Your Destination...Our Priority

Travel Times

I-94 Clearwater to St. Cloud Unbonded Concrete Project

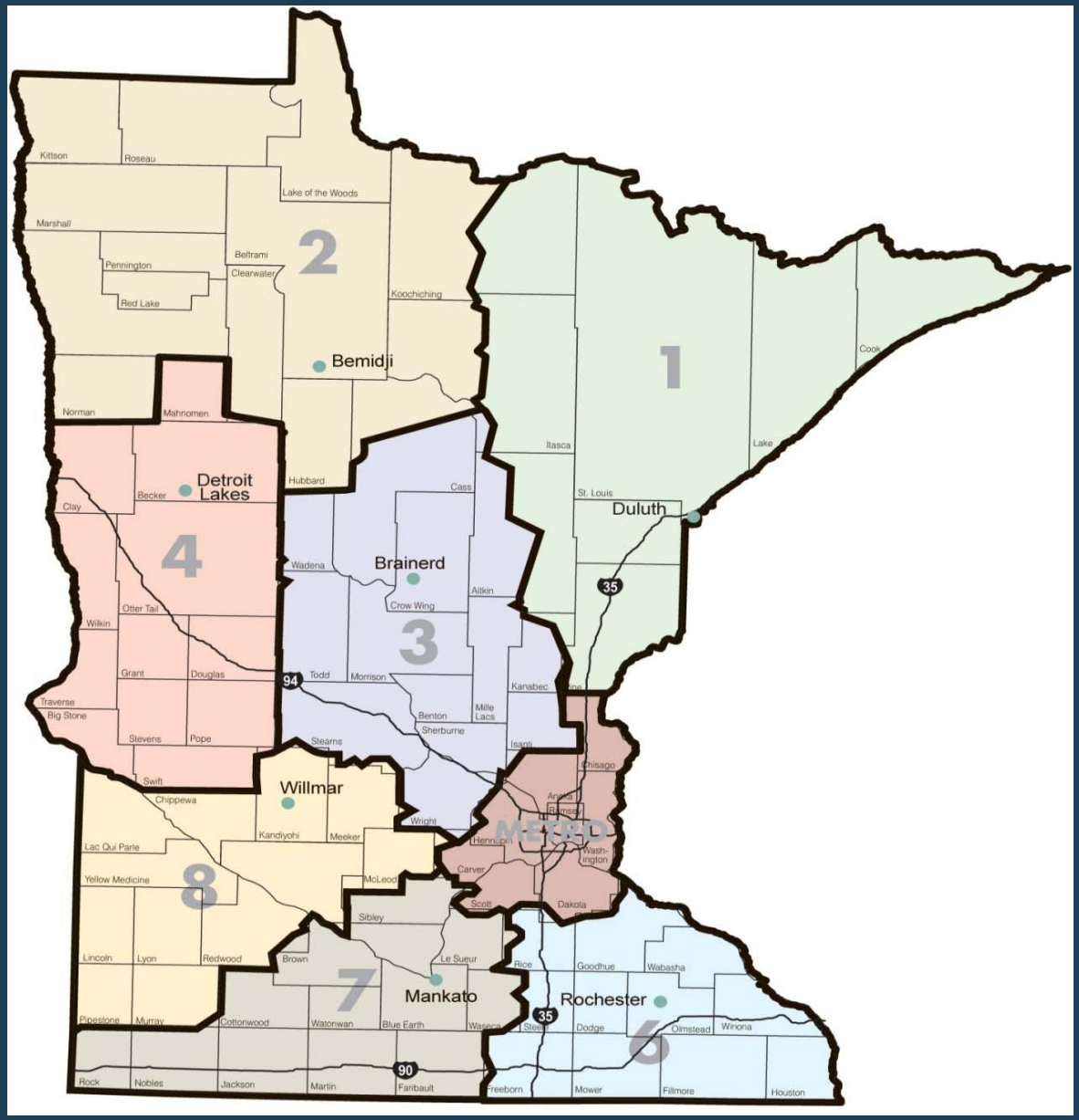
St. Cloud
Aug. 26, 2013

ITS

Your Destination...Our Priority

District 3

- **12 Counties**
- **Central Minnesota**
- **I-94 - 80 miles**
- **Baxter – headquarters**
- **St. Cloud – sub area**



I-94 Project
Un-bonded Concrete Overlay

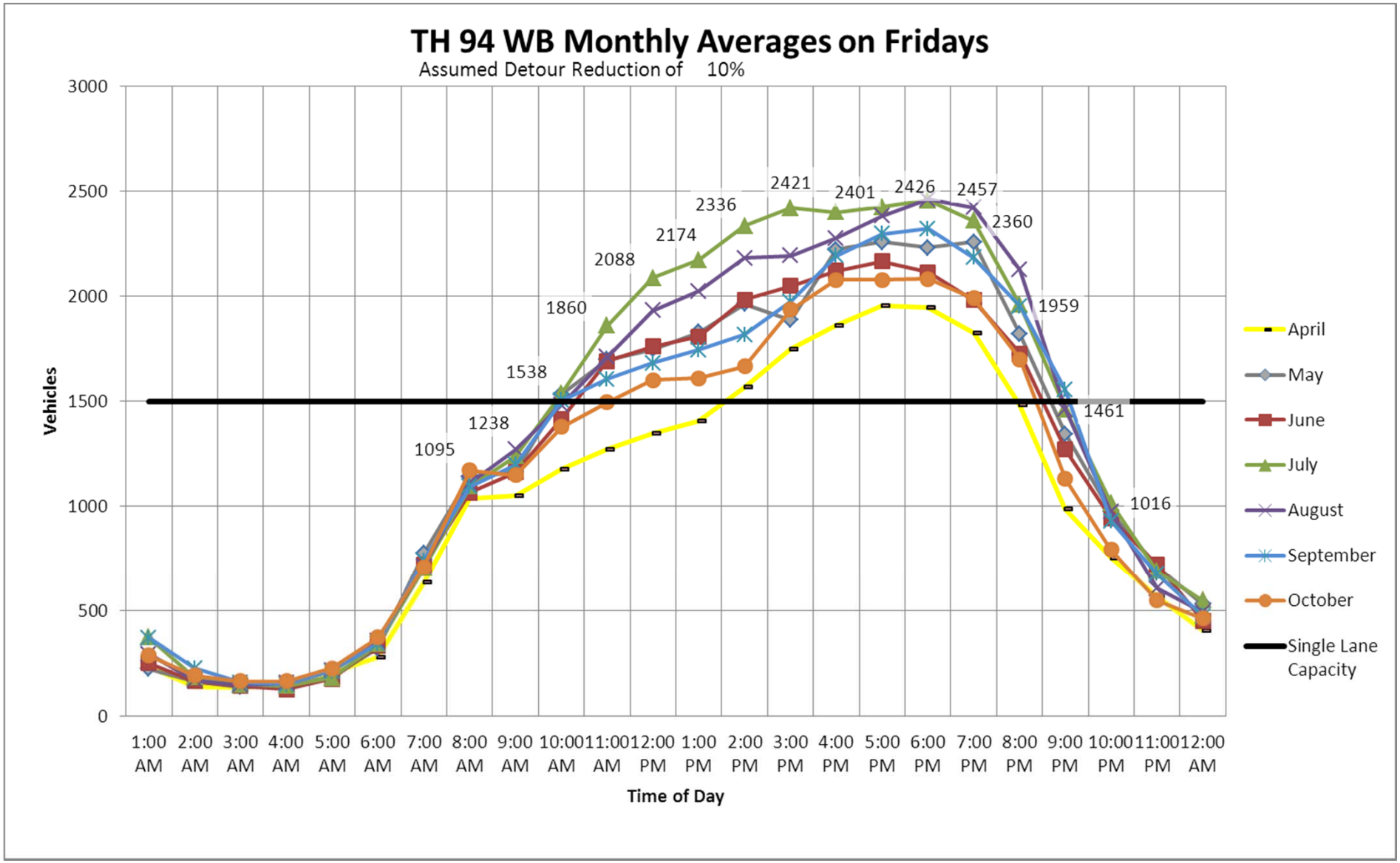
- SP 7380-238
- Concrete overlay
- Clearwater to St. Cloud
- Spring 2013
- 7.5 miles length
- $16.5 M

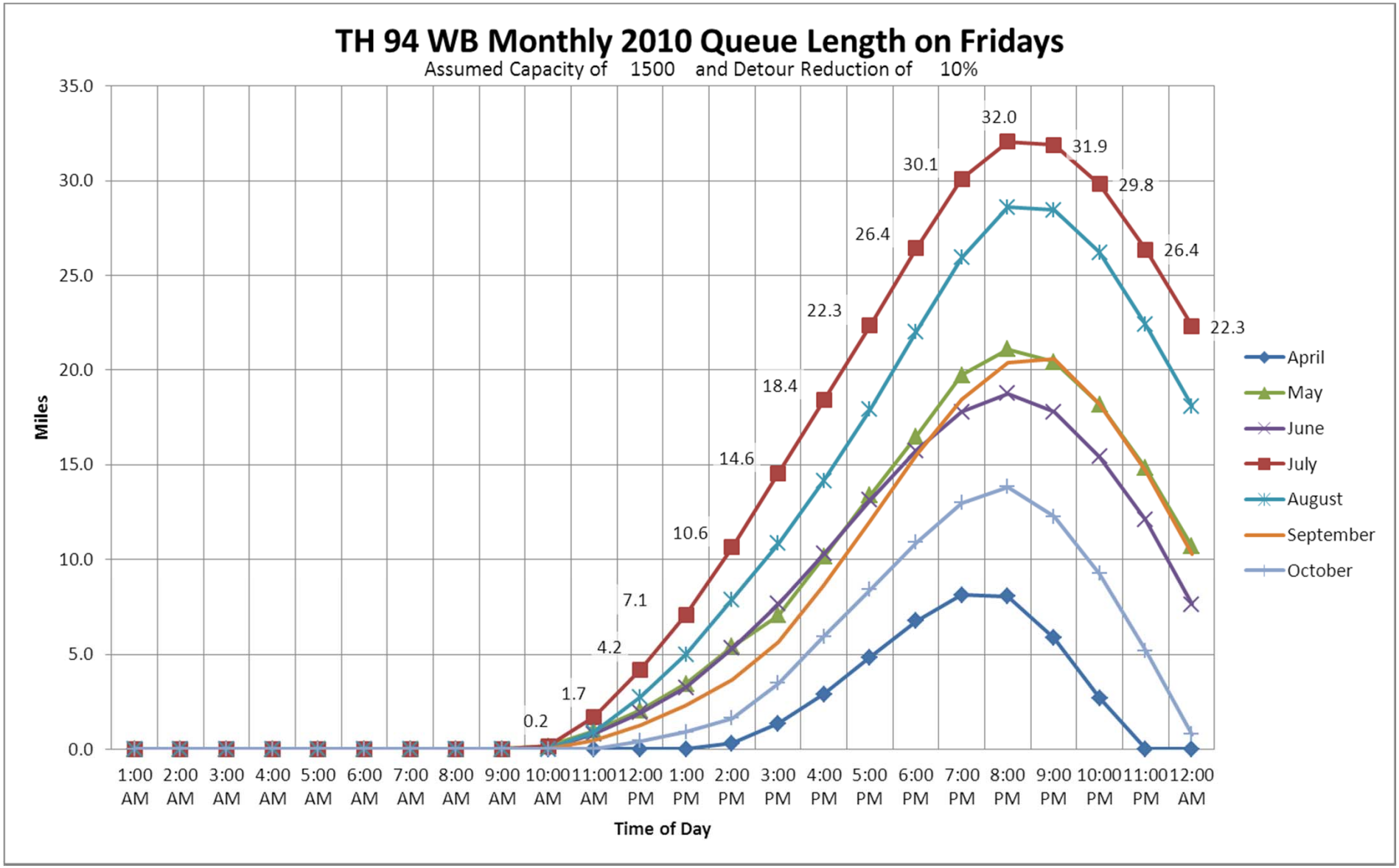
I-94 Traffic Volumes

- Average Daily Traffic (ADT)
  - 45,500 (M-Thur)
  - 55,000 (Average Weekends)
- Hourly volumes
  - Peak periods – 2,400 – 2,800 VPH
- Single Lane Capacity
  - 1,500 VPH – merge area
  - 1000 vehicles per hour over capacity

❖Significant Delays/Backups

- Traffic Management Plan


TH 94 WB Monthly Averages on Fridays
Assumed Detour Reduction of 10%
Vehicles
Time of Day
3000
2500
2000
1500
1000
500
0
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
12:00 AM
1095
1238
1538
1860
2088
2174
2336
2421
2401
2426
2457
2360
1959
1461
1016
April
May
June
July
August
September
October
Single Lane Capacity


TH 94 WB Monthly 2010 Queue Length on Fridays
Assumed Capacity of 1500 and Detour Reduction of 10%
Miles
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.2
1.7
4.2
7.1
10.6
14.6
18.4
22.3
26.4
30.1
32.0
31.9
29.8
26.4
22.3
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
12:00 AM
Time of Day
April
May
June
July
August
September
October

Traffic Management Plan

- Significant Impact Project
- Traffic Management Plan (TMP)
  - 1 – Traffic Control Plans
  - 2 – Traffic Operations Plan
  - **3 –** Public Information Plan

- TMP – revisit scope of project
  - Concrete – due to material life span

Traffic Control Plans
Un-bonded Concrete Project

- One lane traffic
- Crossovers
- Head-to-head traffic
- Ramp closures
- Detours
  - Ramps/loops/TH 24

Construction Staging
Un-bonded Concrete Project

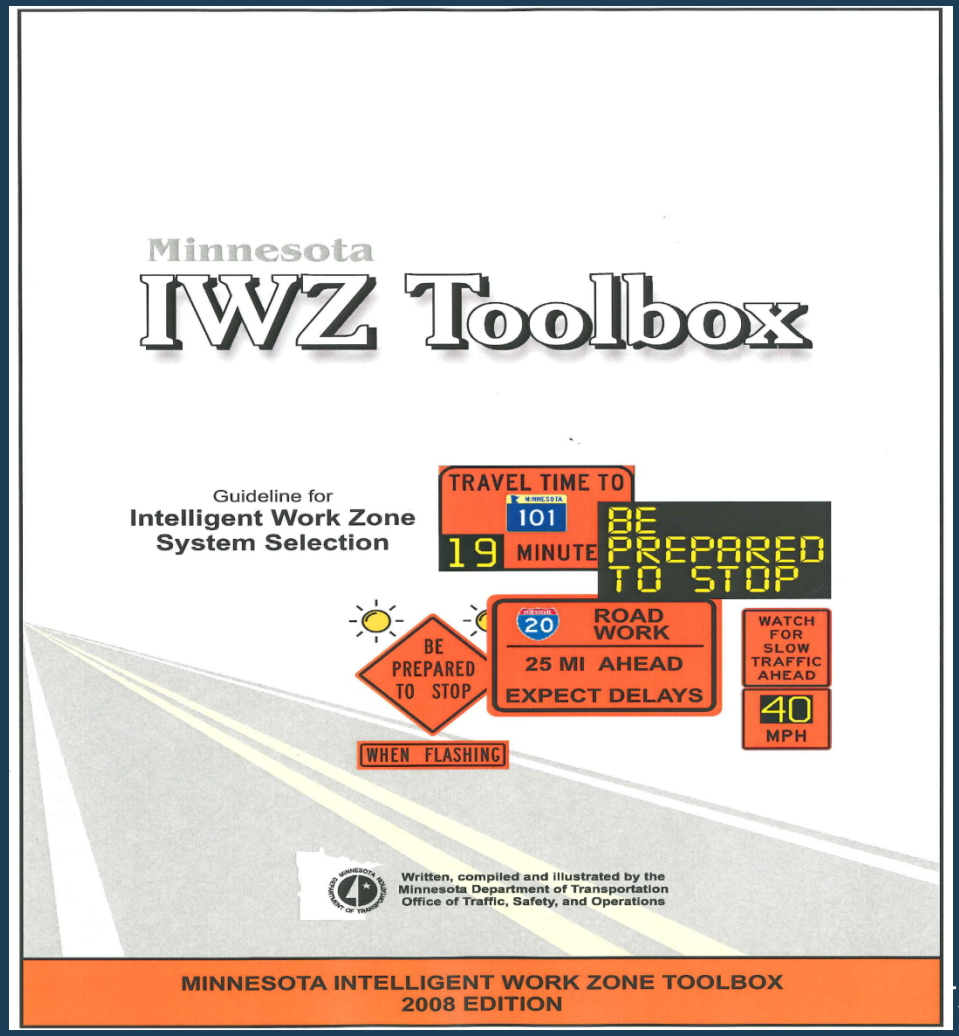
- Prep work Fall of 2012
- April to June 2013 – least impact
  - Stage 1 – EB closed
    - April to Memorial
  - Stage 2 – WB closed
    - Memorial to July 4th
- 4-lane open Memorial Weekend
- 4-lane by July 4th Weekend

