# Traffic Control Optimization

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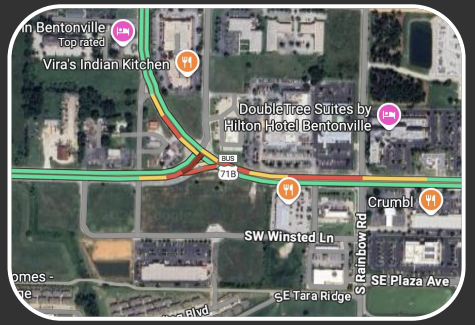
# Rising Traffic Issues in Bentonville

- **Population growth** in NWA
- **Daily transportation is essential** for work, school, and community life.
- **Limited public transit.**
- Most households rely on **personal vehicles** for nearly all trips.
- Creation of heavy **traffic & congestion**

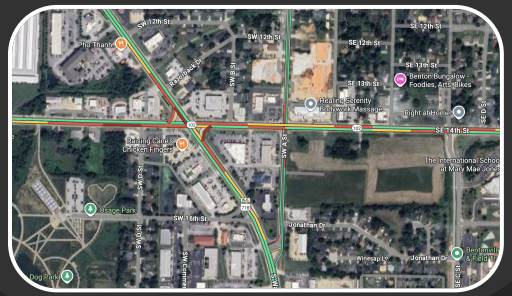
## 1 SW Regional Airport Blvd & SW I ST

## 2 Greenhouse & E Centerton Blvd

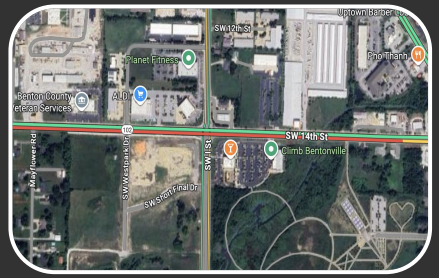
## 5 SW Regional Airport Blvd & SE Walton Blvd




## 3 S Walton & 14th Street

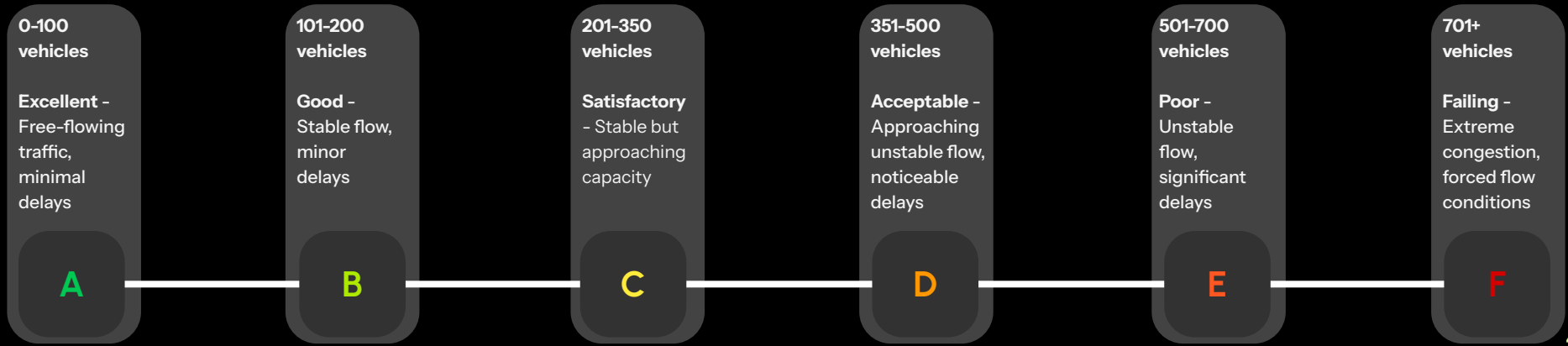


## 4 SW 14th ST & SW I ST




# Understanding Level of Service (LOS)

**LOS:** A grading system (A-F) that measures intersection traffic congestion. Every 15 minutes, we count all vehicle movements (12 directions: left/through/right turns from north, south, east, west), sum them, and assign a grade based on total volume. Hourly LOS averages four 15-minute scores to identify peak congestion times across intersections.



# Our LOS Calculation

## Movement Volume

Sum of 12 Turning Movements Per Interval:
(NB/SB/EB/WB: Left, Through, Right)

## Time Windowing

15-minute interval used to capture short-term demand patterns.

## Threshold Mapping

Strict Volume-to-LOS bands (A-F) applied to each 15 minute interval.

