

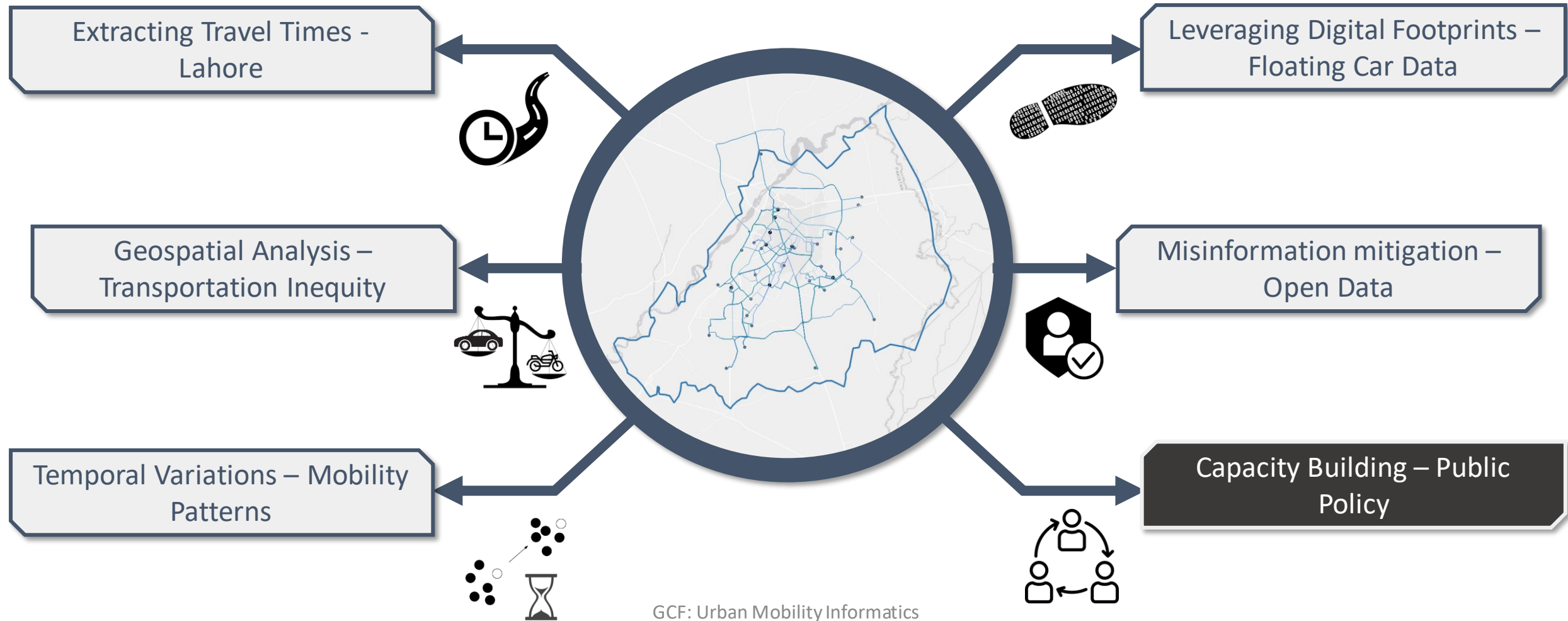


# URBAN MOBILITY INFORMATICS

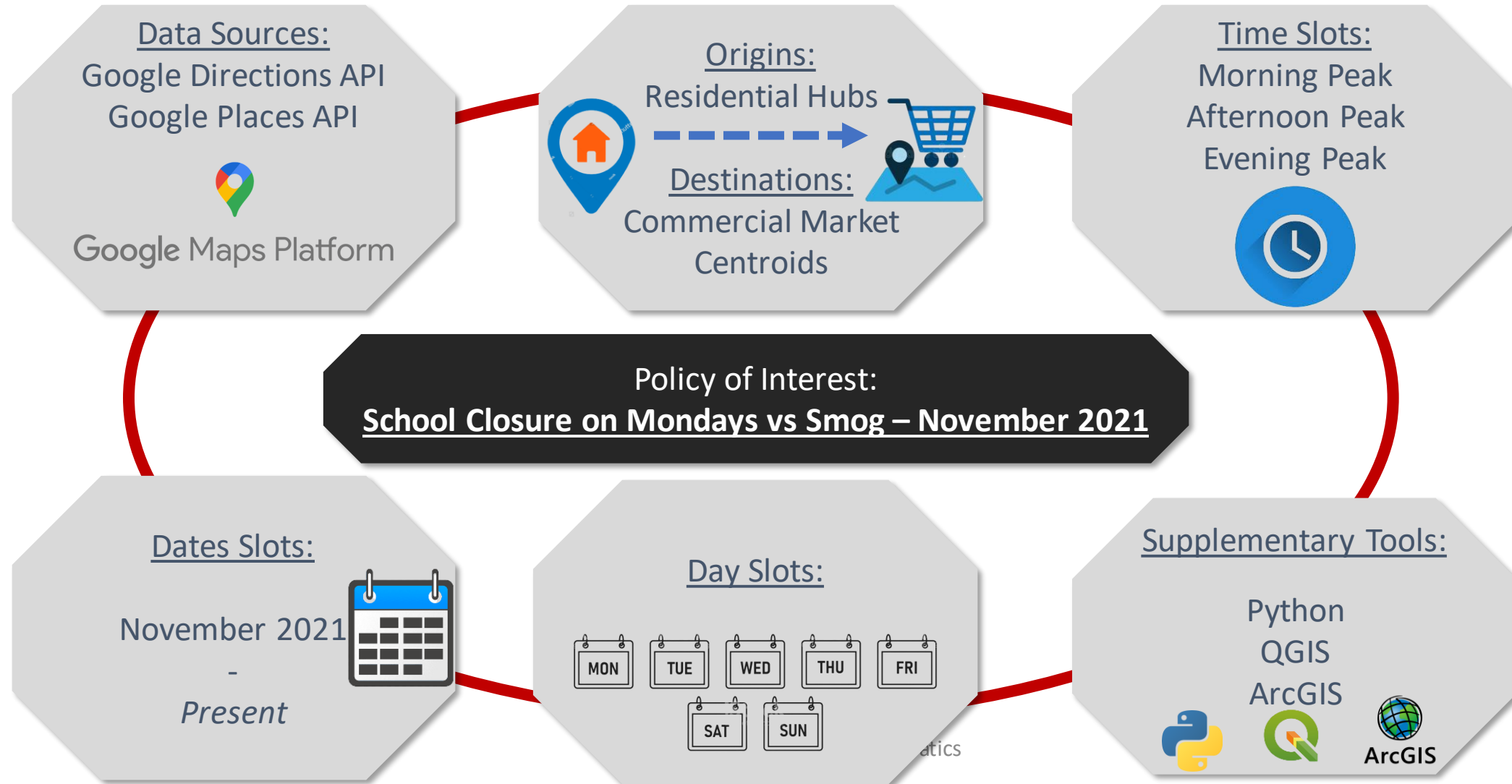
Exploring the bittersweet relationship of schools' closure and smog – an effective step in alleviating traffic congestions?

