

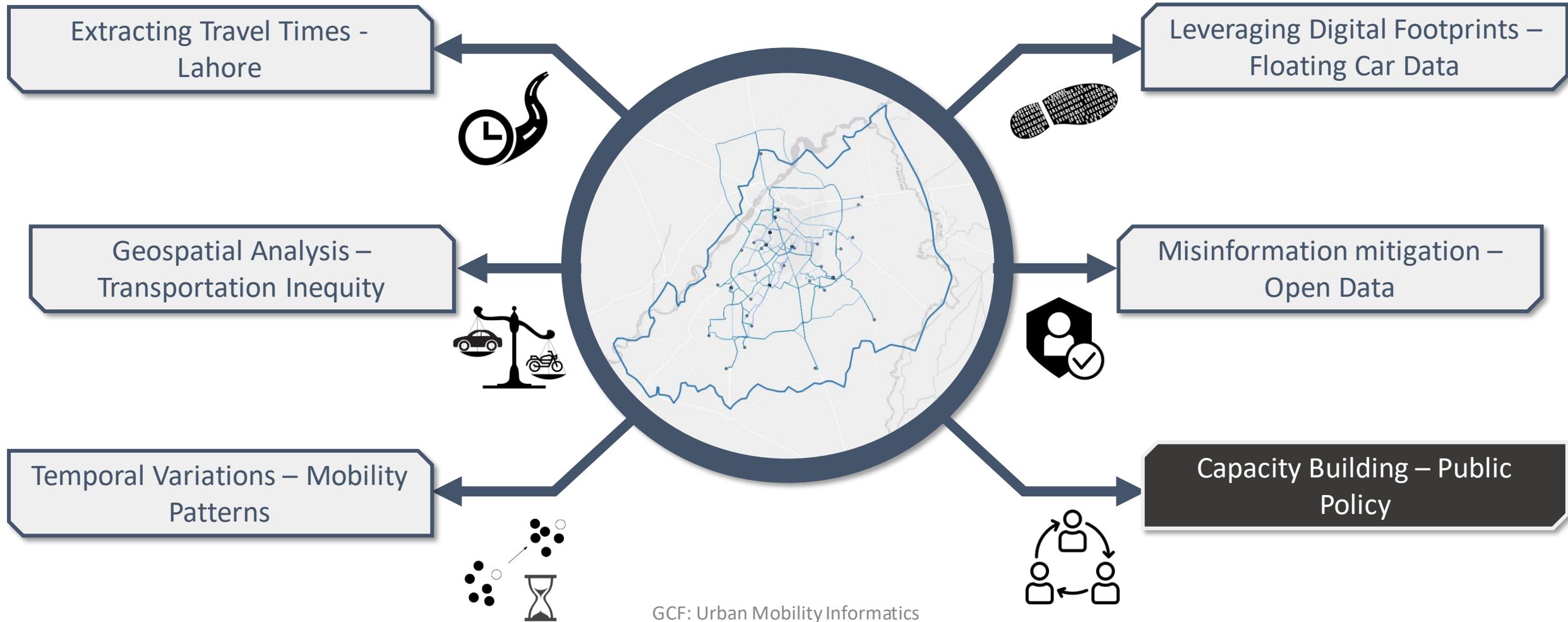


# URBAN MOBILITY INFORMATICS

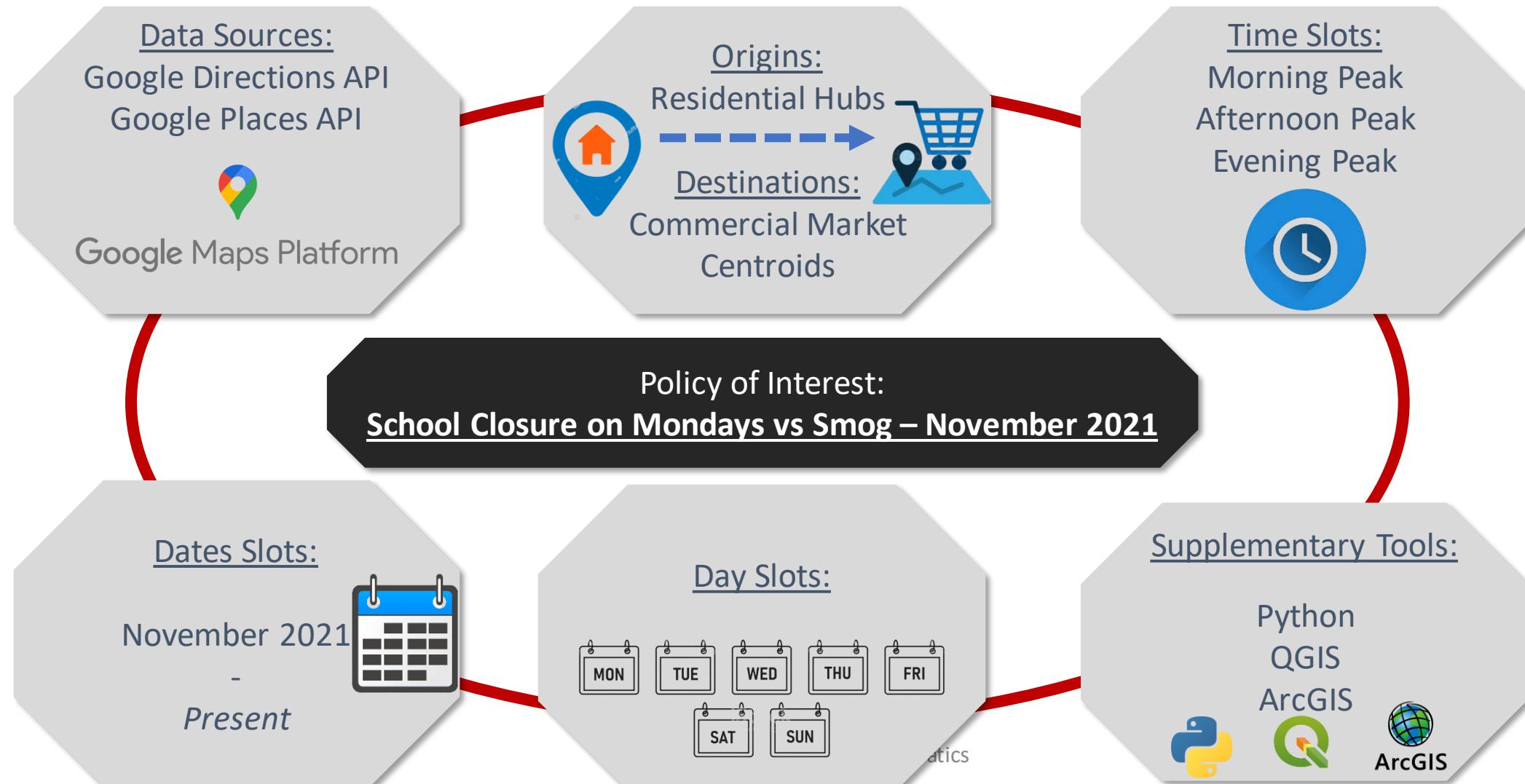
Exploring the bittersweet relationship of schools' closure and smog – an effective step in alleviating traffic congestions?