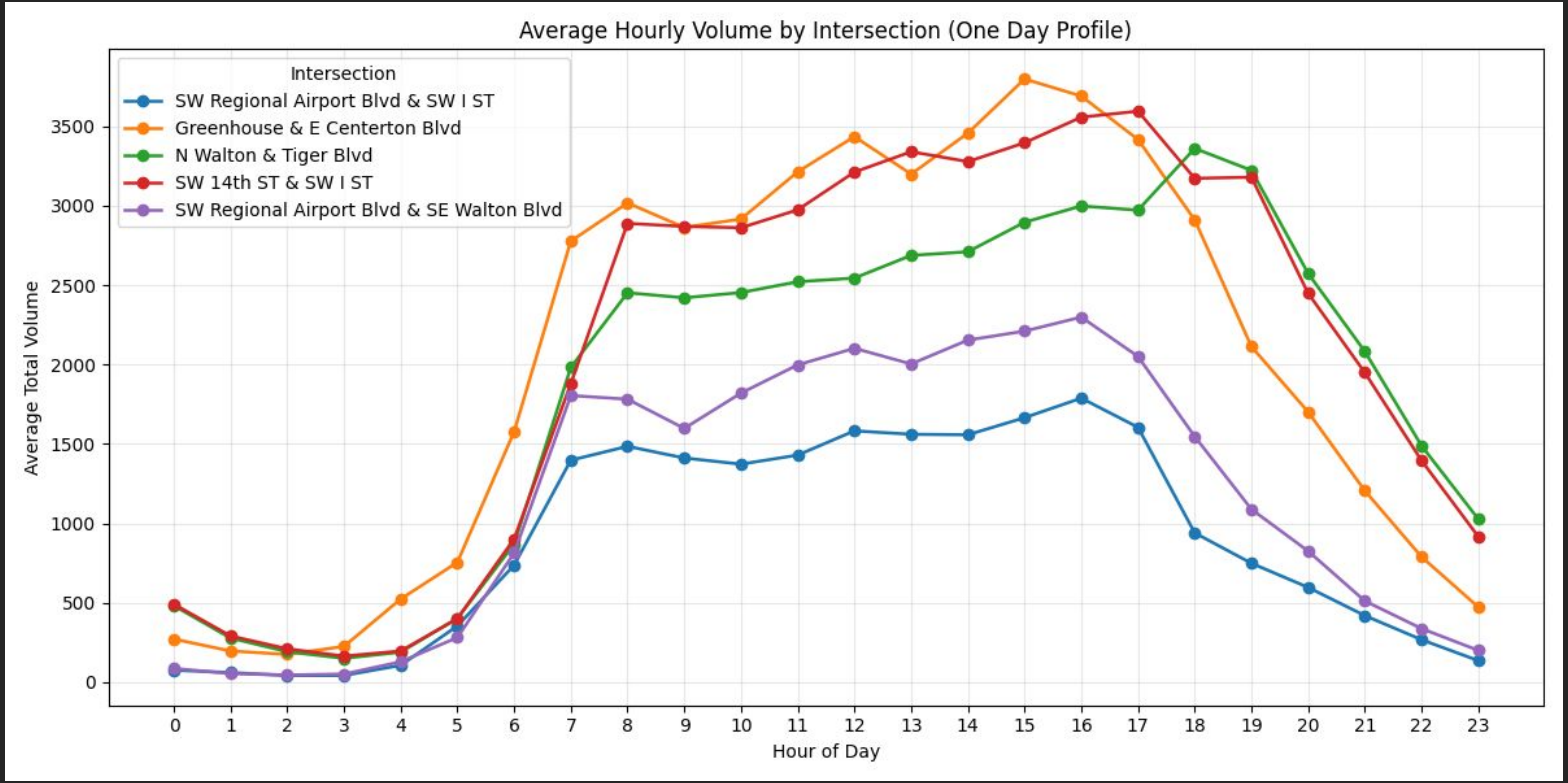
## Hourly Aggregation

Convert A-F to scores (1-6) and average the 4 intervals to get the Hourly LOS

# LOS Calculation

| Intersection | SW Regional Airport Blvd & SE Walton Blvd | SW Regional Airport Blvd & SW I ST | Greenhouse & E Centerton Blvd | SW 14th ST & SW I ST | N Walton & Tiger Blvd |
|---|---|---|---|---|---|
| **Best Times** | 9 PM - 11 PM | 5 AM - 7 AM | 5 AM - 7 AM | 6 AM - 8 AM | 6 AM - 9 AM |
| **Worst Times** | 4 PM - 5 PM | 7 AM - 6 PM | 1 PM - 7 PM | 12 PM - 7 PM | 10 AM - 5 PM |

# LOS Calculation



1 SW Regional Airport Blvd & SW I ST

C

2 Greenhouse & E Centerton Blvd

E

5 SW Regional Airport Blvd & SE Walton Blvd

D

3 N Walton & Tiger Blvd

E

4 SW 14th ST & SW I ST

E

# Improvement Strategy

Improvement strategy: Corridor-wide adaptive signal timing and coordination.

- Most of the delays caused by poor signal coordination
- Even though intersection had different grades, the biggest contributor is:
  - Traffic is stopping too often because the signals were not working together
- Implement corridor-wide adaptive signal timing, which automatically adjusts lights based on real-time traffic flow.
- We can reduce unnecessary stops, smooth out traffic, and improve level of service for the entire corridor, not just one intersection at a time.

# Our Solution: A.C.E.

## Artificial Intelligence Scheduling

- Reprogram signal timers on Airport Blvd to match the specific all-day traffic surges identified in our data analysis.
- Eliminates unnecessary midday delays without the cost of purchasing new sensor hardware

## Calibrated Capacity

- Extend the short left-turn lanes at SW 14th St to stop turning vehicles from spilling over into the main road.
- Frees up the through-lanes so that one waiting car does not trap everyone behind it.

## Enhanced Synchronization

- Sync the traffic signal clocks along SE Walton Blvd so they turn green in a predictable sequence.
- Creates a continuous "Green Wave" that allows commuters to drive through multiple intersections without stopping

# Thank you