ABDULLAH AZHAR

# Travel Times: Motivation



# Travel Times: Overview



# Travel Times: Data Source – Google Maps

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## Directions API

### Returns:

Travel Time  
Travel Distance  
Travel Route

**Incorporates Live  
Traffic**

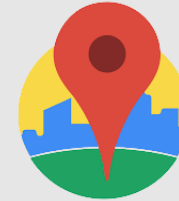


## Distance Matrix API

### Returns:

Travel Time  
Travel Distance

**Incorporates Live  
Traffic**

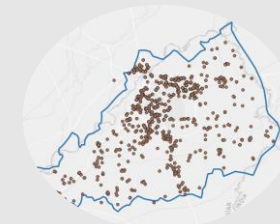


## Places API

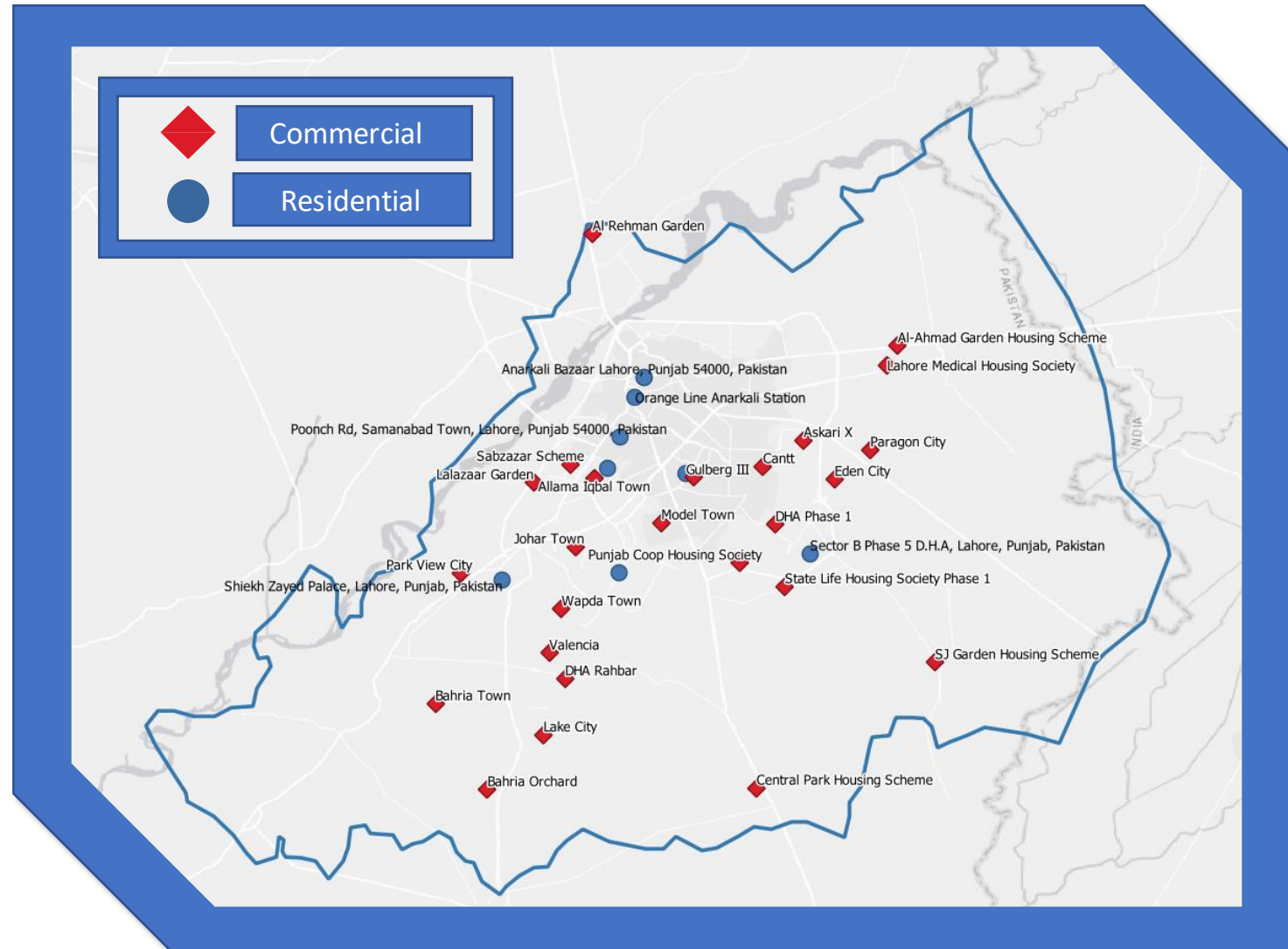
### Returns:

Geotagged Points of  
Interests

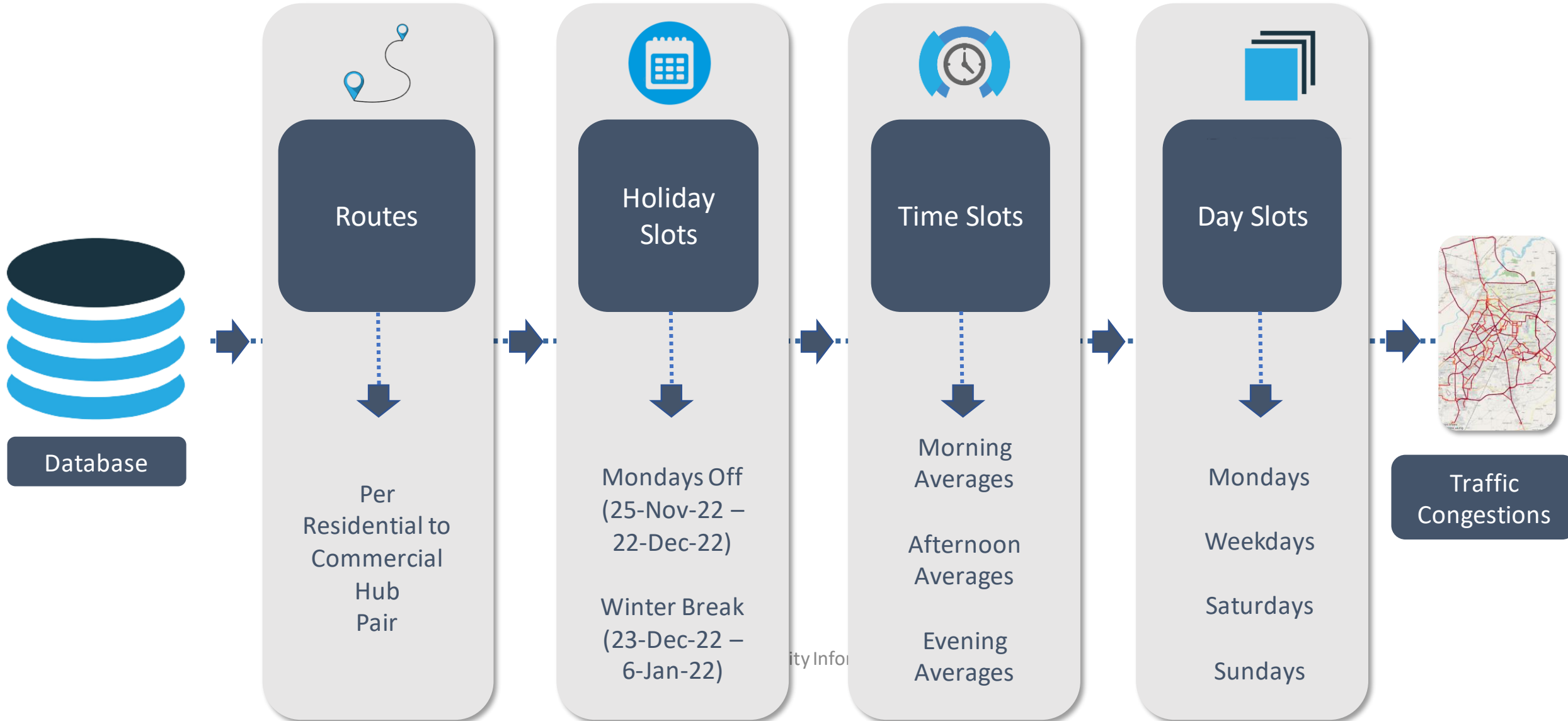
**Identification of  
Schools**



# Travel Times: Route Identification



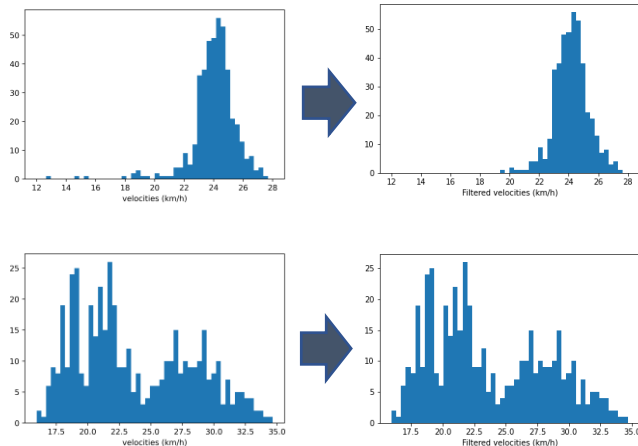
# Travel Times: Analysis Dimensions



# Travel Times: Data Preprocessing

## Removal of Anomalous Values

To attain route specific averages in velocities

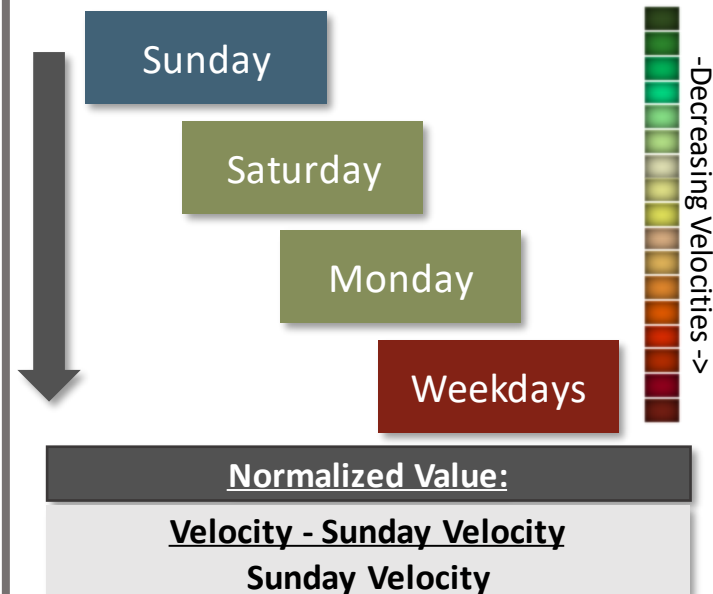