ABDULLAH AZHAR

# Travel Times: Motivation



# Travel Times: Overview



# Travel Times: Data Source – Google Maps



Directions API

Returns:  
Travel Time  
Travel Distance  
Travel Route

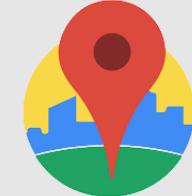
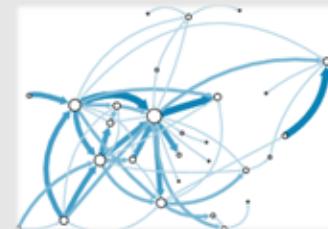
**Incorporates Live Traffic**



Distance Matrix API

Returns:  
Travel Time  
Travel Distance

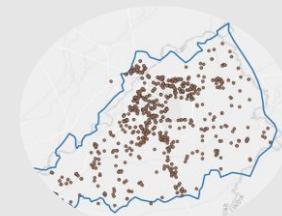
**Incorporates Live Traffic**



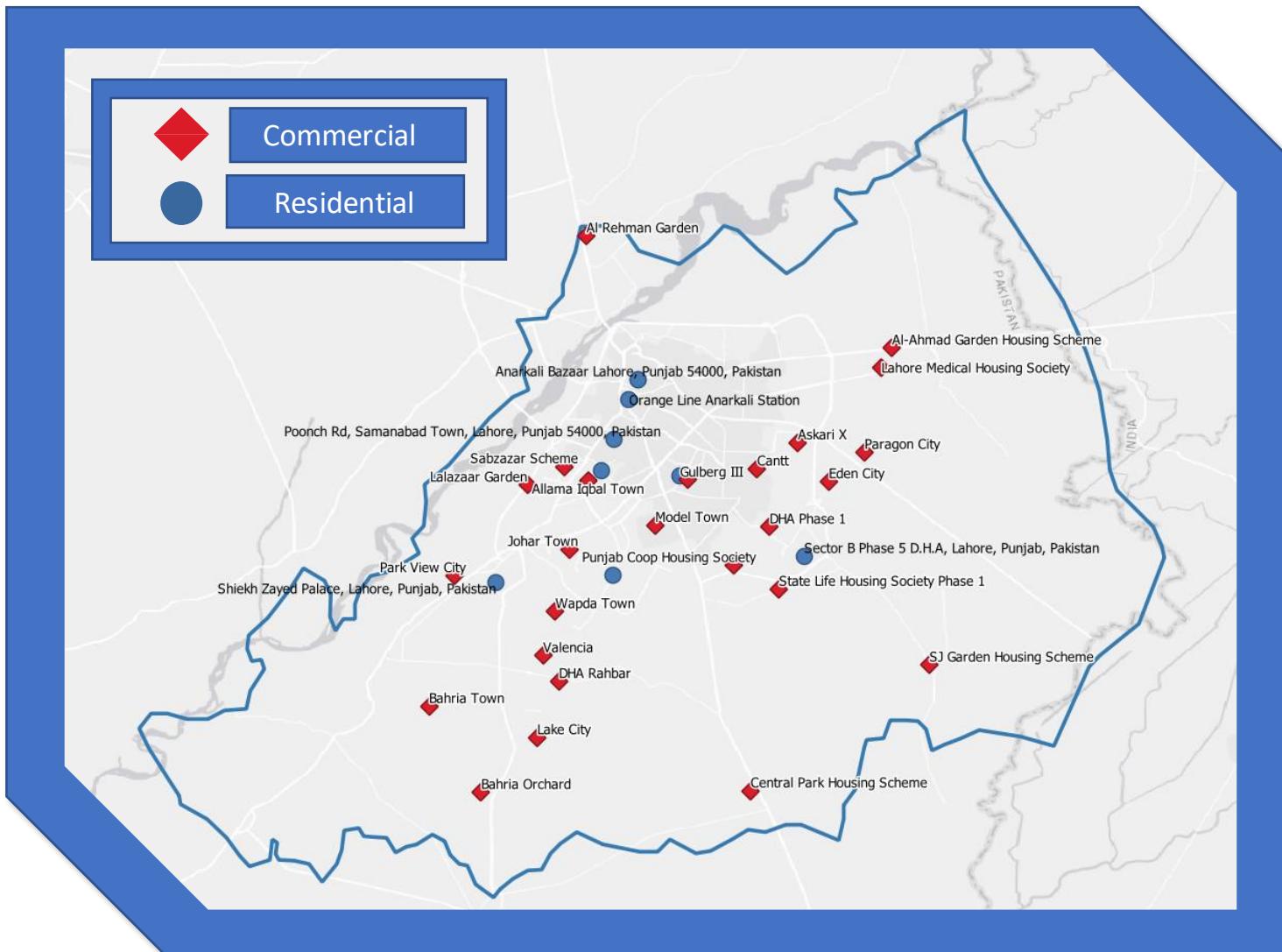
Places API

Returns:  
Geotagged Points of  
Interests

