2B. Habitat Improvement Scenario (40 pts)

Mr. McKay, a former investment banker, owns a 1,000 acre ranch located in central Utah. His ranch is on a transition zone between a sagebrush steppe ecosystem and a conifer forest. In this area, there is two separate aspen groves and Mr. McKay has read about the Sudden Aspen Death (SAD) syndrome that seems to happening to aspen groves around the nation. Aspens are slowly dying off and are not regenerating with only a few theories as to why this is happening. While the SAD syndrome is somewhat disputed among scientists, Mr. McKay would still like to protect his two aspen groves and maintain their health. One of the theories he has read about has been the lack of fire within aspen stands and the invasion of conifers and thinks that he can address these problems on his groves.

One of the groves is 3.5 acres in size and the other is 6 acres. Both are adjacent to a pine-fir mix forest on the higher elevation side and sagebrush steppe on the lower elevation side. Mr. McKay has noticed more and more Douglas firs growing within the aspen stand due to fire having not gone through the area for 27 years. An elk herd also migrates through the area and love to browse on the young aspen trees. Once the treatment is put in place, the elk will be temporarily excluded from the groves to give them time to regenerate. He has decided to partner with the local US Forest Service to help with removing conifers and regenerating the stand.

Under this management plan they will perform the following tasks: 1) log the largest Douglas fir trees and sell to a commercial lumber mill for a profit, 2) perform a prescribed burn to kill off smaller firs and stimulate regeneration of aspen trees, 3) build a split-rail wooden fence around the groves to exclude elk browsing, and 4) return the following late spring and lop off any surviving firs with a chainsaw crew.

Equipment:
- The logging equipment required for the treatment will cost $400/day.
- Fence equipment will cost $5.30 per 8 foot long pole.
    - Grove 1 has a perimeter of 1,384 ft.
    - Grove 2 has a perimeter of 1,812 ft.
    - The wooden fence will be 4 rows high with two poles on each side (see Figure 1).
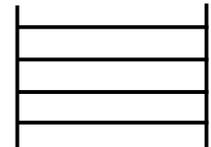   - Hint: There will always be **1 vertical pole** for every **4 horizontal poles**

Figure 1.

Labor:
- It will take a team of three people four days to log the two groves. The work days will consist of 10-hour shifts and each person on the logging crew will be paid $20/hour.
- A separate four-person crew will come in to perform the prescribed fire at a rate of $350/acre.
- A local FFA Chapter will put up the fence as a fundraiser. The team will consist of 10 people who will work for 7 days at the rate of $80/person a day.

Other:
- A survey shows that there are 16 trees big enough to sell with an average of 45 board feet each.
- Each board foot will sell for $6.56.
- The US Forest Service is willing to cover the cost of sending a crew in post-burn to do a thinning treatment in the late spring to remove any surviving fir saplings.

How much will it cost for Mr. McKay to perform this management plan?
**Show your calculations by category (equipment, labor, other) with a grand total:

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How much will it cost total for the Mr. McKay to perform this management plan?

Show calculations based on each financial category:

Equipment:
- Logging equipment: $400/day x 4 days= $1,600
- Fencing equipment: 1,384 ft / 8 ft horizontal poles = 173 horizontal poles x 4 = 692 poles
    692 horizontal poles + 173 vertical poles = 865 poles
    865 poles x $5.30/pole = $4,584.50
    1,812 ft / 8 ft horizontal poles = 227 horizontal poles x 4 = 908 poles
    908 horizontal poles + 227 vertical poles = 1,135 poles
    1,135 poles x $5.30/pole = $6,015.50
- **Cost of equipment= $1,600 (logging) + $10,600 (fencing) = $12,200.00**

Labor:
- Logging treatment: 3 people x 4 days x 10 hour shifts x $20/hour = $2,400
- Prescribed fire treatment: $350/acre x (6 acres + 3.5 acres) = $3,325
- FFA Chapter: 10 people X 7 days X $80/day = $5,600
- **Cost of labor= $11,325.00**

Other:
- Logging profit: $6.56 /board foot x 45 average board feet x 16 trees = $4,723.20
- **Profit of logging= $4,723.20**

Total cost of management plan = $12,200.00 + $11,325.00 – $4,723.20 = $18,801.80