$$\mu - 3\sigma < \text{Velocity (km/h)} < \mu + 3\sigma$$



## Base Velocities Normalization

Sunday Velocities per route per time slot taken as base values





Data Insights and Conclusions



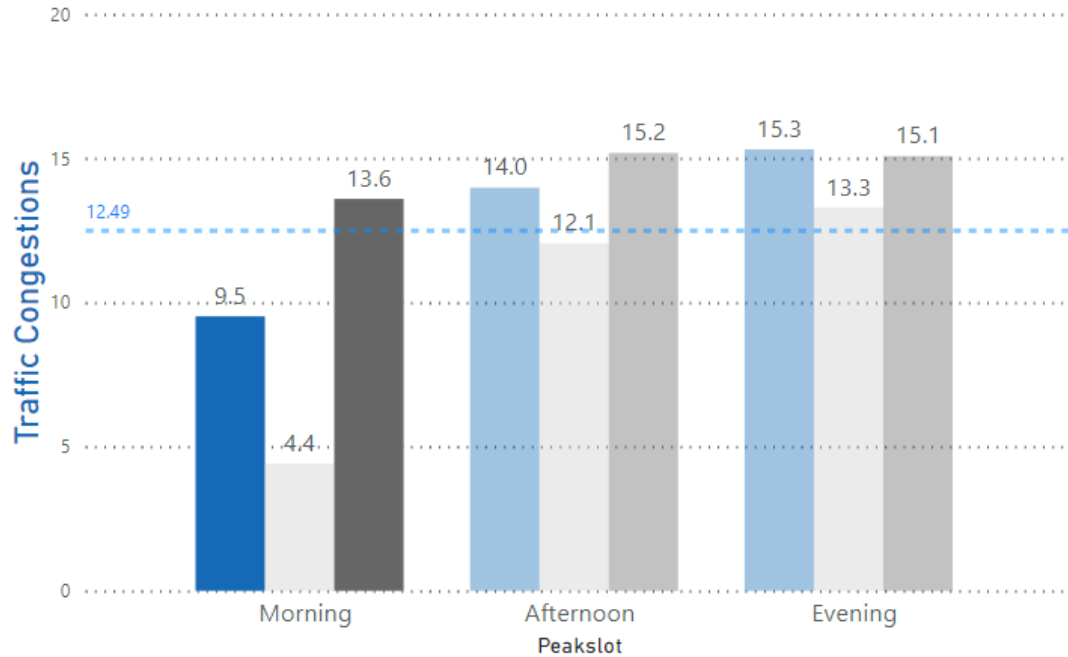


# Travel Times: Mondays Comparison

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