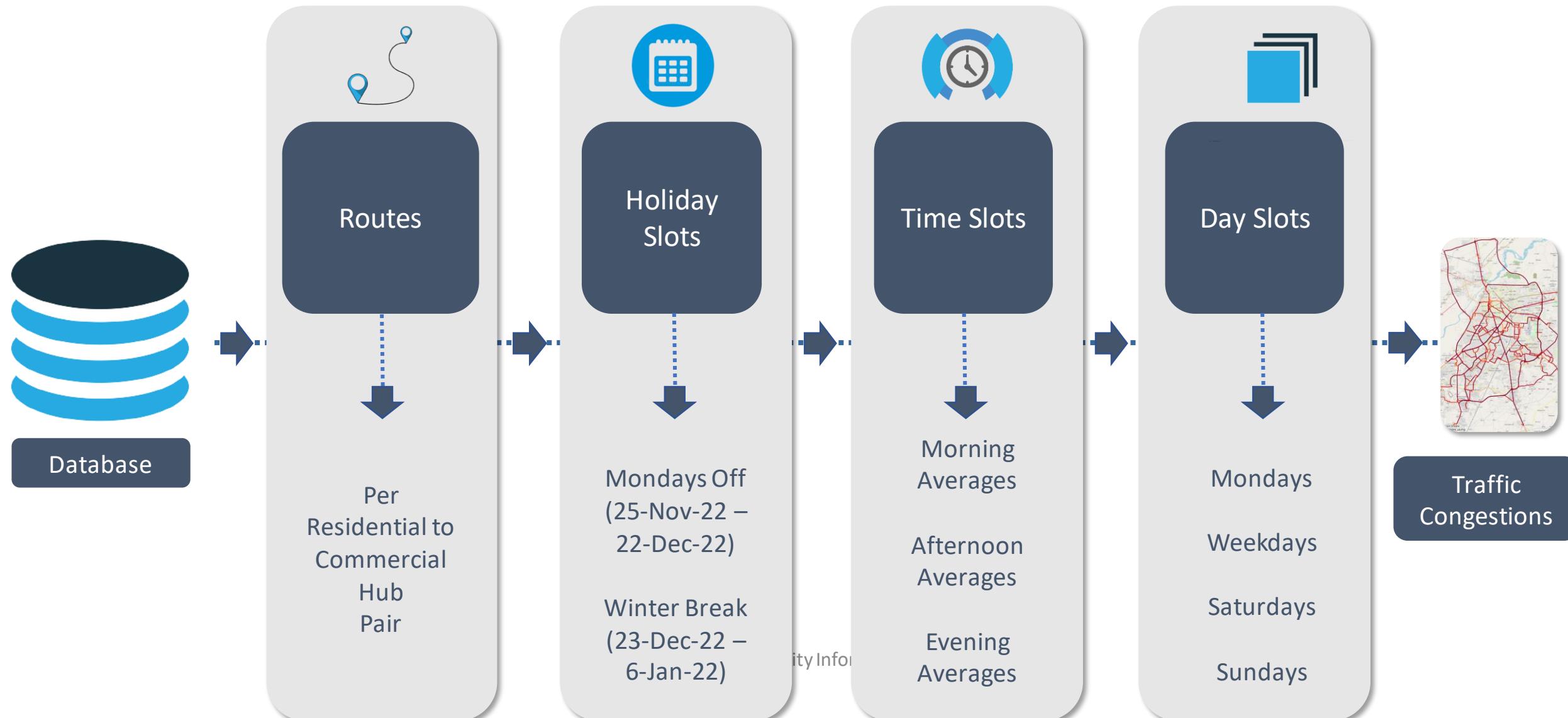
**Identification of Schools**



# Travel Times: Route Identification



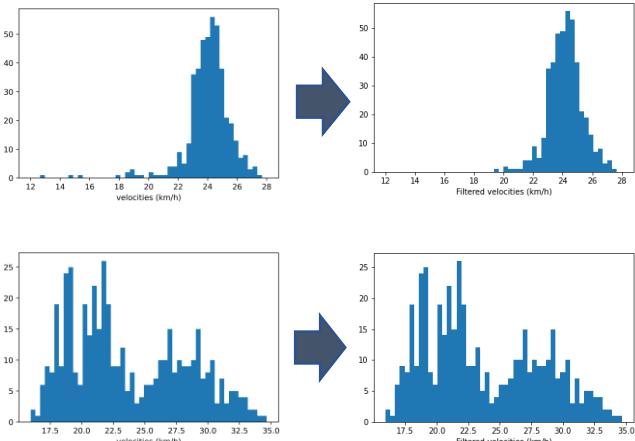
# Travel Times: Analysis Dimensions



# Travel Times: Data Preprocessing

## Removal of Anomalous Values

To attain route specific averages in velocities



$$\mu - 3\sigma < \text{Velocity (km/h)} < \mu + 3\sigma$$



## Base Velocities Normalization

Sunday Velocities per route per time slot taken as base values

Sunday

Saturday

Monday

Weekdays

-Decreasing Velocities ->

Normalized Value:

$$\frac{\text{Velocity} - \text{Sunday Velocity}}{\text{Sunday Velocity}}$$



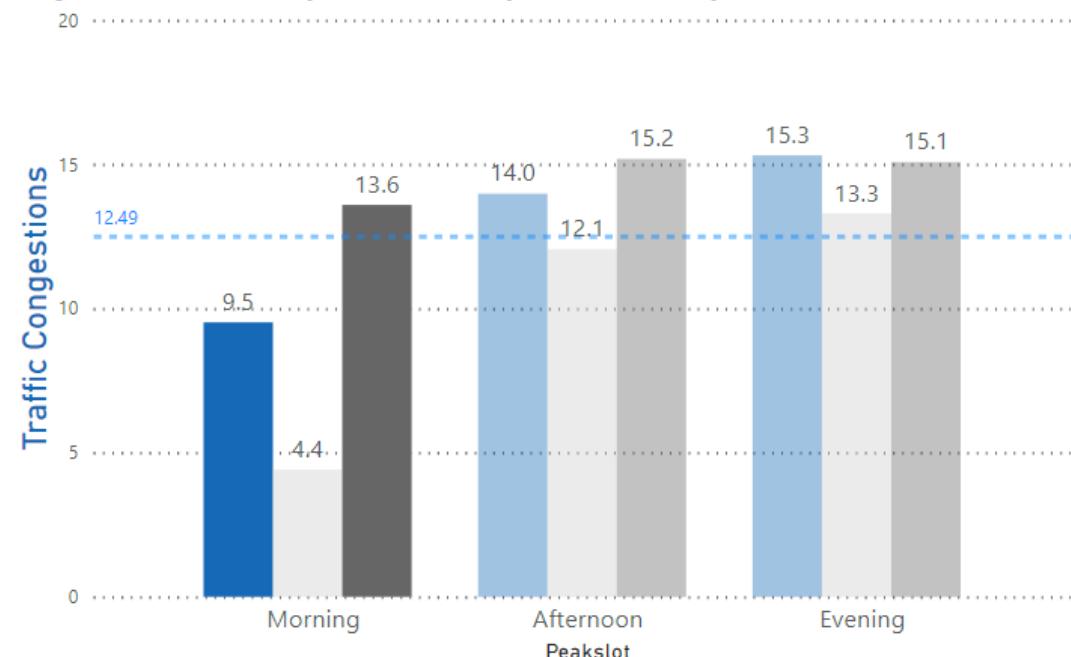
## Data Insights and Conclusions

# Travel Times: Mondays Comparison

Average Velocities (Sundays)  
Before Winter Break: 37.054433 km/h  
During Winter Break: 35.699347 km/h