ITS Project
SP 8823-260
Traffic Operations

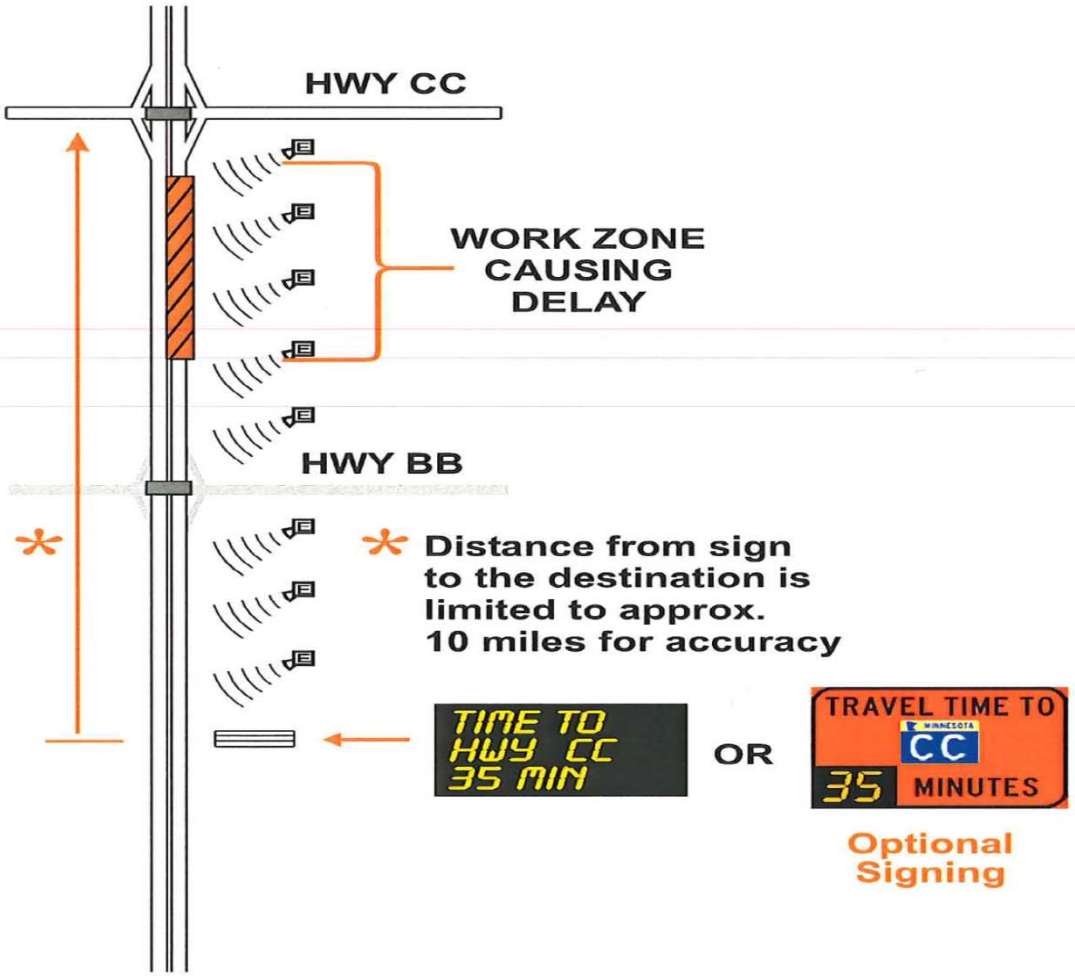
ITS – Separate project

IWZ Tool Box

I. Travel Time Info
II. Stopped Traffic
III. TH 24 Detour -
- Dynamic
- I-94 WB traffic 30% exit TH 24
- CSAH 75 detour



ESTIMATED TRIP TIME

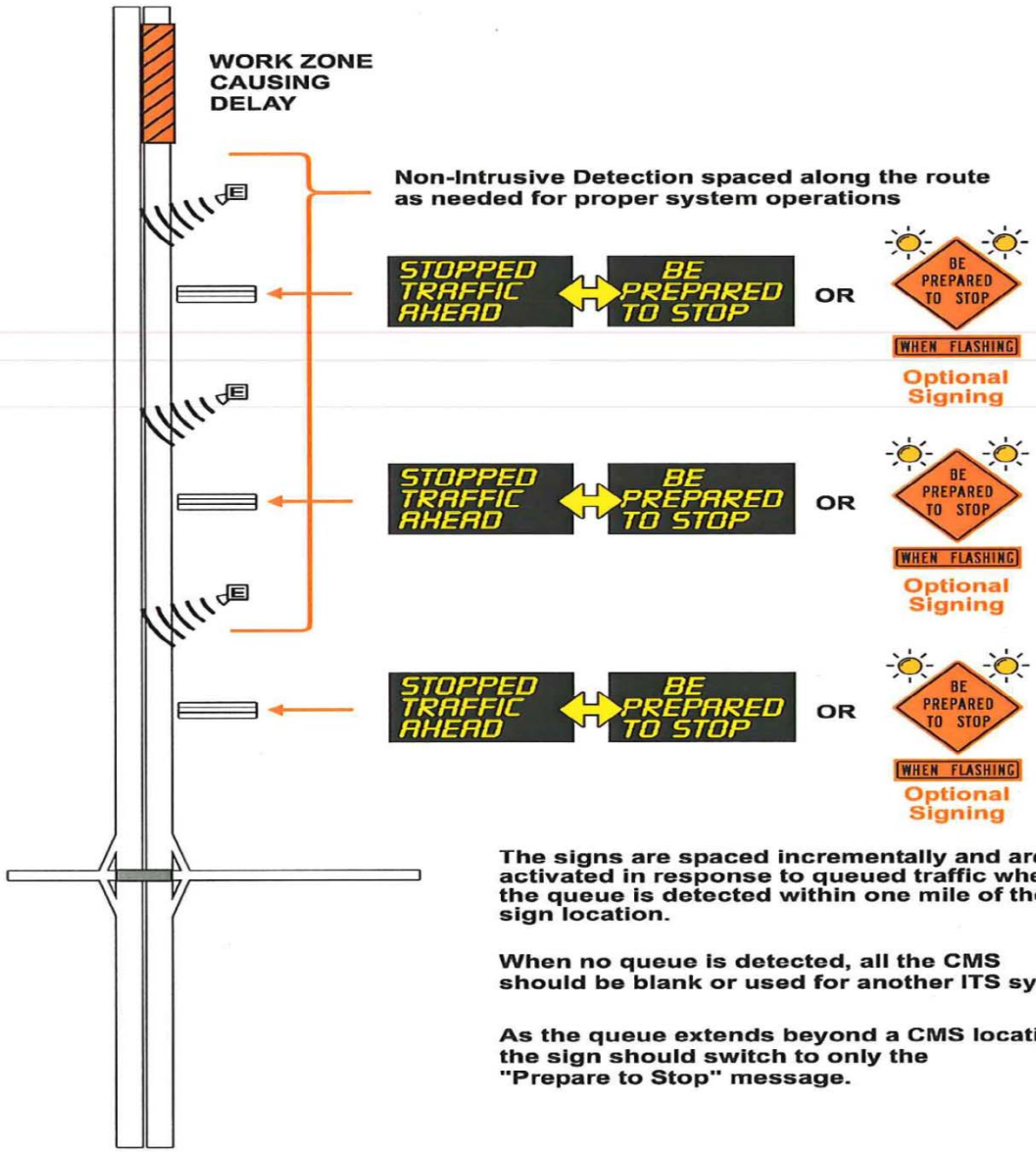


Consideration should be given to posting an alternate route and travel time for additional driver information.

- The CMS may be replaced with static warning signs equipped with two (2) CMS characters in dynamic mode. The characters would display the real-time travel time in the work zone downstream.
- Consideration should be given to posting an alternate route and travel time for additional driver information.
- The CMS may be supplemented with othe informational devices such as Highway Advisory Radio (HAR).

NOTES

- Advance warning signs and other standard temporary traffic control devices have not been shown on this figure. Refer to the MI MUTCD including the 2007 Field Manual or the TTC Layout Templates for typical layout examples.
