedule in Microsoft Project. The durations for tasks are specified for the key activities. **You are concerned with the durations, in “person days”**. This refers to how long it would take if just one person were assigned to this task. For example, if a task said 20 person days and you only assigned one resource to do this task then you would enter a duration of 20. If you want more than one resource on this task you will enter 20 in the duration but enter more than one resource. Begin by entering just the Person Days with one resource. Then go back and add additional resources. When you do this a little “caution symbol will appear. Click on the caution symbol and you will be given three options. Select the option that says “**reduce the duration but keep the work**”. When you do this, you should see the duration for that task go down. Of course, the more resources you add the shorter the task will become, but the more hat task will cost. If you do not see “Person Days” then enter the durations given for that activity.

Some tasks required Skilled or Specialized Labor. For example, plumbing work requires a plumber, electrical work requires an electrician, etc. Specific skilled labor includes:

Masons perform masonry work only (i.e. concrete, foundation, footings, fireplace)

Electricians perform electrical work only (i.e. wiring, lighting)

Plumbers perform plumbing work only (i.e. water/plumbing, heating & air conditioning, gas)

Roofers perform roofing work only

Carpenters perform (construction, flooring/tile, windows/doors, dry wall, siding, kitchen cabinets, appliances)

Framers only **frame** the structure

Painters perform painting only

Excavators perform excavation work only (Digging, machinery)

Surveyor performs site survey work

Flooring only works on floors

Tiler only works on installing tile/marble/ceramics

Insulation workers only install insulation

Dry Wall Tapers only tape and plaster dry wall

General Labor assists skilled labor, does clean up

Landscapers only perform landscaping

# Activities

Build your activities according to the following information.

1. **Initiate Project**
   1. Project starts by contracting with an Architect to do the architectural drawings (25 days) (**Architect Fee: $5500**) Cannot be less than 25 days
   2. Survey work site begins for new addition and new garage (**2 days**) for the house, **1 days for the Garage**. (**Surveyor Fee: $3000**) This task Cannot be less than 3 days
   3. Architectural plans are reviewed by you and architect and modifications made (5 days) This task Cannot be less than 5 days
   4. After the architectural plans are reviewed, three Contractors have been selected to bid on the project (**30 days**) Each has **30 days** to submit a quote
   5. A Contractor is selected and a contract signed after receiving bids (**3days**)
   6. After the Contractor is selected, the finalized Site Survey is received and reviewed with you, the Contractor and the Architect (1 day)
   7. After review of the site survey, the architect takes the finalized plans along with the site survey and submits them with a project proposal to the Village Planning office for review and to apply for a building permit. (1 day)
   8. The Village Planning board reviews application & issues a building permit (30 days) (**Permits Expense: $2000**) This task Cannot be less than 30 days
   9. While the building permit is being approved you apply for a construction loan from the bank. This means this task can start (i.e. take place in parallel) when the village begins to review the permit application. (**30 days**) This task Cannot be less than 30 days
2. **Develop Project Mgmt. Plan**

**2.1 Scope Management and Communication Management and Quality**

* 1. While the building permit application is under review, the Contractor meets with you to review your Project Overview Statement, your ideas and Scope statement **(2 days)** This means this task can start (i.e. take place in parallel) when the village begins to review the permit application. Enter the predecessor for this task (see item “h” above) using the precedence relationship **Start Start**, (i.e.SS)
  2. After Project Overview Stmt. and Scope is reviewed, Contractor and you review Conditions of Satisfaction Statement, Quality Plan. During this time you also set up when and how you will communicate with each other (**2 days**)
  3. **Work Breakdown Structure (WBS)**
     1. After finalizing the Project Scope, conditions of satisfaction, communication and quality plans, the Contractor develops a list of specific tasks for the project (**3 days**) (this task cannot take less than 3 days)
     2. After Activities have been defined, the Contractor develops a Work Breakdown Structure (WBS) (**2 days**) (this task cannot take less than 2 days)

**2.3 Resources Management**

a. Contractor performs a **Skills Assessment** after activities have been defined and WBS defined to identify skills needed (**3 days**)

1. After the skills assessment is performed Contractor lines up his sub-contracting team including excavator, framers, carpenters, roofers, a HVAC (Heating, Ventilation & Air Con.), plumber, electrician, flooring, painter, etc. (**10 days**)
2. After identifying his sub-contractors Contractor Sequences activities (**2 days**)

**2.3 Schedule Management**

1. Define & estimate activity durations after sequencing activities(**2 days**)
2. After defining and estimating activity durations, estimate activity costs (**5 days**)
3. Once activities durations have been defined & sequenced, a Schedule can be developed (**3 days**)
4. Schedule is reviewed with the homeowner (**1 day**)