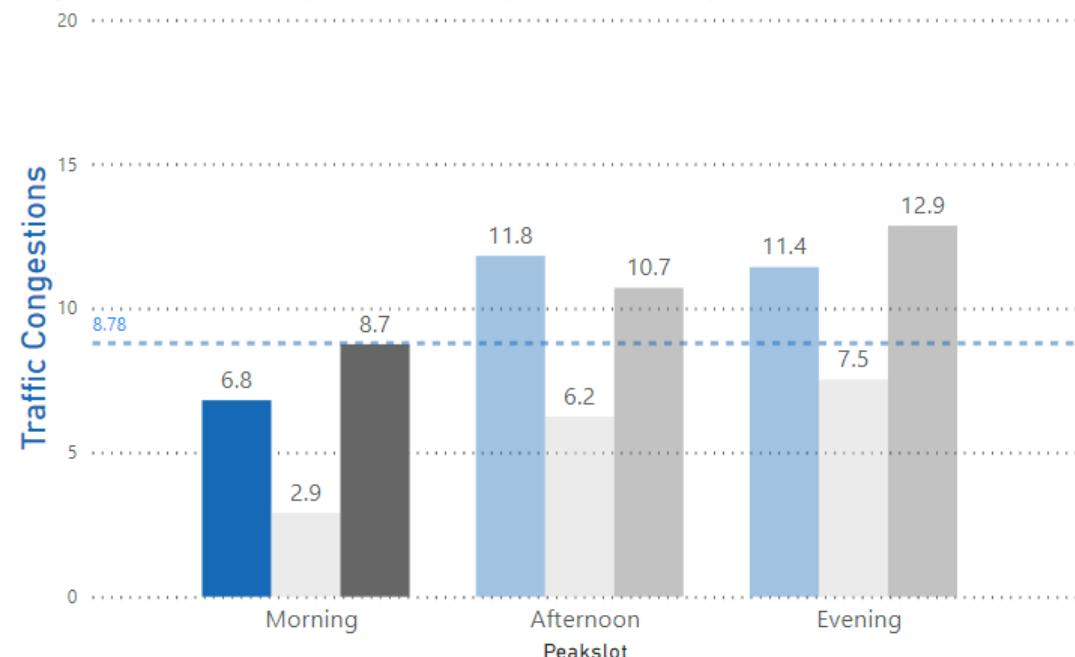
Before Winter Break

Dayslot ● 1. Monday ● 2. Saturday ● 3. Weekday

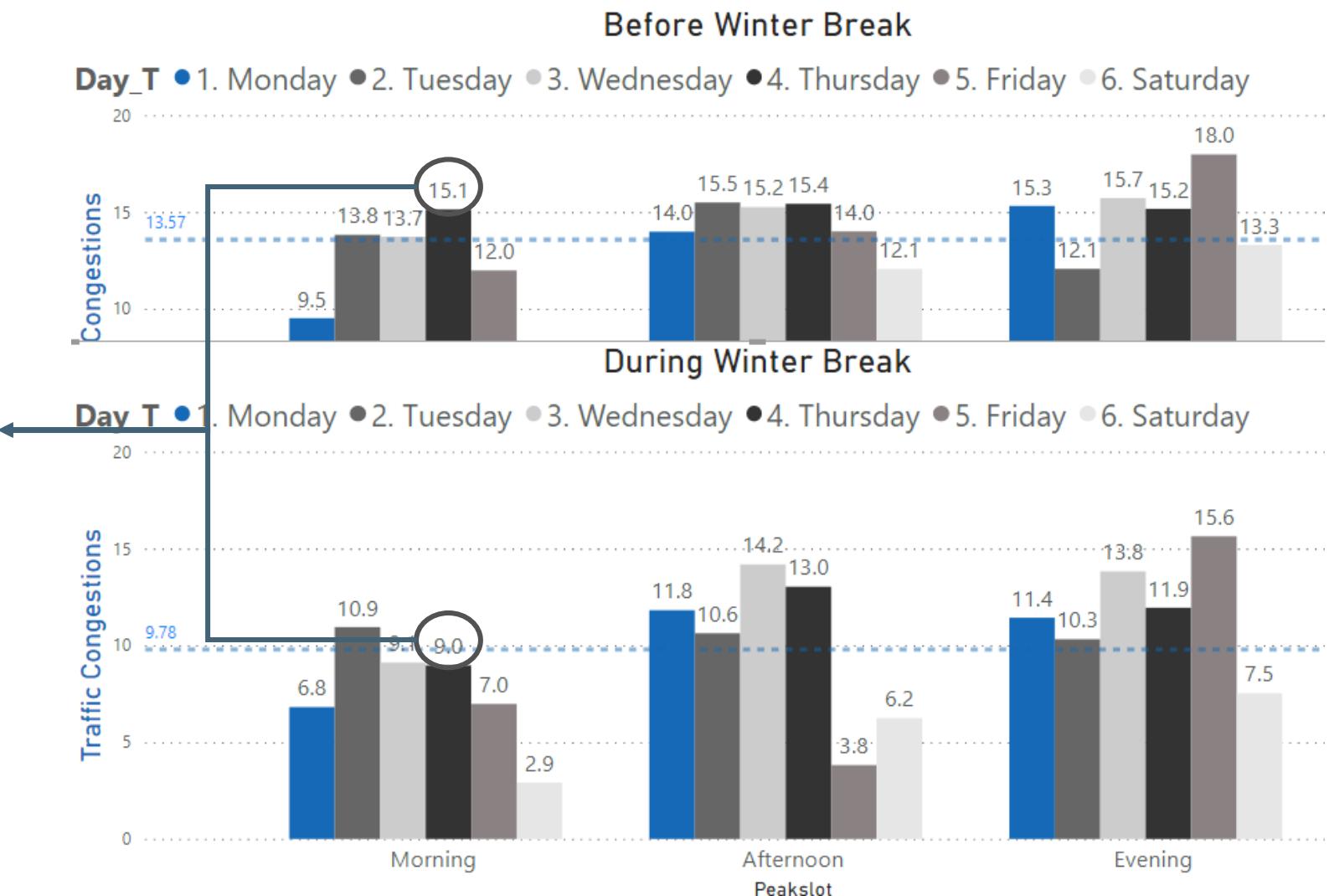


