CHAPTER 5 - ACTIVITY DURATIONS

ESTABLISHING ACTIVITY DURATIONS

- NECESSARY STEP BEFORE SCHEDULING CAN START
- STEPS
  - SELECT THE TIME UNITS TO BE USED (HRS, DAYS, WKS, MOS)
  - ESTIMATE THE TIME FOR EACH ACTIVITY BASED ON
    - TYPE AND AMOUNT OF WORK TO BE DONE
    - METHOD TO BE USED
    - TYPE AND AMOUNT OF RESOURCES TO BE USED
- ACTIVITY DURATION ESTIMATES CAN COME FROM
  - COMPANY'S HISTORICAL DATA
  - FIELD PERSONNEL
  - INDUSTRY HANDBOOKS (E.G., R.S. MEANS)
- MUST INCLUDE ALLOWANCES FOR
  - WEATHER
  - OTHER CONTINGENCIES

SELECTION OF TIME UNITS (TIME SCALE, LEVEL OF DETAIL)

- SHORT ACTIVITIES REQUIRE A TIGHT SCALE AND VICE VERSA
- DAYS ARE THE TYPICAL UNITS IN CONSTRUCTION
  - MOST RESOURCES WORK 8 HR/DAY, 40 HR/WEEK
  - ASSUME THAT EACH DAY = 8 HRS
  - ASSUME THAT EACH WEEK = 5 DAYS
- FOR RESOURCES THAT WORK OVERTIME E.G., 12 HR/DAY
  - KEEP THE SAME WORKING DAY
  - MAKE A NOTE THAT 1 WORKING DAY = 12 HOURS
- FOR ACTIVITIES THAT WORK 24/7, E.G., CONCRETE CURING,
  - USE THE TOTAL REQUIRED DURATION INITIALLY
  - PERFORM SCHEDULING COMPUTATIONS
  - ADJUST DURATION AS NEEDED TO ACCOUNT FOR WEEKENDS
- DO NOT MIX CALENDAR DAYS WITH WORKING DAYS
- SCHEDULING SOFTWARE AVOID THESE PROBLEMS
  - ALLOW EACH ACTIVITY OR RESOURCE TO HAVE ITS OWN CALENDAR
    - 8 HR/DAY, 5 DAYS/WEEK
    - 12 HR/DAY, 6 DAYS/WEEK
    - 24 HR/DAY, 7 DAYS/WEEK
  - USE HRS INTERNALLY FOR SCHEDULING COMPUTATIONS
  - CAN SHOW RESULTS IN DAYS, OR WEEKS, OR MONTHS

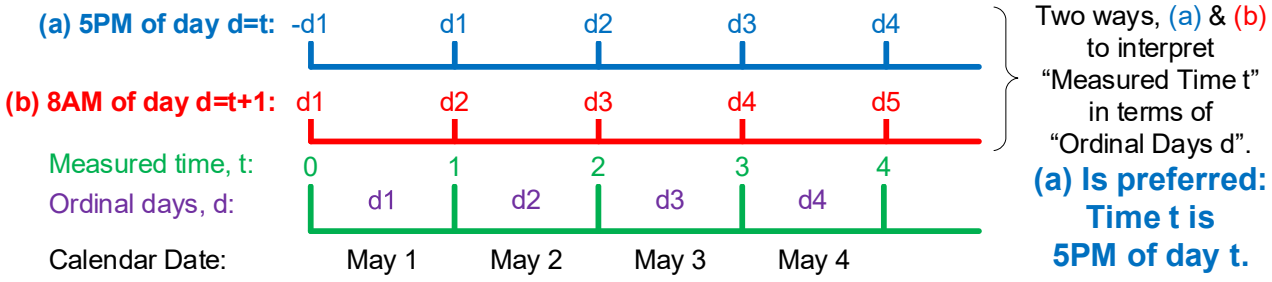
- **ESTIMATING ACTIVITY DURATIONS**
  - ESTIMATES OF ACTIVITY DURATIONS MUST BE ACCURATE, REALISTIC
    - MUST NOT BE AN OFF-HAND GUESSES
  - ESTIMATOR MUST USE PAST DATA
    - EVEN THOUGH COMPANY DATA ARE GEARED MORE TOWARDS ESTIMATING COST RATHER THAN ESTIMATING TIME
  - MOST DIRECT ADDITIONAL RESOURCE IS THE FIELD FORCE
  - SUPER & FOREMEN SHOULD PARTICIPATE IN PLANNING AND SCHEDULING PROCESS
  - THEY ARE THE ONES THAT HAVE TO ADHERE TO TARGET SCHEDULE
  - FACTORS AFFECTING GETTING INPUT FROM FIELD PERSONNEL
    - SIZE OF THE COMPANY
    - PHYSICAL LOCATION OF ESTIMATOR AND FIELD PERSONNEL
    - ORGANIZATIONAL PROXIMITY OF THE ESTIMATOR TO FIELD PERSONNEL
  - INDUSTRY HANDBOOKS (E.G., R.S. MEANS) ARE USED
    - TO CHECK OWN ESTIMATES
    - WHEN NO COMPANY DATA ARE AVAILABLE

