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Southeast Michigan Council of Governments

Processing Requests for Technical Assistance

Basic Steps and US-23 Case Study

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Transportation Technical Committee Meeting
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Technical Assistance Request

- Data not available “off the shelf”
- Requires some or all of the following:
  - Model network changes
  - Full or partial model run
  - Scenario analysis

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Basic Steps

Review Request

Recalibrate Base Case

Develop Alternative Cases

Analyze Model Output

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Review Request

- Information to identify:
  - Contact person
  - Project background, details
  - Type of data, years of data needed
  - Model version to use for request
- Meet with client
- Gain familiarity with project area

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Model Definitions

- Base case – existing 2005 regional model
- Modified base case – updated network (if base differs from reality)
- Alternative case – modified network per project specifications

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Recalibrate Base Case

Why Recalibrate?

- Regional model output may not accurately reflect traffic at local level
- Corrections to network geometry and link attributes may be needed in study area

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Recalibrate Base Case

Data Needed for Verification and Revision

- Observed traffic counts and modeled volumes
- Posted speeds and modeled free-flow, congested speeds
- Number of lanes, capacity, func. class, area type, other network attributes
- Network topology

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Recalibrate Base Case

Perform Reasonableness Checks

- Compare base with modified base
  - Volumes: all-day, hourly, peak, off-peak
  - Volume/capacity ratios, speeds
- Make additional changes until modified base case satisfies project needs (iterative process)
- Review future-year model output, if any

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Develop Alternative Cases

- Determine number of alternatives
- Select model networks, years needed
- Identify model links affected by project
- Make geometric and attribute changes to network
- Make GISDK code changes if necessary

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Analyze Model Output

- Perform model runs, create summaries
- Analyze model output data
  - Overall reasonableness
  - Before and after volumes (by time period if necessary), congested speeds, V/C ratios
- Document, review, and submit finding memo to requesting agency (along with supporting files)

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US-23 Case Study

Project Understanding

- Year 2010 road maintenance project on US-23 between Silver Lake Rd and CSX railroad overpass (south of Grand River Ave) in Livingston County
- Project calls for single lane closure in NB direction during off-peak hours, restriction on one side

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Project Purposes

- Assist in preparing “traffic circulation plan” or detour plan as part of “work zone traffic control” design
- Assess areas with significant traffic volume diversion due to construction

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Familiarity With Project Area

- Project location – US-23 between Silver Lake Rd interchange and CSX railroad overpass in Livingston County
- Project area – 3x3 to 5x5 square miles
- Google maps
- GIS road layers, aerial photos

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Familiarity With Project Area

- SE data in surrounding TAZs, looking for growth patterns
  - Household, population, employment
- Transportation data
  - Traffic counts, posted speeds
  - Functional class, number of lanes

