

# Transfer Stations





# Transfer Station

- Alternative to direct haul
- Justified when cost to transport waste from generation point to disposal site is greater than cost to transport from generation point to transfer station plus haul to the disposal site



# Benefits

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- Large trailers replace many collection vehicles
- Get collection vehicles back to work rapidly
- Locate disposal site far from population areas
- Opportunity to inspect waste
- Opportunity to process waste
- Use multiple disposal sites



# Need

- Presence of illegal dumps and litter
- Remote disposal sites
- Small capacity collection vehicles
- Low density residential areas



# Types

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- Direct discharge – waste pushed into open trailers
- Storage pit – tip onto floor, into hoppers to compactor that pushes waste into vehicle



# Transfer Station Tipping Floor



MSW  
Tipping  
Tool



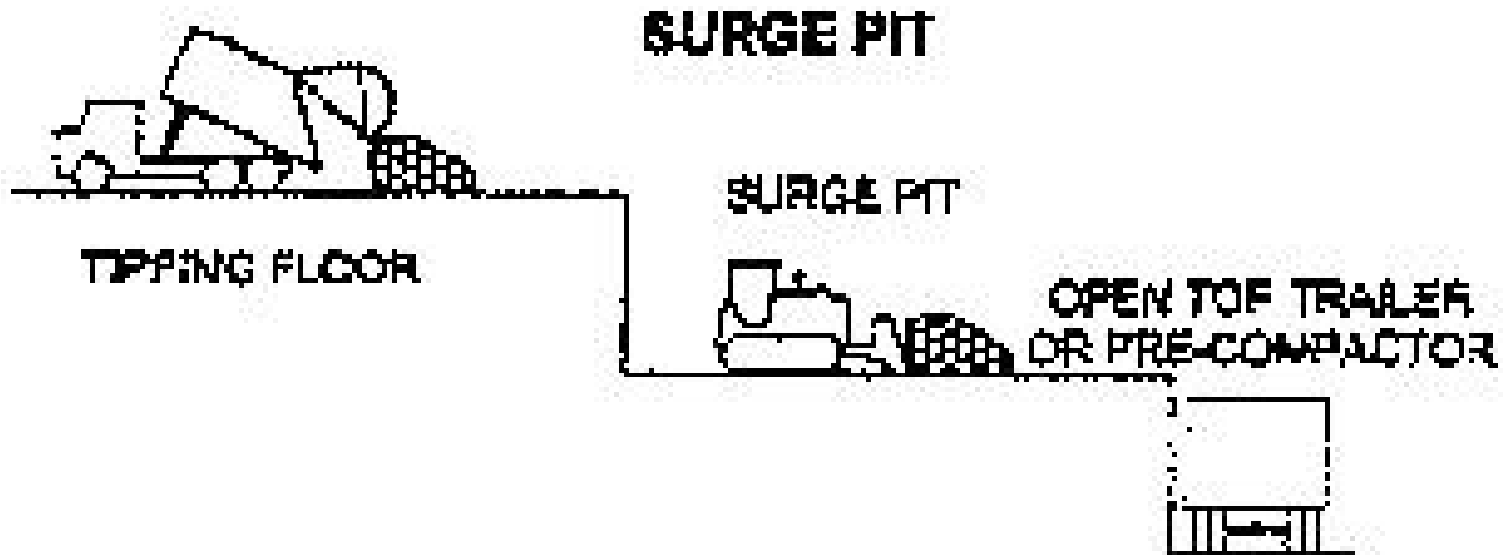


# Compacter





# Surge Pit

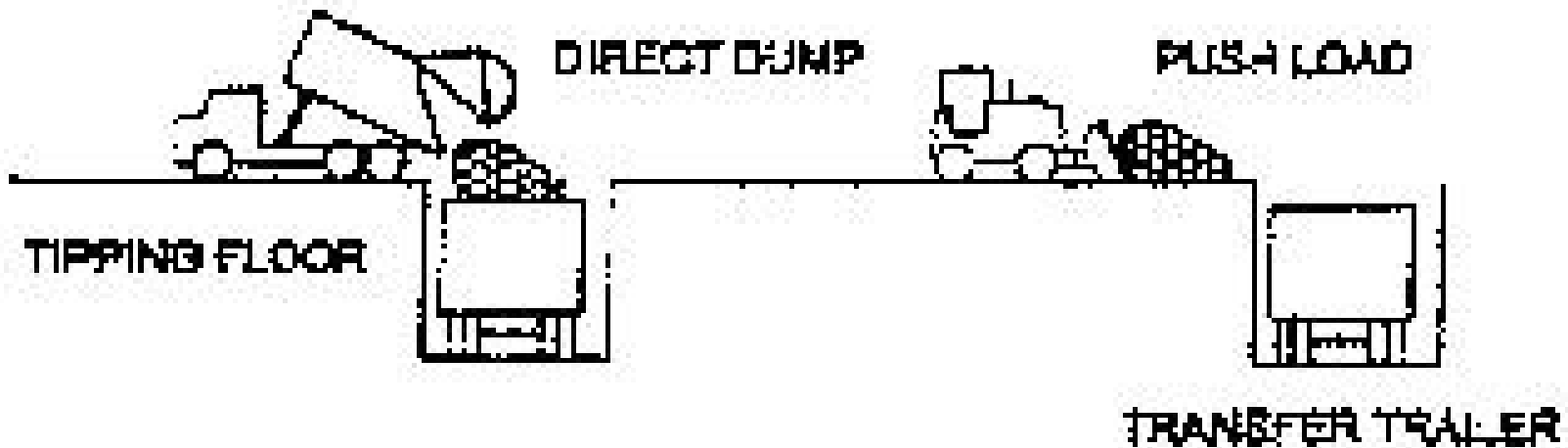






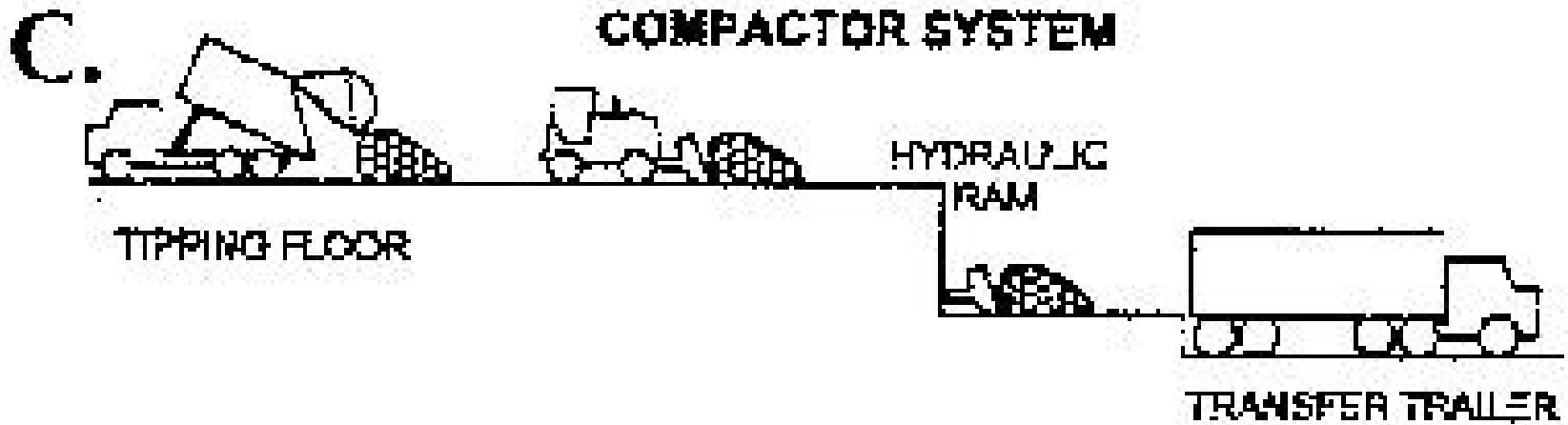
# Open Top Transfer Trailers

## OPEN TOP TRANSFER