During Winter Break

Dayslot ● 1. Monday ● 2. Saturday ● 3. Weekday

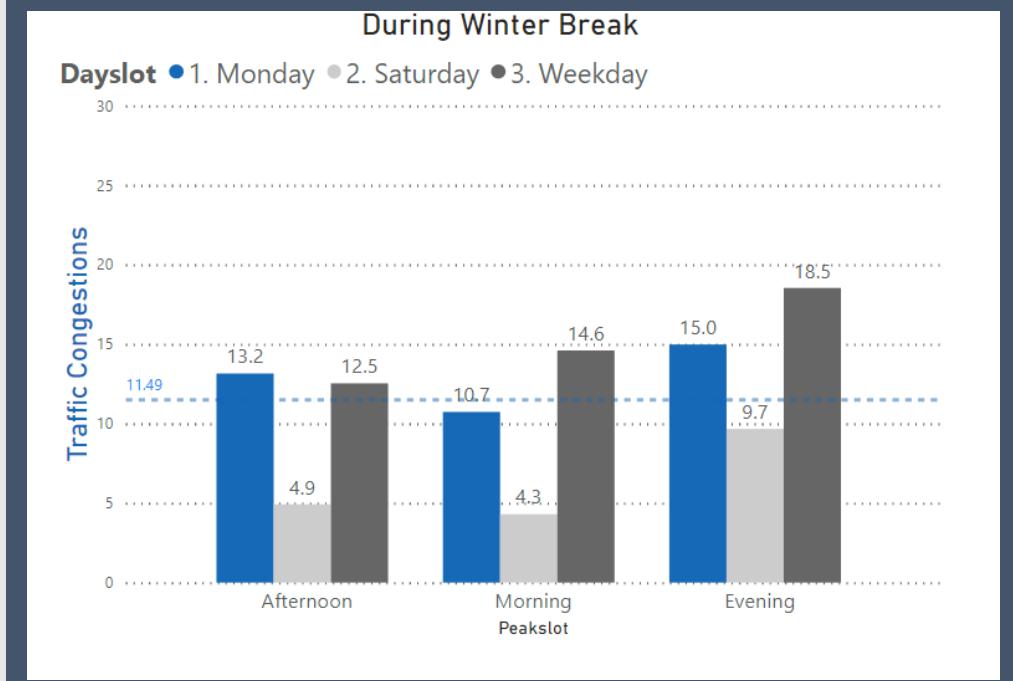
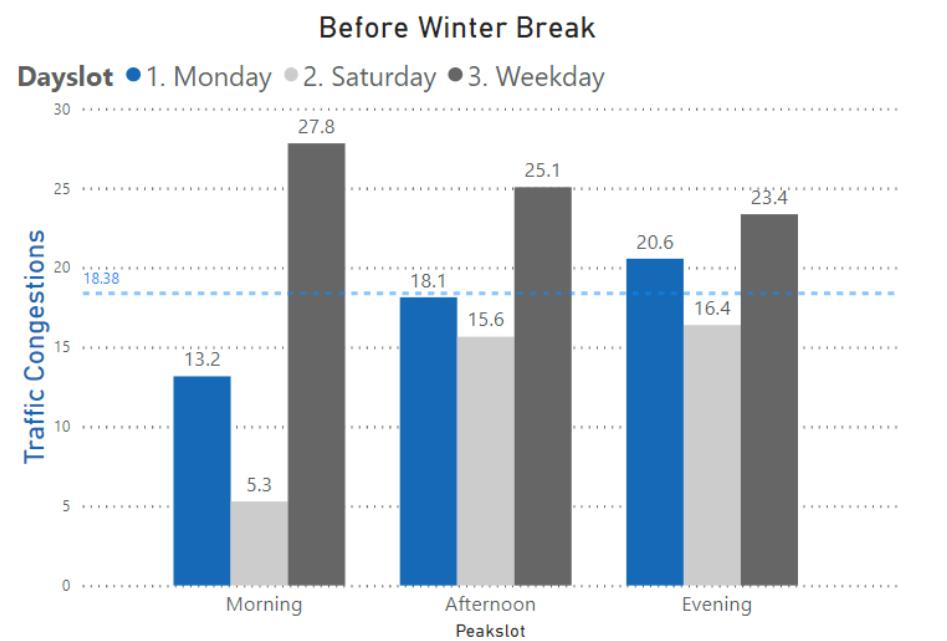


