Title: Designing a Pipeline with Minimal Cost

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Problem: A common problem encountered by the oil industry is determining the most cost-effective pipeline route in connecting various wells in an oil fertile area. The attached map is a section of a U.S. Geographical Survey Contour Map of northeast Ohio with wetland (swamp) area outlined for clarity. An existing oil well is located approximately at the point labelled B. If a new well is to be dug at point A, a pipeline installation company must be directed as to where to lay connecting pipe. In consultation with the installation company, the following information has been obtained:

- Straight, two-inch coated pipe must be used at a cost of $1.50/foot.
- A maximum of two elbow joints may be used. Assure that the elbows may be fabricated with any angle measure.
- In crossing normal terrain, installation cost is $1.20/foot.
- Installation in the wetland area requires an additional Track Hoe at a cost of $60/hour. (i.e., 2 are required for wetland, 1 for land)
- In a 10 hour day, a Track Hoe can dig approximately 300 feet of trench. On land 2 Track Hoes will dig 300 feet in 10 hours on wet.

Determine the pipeline route connecting the new well at A to the well at B which incurs the least cost.

Suggestion: First, solve the problem as if the wetland separating A and B were a rectangle, then improve on this solution by modelling the wetland area more accurately.