**2.4 Procurement Plan**

1. Once a schedule is developed and after client review, determine necessary building materials needed to complete renovation (**5 days**)
2. After determining building materials sign contracts with suppliers/providers as appropriate. (**5 days**)
   1. **Cost Management**
3. Contractor compile all the estimated costs of materials to create a materials budget (**10 days**)
4. While compiling material costs and after lining up work team and defining durations, contractor determines estimated labor costs (**5 days**)
5. Contractor determines an estimated project expense budget (**3 days**)
6. Contractor Budget is reviewed with the homeowner (**1 day**)
7. **Execute**

**3.1 Site Prep and Procurement**

1. Once the project loan from the bank is approved, and after review with homeowner, team assembled, hold a kickoff Meeting and communicate the schedule (**1 day**)
2. After kickoff meeting demolition of existing home begins **(30 person days)** General Labor only
3. After demolition dig basement for new addition (Requires Excavator, Excavation equipment at $500 per day and 1 operator and one general operator) **(2 person days) cannot be less than 2 days**
4. After basement foundation is dug, excavate and prepare site for new garage (Requires Excavator, Excavation equipment, $500 per day, 1 operator and one general labor) **(2 person days) cannot be less than two days**

**When Demolition begins, the Contractor can begin the following. Durations below include ordering and lead time**

1. Order windows & doors(18 windows & 3 doors) (**30 days**) (**SS**)
2. Order garage lumber supplies (10 days)
3. Order house and porch supplies, plumbing, electrical, (10 days) (**SS**)
4. Order Masonry blocks (500 blocks) (**5 days**) (**SS**)
5. Order concrete (10 tons) (**2 days**) (**SS**)
6. Order Dry Wall (200 sheets) (**2 days**) (**SS**)

**Start Start** Relationship

1. Order Insulation (**2 days**) (**SS**)
2. Order Bath/Kitchen Fixtures/tile (**10 days**) (**SS**)
3. Order tile/hardwood flooring 1800 square feet (**30 days**) (**SS)**
4. Order Lighting **(30 Days)(SS)**
5. Order kitchen cabinets (3**0 days**) (**SS**)
6. Order granite countertops (**30 days**) (**SS**)
7. Order Heating & Air Conditioning (**20 days**) (**SS**)
8. Order Garage Doors (**20 days**) **(SS)**

**Note: Items 5 – 18 above have a start/start (i.e. SS) relationship instead of a Finish Start relationship.** MS Project automatically defaults to Finish Start (FS) Change the relationship on these items so they all start at the sametime right when Demolition begins.

**3.2 Foundation**

1. After garage site excavated & prepared, dig and prepare footings for garage **(6 person days )**
2. After garage footings prepared, prepare footings for new addition foundation **(8 person days)**
3. After new addition footings are prepared, Pour concrete footings for garage **(1 person days)**
4. Pour concrete footings for new addition **(4 person days)**
5. After new addition footings are poured and masonry blocks ordered, build foundation for garage, requires at least one Mason (**4 person days**)
6. After basement footings poured and masonry blocks ordered, build basement foundation, requires at least one Mason **(16 person days)**
7. **Hold Milestone Review with Contractor(1), Review expenses to budget**

**3.3 Construction**

1. When garage materials arrive frame garage. **(18 person days)**
2. While garage is framed and after materials arrive, frame new addition and front porch **(60 person days)** Along with skilled labor**,** must includeone general labor. (i.e. it would take one skilled framer 70 days to frame new addition and porch. To reduce this further you would need additional skilled labor plus one general labor)
3. After house is framed, put new roof on garage (**8 person days**) must have at least one skilled roofer labor. (i.e. it would take one skilled roofer 8 days to install a new roof. To reduce this further you would need at least one skilled labor and one general labor)
4. Put new roof on house after garage roof **(20 person days)** Must have at least one skilled labor. (i.e. it would take one skilled roofer 20 days to install a new roof. To reduce this further you would need additional skilled labor and at least one general labor)
5. After roof and framing of new addition is complete, construct masonry fireplace **(10 person days)** To reduce this further you would additional need skilled labor
6. **Milestone review & Progress inspection with Bank Examiner**