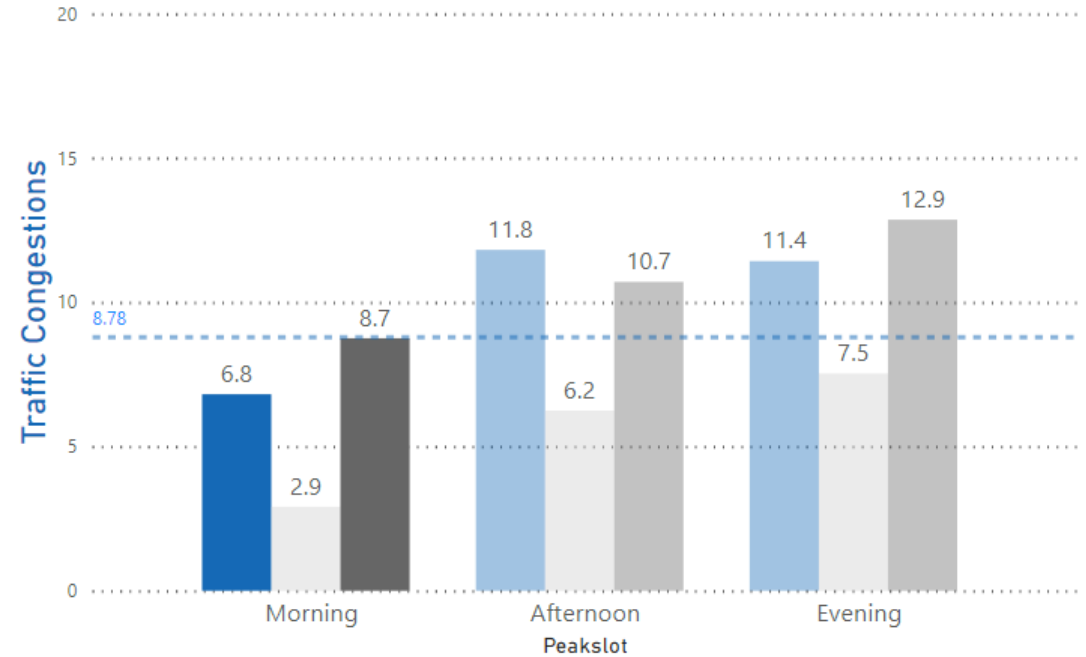
Before Winter Break

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

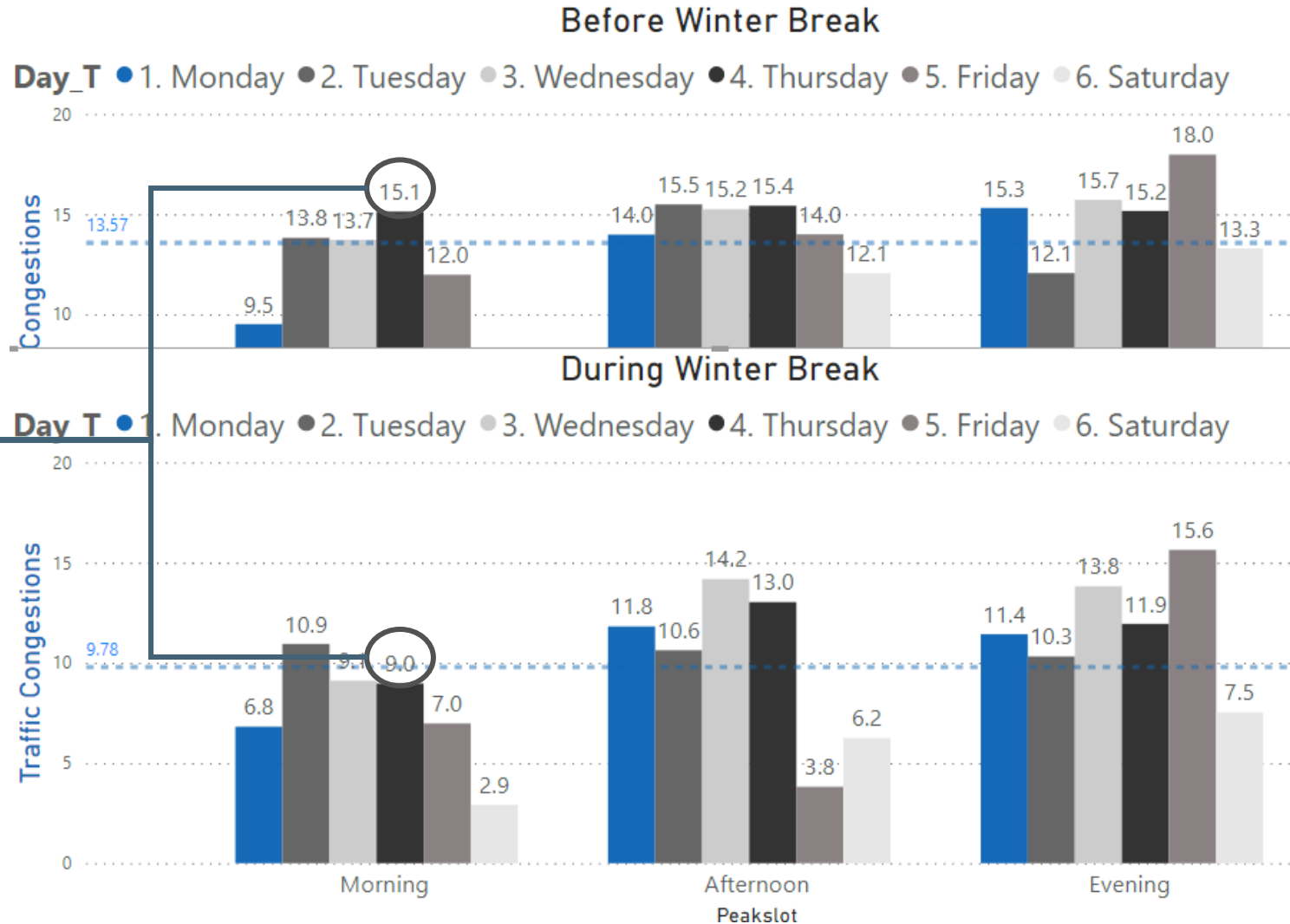


During Winter Break

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



# Travel Times: All Weekdays



Greatest Percentage Points Difference observed on Thursdays

Is Monday really the optimal day for school closures?