WEATHER ALLOWANCES

- WEATHER (OR ITS MISMANAGEMENT) IS THE ALLEGED CAUSE OF MOST DELAYS
- THE IMPACT OF WEATHER MUST BE INCLUDED IN ACTIVITY DURATIONS
- **METHOD (A)**
  - INCLUDE ONE OR MORE “WEATHER BUFFER ACTIVITIES”
    - AT THE END OF THE NETWORK OR
    - AT THE END OF WEATHER-SENSITIVE SEGMENTS OF THE WORK
  - EFFECTIVE WHEN
    - MOST OF THE ACTIVITIES ARE WEATHER DEPENDENT
    - MANY OF THE CRITICAL ACTIVITIES ARE WEATHER DEPENDENT AND LONG
  - CAN CAUSE PROBLEMS:
    - ACTIVITIES ARE SCHEDULED ON OPTIMISTIC TIMES
    - IF BAD WEATHER CAUSES DELAYS, MATERIAL DELIVERIES MAY OCCUR TOO EARLY
  - REMEDY:
    - ADD “WEATHER” ACTIVITY(S) AT THE END OF WEATHER-SENSITIVE SEGMENTS
- **METHOD (B)**
  - INCREASE THE DURATION OF EACH WEATHER-SENSITIVE ACTIVITY TO ANTICIPATE POSSIBLE DELAYS
  - EFFECTIVE WHEN
    - FEW ACTIVITIES ARE WEATHER DEPENDENT
    - FEW CRITICAL ACTIVITIES ARE WEATHER DEPENDENT AND MOST OF THEM ARE SHORT
  - CAN CAUSE PROBLEMS:
    - ACTIVITIES ARE SCHEDULED ON PESSIMISTIC TIMES AND THUS MATERIAL DELIVERIES MAY OCCUR TOO LATE

CONTINGENCY ALLOWANCES

- REASONABLY EXPECTED CONTINGENCIES CAN BE ANTICIPATED SIMILAR TO WEATHER DELAYS
  - EXAMPLES:
    - DELAYS IN MATERIAL DELIVERIES
    - LABOR STRIKES
    - DIFFERENT SOIL CONDITIONS
- UNEXPECTED AND UNKNOWN CRISES SHOULD BE HANDLED BY UPDATING THE NETWORK



MEASUREMENT AND COUNTING OF TIME—WHAT IS TIME 0 (ZERO)?

- TWO METHODS TO MEASURE / COUNT TIME IN DAYS
  - A. TIME t (IN DAYS) IS CONTINUOUS & MEASURED FROM TIME ZERO
  - B. TIME "ORDINAL DAYS" IS DISCRETE STARTING FROM DAY 1 (d1)
- **THIS COURSE USES METHOD (A): TIME t IS CONTINUOUS & STARTS AT 0**
  - MAKES CALCULATIONS EASY AND INTUITIVE
  - ALLOWS FOR FRACTIONS IN ACTIVITY DURATIONS
  - **TIME t CAN BE MAPPED INTO ORDINAL DAYS d IN 2 WAYS:**
    - **(a) Time t is 5 PM AT THE END OF DAY d = t (Blue Scale)**
      - PLACES EMPHASIS ON ACTIVITY **FINISH TIMES**
        - START TIME t=1, ➔ ACTIVITY STARTS AT 5 PM ON DAY t=1 i.e., ACTIVITY REALLY STARTS AT 8 AM THE NEXT DAY t+1=2
        - FINISH TIME t=3, ➔ ACTIVITY ENDS AT 5 PM ON DAY t=3
      - **THIS IS THE PREFERRED METHOD** (Finish Times are clear)
    - (b) Time T is 8 AM AT THE START OF DAY d = t+1 (Red Scale)
      - PLACES EMPHASIS ON ACTIVITY START TIMES
        - START TIME t=1, ➔ ACTIVITY STARTS AT 8AM ON DAY t+1=2
        - FINISH TIME t=3, ➔ ACTIVITY ENDS AT 8AM ON DAY t+1=4 i.e., ACTIVITY REALLY ENDS AT 5PM ON DAY t=3
      - **AVOID** (Finish Times are NOT clear and this can lead to delays)
- **SCHEDULING SOFTWARE SHOW DATES USING METHOD (B).**
  - SCHEDULING SOFTWARE SHOWS START AND FINISH TIMES USING "CALENDAR DATES" OR "ORDINAL DAYS" (I.E., INTEGER DAYS 1,2,3,…)
- "DATES" IN MODERN SOFTWARE USE BOTH SCALES, RED AND BLUE
  - ACTIVITIES START AT 8 AM ON THE DATE SHOWN: May 3, 8 AM
  - ACTIVITIES FINISH AT 5 PM ON THE DATE SHOWN: May 3, 5 PM
    - FINISH TIMES FOR DUMMIES ARE AN EXCEPTION
      DUMMIES FINISH AT 8 AM ON THE DATE SHOWN: May 3, 8 AM
- AMBIGUITY: WHEN "ACTIVITY START DATE = ACTIVITY FINISH DATE" (FOR EXAMPLE, "START DATE" = "FINISH DATE" = "MAY 3, 20XX")
  - IS THE ACTIVITY A ZERO-DURATION ACTIVITY (DUMMY)?
  - IS THE ACTIVITY A ONE-DAY ACTIVITY?
  - ANSWER IS NOT CLEAR. SO, CHECK ACTIVITY DURATION ENTRY.