**Review expenses to budget**

1. After house is framed and after ordering windows & doors, install new windows & doors in garage and house **(16 person days)** Along with skilled labor(i.e. it would take one skilled worker 16 days to install all the doors and windows. To reduce this further you would need at least additional general labor)
2. While windows & doors are being installed, install electrical throughout house & garage **(25 person days)** (i.e. it would take one skilled labor 25 days to install all the electrical in the house and garage. To reduce this further you would need additional skilled labor)
3. While electrical is being installed, install plumbing **(30 person days) (**To reduce this further you would need additional skilled labor)
4. After plumbing and electrical install heating and air conditioning **(40 person days)** To reduce this further you would need additional skilled labor)
5. After procuring insulation and after installing electrical, plumbing and heating, install insulation throughout house. **(6 person days)** this task cannot take less than 3 days and can only be performed by insulation installers
6. After insulation, and after ordering dry wall, install dry wall throughout the house **(30 person days)** skilled labor only
7. Tape & Plaster dry wall **(12 person days)** Tape & plaster are performed by specialists who only do this type of work.Skilled labor only
8. While Taping & Plastering, Order Paint (40 gallons) 3days
9. After taping and plastering dry wall and after procuring paint, paint interior walls and ceilings **(30 person days)** Skilled labor only
10. While painting is being done, install new siding on outside of house **(60 person days)** To reduce this further you would need additional skilled labor only
11. **Milestone review with Contractor(2), Review expenses to budget**
12. After painting and after plumbing install bathroom fixtures **(10 person days)** skilled labor only
13. After bathroom fixtures installed, and after procuring kitchen/bath cabinets, install kitchen/bath cabinets **(30 person days)** Along with skilled labor(to reduce this further labor must be skilled labor
14. Build and install interior moldings and trim work after kitchen cabinets installed **(14 person days)** skilled labor only. To reduce this further you would need additional skilled labor
15. Install kitchen and bathroom counter tops after cabinets installed **(4 person days)** skilled labor only.
16. After bathroom fixtures installed and after procuring tile, install tile flooring and anywhere there is tile in the house **(12 person days).** This task must be performed by skilled labor . To reduce this further you would need additional skilled labor
17. After tile flooring installed and after procuring lighting, install lighting **(20 person days)** skilled labor only. To reduce this further you would need additional skilled labor. (This task cannot be reduced to less than 5 person days)
18. After procuring flooring, and after lighting installed, install hardwood flooring **(40 person days**) skilled labor only. To reduce this further you would need additional skilled labor. Cannot be completed in less than 10 days
19. Install kitchen appliances after hardwood flooring **(2 person days)** skilled labor only. (Task cannot go below 2 days)
20. Clean up worksite (Requires 2 Dumpsters $800 each) **(10 person days)** (general labor only)
21. **Milestone review with Contractor(3) & progress review with Bank Examiner**

**3.4 Exterior Landscape**

1. After worksite cleaned up, **excavate lawn** and plant grass seed **(4 person days)** Along with skilled labor**,** must includeone general labor
2. Plant outside landscape **(6 person days)** Along with skilled labor**,** must includeone general labor
3. **Project Close Out**
4. Village Building Inspector inspects house & garage with contractor (1 day)
5. After inspection Village Building inspector issues a Certificate of Occupancy (1 day)
6. After Certificate of Occupancy received conduct walk through with Contractor (1 day)
7. Billing /accounts for suppliers and skilled labor finalized with contractor and you (10 days)
8. Contractor and you gather all documents, invoices, etc. and archive (4 days)
9. **Milestone Review with Contractor (4). Contactor reviews heating and air conditioning systems, plumbing, electrical, etc.**
10. Celebrate

# Project Assumptions

1. The project should begin on Monday, July 10th, 2023
2. Assume project is taking place at 10 Academy St., Concord, NH
3. Workers work 5 days per week, 8 hours per day, beginning at 7am and ending at 4pm with a 1 hour lunch
4. There is no work taking place on:

Monday, September 4th, 2023 (Labor Day)

Tuesday, October 31st, 2023 (Halloween)

Thursday November 22nd & 23rd, 2023 (Thanksgiving Holiday)

Monday December 25th, 2023 (Christmas Holiday)

Monday January 1st, 2024 (New Year’s Day celebration)

Wednesday, February 4th, 2024 (Valentines Day)

Monday, May 27th, 2024 (Memorial Day)

**Assignment; What’s due:**

You will submit your Microsoft Project schedule that implements the activities above. The total days and cost of your project should be visible on your schedule (i.e. MS Project worksheet). You have the flexibility of scheduling activities in serial or parallel, as you feel appropriate. **You should have several ”Notes” scattered throughout your project** . You should have a link to your project site.

There are explicit and implicit constraints in the tasks. An example of an “***explicit***” constraint is “After basement footings are poured, build basement foundation (5 days). An example of an “***implicit***”(i.e. implied or logical) constraint is; you would tape and plaster the dry wall only after installing the dry wall.