# Travel Times: All Weekdays



# Travel Times: Routes Analysis - Mondays

Valencia -> Hali Rd Gulberg III

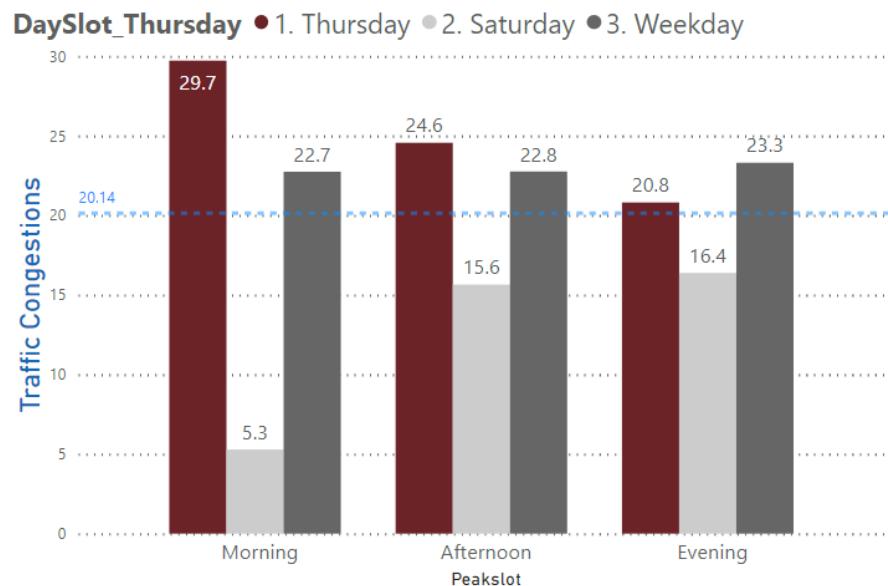


# Travel Times: Routes Analysis - Thursdays

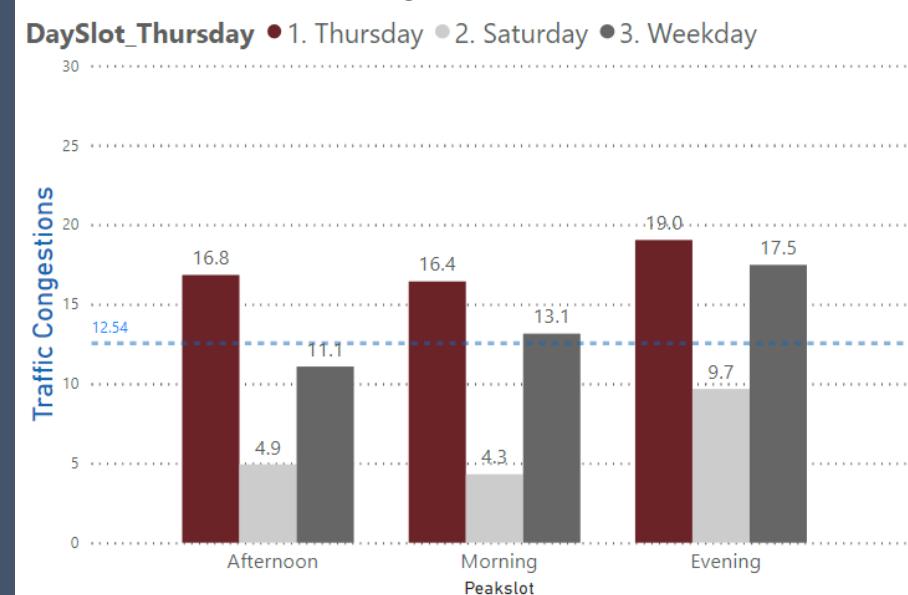
Valencia -> Hali Rd Gulberg III



## Before Winter Break



## During Winter Break



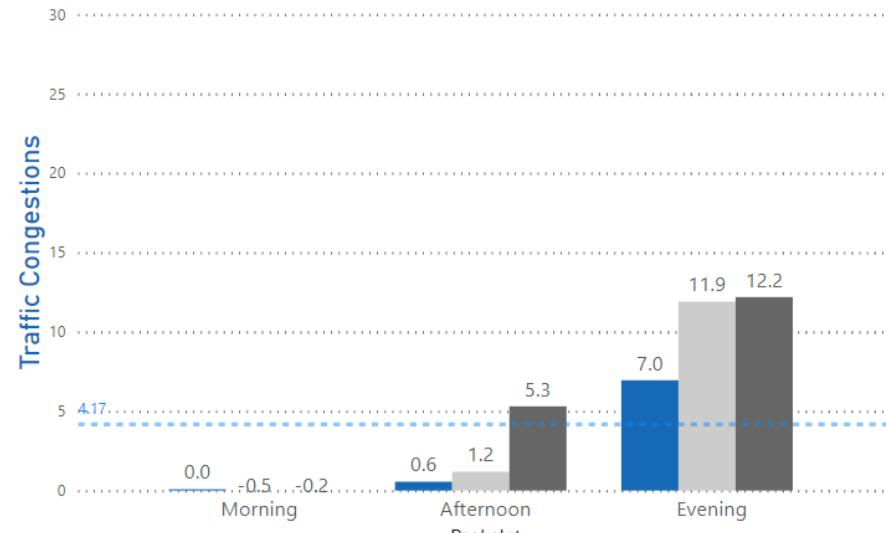
# Travel Times: Routes Analysis - Mondays

Eden City -> DHA Phase 5



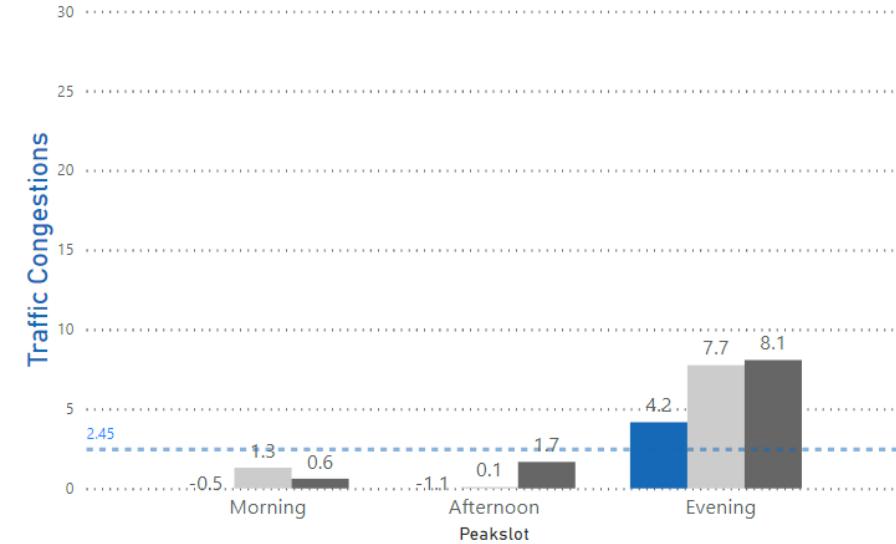
## Before Winter Break

Dayslot ● 1. Monday ● 2. Saturday ● 3. Weekday



## During Winter Break

Dayslot ● 1. Monday ● 2. Saturday ● 3. Weekday



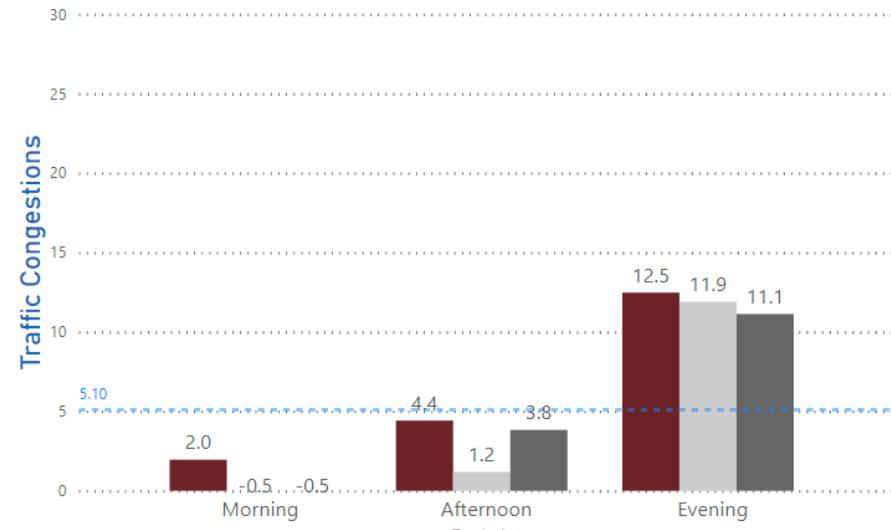
# Travel Times: Routes Analysis - Thursdays

