HW Clarifications

- P4: For the beams assume Concrete mix to be 1:1:1.75
- P4: Aggregates use the following items:
  - Cement: Portland type I: 03060-200-0240
  - FA: 03060-110-0250
  - CA: 03060-110-1050
- P5: This is a 2 way slab (L/B<2)
- HW2: Modifications applied to unit costs

Next Week

- 10/3, Monday: Dr. Stan Vitton
- 10/5,6 Wednesday/Thursday: MERL: Estimating Highway Construction Projects
- 10/10-13: Computer Estimating/ Simulation methods
- On going lab-work: Division 3 material take off on Van Nuys Drawings (Concrete, formwork, rebar)

Sources of Equipments

- Purchase
  - Ownership costs
    - Investment: Interest-Income loss
    - Depreciation: Due to use and age (different approaches)
    - Taxes & Insurance
  - Operating costs
    - Maintenance & Repairs
    - Fuel & lubricating oil
- Rent
  - Rental costs
  - Operating costs
  - Lease with option to purchase

Calculating Depreciation

- Linear depreciation
  - P: List price + Freight cost + Sales Tax + Setup Cost
  - F: Salvage value
  - n: Number of years
  - (P-F)/n: Yearly depreciation
- Sum of Digits method
- Declining Balance method

Ownership Costs

- Capital Recovery Equation
  - \( A = \frac{P( i (1 + i)^n)\left[1 + i^x - 1\right]}{(1 + i)^x} \)
- Sinking Fund Equation
  - \( A' = \frac{F\left[i\right]\left[1 + i^x - 1\right]}{(1 + i)^x} \)
- Cost of Ownership: \( A - A' \)
- \( i \): Minimum attractive rate of return
- Sum of interest rate for borrowing money, risk, tax, insurance, storage
Operating Cost

- Maintenance & repair costs
  - 80-120% of Depreciation costs
- Fuel consumption
  - Rated Power * Operating factor * 
    \( 0.04 \text{gal/(hp.hr)} \)
  - Operating factor: Time factor * Engine factor
- Lubricating oil costs
  - Eqn 5.3
- Cost of tires

Total cost (ex. Operator)

- Total hourly ownership cost +
- Total hourly operating cost

Contractors’ Dilemma

- Compare
  - Hourly fixed + variable costs of new equipment
  - Hourly rent cost + variable costs of rented equipment