Dear CEO,

The following report was made as requested. I have explored all of our options in order to determine what path of pipeline will save us the most money. I have chosen to include Three types of paths: Strictly BLM Land, Shortest path across private land, and a mix of Private land and BLM land.

Route A consist of two options, first heading east through the mountain and then South, Second west then South and east around the private land. The first option is a total of thirty miles, including through the mountain. It will cost $500,000 per mile with additional cost of $2 million for drilling and environmental study. The total comes to $17 million. The Second option is a total of thirty-six miles. It will cost $500,000 per mile with no additional cost, which brings the total cost to $18 million.

Route B runs Directly from the oil Rig to the refinery, across the private land. To do this, we use geometry to find the shortest distance. The pythagorean theorem allows us to use the 8 miles South and 22 miles east to determine the diagonal, which is the shortest distance, to the Refinery. This will Require an additional $350,000 per mile bringing the cost to $850,000 per mile. The total miles would be $\sqrt{548}$ miles, Bringing the total cost to $19,897,990.

Route C runs South through the private land and then east across BLM land. The cost function for this, with the additional cost, would be:

$$C(x) = 850{,}000\sqrt{64+x^2} - 500{,}000x + 11{,}000{,}000$$ (work shown in Decimal form of millions.)

By finding the derivitive and minimizing the function we are able to minimize the cost of our pipeline.

As you Can See, Mr CEO, The figure in part D shows the most optimum route for laying the pipeline. It will consist of approximately 9.89 miles through Private ground and 16.18 miles across BLM Land. This will come to a total of exactly $16,499,090.83 for all of the pipe and any additional cost. This is the lowest cost for our company and will save us millions.

Thank you,
Jared Hansen

Project 2 - Jared Hansen

A) I. $C = .5(30) + 12 + .24 + 4(.14)$

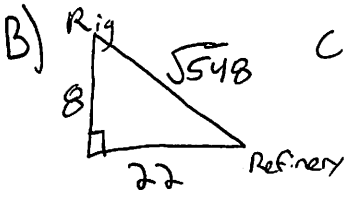
$C = 15 + 1.44 + .56$

$C = 17$ million Dollars

II. $C = .5(3) + .5(8) + .5(25)$

$C = 1.5 + 4 + 12.5$

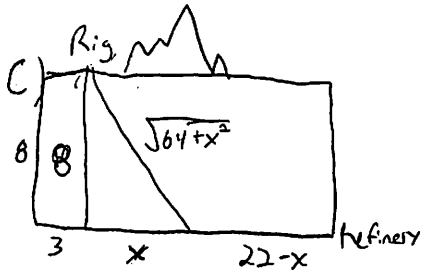
$C = 18$ million Dollars

B) 

$C = (.5 + .35)(\sqrt{548})$

$C = (.85)(\sqrt{548})$

$C = 19.897\,99$ million

C) 

$C(x) = .85(\sqrt{64+x^2}) + .5(22-x)$

$C(x) = .85\sqrt{64+x^2} + 11 - .5x$ in millions of Dollars

D) $C'(x) = \frac{.85(2x)}{2\sqrt{64+x^2}} - .5$

$= \frac{.85x}{\sqrt{64+x^2}} - .5 \overset{=0}{=} DNE$

$.5 = \frac{.85x}{\sqrt{64+x^2}}$

$(.5\sqrt{64+x^2})^2 = (.85x)^2 \rightarrow .25(64+x^2) = .7225x^2 \rightarrow 16 + .25x^2 = .7225x^2$

$-.25x^2 \quad -.25x^2$

$16 = .4725x^2$

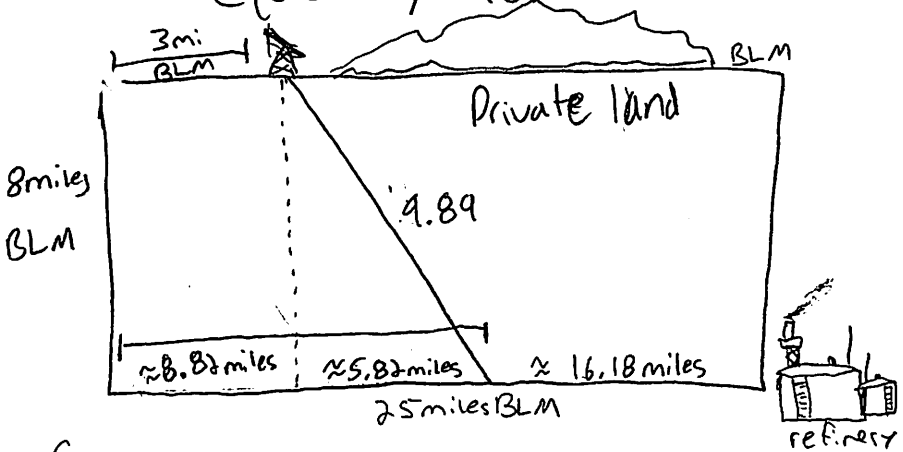
$\frac{16}{.4725} = x^2$

$\sqrt{33.8624\ldots} = \sqrt{x^2}$

$x = 5.81914374$

when $x = 5.819\ldots$ $C(5.819\ldots) = .85\sqrt{64+(5.819\ldots)^2} + .5(22-(5.819\ldots))$

$C(5.819\ldots) = 16.49909083$ million Dollars



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