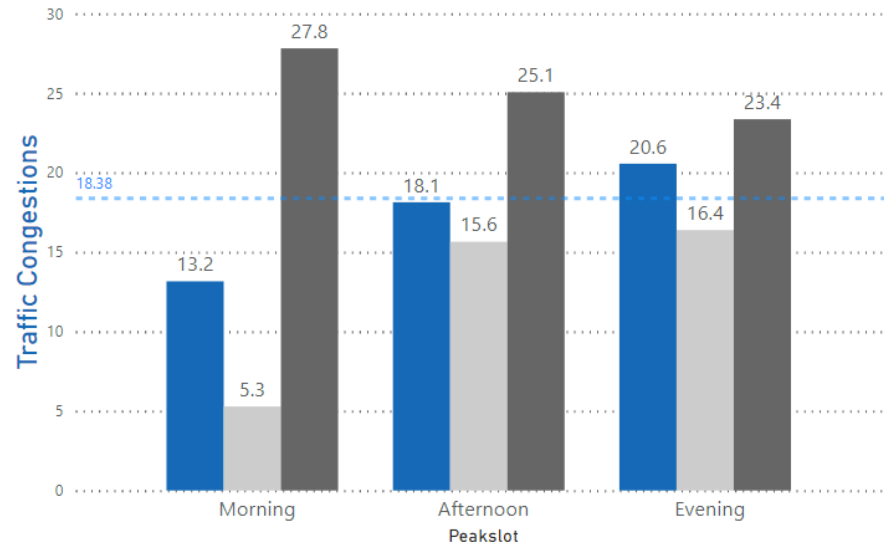
# Travel Times: Routes Analysis - Mondays

Valencia -> Hali Rd Gulberg III



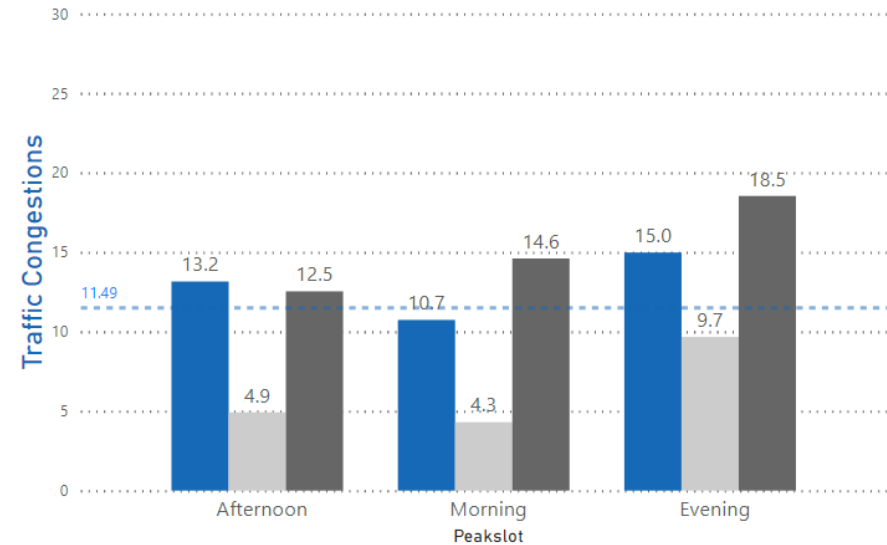
Before Winter Break

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



During Winter Break

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



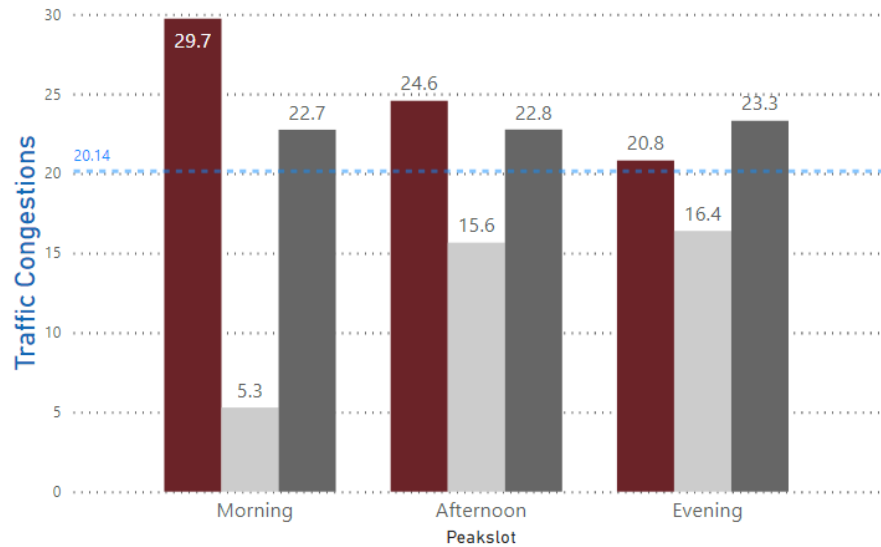
# Travel Times: Routes Analysis - Thursdays