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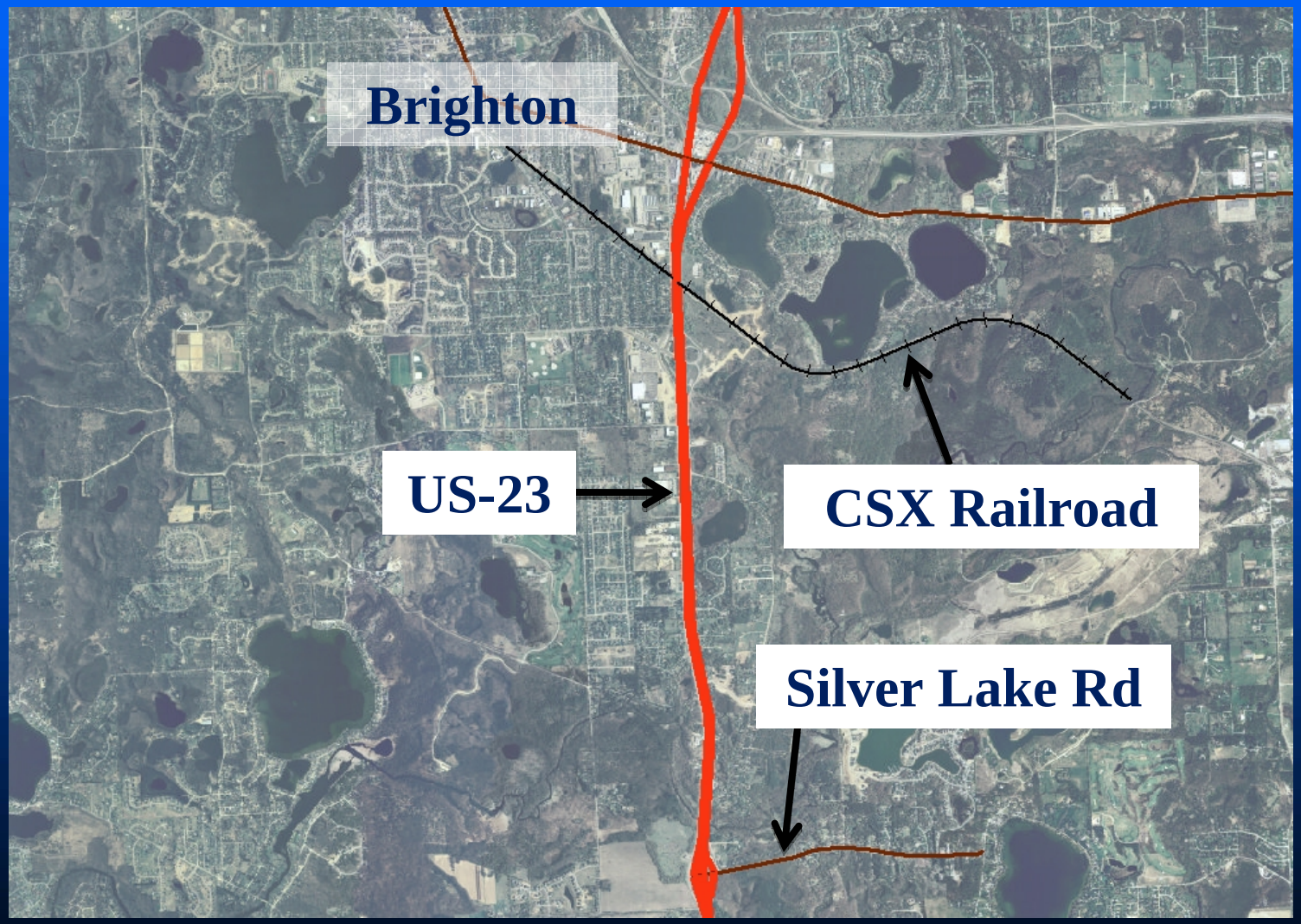
US-23 Case-Study Area



Project Area: North Limit

Project Area: South Limit

Note: Eastern frontage road (Fieldcrest Rd) is a local road and not part of model network

Posted Speed-Limit Data in Study Area: Examples

- US-23 NB and SB: 70 mph
- Whitmore Lake Rd: 55 mph
- Lee Rd, west of Whitmore Lake Rd: 35 mph
- Grand River Ave near US-23: 45 mph

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Network Attributes

US-23 NB in Base Case

ID	Length	Dir	AB_lanes	Func_cl	Area_type	AB_time	AB_ffs
4587	0.4207	1	2	2	3	0.39	65
4588	2.4872	1	2	2	5	2.13	70
4589	0.2376	1	2	2	5	0.20	70
4590	0.4752	1	2	2	5	0.41	70

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Traffic Counts in Study Area

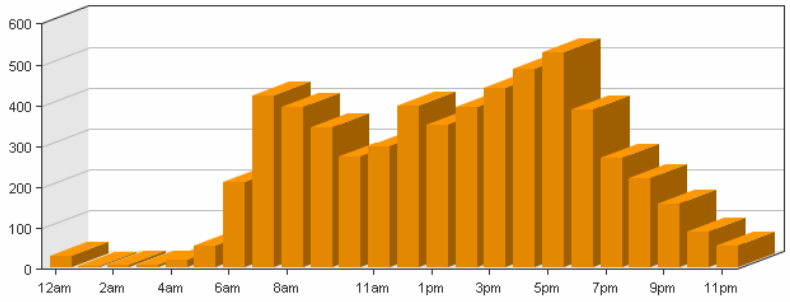
Count data sources:
Local agencies, MDOT, SEMCOG (viewable in SEMCOG database/ website, MDOT website)

Example from SEMCOG website:
Whitmore Lake Rd from
Silver Lake Rd to Maltby Rd
Off-peak count (6 pm–7 am) of
1506 vehicles

Traffic Counts

Detailed report for Traffic Count ID Number 2496

Road Name :	Whitmore Lake
Direction :	2-WAY
Count Limits :	Silver Lake to Maltby
Type of Count :	Link
Date of Count :	6/22/2004 to 6/23/2004
Day of Week :	Tuesday
County :	Livingston
Community :	Green Oak Twp
PR Number :	932204
From Mile Point :	2.989
To Mile Point :	5.337
24 Hour Count :	5,825



Hour	Count	Hour	Count	Hour	Count
12 am - 1 am	28	8 am - 9 am	394	4 pm - 5 pm	485
1 am - 2 am	5	9 am - 10 am	344	5 pm - 6 pm	528
2 am - 3 am	8	10 am - 11 am	272	6 pm - 7 pm	386
3 am - 4 am	9	11 am - 12 pm	296	7 pm - 8 pm	268
4 am - 5 am	20	12 pm - 1 pm	397	8 pm - 9 pm	219
5 am - 6 am	54	1 pm - 2 pm	349	9 pm - 10 pm	157
6 am - 7 am	209	2 pm - 3 pm	393	10 pm - 11 pm	88
7 am - 8 am	421	3 pm - 4 pm	440	11 pm - 12 am	55

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Network Attributes

Base Case: Whitmore Lake Rd from Winans Lake Rd to Lee Rd

ID	Dir	AB_lanes	BA_lanes	Func_cl	Area_type	Tot_vol_op
4710	0	1	1	6	3	6552
4711	0	1	1	6	3	0
4712	0	1	1	6	3	0
4713	0	1	1	6	3	4713

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Update Link Attributes for Base Case

- US-23 NB and SB: Set FFS to 70 mph from North Territorial Rd (in south) to Hyne Rd (in north)
- Whitmore Lake Rd: Changed FFS from 30 mph to 55 mph between 8 Mile Rd (in south) and Hyne Rd (in north)

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Build Modified Base Case

- Recalculated travel time for modified links in highway network
- Performed new model run
- By adjusting FFS and travel time, achieved more desirable volume pattern (closer to reality)

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Network Attributes

Modified Base Case: Whitmore Lake Rd from Winans Lake Rd to Lee Rd

ID	Dir	AB_lanes	BA_lanes	Func_cl	Area_type	Tot_vol_op
4710	0	1	1	6	3	6667
4711	0	1	1	6	3	535
4712	0	1	1	6	3	535
4713	0	1	1	6	3	5505

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Build Alternative Case

US-23 Project Specifications

- Project year: 2010
- Closure: one lane closed, NB side only
- Hours of restriction: evening period only (11 pm–5 am)
- Side restriction: one side (10% roadway capacity reduction)
- Construction posted speed: 45 mph

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Build Alternative Case

Link Attribute Changes

- Carried over changes made in modified base case to 2010
- Changed AB_FFS from 70 to 45 mph
- Changed AB_LANES from 2 to 1
- Recalculated AB_TIME = (LENGTH / FFS) * 60
- Reduced AB_OPCap by 10% to represent capacity reduction due to one side restriction

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Build Alternative Case

Final Steps

- Manually calculated travel time and updated highway link attribute table
- Built network using updated link info
- Changed GISDK code and recompiled
- Performed off-peak traffic assignment using 2010 trip tables
- Generated model run summary

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Analyze Model Output

- Calculated before-and-after volumes (absolute and percentage differences)
- Calculated before-and-after speeds and V/C ratios
- Checked new traffic patterns and diversions for reasonableness, using engineering judgment and experience

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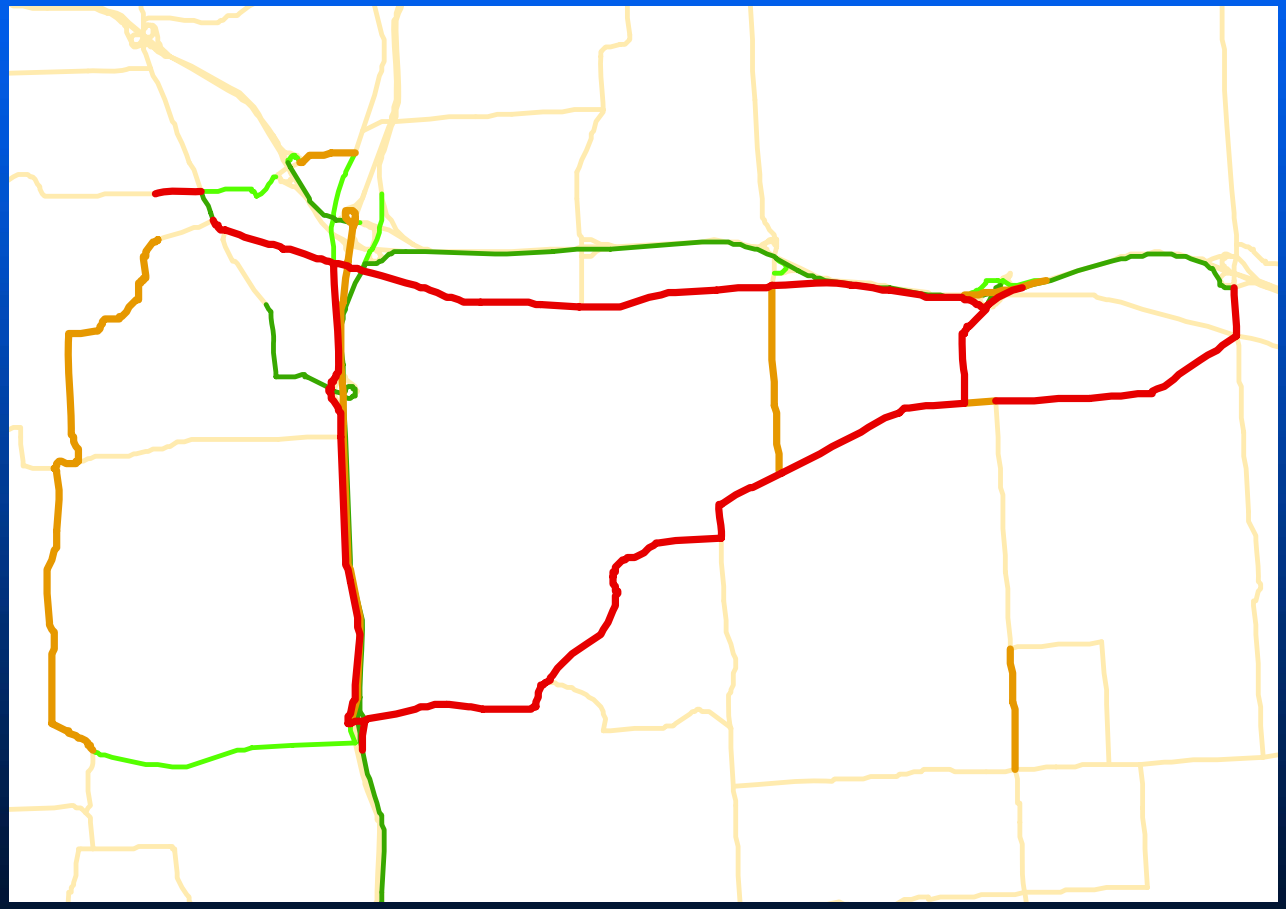
Off-Peak Volume Difference

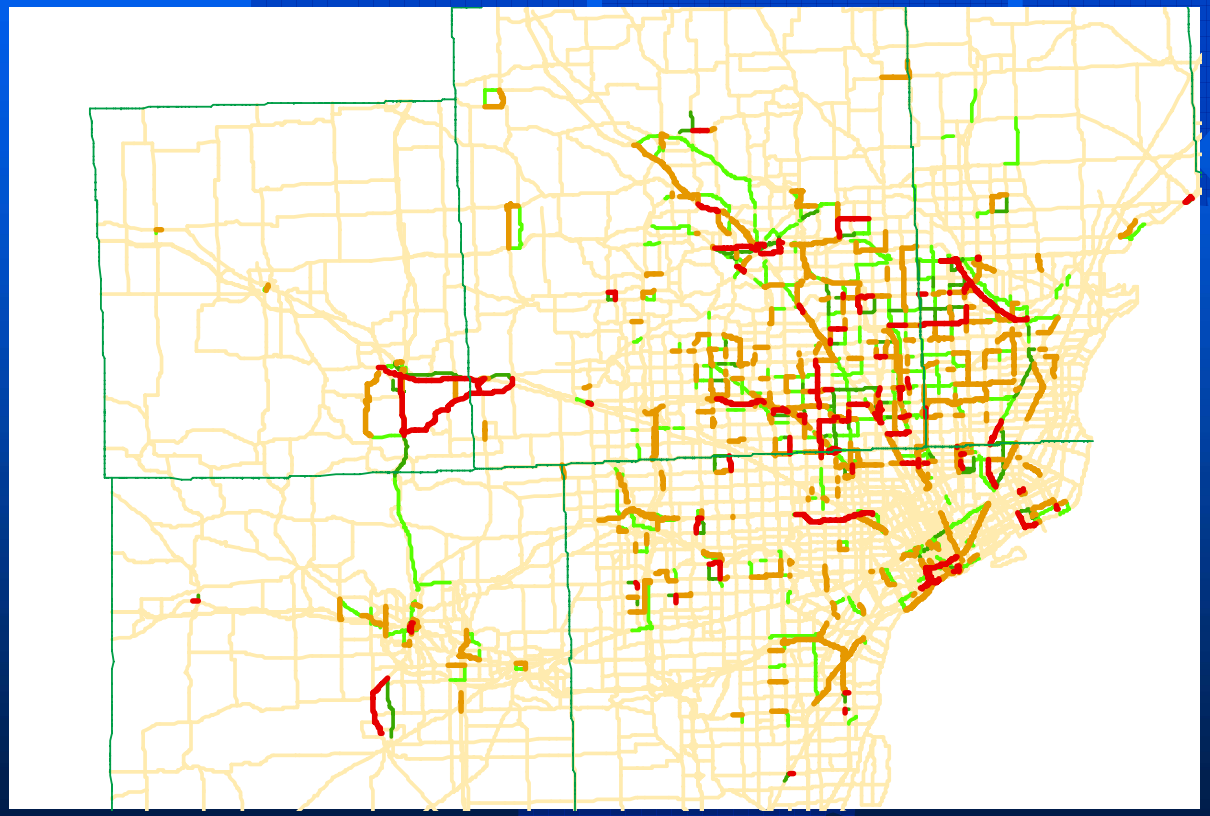
Alternative Case vs. Modified Base Case



- Large decrease (-300 or more)
- Small decrease (-100 to -300)
- Little change (-100 to +100)
- Small increase (+100 to +300)
- Large increase (+300 or more)

Equilibrium Assignment

Unexpected Consequences



Large decrease
(-300 or more)

Small decrease
(-100 to -300)

Little change
(-100 to +100)

Small increase
(+100 to +300)

Large increase
(+300 or more)

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Finalize US-23 Case Study

- Developed technical memo and cover letter on findings
- Transmitted memo and model data files to requesting agency
- Logged request in SEMCOG's request database (TDMS)

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