## Earned Value Problem

Calculate earned value for each month of the pavement project used in the previous homework (Unit Price Bid Problem). Use the unit prices given in Table 1 below. Notice that the project has been simplified to the items shown in Tables 1 and 2 below. The actual performance data is given in Table 3. The work schedule network is given in Figure 1.

Make a graph of BCWS, ACWP, BCWP (vertical axis) versus time (horizontal axis) in months of total project duration (3 lines in one chart).

Table 1 - Unit prices:

| Pay Items | Quantity | Unit | \$/Unit | Labor hr |
| :--- | ---: | ---: | ---: | ---: |
| Detour | 1 | LS | 62,000 |  |
| Install Base | 8,000 | CY | 79.00 | 5,000 |
| Topping | 36,000 | SY | 35.00 | 9,000 |

Table 2 - Estimated costs:

| Cost Item | Quantity | Unit | Material | Equip. | Labor | Sub | Duration |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Detour | 1 | EA | $\$ 14,000$ | $\$ 24,000$ | 16,000 |  | 15 Install <br> 10 Remove <br> 20 Deliver |
| Concrete plant(for <br> topping) | 1 | EA |  | $\$ 60,000$ |  |  |  |
| Install base <br> Concrete topping <br> Quality control ( $1 / 2$ for <br> base and $1 / 2$ for topping) | 12,000 | CY@ | $\$ 14$ | $\$ 15$ | $\$ 13$ |  | 30 |
| Variable overhead $\$ /$ day) | 1 | CY@ | EA | $\$ 60$ | $\$ 25$ | $\$ 34$ | 40,000 |

Table 3 - Actual performance on project: Month = 20 working days
Day refers to 6:00 pm (end of day)

| Month | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ | $\mathbf{5}$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Detour in | Started day 3, finished day 16 |  |  |  |  |
| Detour out | Started day 94, finished day 98 |  |  |  |  |
| Concrete plant | Delivered day 19 |  |  |  |  |
| Install base Start/Finish | $23 / 59$ | $3,800 \mathrm{CY}$ | $4,500 \mathrm{CY}$ |  |  |
| Labor hours |  | 2,760 | 2,740 |  |  |
| Place topping | $59 / 92$ |  | $1,000 \mathrm{SY}$ | $20,000 \mathrm{SY}$ | $15,000 \mathrm{SY}$ |
| Labor hours |  | 700 | 6,300 | 3,500 |  |

## Change Orders:

Install base
Place topping

Change order $=+\$ 2.00 / \mathrm{CY}$ and $\mathrm{U}_{\mathrm{p}}=+500 \mathrm{CY}$ (during $2^{\text {nd }}$ month) Increase thickness by 2 inch And Change order $=+\$ 4.00 / \mathrm{SY}$ (during $2^{\text {nd }}$ month)

Figure 1: CPM Schedule


