# Problem Statement –

Suppose you have three zones in an air handling unit (AHU) system, and you want to balance outside air (OA) and supply air (SA) to meet minimum requirements. The parameters are as follows:

AC Unit:

SA = 7500 CFM

OA = 2600 CFM

% Total OA = 34.6%

Zone 1:

Load CFM: 2000

Minimum OA: 600 CFM

* Current %OA: 30%

Zone 2:

Load CFM: 2500

Minimum OA: 1000 CFM

* Current %OA: 40%

Zone 3:

Load CFM: 3000

Minimum OA: 1000 CFM

* Current %OA: 25%

We can meet the requirements by either adding SA or adding OSA to total OA.

Let,

Additional SA = Xi

Additional OSA = Yi

Increase SA Method –

* Xi = Min OA / (%Total OA)

Increase % Total OA Method –

* Yi = (SA \* Current %OA) - (SA \* %Total OA)

Objective: Minimize Xi + Yi

Note that –

each increase in 1000 CFM OSA is x times bad as increasing the SA CFM

# Solution –