**Grading criteria:**

1. **Project Set-Up (10%)**

## Activity, Cost and Resource Allocation (60%)

1. **Competitive Scoring (30%)**
   1. Shortest schedule (10%)
   2. Lowest Cost (10%)
   3. Best weighted score for schedule and cost (10%) (you do not have to calculate this. The program will calculate this depending on how your bid ranks with other bids

Treat your Schedule and Budget as a competitive bid, where the other teams in the class are competing contractors/carpenters trying to win the bid for this project. The Best Bid according to the shortest schedule and lowest cost will receive maximum credit. Other bids receive a pro-rated score. Note: violation of any of the rules such as parallel processing where there should not be any will disqualify you from the from shortest schedule. All durations must be at least 1 day. i.e. you cannot reduce a task to less than 1 day.

**Note:**

* **Use this information below to construct your resource sheet and to make your resource allocations**
* **(if you need more resources than are listed below; add $5/hour for each additional general labor resource in a given category and $10/hour for each additional skilled labor)**
* **Note: Be careful not to over allocate your workforce.** **There should not be any over allocated workforce**
* **No Overtime or Saturday-Sunday work is allowed**
* **The Contractor is on this project everyday from the time he is selected until the project is complete. You will pay him a flat fee of $50,000 , $10,000 will be paid at the time of signing and $10,000 at each Milestone review.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Resource Name** | **Type** | **Rate** |
| General Labor 1 | GL-1 | Work | $20/hour |
| General Labor 2 | GL-2 | Work | $25/hour |
| General Labor 3 | GL-3 | Work | $30/hour |
| General Labor 4 | GL-4 | Work | $35/hour |
| Carpenter 1 | C-1 | Work | $70/hour |
| Carpenter 2 | C-2 | Work | $80/hour |
| Carpenter 3 | C-3 | Work | $90/hour |
| Carpenter 4 | C-4 | Work | $100/hour |
| Carpenter 5 | C-5 | Work | $110/hour |
| Roofer 1 | R-1 | Work | $60/hour |
| Roofer 2 | R-2 | Work | $70/hour |
| Roofer 3 | R-3 | Work | $80/hour |
| Roofer 4 | R-4 | Work | $90/hour |
| Plumber 1 | PL-1 | Work | $90/hour |
| Plumber 2 | PL-2 | Work | $100/hour |
| Plumber 3 | PL-3 | Work | $110/hour |
| Plumber 4 | PL-4 | Work | $120/hour |
| Framer 1 | F-1 | Work | $50/hour |
| Framer 2 | F-2 | Work | $60/hour |
| Framer 3 | F-3 | Work | $70/hour |
| Framer 4 | F-4 | Work | $80/hour |
| Electrician 1 | EL-1 | Work | $100/hour |
| Electrician 2 | EL-2 | Work | $110/hour |
| Electrician 3 | EL-3 | Work | $120/hour |
| Mason 1 | M-1 | Work | $60/hour |
| Mason 2 | M-2 | Work | $70/hour |
| Mason 3 | M-3 | Work | $80/hour |
| Painter 1 | PT-1 | Work | $50/hour |
| Painter 2 | Pt-2 | Work | $60/hour |
| Excavator Operator 1 | EX-1 | Work | $50/hour |
| Excavator Operator 2 | EX-2 | Work | $60/hour |
| Dry wall Tapers & Plaster 1 | DWT | Work | $50/hour |
| Dry wall Tapers & Plaster 2 | DWT | Work | $60/hour |
| Insulation Installers | II | Work | $60/hour |
| Landscapers | LS | Work | $45/hour |
| Excavation Equipment | EE | Work | $500/day |
| Windows | WD | Material | $750 per Window |
| Interior Doors | D | Material | $500 per door |
| Garage Doors | GD | Material | $3000 each x 2 installed |
| Concrete | C | Material | $90/ton |
| Hardwood Flooring | HWF | Material | $18.00 per square foot (installed) |
| Tile Material | TL | Material | $5000.00 |
| Const. Supplies for House & Porch includes plumbing, electrical | CS-1 | Material | $150,000 |
| Const. Supplies for Garage includes plumbing, and electrical | CS-2 | Material | $60,000 |
| Lighting | LTG | Material | $10,000 |
| Heating & Air Cond. |  | Material | $20,000 |
| Countertops | CT | Material | $7500 |
| Kitchen/Bath Cabinets | KC | Material | $20,000 |
| Kitchen/Bath Fixtures | KBF | Material | $15,000 |
| Dumpsters |  | Cost | $800 each |
| Dry Wall | DW | Material | $20 per sheet |
| Tiler |  | Work | $50 per hour |
| Masonry Blocks | MB | Material | $6.50/block |
| Roof (House & Garage) | R | Material | $30,000 |
| Insulation Material | I | Material | $10,000 |
| Paint | P | Material | $60 per gallon |
| \* Kitchen Appliances |  | Cost | $15,000 |
| \*Landscape materials |  | Cost | $6000 |

\* Purchased by the homeowner separately