TRAILERS



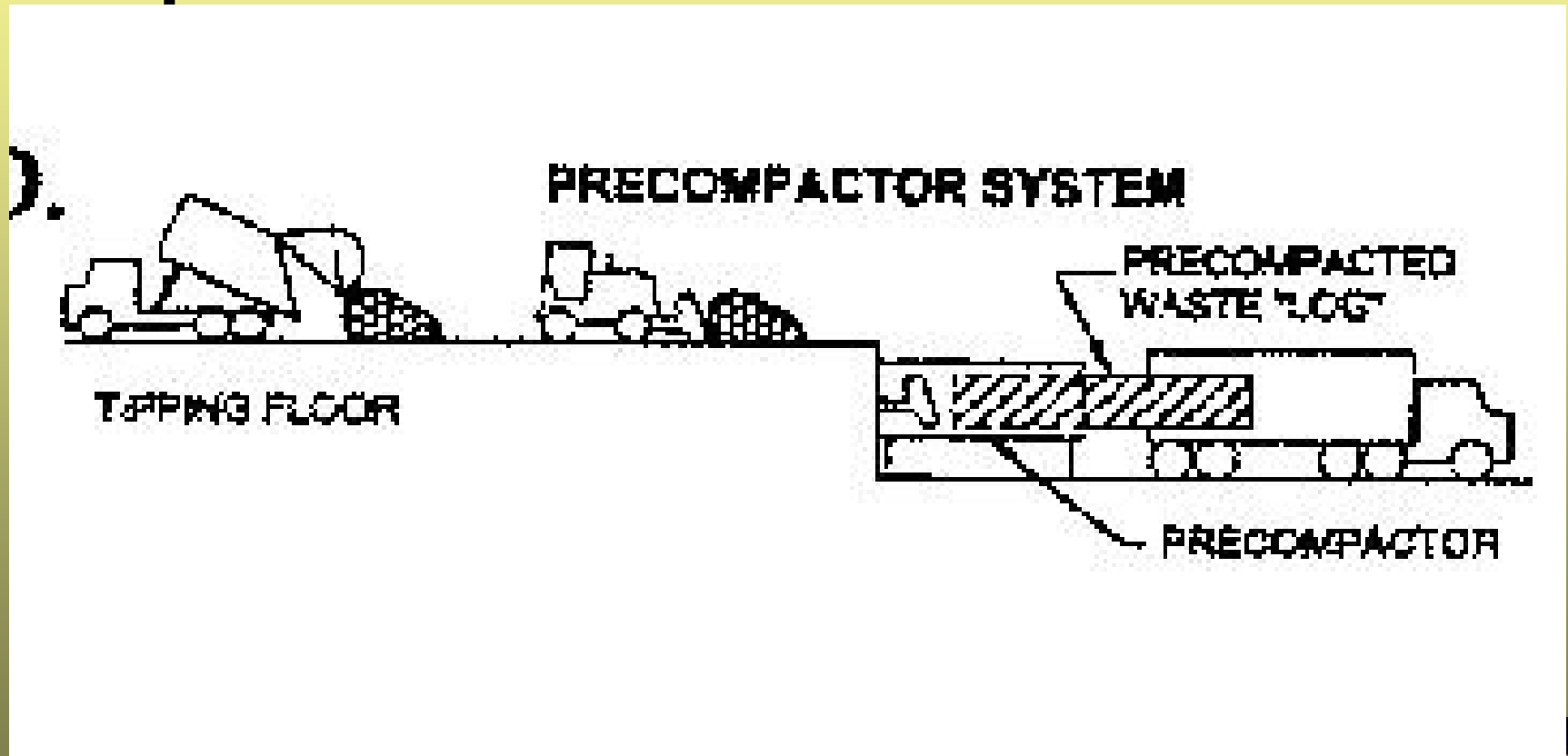


# Compactor System





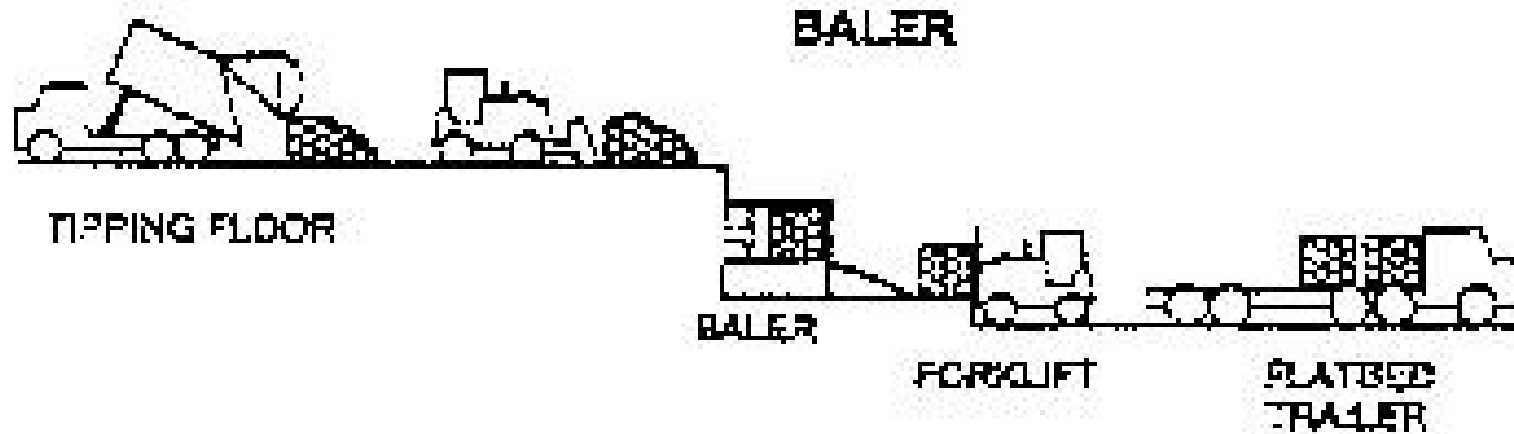
# Precompactor System





# Baler

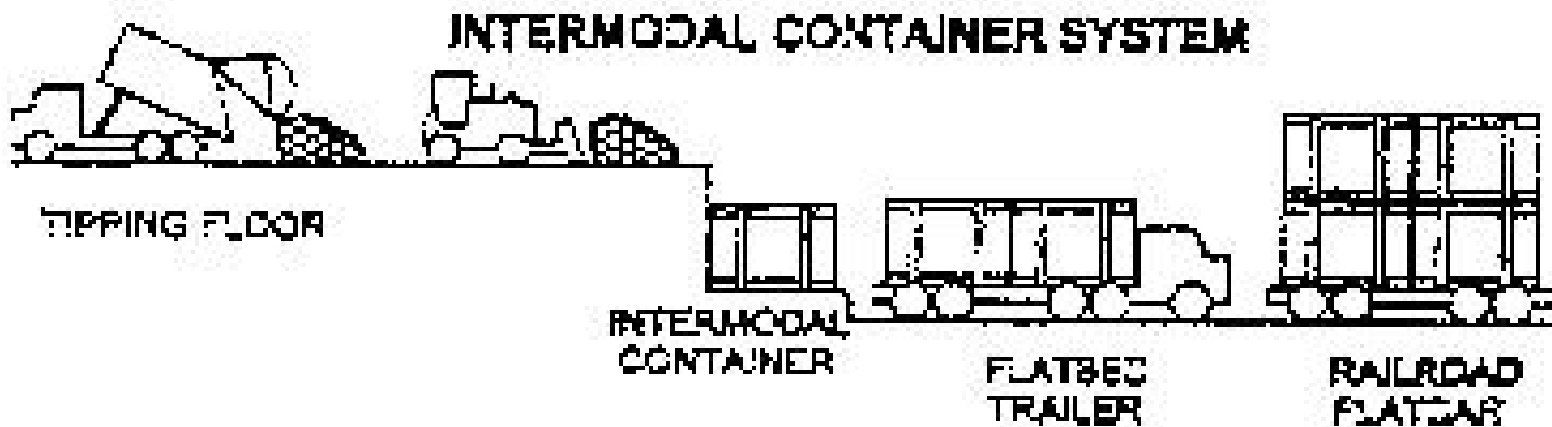
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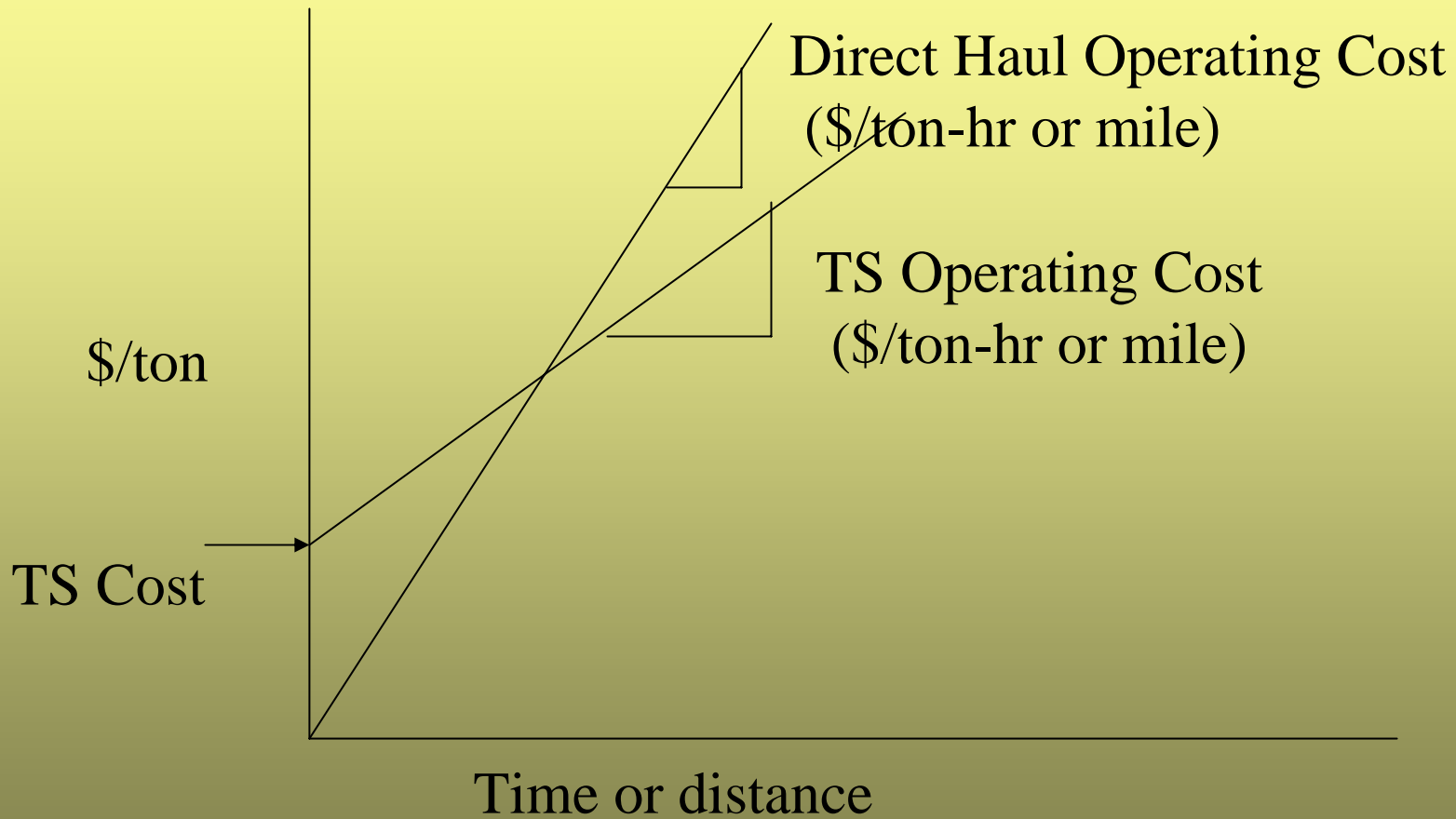