Valencia -> Hali Rd Gulberg III



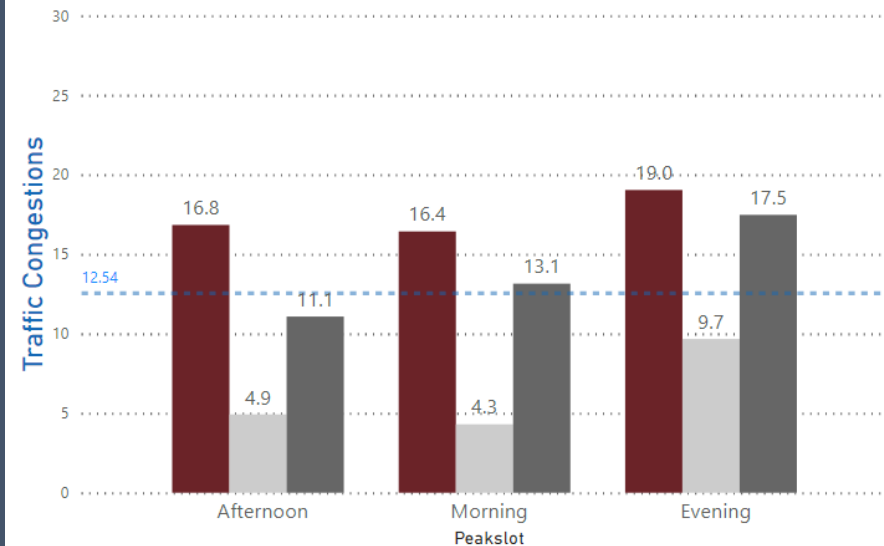
Before Winter Break

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



During Winter Break

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



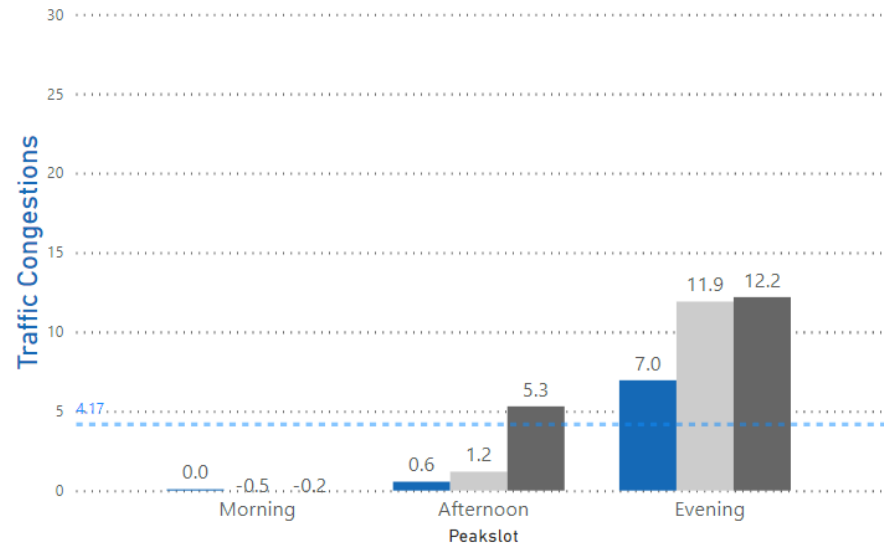
# Travel Times: Routes Analysis - Mondays

Eden City -> DHA Phase 5



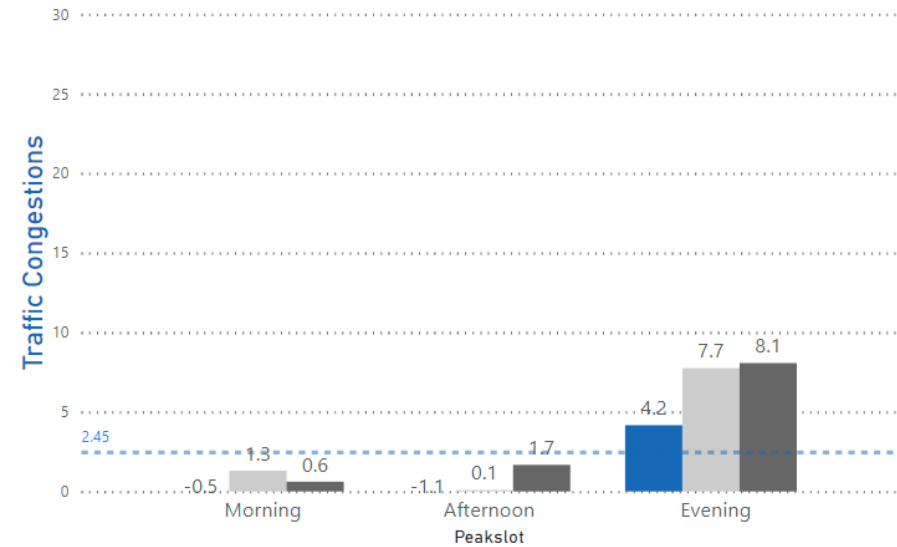
Before Winter Break

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



During Winter Break

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



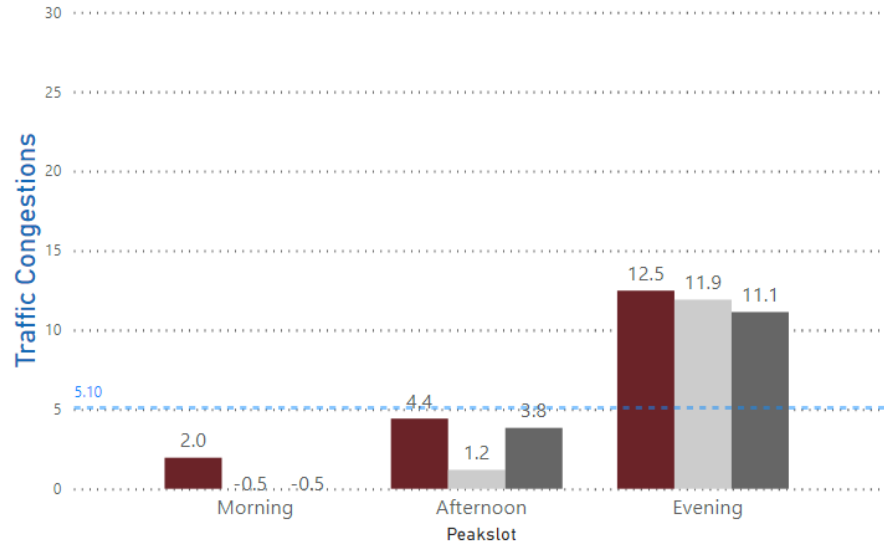
# Travel Times: Routes Analysis - Thursdays