- All IWZ Guide Signs and CMS should be reviewed by the Mn/DOT Office of Traffic Safety, & Operations for design and message approval.
- Approved CMS messages should be listed in the Special Provisions, and approx CMS locations should shown on the TTC plans. All CMS displays should be blank when messages are not warranted.
- Refer to the Toolbox Definitions Section fc graphic symbols and terms.



The signs are spaced incrementally and are activated in response to queued traffic when the queue is detected within one mile of the sign location.

When no queue is detected, all the CMS should be blank or used for another ITS system.

As the queue extends beyond a CMS location, the sign should switch to only the "Prepare to Stop" message.

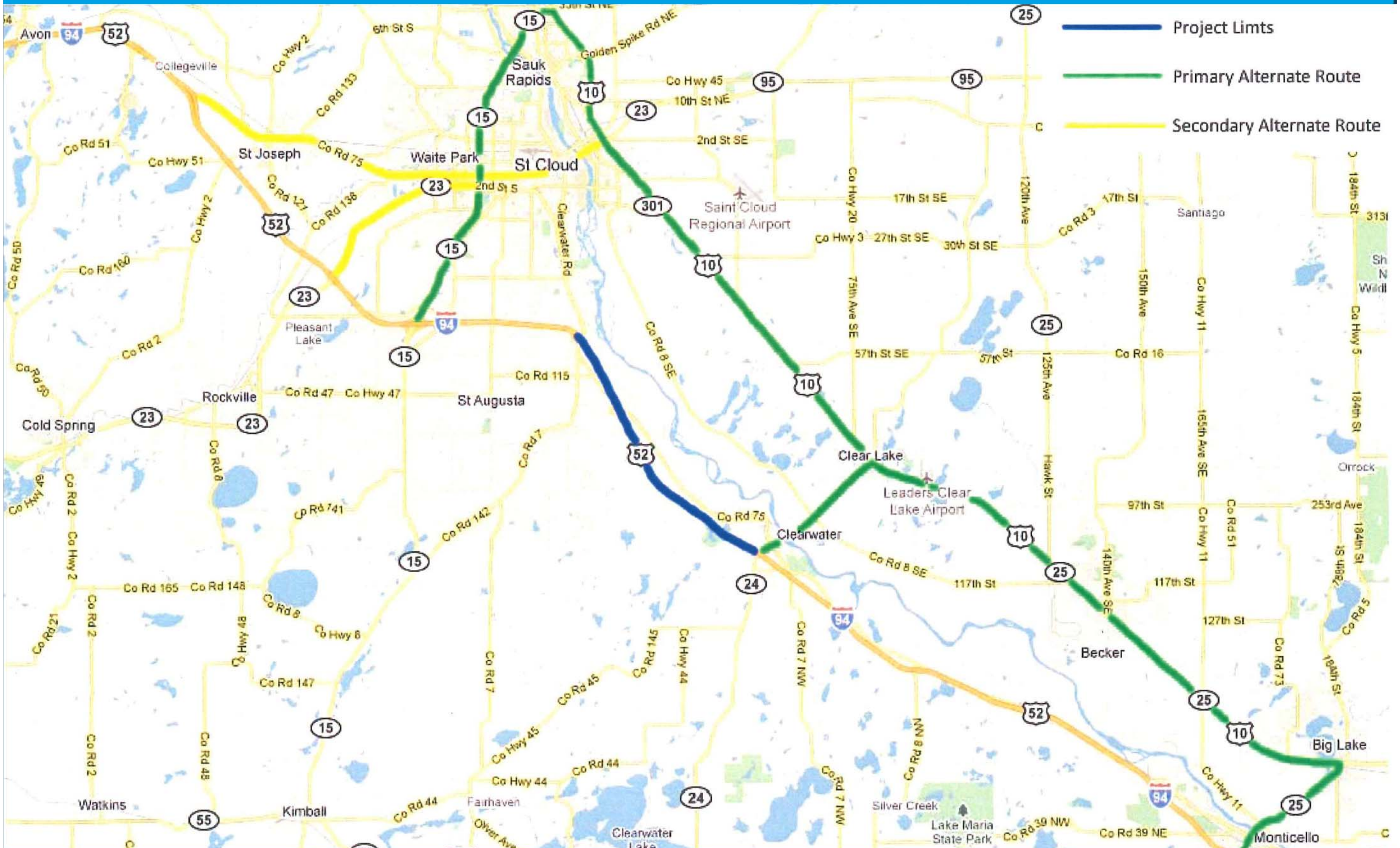
- The CMS may be replaced with an appropriate warning sign equipped with dynamically automated flashing lights as shown below.
- The static signs are spaced incrementally and the individual flashers are activated in response to queued traffic when the queue is detected within one mile of the sign location.