# Intermodal Container System

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# Problem Statement

- Determine the break-even haul time between a direct haul system and a transfer station operation with the following properties:
- Direct haul system uses a 10 yd<sup>3</sup> container
- Direct haul cost = \$20/hr
- The transfer trailer has a capacity of 100 yd<sup>3</sup>
- Tractor- trailer haul cost = \$40/hr



# TS Facility Costs

- Function of amortized capital cost, capacity, operating costs
  - Cost \$3,750,000 (for bldg, equipment, tractor/trailer)
  - Capacity of 300,000 yd<sup>3</sup> per year
  - CRF is 0.08 (capital recovery factor is a function of interest rate and years to pay off – converts capital cost to \$/yr), yr<sup>-1</sup>
  - TS operating cost is \$225,000/yr
- Normalize all costs by capacity







# Step 1a: Calculate Capital Cost Elements (TS)

TS total cost/yd<sup>3</sup> = annual capital cost plus annual op cost

Amortize Capital cost:

$$= \$3,750,000 \times 0.08 = \$300,000/\text{yr}$$

Total annual costs:

$$(\$300,000 + \$225,000) \text{ yr}^{-1} = \$525,000/\text{yr}$$

Cost/yd<sup>3</sup>:

$$(\$525,000/\text{yr})/300,000 \text{ yd}^3/\text{yr} = \$1.75/\text{yd}^3$$





# Step 1b: Calculate Hauling Operating Cost

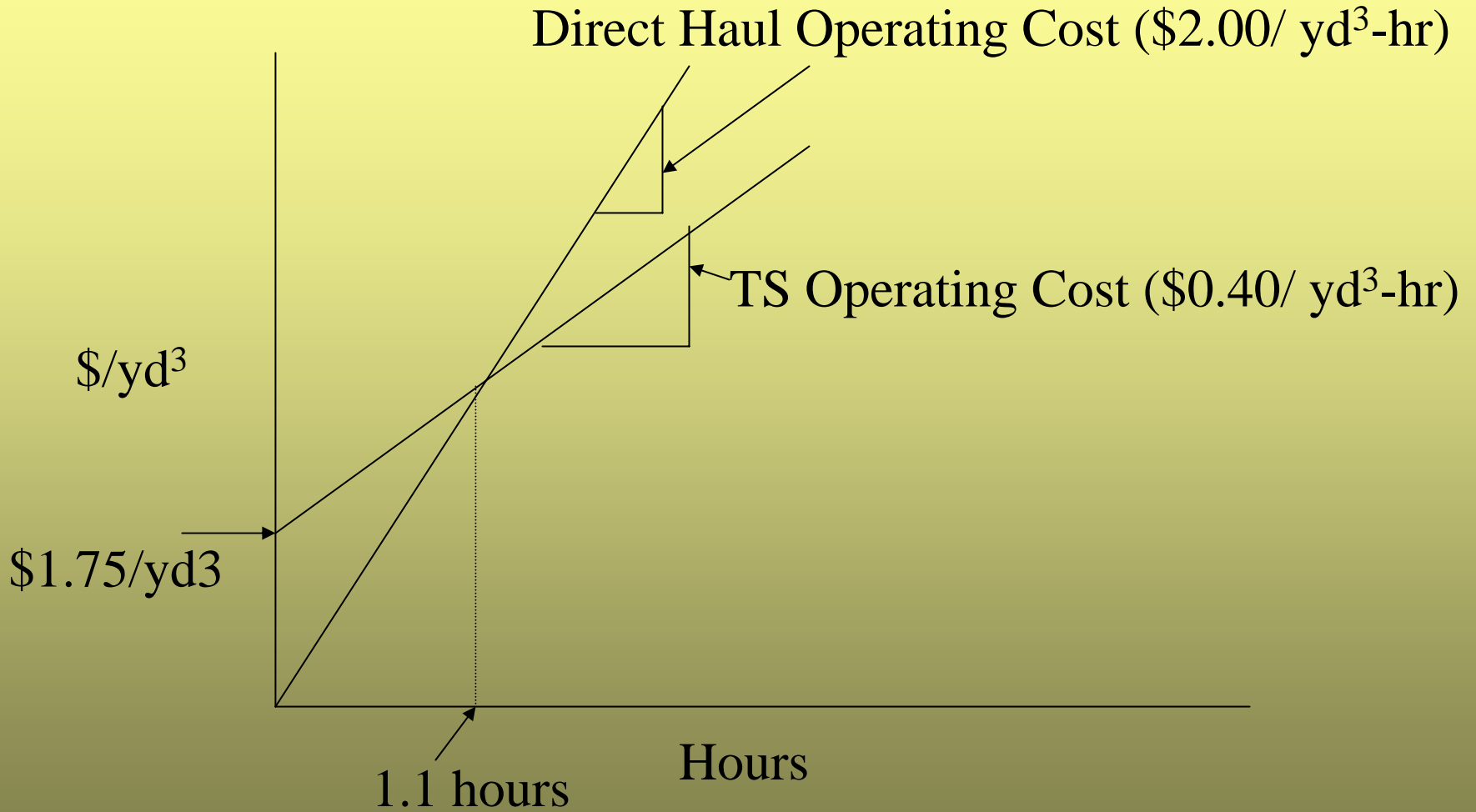
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TS trailer haul operating cost =