Eden City -> DHA Phase 5



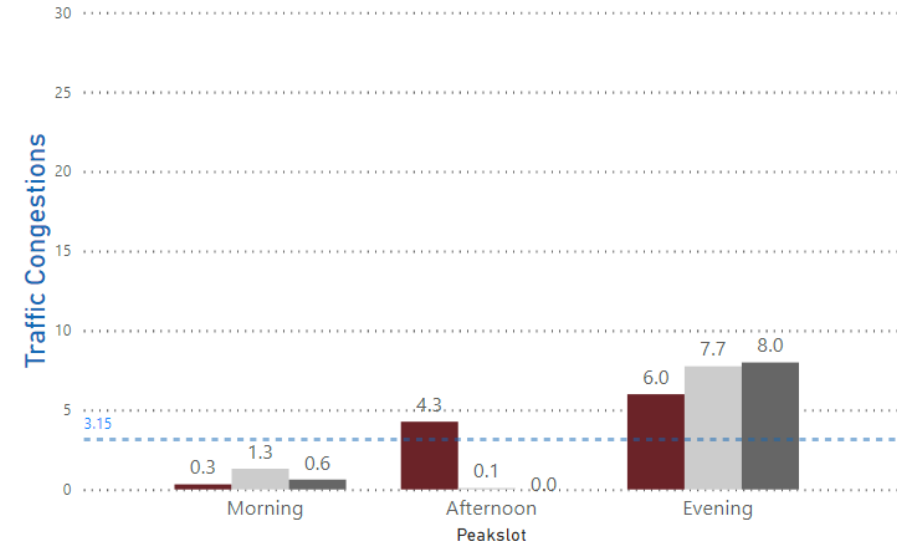
Before Winter Break

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



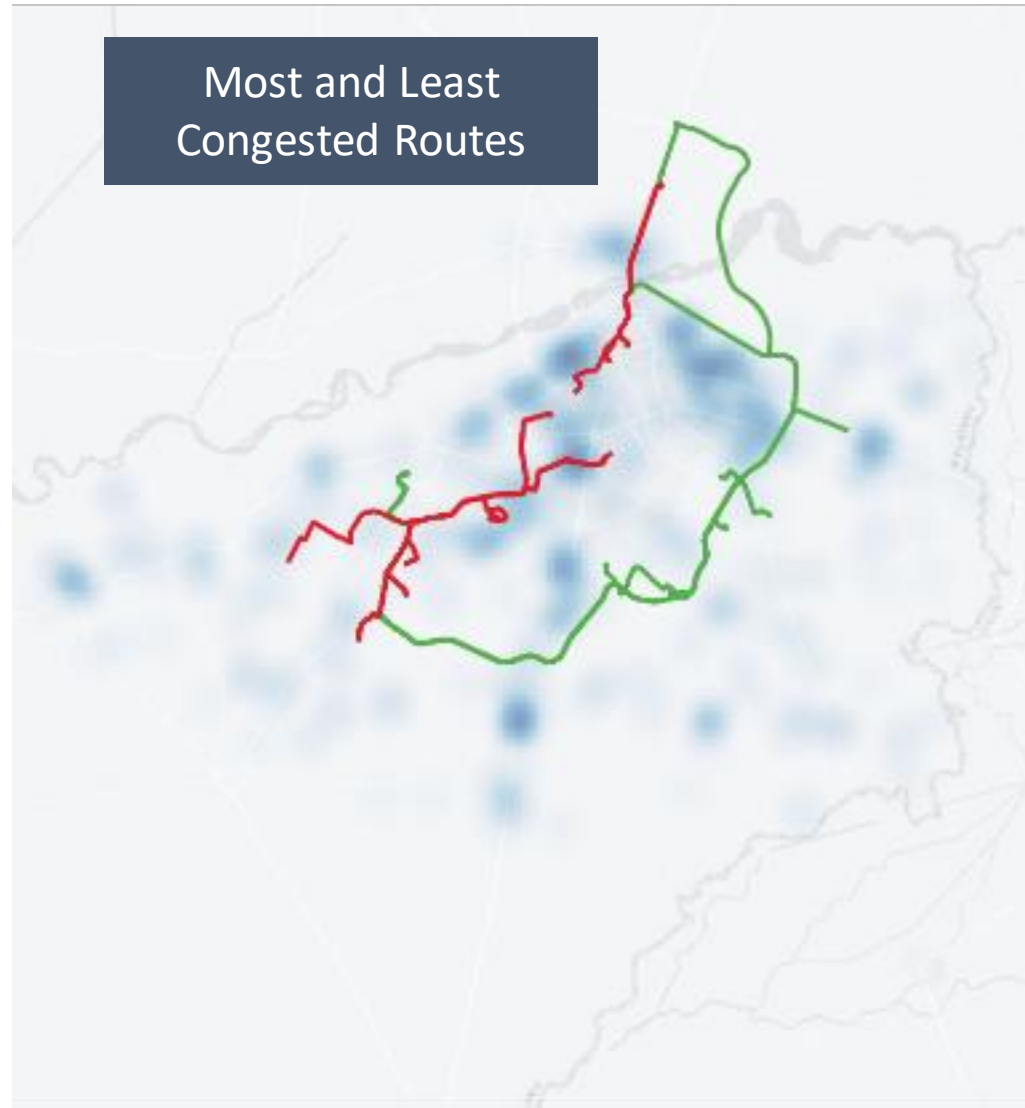
During Winter Break

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



# Travel Times: Schools Heatmap

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Criteria for Most  
Congested:

Maximum variation  
of travel speeds from  
Sunday base to  
Weekdays

# Way forwards

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- 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