Eden City -> DHA Phase 5



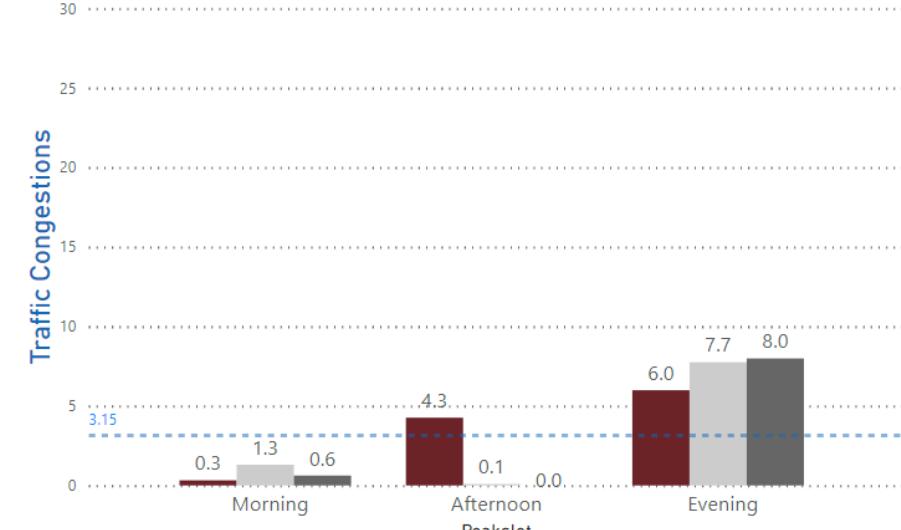
## Before Winter Break

DaySlot\_Thursday ● 1. Thursday ● 2. Saturday ● 3. Weekday



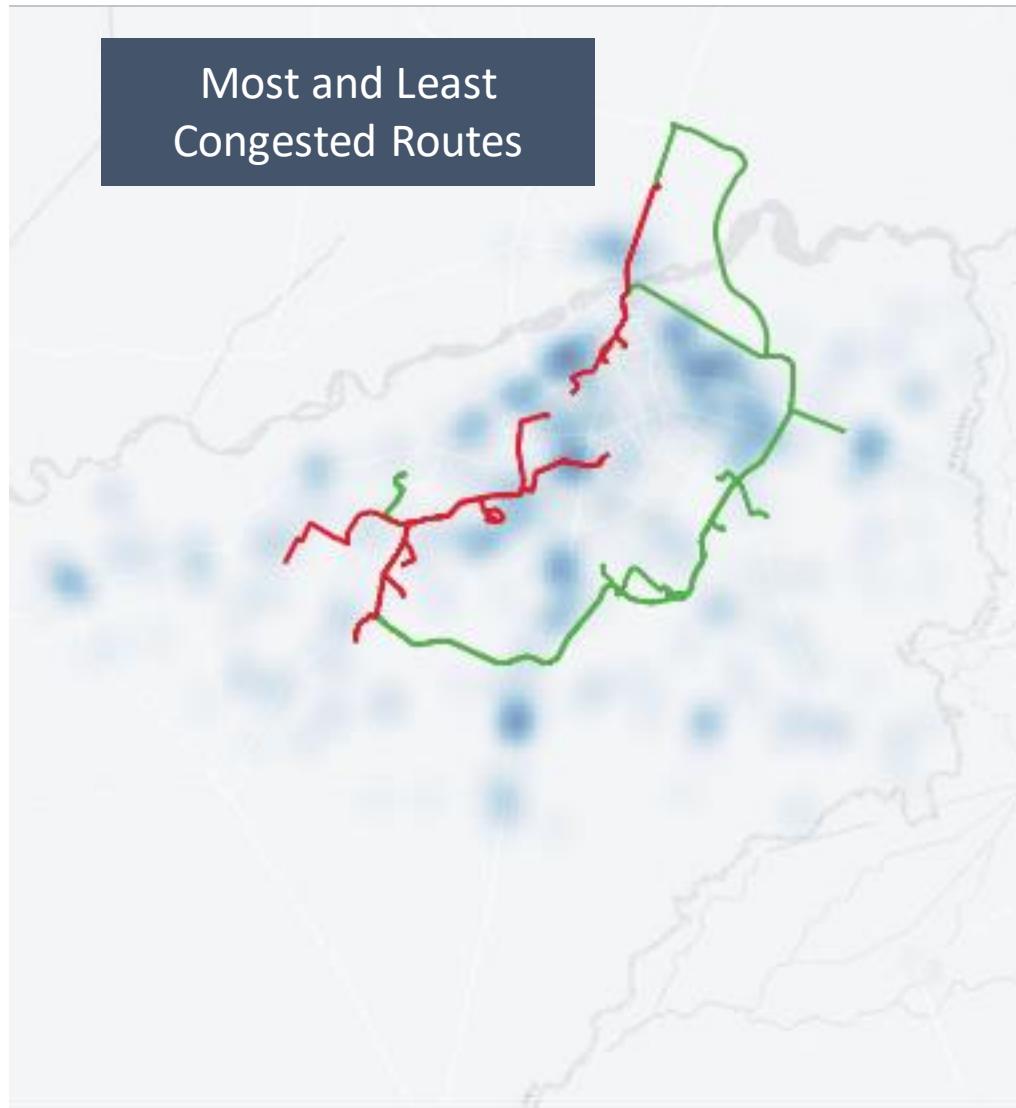
## During Winter Break

DaySlot\_Thursday ● 1. Thursday ● 2. Saturday ● 3. Weekday



# Travel Times: Schools Heatmap

---



Criteria for Most Congested:

Maximum variation of travel speeds from Sunday base to Weekdays

# Way forwards

---

- Identification of Schools as POIs with field attributes for weighted congestion hotspots:
  - Enrolment Cap
  - School Area
  - No. of grades taught
  - Public –vs – private
- Continue the same insights for the remaining date slots
- Merging of times data with other verticals to draw further insights
- Using Machine Learning to predict city level traffic flows via travel times