OPTIONAL SIGN DESIGN

- When traffic queue lengths are reasonably predictable, warning motorists of stopped / slowed traffic may be accomplished with the use of typical TTC warning signs placed prior to the anticipated beginning of queue.
- The system may be combined with "Dynamic Merge" and "Stopped Traffic Advisory" systems

NOTES

- Advance warning signs and other standard temporary traffic control devices have not been shown on this figure. Refer to the MN MUTCD including the 2007 Field Manual or the TTC Layout Templates for typical layout examples.
- All IWZ Guide Signs and CMS should be reviewed by the Mn/DOT Office of Traffic, Safety, & Operations for design and message approval.
- Approved CMS messages should be listed in the Special Provisions, and approx CMS locations should shown on the TTC plans. All CMS displays should be blank when messages are not warranted.
- Refer to the Toolbox Definitions Section for graphic symbols and terms.


Project Limts
Primary Alternate Route
Secondary Alternate Route
Avon
Collegeville
St Joseph
Waite Park
St Cloud
Sauk Rapids
Saint Cloud Regional Airport
Pleasant Lake
Rockville
Cold Spring
St Augusta
Clear Lake
Leaders Clear Lake Airport
Clearwater
Becker
Santiago
Orrock
Big Lake
Monticello
Silver Creek
Lake Maria State Park
Clearwater Lake
Fairhaven
Kimball
Watkins
Co Rd 75
Co Rd 8 SE
2nd St SE
10th St NE
Co Hwy 45
Golden Spike Rd NE
17th St SE
27th St SE
30th St SE
57th St SE
117th St
127th St
97th St
253rd Ave
Co Rd 16
Co Rd 115
Co Rd 47
Co Hwy 47
Co Rd 142
Co Rd 165
Co Rd 148
Co Rd 147
Co Hwy 44
Co Rd 44
Co Rd 39 NE

ITS Procurement

Travel Information System

Procurement Methods

1. Request for Proposal (RFP)
2. In-House – State forces
3. Design/Bid/Build – selected
   - Hybrid System/Control – Why???
   - MnDOT – manage I-94 WB
   - Contractor – manage I-94 EB

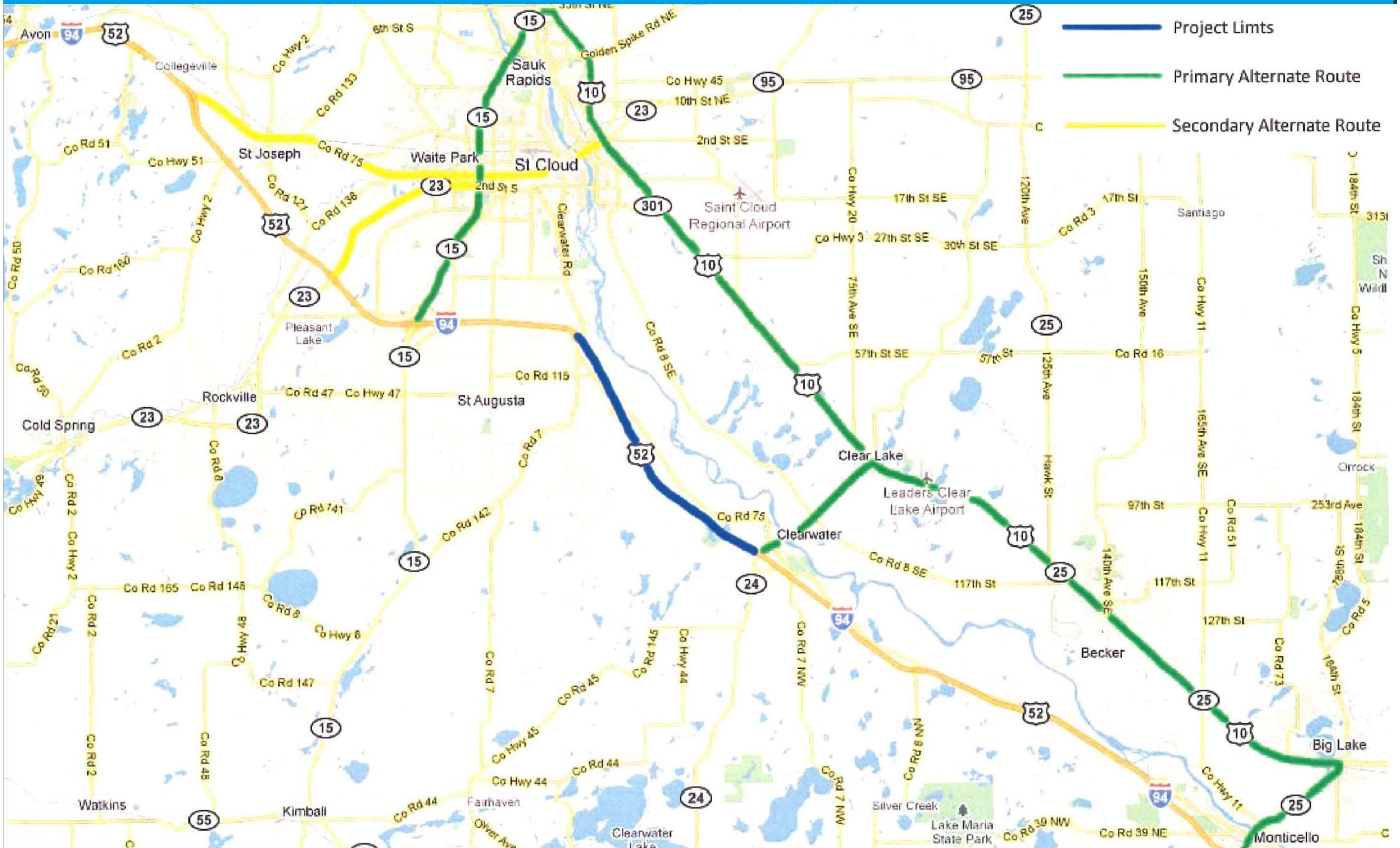
Design/Bid/Build

- Leverage existing infrastructure
  - St. Cloud east to Metro
    - Fiber network
    - Connected to RTMC
  - Detectors/Cameras/DMS
- St.Cloud west
  - Limited infrastructure

Concerns

- Project costs – 20 detectors
  - I-35 Duluth 6 detectors/$395,000
  - $500,000 - ????
- Integration
- Accuracy of information – length

Your Destination...Our Priority



HONOR *Service* LEADERSHIP

ITS Concept Plan Development

1. Travel Time
   - 2 signs each direction
   - 10 and 15 miles prior to project
   - Detector spacing/mile (20 total)
2. Stopped Traffic Advisory
   - CMS every 3 miles (8 total)
   - 2 boards active prior to slow/stop point
   - Common detection

Concept Plan Development

3. TH 24 Dynamic Detour
   - 1 CMS prior to Hasty interchange
   - Activated when backups started
   - Approx. 5 miles before project
   - Backups – Hasty interchange
   - Hasty exist heavily used
   - 1000 vph less on I-94 WB peak times

I-94 EB
ITS contract

- Contractor responsible for EB
- Travel time at 17 & 10 miles
  - Hybrid signs – Static/Dynamic
  - Series 3 signs at 17 mile pt.
  - 1 Hybrid sign -10 mile point
- Stopped traffic Advisory
  - CMS every 3 miles

I-94 EB
17 mile point

I-94 EB

2nd sign

I-94 EB

3rd Hybrid sign (17 mile pt.)

I-94 EB

Hybrid sign (10 mile pt.)

Nonintrusive Detector

1 mile spacing

I-94 WB
Travel time (MnDOT)

I-94 WB
Travel time (MnDOT)

Project Costs

- Much lower than expected
  - $200,000 range
- 2 Bidders
- Safety Signs – awarded contract
  - ASTI subcontractor

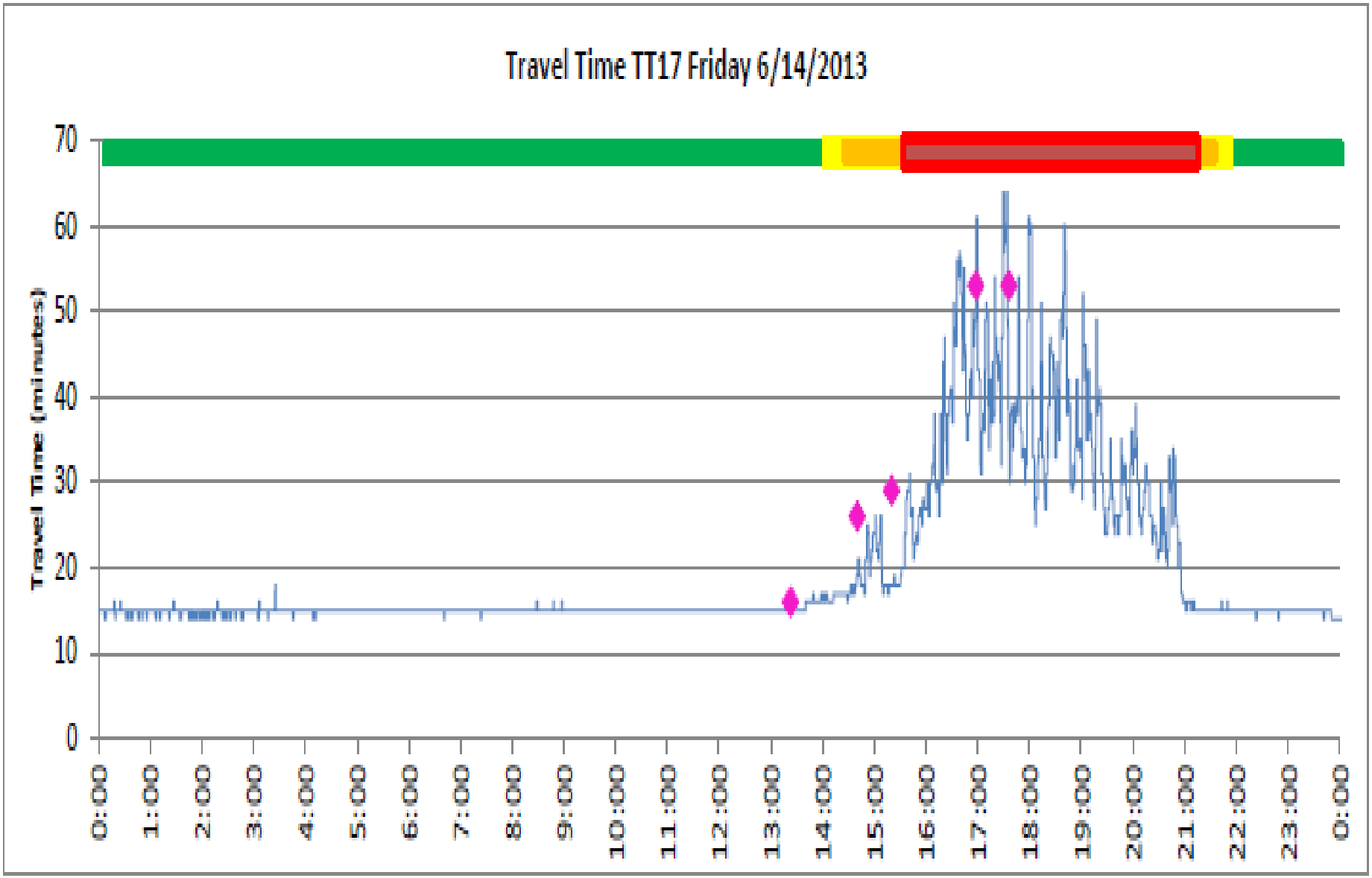
Data Collection

- Weekly data collected
  - Speeds
  - Travel times
  - Message content
    - Travel time postings
    - Stopped message posting
  - Compare to field information

