Traffic Analysis for Construction
A Case Study of I-94 NS and Local Roads

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Overview

- Project Background
- Unique Project Challenges
- Overall Analysis Approach
- Freeway Analysis
- Local Road Analysis
- Lessons Learned
I-94 NS Corridor

- Three segments
  - Milwaukee County (North)
  - Racine County (Central and South)
- 18.5 total miles of construction
- 7 interchanges
- Fastest paced WisDOT freeway mega project
Project Study Area

- Central Segment
  - CTH G to WIS 20
- South Segment
  - WIS 20 to WIS 142
  - Local Roads
Local Roads

- Capacity Expansion
  - WIS 11: Four Lanes
  - Braun Rd: Six Lanes
  - CTH KR: Six Lanes
  - CTH H: Four lanes

- Intersection Improvements
- Permanent Signalization
- Extension of International Dr to WIS 11
- Wisconn Valley Way
Unique Project Challenges

- