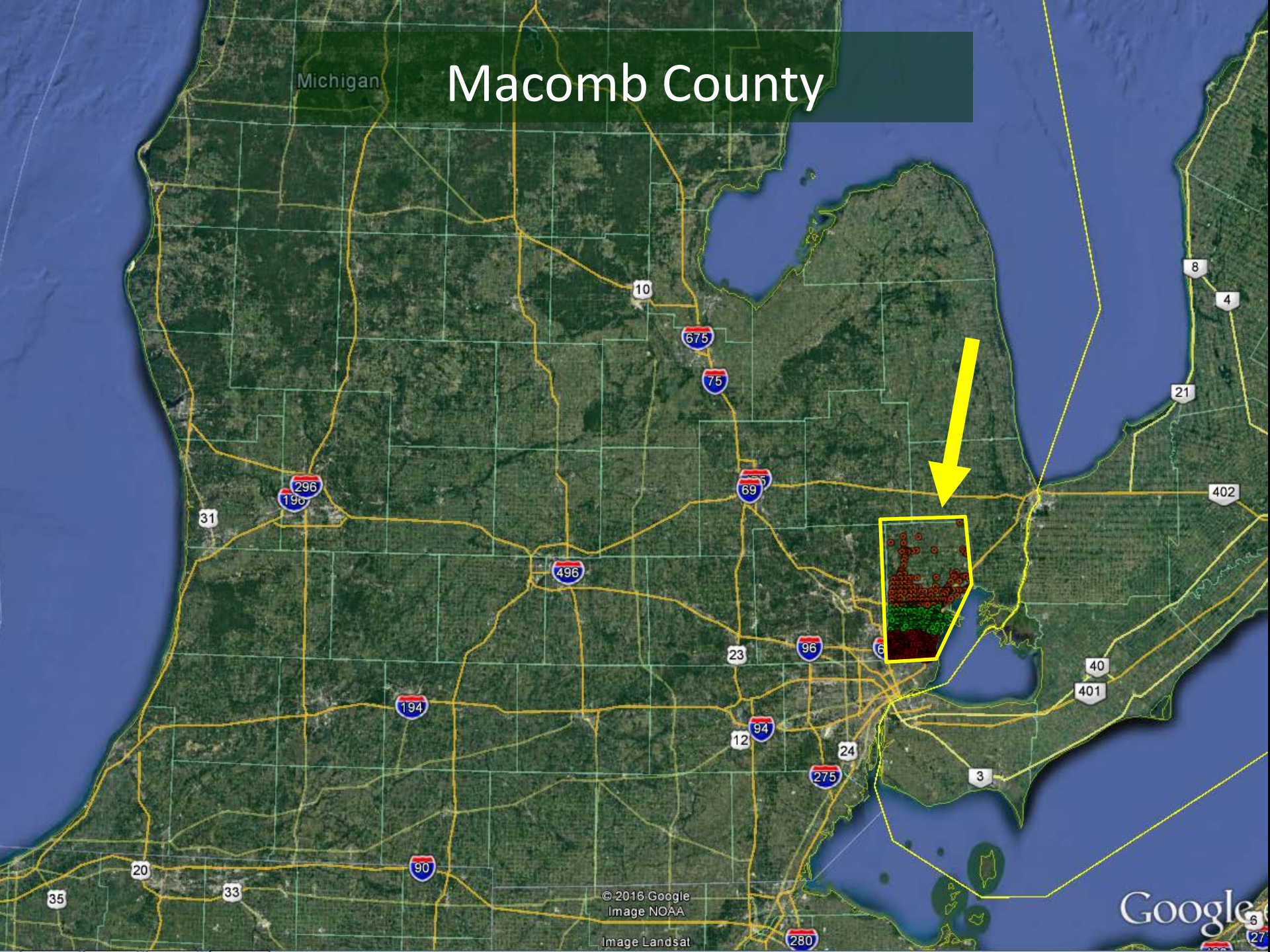
RENOVATING ITS OPERATIONS IN A COUNTY FAR, FAR, AWAY

Jackie Kawa, PE

Tim Brandstetter, PE

Kimley»Horn


Macomb County
Michigan
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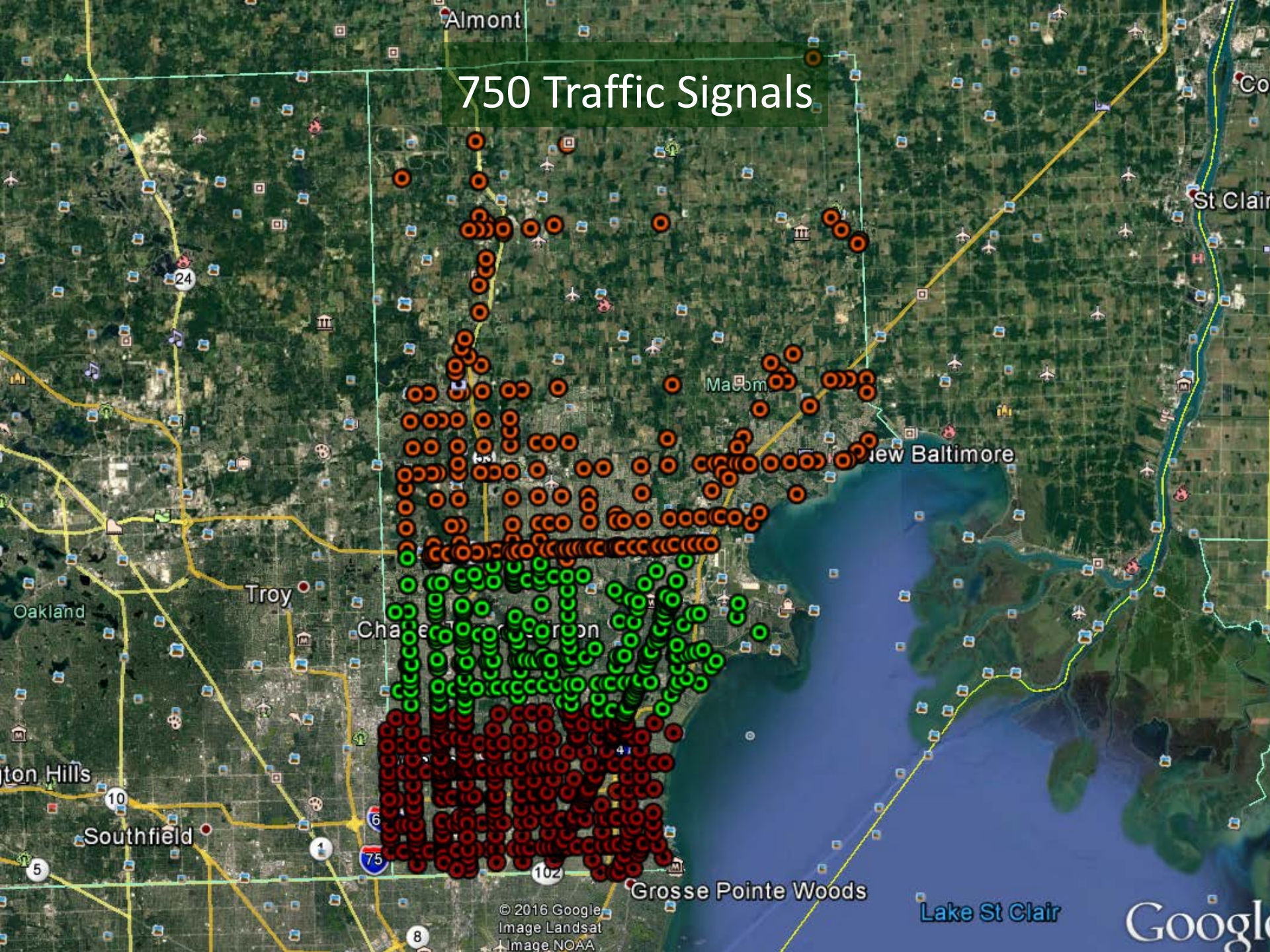
750 Traffic Signals
Almont
Troy
Oakland
Southfield
Grosse Pointe Woods
Lake St Clair
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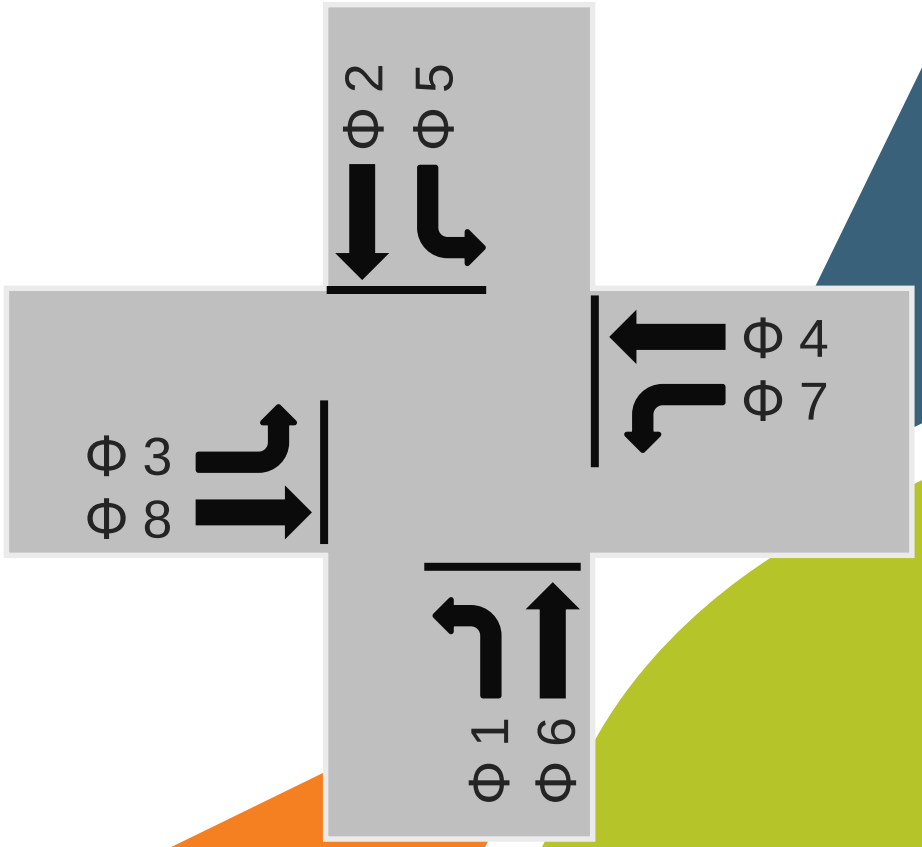
Traffic Operations Vision

- Standard Signal Timing Phasing
- Standard Cycle Lengths
- Standard TOD Schedules
- New Controller Software and Central System
- Flashing Yellow Arrows
- Innovative Traffic Operations Center

MCDR Standard Signal Timing Phasing

- Φ 1 = Northbound Left
- Φ 2 = Southbound Thru
- Φ 3 = Eastbound Left
- Φ 4 = Westbound Thru
- Φ 5 = Southbound Left
- Φ 6 = Northbound Thru
- Φ 7 = Westbound Left
- Φ 8 = Eastbound Thru



Countywide Cycle Lengths

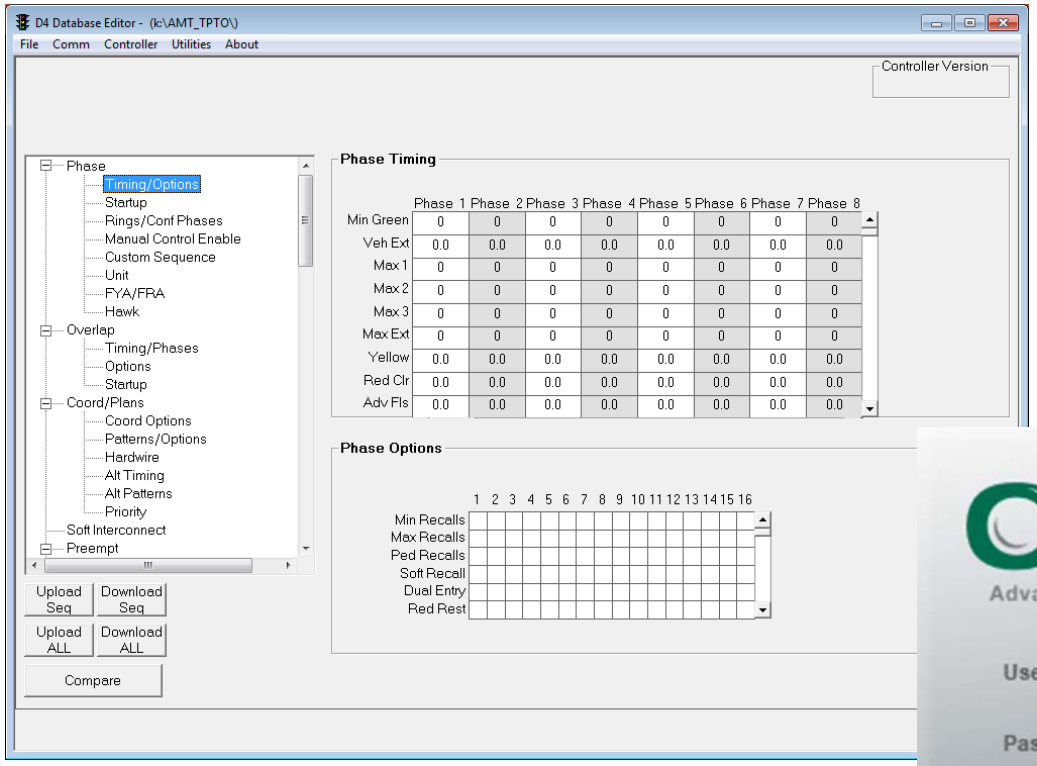
Pattern Number	Peak	Cycle Length (sec.)
1	Midday/Off-Peak	100 sec.
2	AM Peak	120 sec.
3	PM Peak	120 sec.
4	Saturday Peak	100 sec.
5	Sunday Peak	100 sec.
6	AM Special Plan	120 sec.
7	PM Special Plan	120 sec.
8	Peak of the Peak Plan	180 sec.

Countywide TOD Schedule

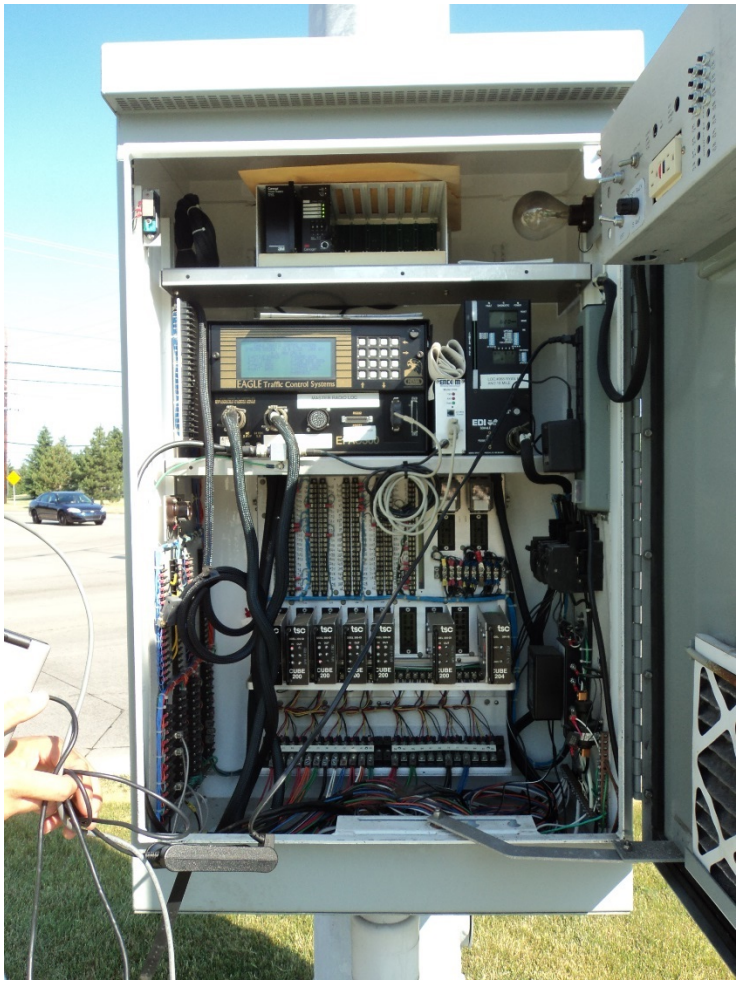
Day of Week	Time of Day	Pattern Number	Cycle Length (sec.)
Sunday	00:00	1	100 sec.
	10:00	5	100 sec.
	19:00	1	100 sec.
Monday-Friday	00:00	1	100 sec.
	06:00	2	120 sec.
	09:00	1	100 sec.
	13:30	3	120 sec.
	19:00	1	100 sec.
Saturday	00:00	1	100 sec.
	10:00	4	100 sec.
	19:00	1	100 sec.

*Flash schedules do not begin before 22:30 if determined for intersection

D4 Controller Software and Centracs



Challenges: Existing Cabinet Limitations



Challenges: Optimization Projects

- Scheduling
  - Controller Testing and Deployment
  - Signal and Cabinet Upgrades
  - Road Construction
- Lead/Lag Operations and Conflict Monitors

Challenges: Signal Upgrades

Challenges: Cabinet Upgrades

Challenges: Construction Projects

Additional Challenges

- Maintaining Daily Operations
- Electrical Crew Support
- Motorist Complaints
- Weather
- Moving of TOC and Test Labs

Source: Michigan ITE Newsletter Winter 2012

Traffic Operations Center

- Mission:
  - “The Macomb County Department of Roads (MCDR) Traffic Operations Center (TOC) is to provide and maintain a reliable real-time traffic operations system which is operated from a joint facility in coordination with stakeholders to deliver a safe, efficient and informative traveling experience to the public.”

COMMUNICATIONS AND TECHNOLOGY CENTER (COMTEC)

TRAFFIC OPERATIONS CENTER

MACOMB COUNTY
MACOMB COUNTY
MICHIGAN
NEW DEFENSE CHIEF HOLDS 1ST NEWS CONFERENCE
20’ x 50’ Video Wall

- Roads
- Emergency Management
- Sheriff Dispatch
- IT

INCIDENT RESPONSE TIMING PLANS

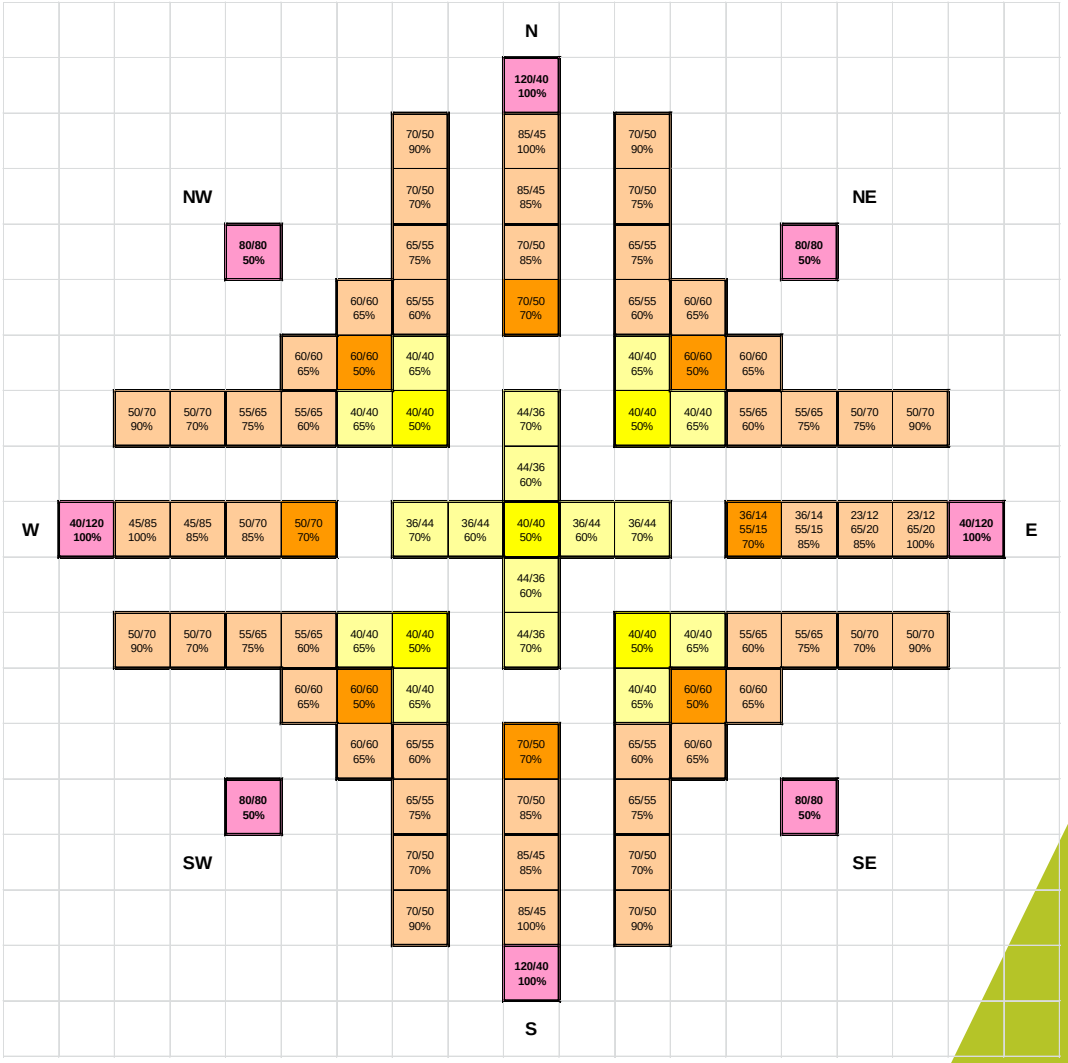
Timing Plans Goals and Uses

GOAL: Establish a county-wide, continuous signal timing system that employs active traffic responsive management by operators and traffic engineers at the Macomb County Communications and Technology Center (COMTEC).

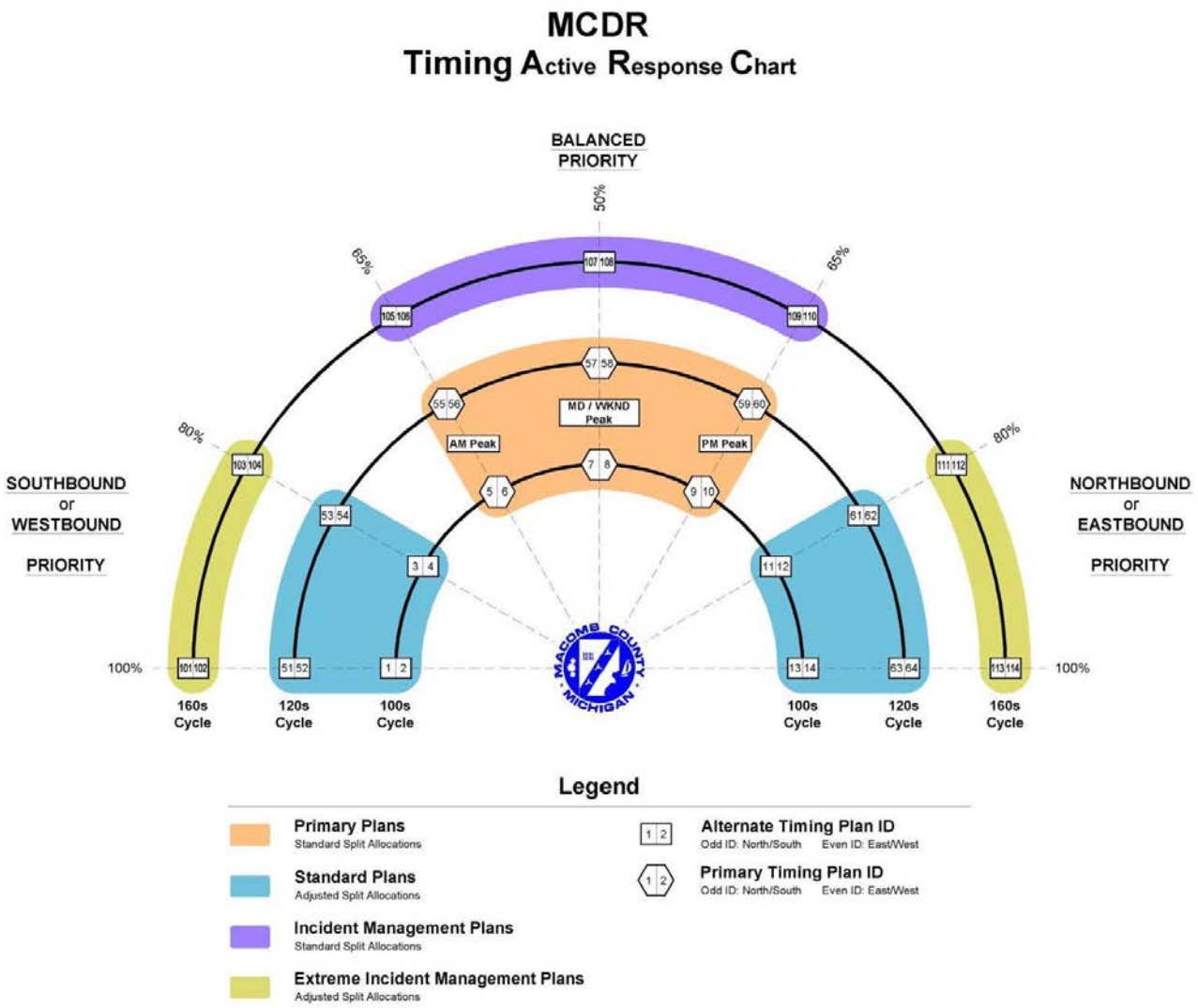
USES:

- Non-recurring daily congestion
- Incident management
- Construction activities
- Special events

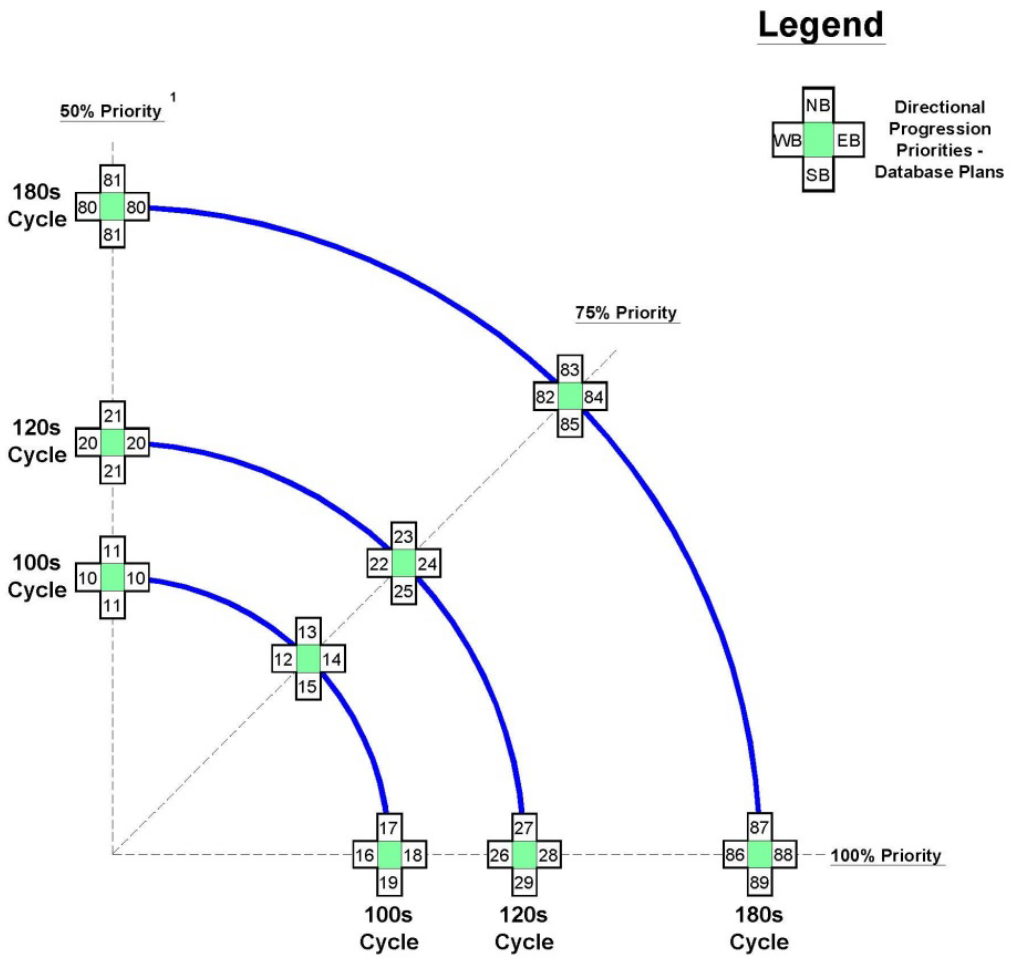
Contingency Plans History- Compass Rose



Contingency Plans History – Timing ARC



Contingency Plan History – Folded ARC



Standard Database Plans

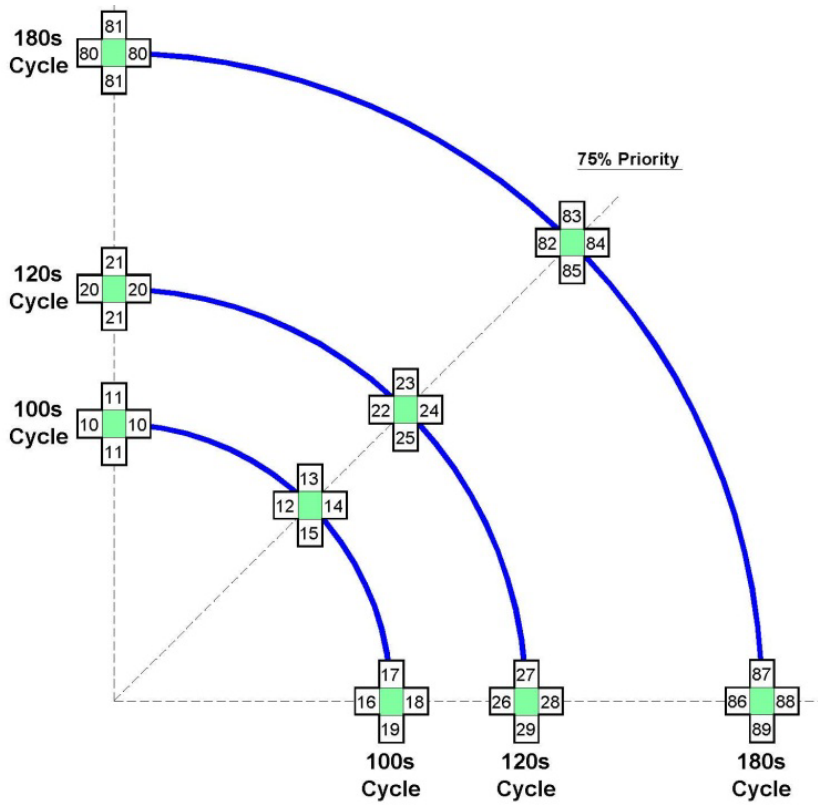
1 = Mid-Day/Off
2 = AM Peak
3 = PM Peak
4 = Saturday
5 = Sunday
6-9 = Other [2]

Notes:
1 - For 50% priority, NB=SB and WB=EB

2 - Reserved for specialty plans, such as Holiday or School Plans

Contingency Plan History - Folded ARC

- Limitations
  - Not Time-of-Day dependent
  - Example:
    - AM runs 70/50 split allocation (main to minor)
    - PM runs 60/60 split allocation (main to minor)
  - Operator sees mainline NB issue
  - Selects Plan 23
    - AM would want 75 seconds
    - PM would want 65 seconds
  - Plan 23 cannot handle both needs



Timing Plan Objectives

OBJECTIVES:

- Operators will be able to easily determine what plans to choose based upon time-of-day and progression priorities from a “visual” set of plans with which to choose from

- Maintain coordination with adjacent signals by utilizing existing cycle lengths

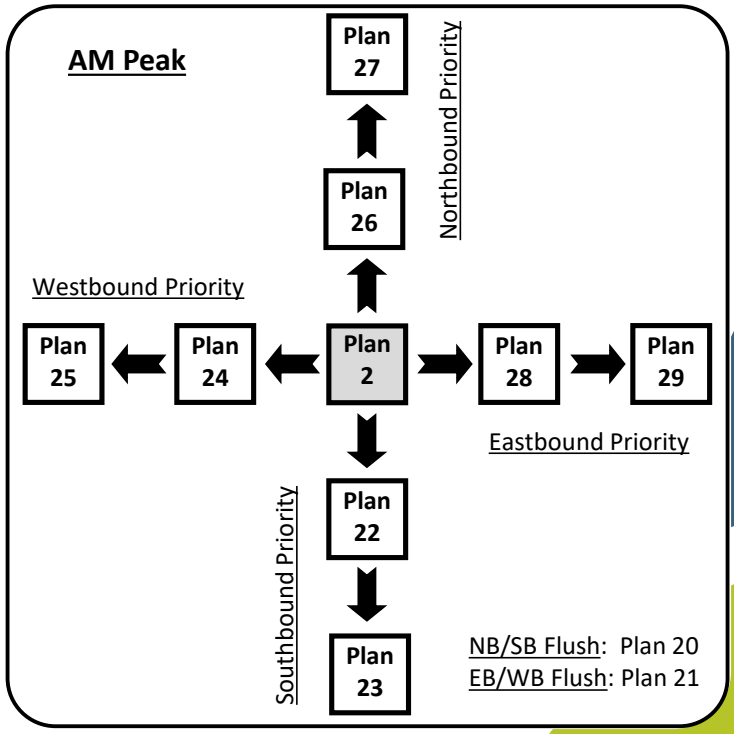
- Provide multiple options of split flexibility

- Standard timing plan nomenclature that is consistent countywide.

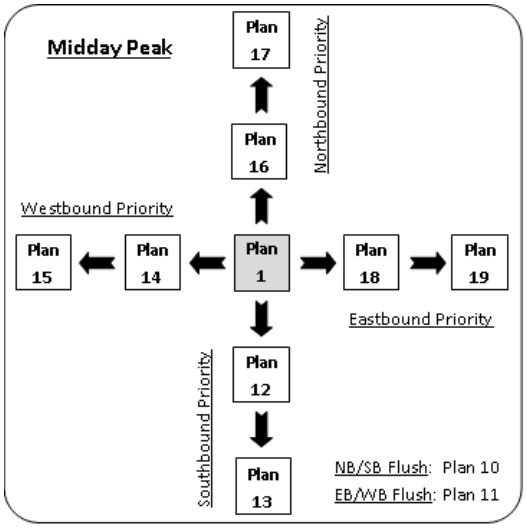
- Built off the existing timing plans for efficient development and quick implementation

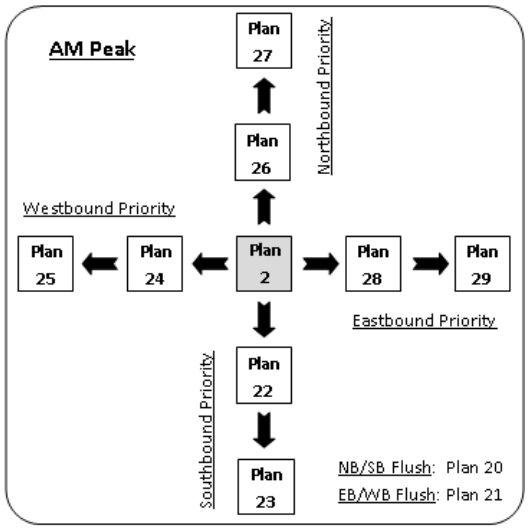
Proposed Timing Approach

- Benefits
  - Easy to select
  - Maintains corridor offsets
  - Maintains intersection operation
  - Intuitive numbering with phasing
  - Visual selection
- Operational Consideration
  - Cover ped timing if no buttons present

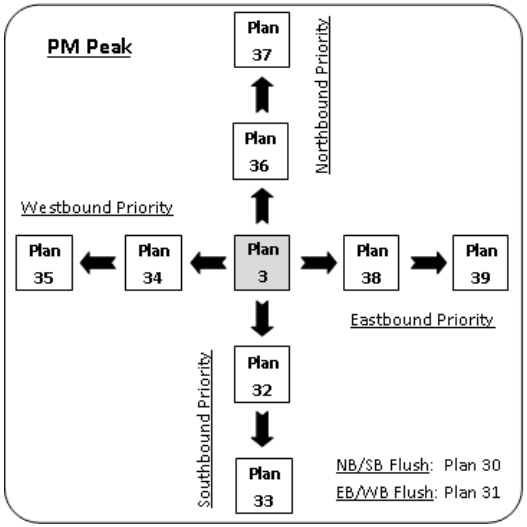


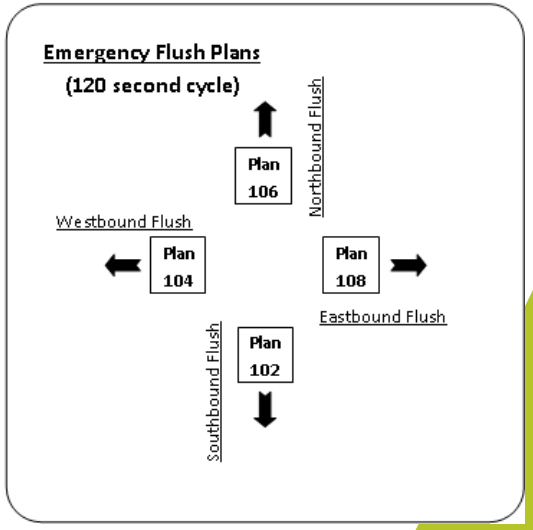
Quick Example





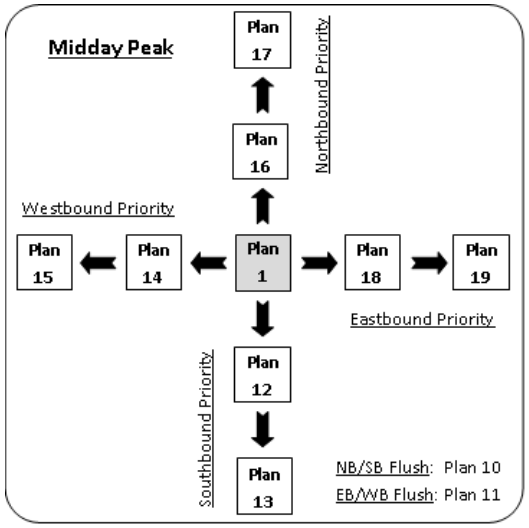
= 5 second split change

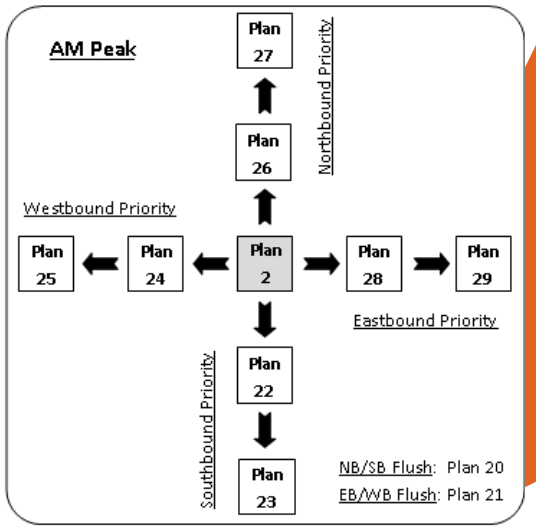




Quick Example

- Step 1
  - What Plan/TOD is currently operating?





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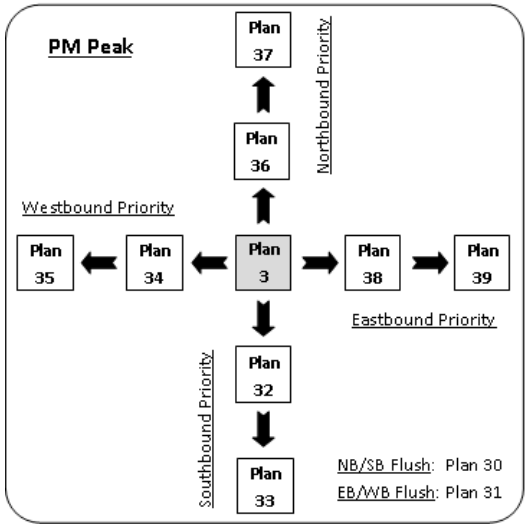

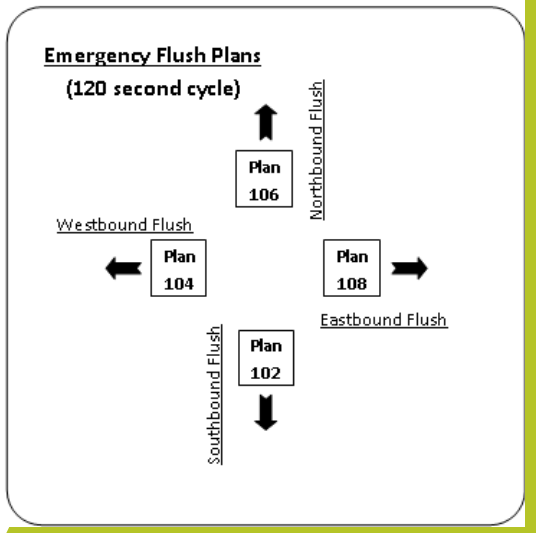

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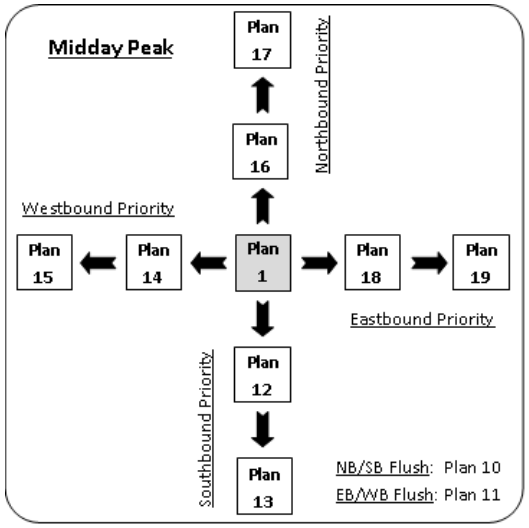

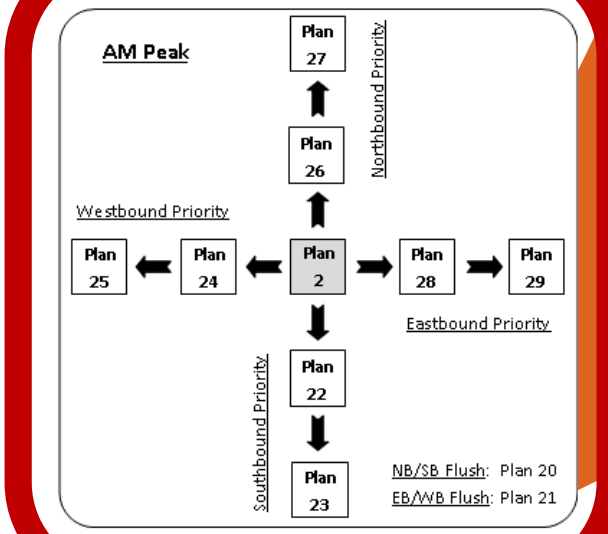

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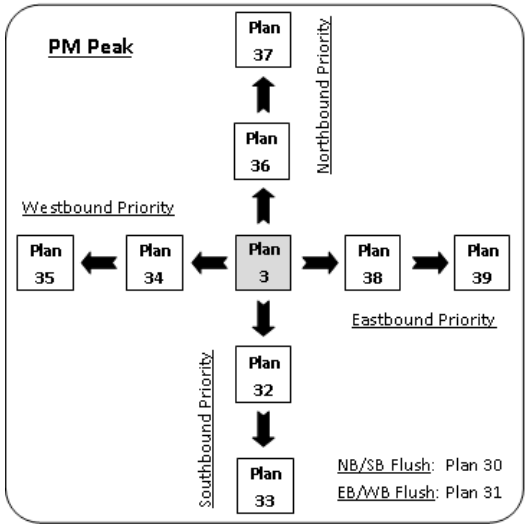

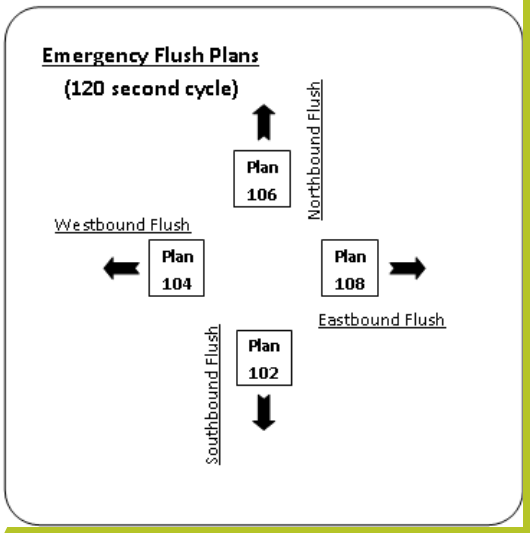

Quick Example

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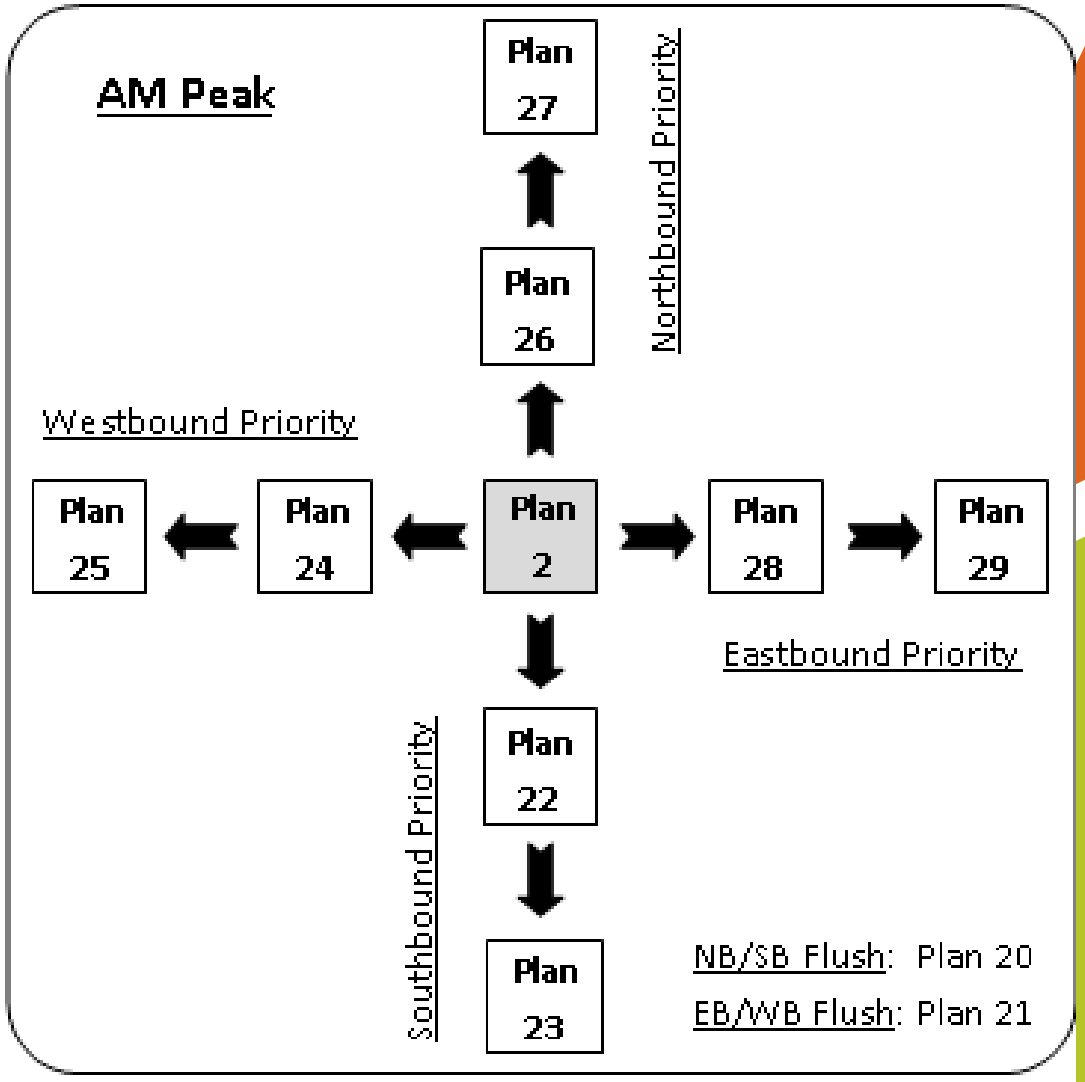
- Step 2
  - Determine which direction needs more split or is the priority



Quick Example

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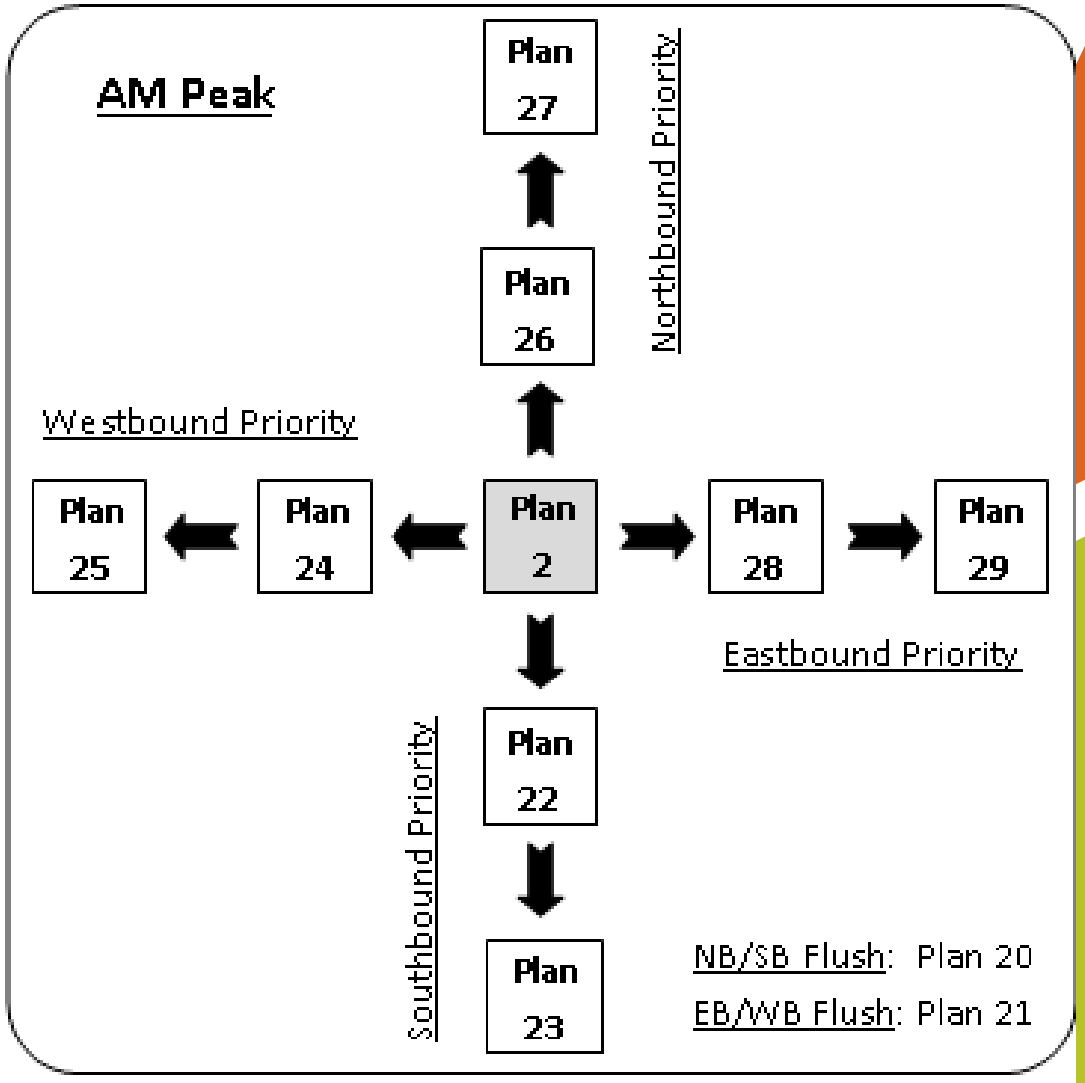
  - Choose amount of split time needed for direction



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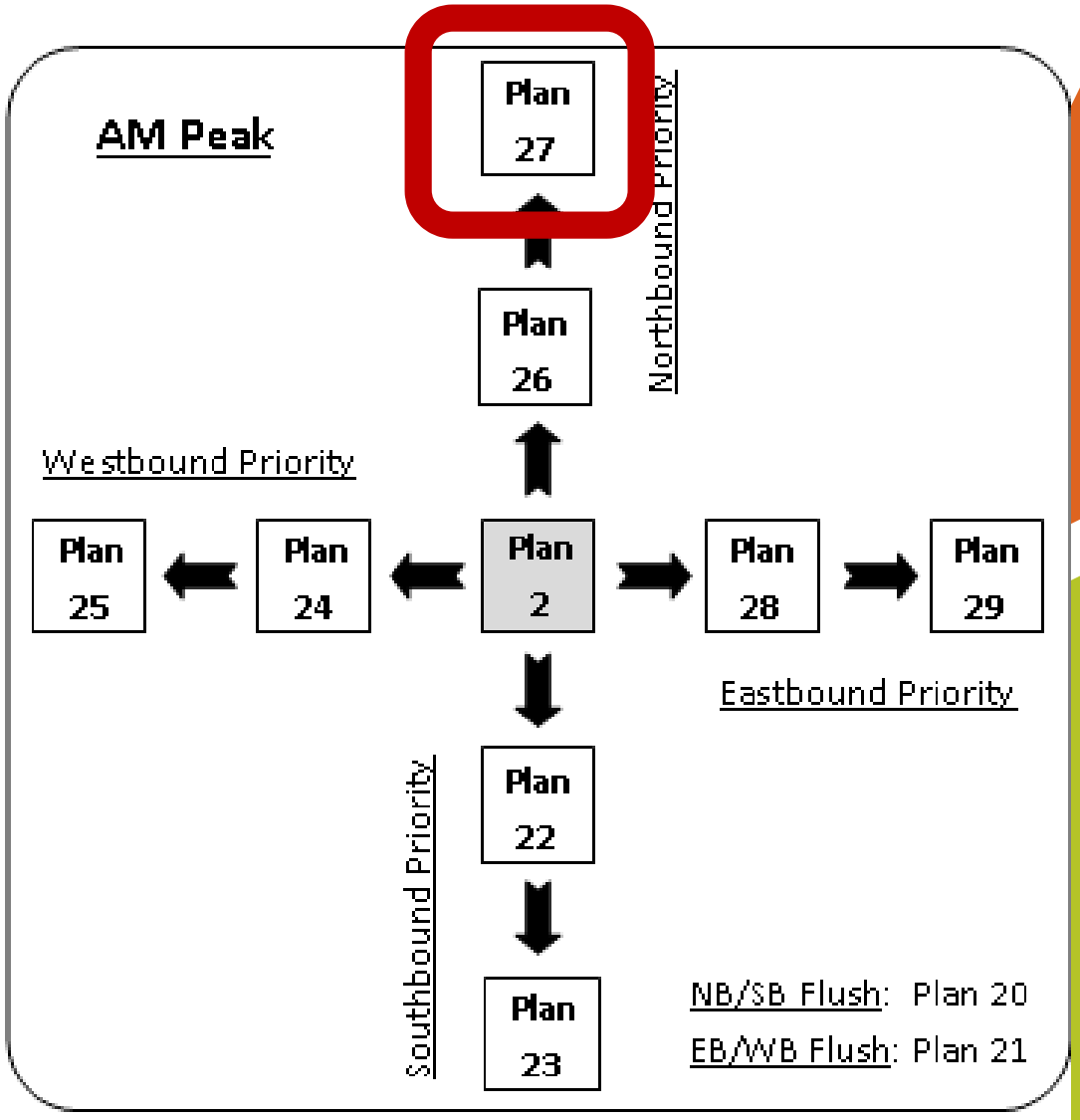
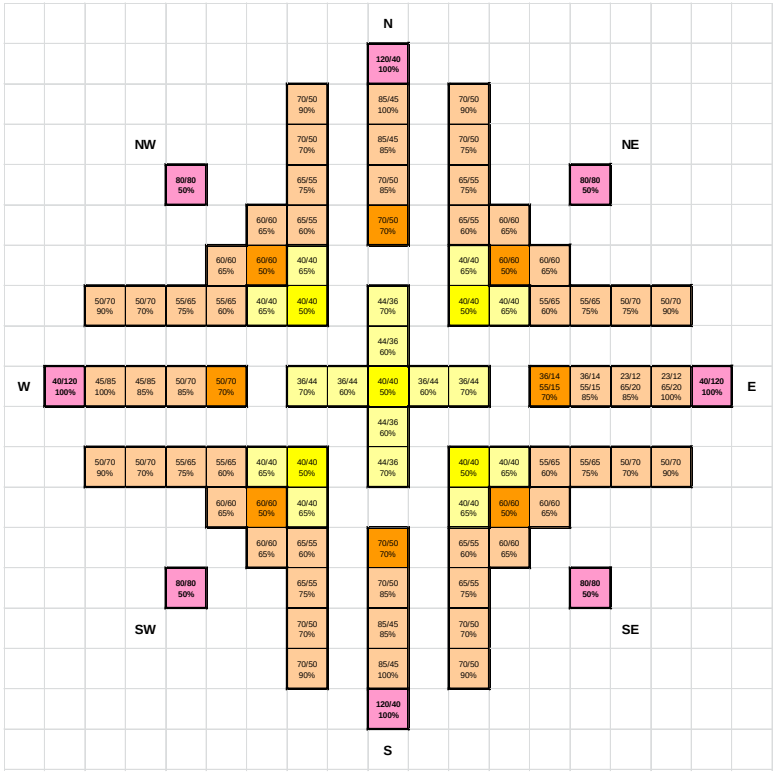
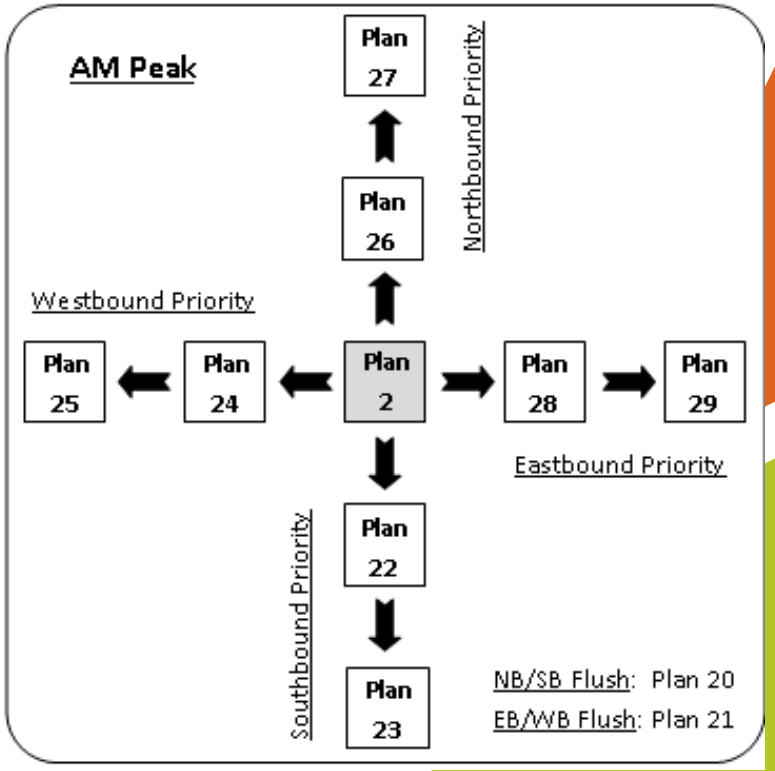
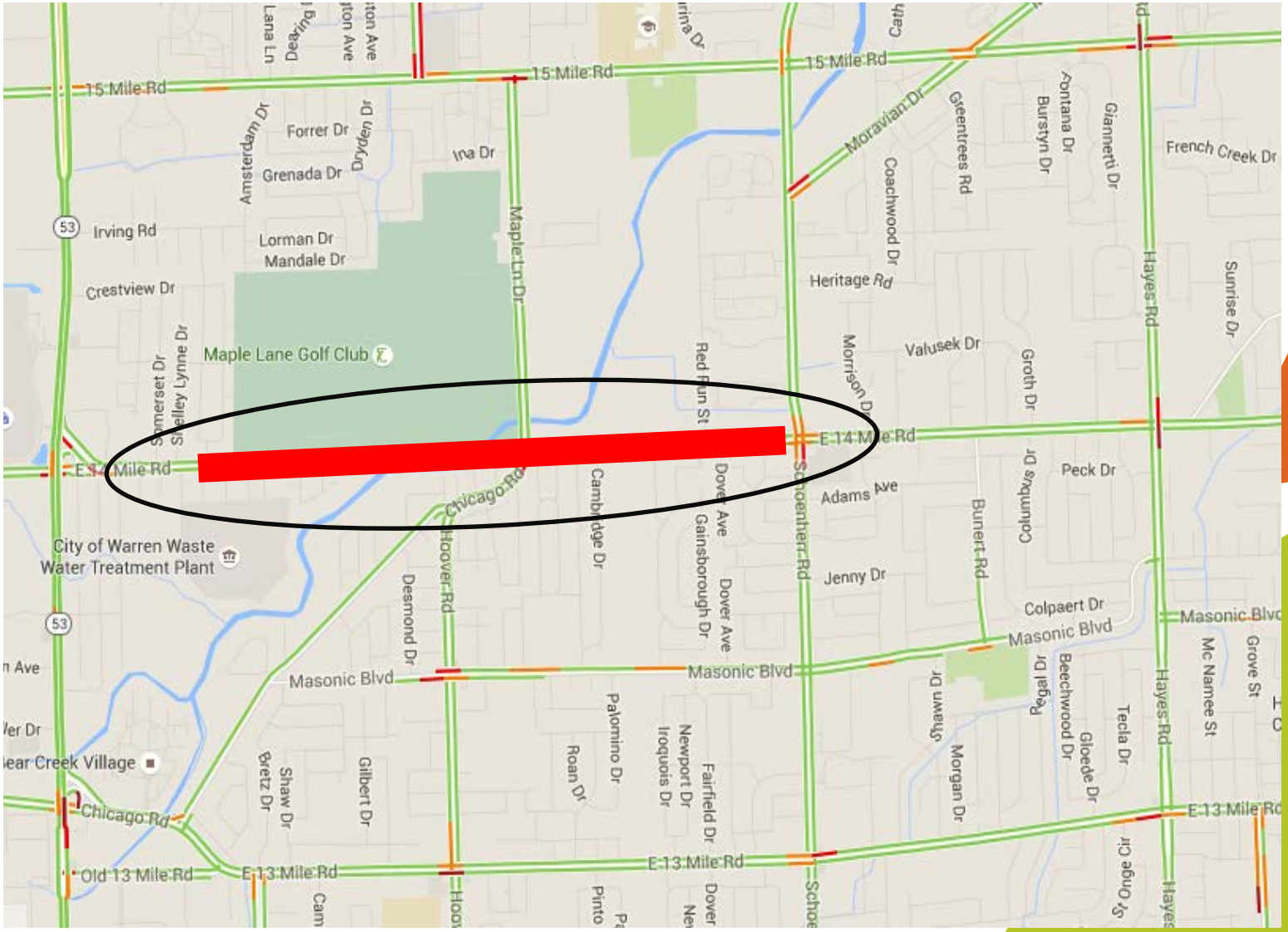


Contingency Plans Growth





Concept Expansion



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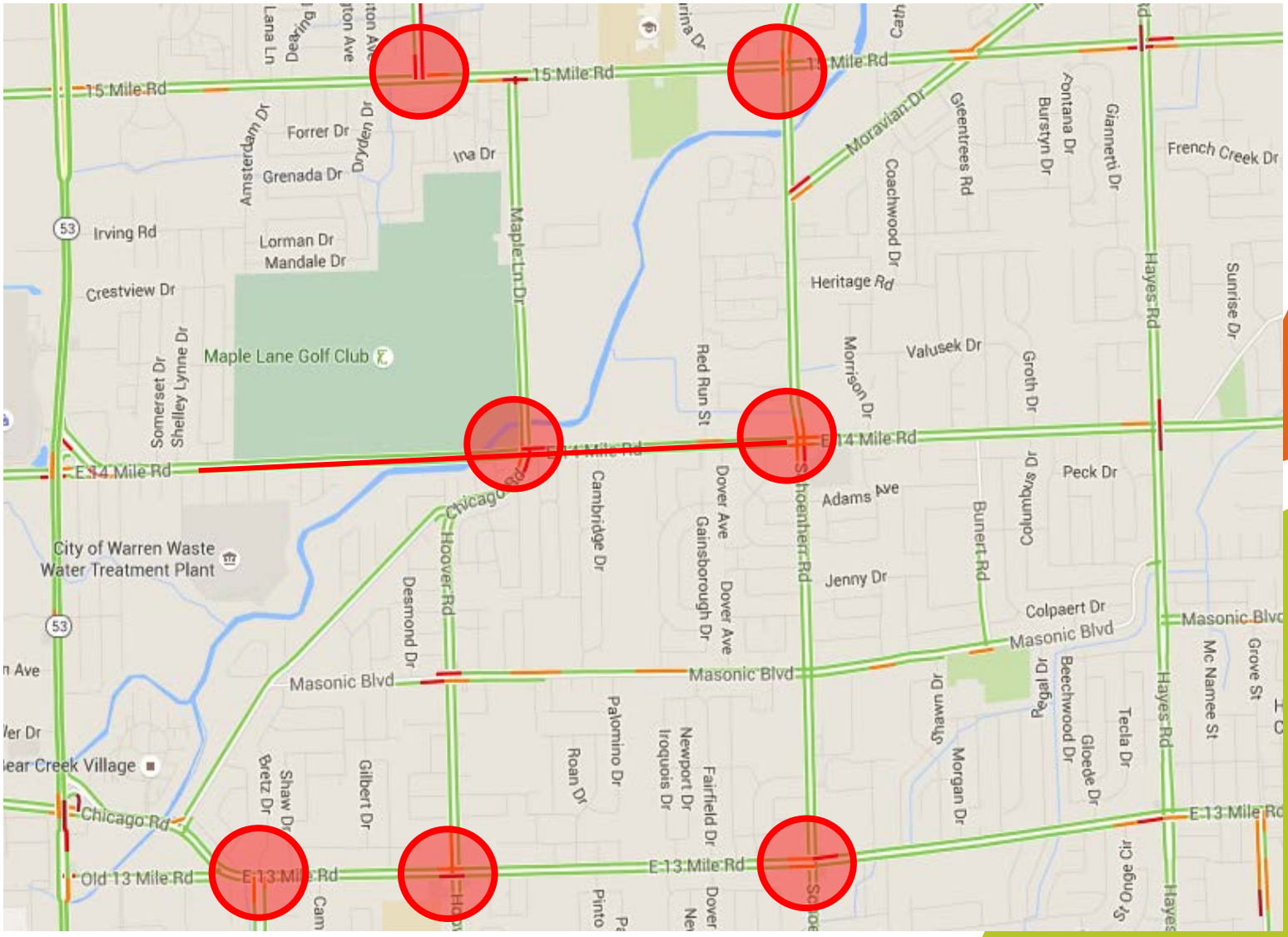

Additional ITS Efforts

- Integrated Corridor Management
  - MDOT operators access into Centracs
- Bluetooth travel times
  - Acyclica units
  - Utilized for signal operation validation
- CV partnerships
  - GM Warren Tech Center
- Signal performance measures

Thank You

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