Greater than 40 mph
Less than 40 mph, greater than 30 mph
Less than 30 mph, greater than 15 mph
Less than 15 mph

Eastbound Detector Speeds

	Avon				St Joseph				TH 23			TH 15				CSAH 75	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q10
6/14/13 2:00 PM	73	69	73	74	76	69	67	73	71	70	72	74	70	20	46	57	59
6/14/13 2:15 PM	73	68	74	75	77	70	69	73	72	70	71	74	70	21	37	58	57
6/14/13 2:30 PM	74	69	75	75	76	70	68	73	72	71	72	75	46	19	36	57	57
6/14/13 2:45 PM	74	69	76	76	78	70	69	74	73	71	72	76	23	19	40	59	57
6/14/13 3:00 PM	73	68	75	75	78	71	69	74	73	71	72	75	27	16	48	59	58
6/14/13 3:15 PM	73	68	74	75	78	71	68	73	72	72	73	75	54	20	33	59	58
6/14/13 3:30 PM	73	67	74	74	78	70	68	73	73	71	71	75	16	15	32	60	47
6/14/13 3:45 PM	73	68	73	74	74	69	68	73	72	71	72	75	12	20	32	57	55
6/14/13 4:00 PM	72	67	73	74	76	69	67	72	72	71	72	73	13	13	24	50	50
6/14/13 4:15 PM	72	68	74	74	77	70	68	73	72	70	71	75	28	19	11	10	33
6/14/13 4:30 PM	73	68	74	74	73	70	68	73	72	70	71	74	7	8	14	16	33
6/14/13 4:45 PM	74	69	75	74	78	70	68	73	73	71	72	69	4	12	20	17	26
6/14/13 5:00 PM	74	69	75	75	76	70	68	73	72	72	72	51	9	13	22	19	32
6/14/13 5:15 PM	74	70	75	76	77	70	68	74	73	71	72	26	7	15	23	16	34
6/14/13 5:30 PM	74	69	74	75	77	70	68	73	73	71	73	28	10	14	27	23	32
6/14/13 5:45 PM	74	70	75	74	78	69	68	73	72	72	72	65	6	12	22	17	32
6/14/13 6:00 PM	74	70	76	76	80	70	69	73	74	71	73	50	7	17	35	28	33
6/14/13 6:15 PM	73	69	74	76	78	69	67	73	73	72	73	56	12	19	39	13	32
6/14/13 6:30 PM	74	70	76	73	76	70	70	73	71	71	72	68	5	12	40	12	31
6/14/13 6:45 PM	74	70	76	75	76	71	69	73	73	72	73	57	14	22	39	13	33
6/14/13 7:00 PM	74	70	75	76	77	71	69	73	72	72	72	74	19	10	32	14	33
6/14/13 7:15 PM	74	70	75	75	76	71	69	74	73	71	73	76	53	10	27	18	34
6/14/13 7:30 PM	74	70	75	77	78	70	69	74	74	72	74	75	64	15	39	18	33
6/14/13 7:45 PM	74	70	76	76	78	72	69	74	74	71	74	75	71	19	35	12	36
6/14/13 8:00 PM	74	70	76	76	76	71	68	73	73	72	72	74	71	11	43	15	34
6/14/13 8:15 PM	74	70	77	75	79	72	70	74	73	72	73	76	71	65	50	16	36
6/14/13 8:30 PM	74	70	75	74	76	71	70	74	74	72	75	75	73	65	50	14	37
6/14/13 8:45 PM	74	70	76	77	79	72	70	74	73	72	73	74	71	64	63	27	32
6/14/13 9:00 PM	74	68	75	75	77	71	69	74	73	72	72	74	71	64	72	64	36
6/14/13 9:15 PM	73	68	76	75	76	69	67	73	72	72	73	74	71	66	73	64	50
6/14/13 9:30 PM	74	68	74	75	76	70	69	73	72	71	72	75	71	66	72	62	46
6/14/13 9:45 PM	72	68	72	72	74	69	68	73	72	70	72	72	71	64	72	61	41
6/14/13 10:00 PM	72	68	74	75	75	70	68	71	70	71	72	74	70	66	74	59	59
6/14/13 10:15 PM	71	68	73	72	74	68	69	72	70	70	72	72	71	65	73	59	62
6/14/13 10:30 PM	72	69	74	76	78	69	68	73	71	70	71	74	71	65	72	60	63
6/14/13 10:45 PM	73	68	74	75	78	70	66	73	72	71	72	75	71	65	73	63	62
6/14/13 11:00 PM	71	68	74	74	75	67	68	72	70	71	72	73	70	67	72	62	63


Travel Time TT17 Friday 6/14/2013
Travel Time (minutes)
70
60
50
40
30
20
10
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

Project Findings

- Integration – smoother than expected
- Contractor - open to improvements
- Backups less the expected
- Diversion of traffic – up to 1000 vph
  - TH 24 detour
  - TH 10 – good parallel route WB
  - CSAH 75 parallels I-94
  - Limited public complaints

Project Findings

- Improvements:
  - Speed variations during hour
  - Contractor's web site
    - Hybrid signs – Display ???

Questions