Project Performance Analysis

Highway Project

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1. **Cost/Schedule Variance Percentages**

   a. Schedule Variance Percentage = $\frac{\text{Schedule Variance}_{cum}}{\text{BCWS}} \times 100$

   $\frac{-4}{17.5} \times 100$

   -22.9% unfavorable

   b. Cost Variance Percentage = $\frac{\text{Cost Variance}_{cum}}{\text{BCWP}} \times 100$

   $\frac{-1.0}{13.5} \times 100$

   -7.4% unfavorable

2. **Performance Indices (PI)**

   a. Cost Performance Index$_{efficiency}$ = $\frac{\text{BCWP}_{cum}}{\text{ACWP}_{cum}}$

   $\frac{13.5}{14.5} = .93$

   b. Cost Performance Index$_{performance}$ = $\frac{\text{ACWP}_{cum}}{\text{BCWP}_{cum}}$

   $\frac{14.5}{13.5} = 1.07$

   c. Schedule Performance Index = $\frac{\text{BCWP}_{cum}}{\text{BCWS}_{cum}}$

   $\frac{13.5}{17.5} = .77$

3. (a) Months (ahead or behind) = $\frac{\text{Schedule Variance}_{cum}}{\text{BCWP}_{monthly\ avg*}}$

$$\frac{-4}{1.93}$$

$$= \text{2.07 months behind}$$

(b) Months (ahead or behind) = $\frac{\text{Schedule Variance}_{cum}}{\text{BCWS}_{monthly\ avg*}}$

$$\frac{-4}{2.5}$$

$$= \text{1.6 months behind}$$

4. **Percent Complete/Spent**

a. Percent Complete = $\frac{\text{BCWP}_{cum}}{\text{BAC}}$ X 100

$$\frac{13.5}{30.0} \text{ X } 100 = 45\%$$

b. Percent Spent

(1) = $\frac{\text{ACWP}_{cum}}{\text{BAC}}$ X 100

$$\frac{14.5}{30.0} \text{ X } 100$$

$$= 48.3\ \%$$

(2) = $\frac{\text{ACWP}_{cum}}{\text{EAC}}$ X 100

$$\frac{14.5}{30.5} \text{ X } 100$$

$$= 47.5\%$$

5. **To Complete Performance Index**

$$TCPI = \frac{\text{Budgeted Cost of Work Remaining}}{\text{Estimate to Complete}} = \frac{\text{Budget at Completion - Earned Value}_{cum}}{\text{Estimate at Completion - Actuals}_{cum}}$$

$$\frac{30 - 13.5}{30.5 - 14.5}$$

$$\frac{= 16.5}{16}$$

$$= 1.03$$

6. **Independent Estimate At Completion (IEAC)**

a. $$IEAC = \frac{BAC}{CPI_E}$$

$$\frac{30}{.93} = 32.258$$

b. $$IEAC = ACWP_{cum} + \frac{(BAC - BCWP_{cum})}{(80\% \times CPI_E) + (20\% \times SPI)}$$

$$14.5 + \frac{30 - 13.5}{[(.80 \times .93+ + (.20 \times .77)]}$$

$$= 14.5 + \frac{16.5}{.898} = 32.874$$

c. $$IEAC = ACWP_{cum} + \frac{(BAC - BCWP_{cum})}{(CPI_E \times SPI)}$$

$$= 14.5 + \frac{30 - 13.5}{(.93 \times .77)}$$

$$= 14.5 + \frac{16.5}{.716} = 37.454$$

d. $$IEAC = ACWP + (BAC - BCWP_{cum})$$

$= 14.5 + (30 - 13.5) = 31.000$

7. **Estimated Completion Date (ECD)**

Estimated Completion Date = Months to Complete + Time Now (months)

(a) Months to Complete = $\frac{BAC - BCWP_{cum}}{BCWS_{current}}$ + Time now (months)

$\frac{30 - 13.5}{2.5} + 7 = 13.6$

(b) Months to Complete = $\frac{BAC - BCWP_{cum}}{BCWS_{average}}$ + Time now (months)

In this example with planned linear accomplishment $Budget_{average}$ and $Budget_{current}$ are the same, thus the answer will also be an Estimated Completion Date of 13.6 months.

(c) Months to Complete = $\frac{BAC - BCWP_{cum}}{BCWP_{current}}$ + Time now (months)

$\frac{30 - 13.5}{4.0} + 7 = 11.13$

(d) Months to Complete = $\frac{BAC - BCWP_{cum}}{BCWP_{average}}$ + Time now (months)

$\frac{30 - 13.5}{1.93} + 7 = 15.55$

Estimated Completion Date calculation methods (c) and (d) are preferred to methods (a) and (b) as (c) and (d) are based on actual performance data rather than budget data.

The results of method (c) should consider any unique events which impacted the incredibly favorable current Earned Value in month 7.

Method (d) does not consider any trends found in the data. However, it normalized the effect of the month 7 data by averaging it with the other 6 data points.

8. **Performance to Date vs. Estimated Completion Dates (ECD)**

$$\frac{BCWP_{cum}}{\text{Months to Date}} \quad \text{vs.} \quad \frac{BAC - BCWP_{cum}}{\text{Months to Complete}}$$

$$\frac{13.5}{7} = 1.93 \qquad \frac{30 - 13.5}{15 - 7} = \frac{16.5}{8} = 2.06$$

Only in months 3, 6, and 7 were they able to earn value in excess of 2.0. In each of these months the Cost Performance Index was .88. There is enough evidence to suggest that the projected date of completion (month 15) and the EAC ($30,500.000) are not achievable or consistent.

9. **Best, Worst and Most Likely EACs**

The contractor's final CPR (attached) shows the program's outcome: $3,450,000 overrun and completion in the month 20 (8 months late). This Case Study is based upon an actual program; the name and time frame have been changed to retain confidentiality.

Notes on Final CPR:

1. The Program Management /Support (LOE) costs continued during the 8 month slip (budget ended in month 12) resulting in an overrun of $150K. An underrun of $600K was predicted in the month 7 CPR.
2. General and Administrative (G&A) costs at 17.33% contributed to nearly $600K of the program's overrun.
3. While the Materials were firm fixed price (FFP), the costs of Excavation and Hauling were the primary drivers to the program's overrun. Consequently, it is important to note that when performing analysis using only level 1 data, where LOE is a part of the program data, the results can often be a more optimistic Estimate at Completion (EAC) prediction than the outcome. When LOE is not being performed because of schedule problems on the program (reference contractor's month 7 CPR, which shows Program Management/Support CV of $500K) the Cost Variance is not a true underrun, but merely LOE which has yet to be performed. Favorable LOE cost variances must be considered when conducting program level analysis.