**Problem**: Find minimum average travel time to respond to calls from the 12 districts in Bloomington from its 2 hospitals within the calls/hr constraints for each hospital and district

**Solution**: Find the **minimum average travel time** for any hospital to respond to a call from any district

**Inputs**: in blue in spreadsheet

- Travel time per call (in minutes) from each district to each hospital
- Average calls/hr from each district

**Objective function: Min** (**Average Travel time**) = $\min_{i\in(1\ldots12),\ j\in(1,2)} \sum Xij * Tij$, where

- Minimize the total time for responding to all calls from all districts from both hospitals
- **The result is minimum total units (Calls/hr * Hrs/call)**
    - *Average is not calculated as that would require dividing the equation by total no of calls for both hospitals, which would result in a non-linear problem/solution*
- $\mathbf{X_{ij}}$ – Calls/hr assigned to district i from hospital j
- $\mathbf{T_{ij}}$ - Travel time (hrs) per call from district i to hospital j
    - Data is given in minutes, converted to hrs (divide by 60)
- **i** ∈ **(1…12)** for the 12 districts
- **j** ∈ **(1,2)** for the 2 hospitals

**Decision variable**: $\mathbf{X_{ij}}$ – Calls/hr assigned to district i from hospital j

**Constraints**:

1. $\sum_j \mathbf{Xij}$ **>= 2*ACD$_i$ for all i,** where
    - **ACD$_i$** – Average Calls/hr emanating from each district i
    - Average of both hospitals for each district means 2 is taken to right side of equation to avoid non-linearity
2. $\sum_i \mathbf{Xij}$ **<= MCH$_j$ for all j,** where
    - **MCH$_j$** – Maximum Calls/hr that can be assigned to each hospital j, ∈ (4.9, 5.5)

**Result**:

- The **minimum average travel time** required to respond to a call is **0.92 units**
- Solver method – Simplex LP was used