$$\$40/\text{hr}/100 \text{ yd}^3 = \$0.40/\text{hr-yd}^3$$

Direct haul operating cost =

$$\$20/\text{hr}/10 \text{ yd}^3 = \$2.00/\text{hr-yd}^3$$





## Equate Direct Haul Costs to Transfer Station Costs to Calculate the Break Even Haul Time (x)

$$\$2.00/\text{hr}\text{-yd}^3 \times x = \$1.75/\text{yd}^3 + \$0.40/\text{hr}\text{-yd}^3 \times x$$

$$x = 1.1 \text{ hours}$$



# Class Example

A community which generates waste at a rate of 90 tons/day (7 days/wk) is considering the use of a transfer station. The community already owns collection vehicles so their cost can be ignored. Develop the appropriate cost equations and determine the break-even haul time for the following conditions:





# Problem Data – Direct Haul

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- Direct Haul System
  - Vehicle Capacity = 8 tons
  - Hauling Cost = \$30/hr



# Problem Data - TS

- Present day Facility cost (operating and capital) = \$5000 per ton of capacity/day
- Trailer cost = \$30,000 ea
- Trailer capacity = 30 ton
- Trailer hauling cost = \$35/hr
- Work Week = 5 days\*
- Use 1 tractor and 3 trailers
- CRF = 0.12
- Tractor cost = \$50,000 ea

\*Hint: determine the design capacity of the station Based on a 5 day work week. Calculate total facility cost using this value.





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