

Sustainable Home Construction Project - Group 3 V.2

Example of Pert Estimating Techniques

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Sustainable Home Construction Project
Program Evaluation and Review Technique (PERT)

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Program Evaluation and Review Technique (PERT)

The focus of this home construction project is an industry leading, beautiful, and environmentally efficient home, a high degree of planning is required to ensure projects are on time and within budget. The use of the Program Evaluation and Review Technique (PERT) is statistical technique used to review activities, cost, and “assessing projected risk” (Larson & Gray, 2014, p. 213). PERT analysis “assumes a statistical distribution (range between optimistic and pessimistic) for each activity duration...[to produce a] relative probability...of an activity becoming critical...” (p. 213). This analysis allows the project manager to evaluate the potential of an activity becoming a schedule risk. Armed with this knowledge, the project manager can identify potential risk factors and develop mitigation strategies that will increase the assurance that the project can be completed as planned.

The three time estimates used in the PERT analysis are shown in Table 1: Duration Distribution Table below. The first is the Optimistic time the best case scenario that all things will come together with no issues and the identified task or activity will be completed by this time. Larson and Gray, 2014 define optimistic in the PERT analysis as “a 1 chance in 100 of completing the activity earlier under normal conditions” (p. 240). The next estimate is the Most Likely time in which the activity may be completed based on professional experience and past project data. The final time estimate is Pessimistic and is based on the possibility that some issues might arise and cause a slowdown of the activity. (Larson & gray, 2014) Larson and Gray, 2014 define Pessimistic in the PERT analysis “a 1 chance in 100 of completing the activity later under normal conditions” (p. 240).

Expert opinion provided the basis for the estimated values defined in Table 1 and were used to determine the most reliable duration of each project task using the following PERT

formula $\frac{a+4m+b}{6}$. The results of the PERT analysis will provide the project manager a weighted average (rounded) for each project task which will be used in performing forward and backward pass activities to define the project's duration and identify the critical path.

Table 1: Duration Distribution Table

Task	Optimistic (a)	Most Likely (m)	Pessimistic (b)	Weighted Task Duration
Initiation	1	2	3	2
Design	30	47	60	46
Permitting	15	30	45	30
Foundation	20	22	25	22
Geothermal Heat pump	8	11	15	11
Framing	15	17	25	18
HVAC system	10	13	16	13
Electrical	6	9	12	9
Plumbing	8	11	15	11
Communication system	5	10	15	10
Solar system	3	4	6	4
Exterior finish	25	30	40	31
Interior	60	69	80	69
Landscaping	20	26	35	27
Closing	1	3	5	3

When the project's information is reviewed utilizing PERT as in Table 1 below we determined the project duration to be 246 days. (Larson & Gray, 2014 Table 1) The use of PERT also provides the probability for each project primary activity which is not shown. A great advantage to being able to utilize PERT and the information it provides also allows for identifying specific risks and being able to mitigate those risks. (Larson & Gray, 2014, p. 213)

Table 2: Forward and Backward Pass Analysis

Sustainable Home Construction Project Solution								
Activity	Start node	End node	Activity time	Early Start	Early Finish	Late Start	Late Finish	Slack
Project			246					
Project planning	0	1	47	0	47	199	246	199
Design	2	3	47	0	47	0	47	0
Permitting	3	4	30	47	77	89	119	42
Executing	4	5	127	77	204	119	246	42
Foundation	3	6	22	47	69	47	69	0
Geothermal Heat pump Ground Unit	6	7	11	69	80	69	80	0
Framing	7	8	17	80	97	80	97	0
HVAC system	8	9	13	97	110	97	110	0
Electrical	9	10	9	110	119	110	119	0
Plumbing	10	11	11	119	130	119	130	0
Communication system wiring	11	12	10	130	140	130	140	0
Solar system	12	13	4	140	144	140	144	0
Exterior finish	13	14	30	144	174	144	174	0
Interior	14	15	69	174	243	174	243	0
Landscaping	14	16	26	174	200	220	246	46
Closing	15	16	3	243	246	243	246	0

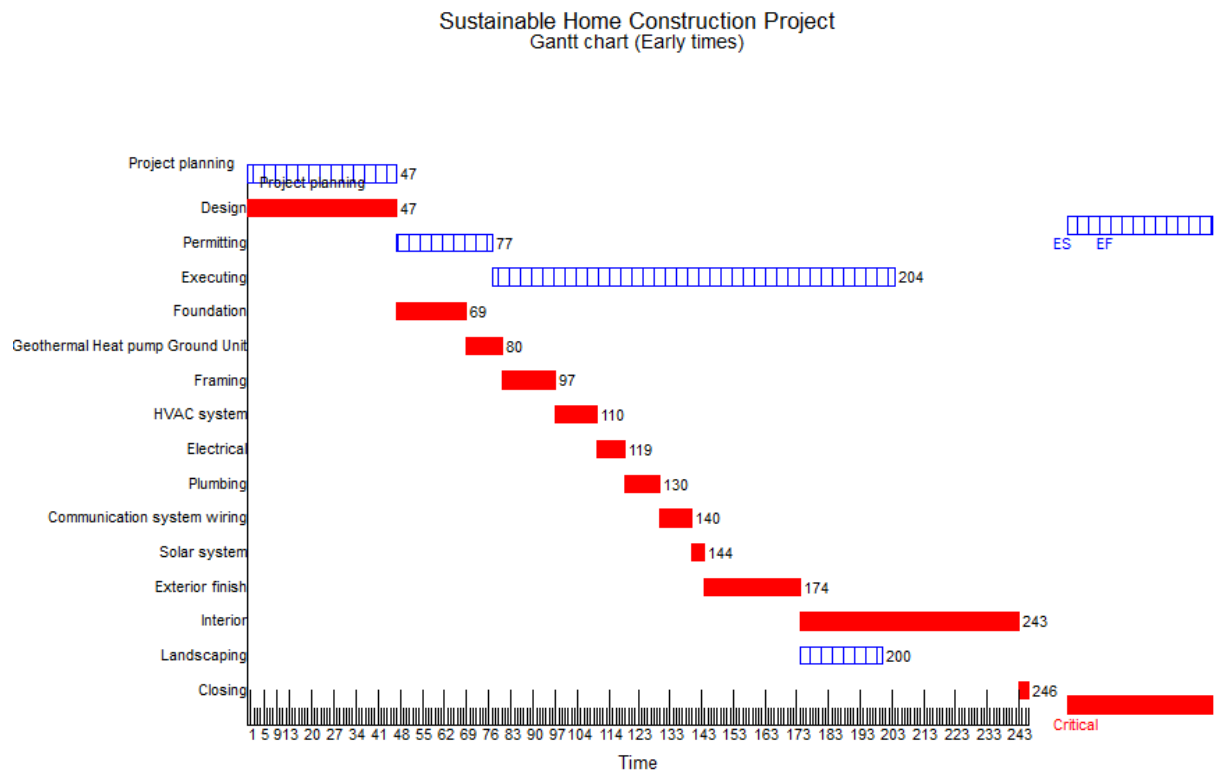


Figure 1: PERT Analysis Graph

References

- Hilton, R. W., & Platt, D. E. (2014). *Managerial accounting: Creating value in a dynamic business environment* (10th ed.). New York, NY: McGraw-Hill Education.
- Larson, E. W., & Gray, C. F. (2014). *Project management: The managerial process*. (6th ed.). New York, NY: McGraw-Hill Education.
- Project Management International. (2013). *A guide to the project management body of knowledge* (5th ed.). Newtown Square, PA: Project Management Institute.