RTAChicago.org

Regional Transit Signal Priority (TSP) Implementation Program

Advanced Technology Task Force (ATTF) /

Regional Transportation Operations Coalition (RTOC)

Joint Meeting

March 22, 2018

Mark E. Pitstick

Regional Transportation Authority

OUTLINE

- Who – TSP Working Group
- What – Transit Signal Priority (TSP)
- Why – Improve Bus Performance
- How – Regional TSP Program & Standards
- Where – 500 Intersections, 13 Corridors, 1 System
- When – Implementation from 2016 to 2020
- Challenges & Opportunities

TSP WORKING GROUP & ROLES

- RTA – Program Management
- CTA and Pace – Primary TSP Implementers
- CDOT and OEMC – City traffic signals & communication upgrades
- IDOT – Traffic signals & permits
- County DOT's (Lake, Cook, DuPage) – Traffic signals & permits as necessary
- CMAP and FTA – Funding partners
- Various consultants

Chicago Metropolitan Agency for Planning

U.S. Department of Transportation
Federal Transit Administration

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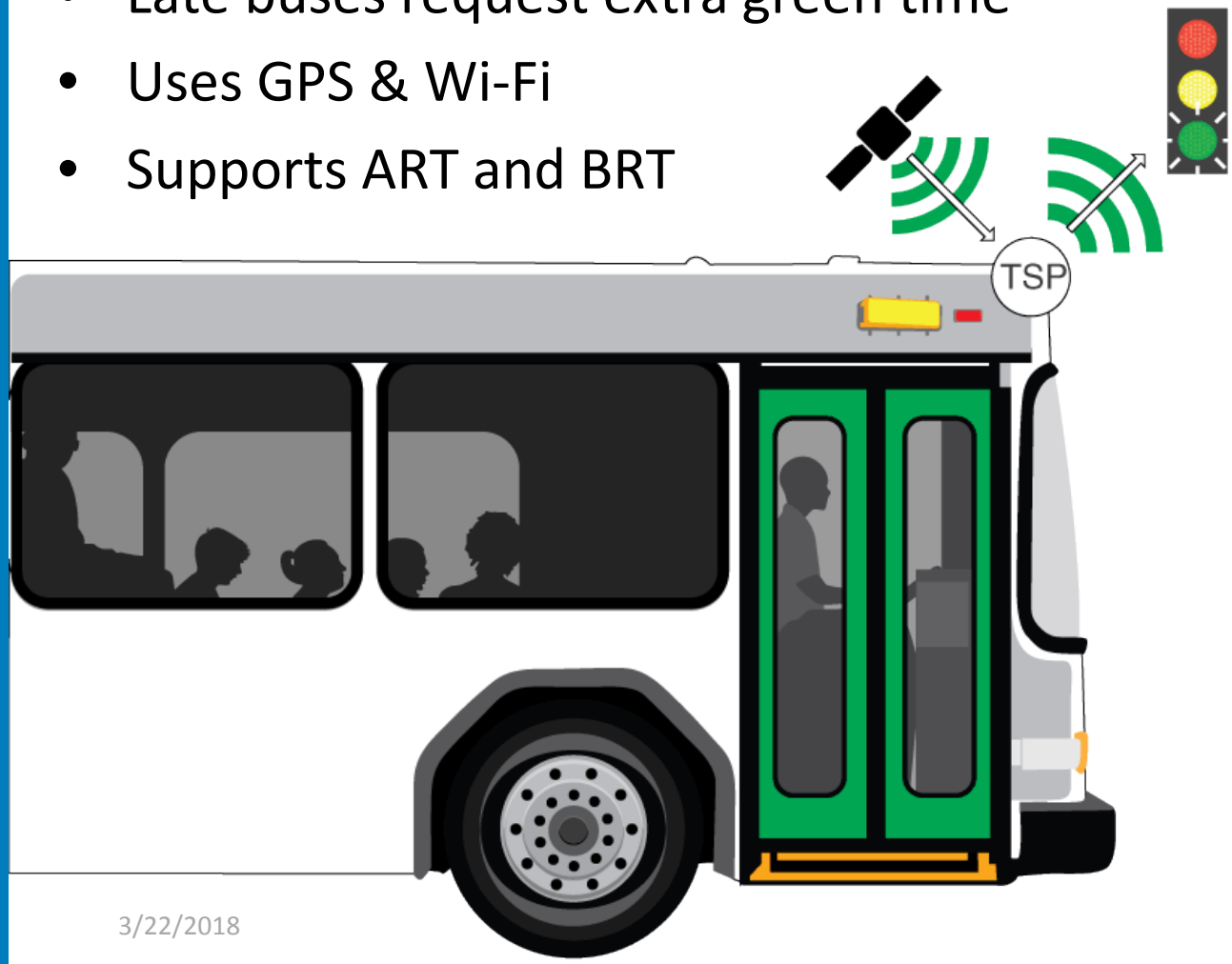
TRANSIT SIGNAL PRIORITY (TSP)

- Late buses request extra green time
- Uses GPS & Wi-Fi
- Supports ART and BRT



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PERFORMANCE MEASURES

- General vehicle travel time
  - First step is to optimize signals
- Bus travel time
  - Travel time variability
  - Bus stops due to red signals
  - Bus delay at traffic signals
- Data collection & analysis
  - Baseline (before improvements)
  - After traffic signals are optimized
  - After TSP is operational

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REGIONAL TSP PROGRAM

- Builds on previous TSP Demos in the region:
  - Cermak Road (IDOT, CTA, Pace) in 1997
  - Western Avenue (RTA, CTA, CDOT) in 2008-2010
  - Harvey Transp. Center (RTA, Pace, IDOT) in 2010-2011
  - Washington Street (Pace, Lake Co.) in 2014
  - Jeffrey Jump (CTA, CDOT) in 2014
- Need to develop & implement a regional program
- $40 million CMAQ grant (90% federal, 10% RTA)
- Plus other federal and local grants

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GUIDING PRINCIPLES

- Interoperable System
  - Different transit and highway jurisdictions
  - Any bus, any traffic signal (properly equipped)
- Open Architecture
  - Industry standard communication protocols
  - Vendor neutral, off-the-shelf equipment
- Use Existing Equipment if possible
  - Bus Automatic Vehicle Location (AVL) systems
  - Traffic Signal Controllers
  - V-2-I, I-2-I and I-2-C Communication

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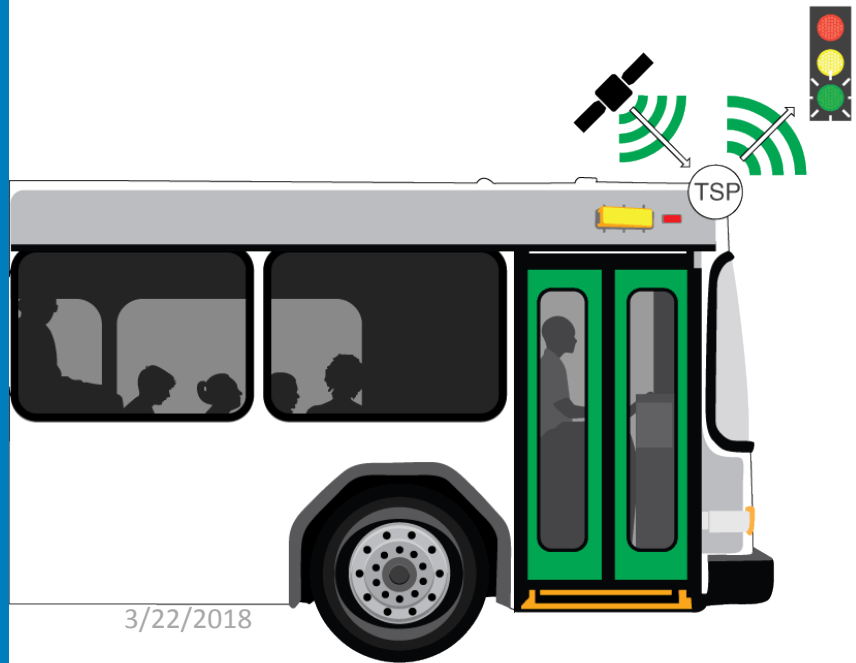
REGIONAL TSP STANDARDS

- Vehicle-to-Intersection TSP Message Set
  - Defines the information communicated between the bus and the traffic signal controller
- 5.0 GHz Wi-Fi with 802.11n (or 802.11ac) protocol



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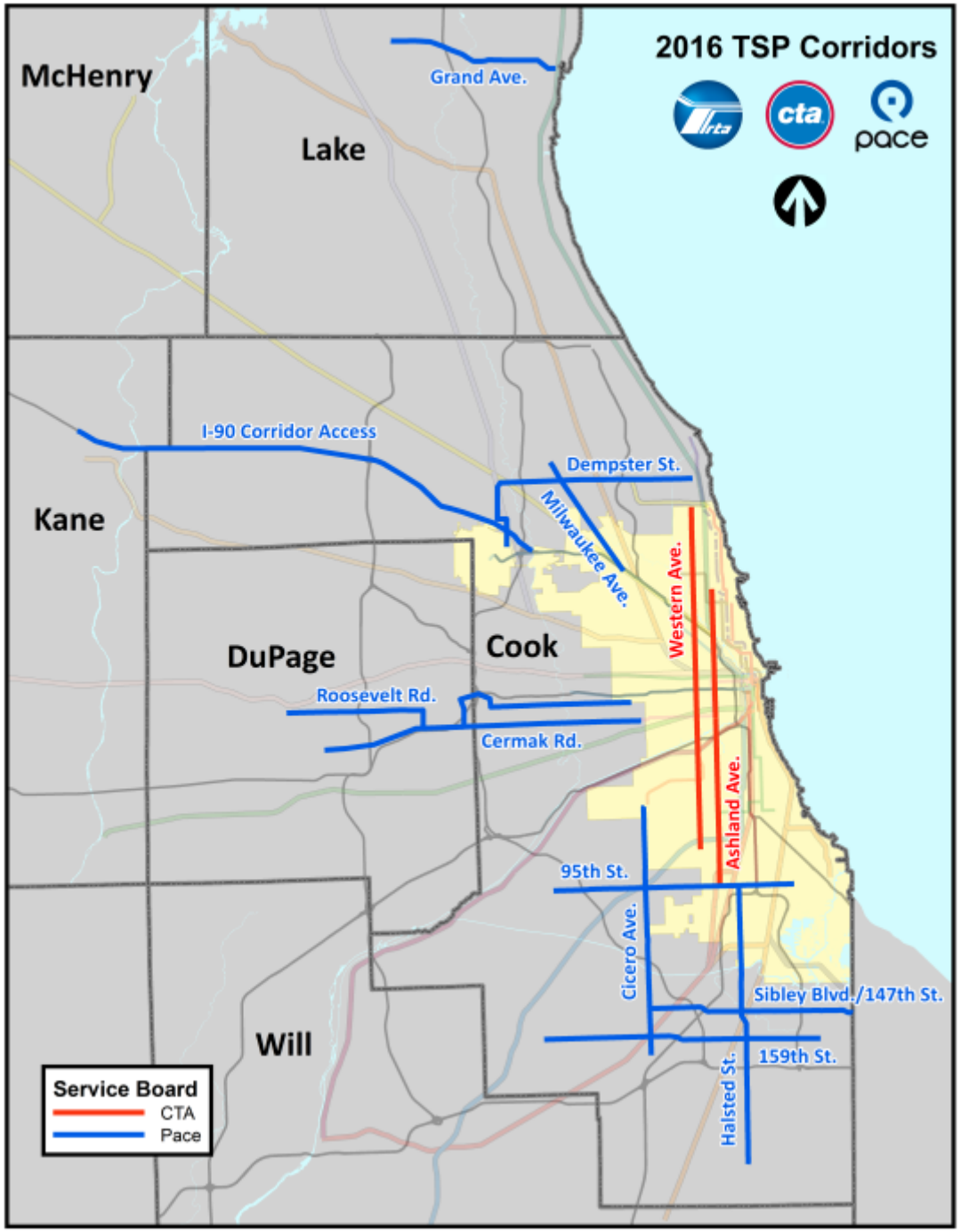
WHERE?

- 500 Intersections
- 100 Miles of Roads
- 13 Corridors
- 1 TSP System



TSP PRIORITY CORRIDORS

- CTA TSP Corridors (≈ 200 signals)
  - Ashland Avenue
  - Western Avenue
- Pace TSP Corridors (≈ 300 signals)
  - Milwaukee Avenue
  - Dempster Street
  - Roosevelt Road
  - Cermak Road
  - Grand Ave. (Lake Co.)
  - I-90 Corridor Access
  - Cicero Avenue
  - Halsted Street
  - 95th Street
  - Sibley Blvd./147th St.
  - 159th Street

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TSP IMPLEMENTATION SCHEDULE

- CTA/CDOT implemented TSP on S. Ashland Ave. in 2016 and implementing on Western Ave. in 2018
- North and Central Ashland Ave. require traffic signal modernization and will follow in 2019-2020
- Pace/IDOT have already optimized most signals
- Pace proof-of-concept test with IDOT, CDOT, and CTA in early 2018 on Milwaukee Ave.
- Pace to implement TSP on Dempster St. and 9 other corridors in 2018-2020

TSP EQUIPMENT ON CTA BUSES

- New Rocket Routers for Mobile Wi-Fi on Nova bus

TSP EQUIPMENT ON CTA BUSES

- New Rocket Routers for Mobile Wi-Fi on New Flyer bus

TSP IMPLEMENTATION ON S. ASHLAND

- New Communication Box (C-Box) – Ashland @ 35th St.

TSP IMPLEMENTATION ON S. ASHLAND

- New advanced traffic controller (ATC) – Ashland @ 95th St.

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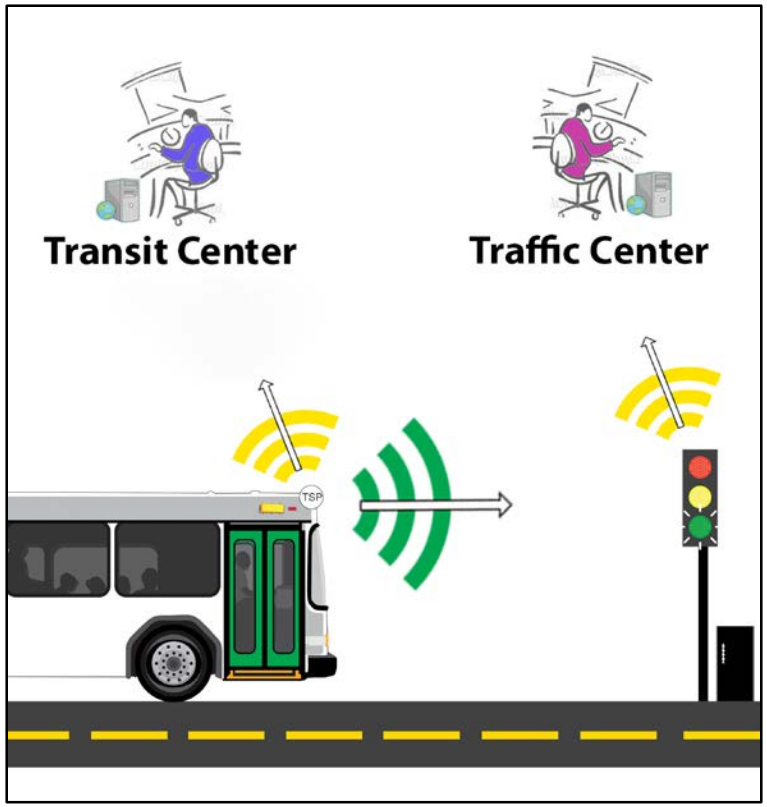
CHALLENGES & OPPORTUNITIES

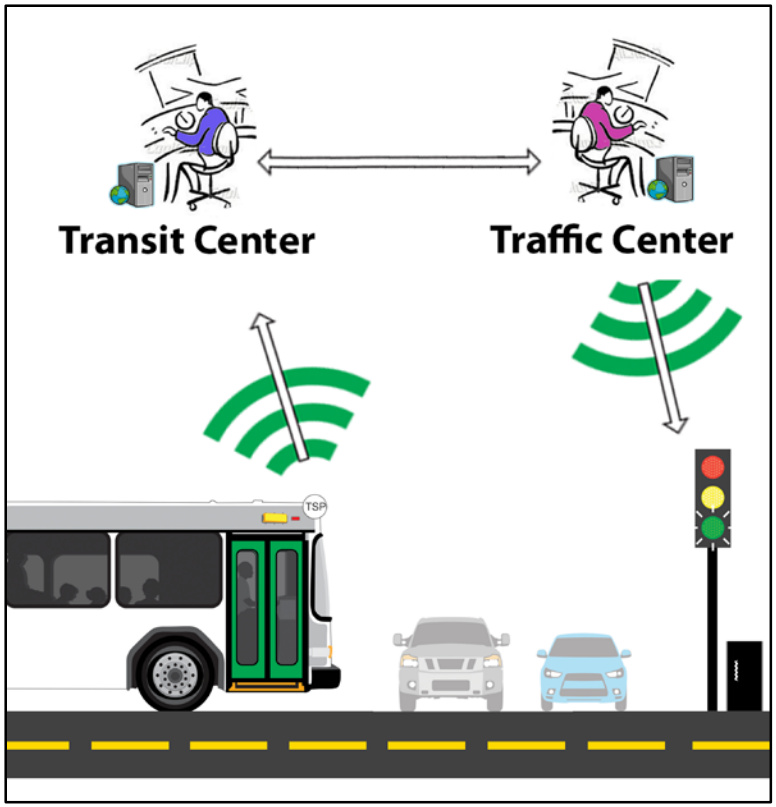
- Performance Measures
  - Need general vehicle travel times from DOT's
  - Need second-by-second AVL data from buses
- Software Modifications and Operating Systems
- Interoperability Testing in 2018
  - Software (on-board, roadside, central)
  - Communication equipment
- Communication Approach – Distributed (V-2-I) vs. Centralized (V-2-C plus C-2-C plus C-2-I)

TSP COMMUNICATION APPROACH

Current



Future



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THANK YOU

Mark E. Pitstick, Ph.D.
Technical Advisor
Regional Transportation Authority
175 W. Jackson Blvd., Suite 1650
Chicago, IL 60604
(312) 913-3235
pitstickm@rtachicago.org

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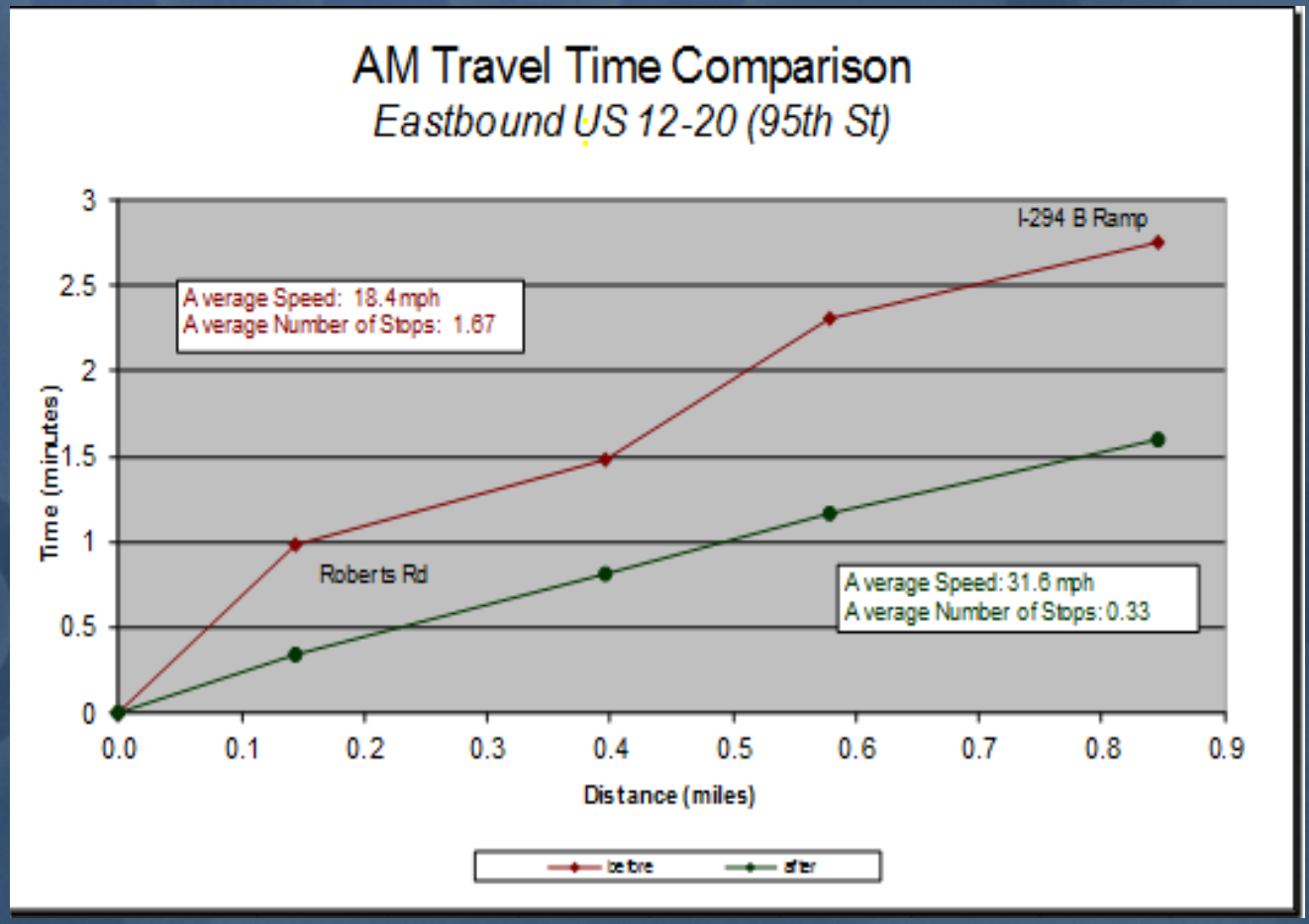
Pace's Innovative Signal Timing Optimization

Increased Corridor SPEED:

- Pace Connected Signal Interconnects for continuous Green
- Optimized Signal Timing along 10 Transit Corridors and Approximately 400 Intersections

- Introduced Green Band Progression for entire Corridor



Transit Signal Priority Program Task Flow Chart

Regional TSP Requirements and Interoperable Standards Development

Technology: *Wi-Fi (802.11n) & 5.0 GHz*
Features: *Interoperable, NTCIP 1211 message set, open standards, non-proprietary*
Status: Completed

Regional Signal Timing Optimization Implementation and TSP Strategies

Scope: ***400 Signals*** *– Milwaukee Ave*
Cicero Ave, Sibley/147th, Roosevelt Rd, 95th St,
Dempster St, Cermak Rd, 159thSt
Grand Ave and Rand Road, 159th street

Status : Completed

Trapeze AVL Software Development (Completed)

PRS Software ATC Signal Controllers (Completed)

Milwaukee Ave TSP Prototype (On Going)

Deployment :2018-19

- ✓ **Cermak Rd**
- ✓ **Cicero Ave**
- ✓ **Sibley/147th**
- ✓ **Roosevelt Rd**
- ✓ **159th St**
- ✓ **95th St**
- ✓ **Grand Ave**
- ✓ **Rand Rd**
- ✓ **Dempster St**
- ✓ **Halsted St** (Programmed)
- ✓ **I-90 Access** (Programmed)

PRS Product (Testing) **& Central Software Development** (On-Going)

Design, PS&E (Completed). **Permits, Systems Integration for 10 Corridors** (Under Procurement)

pace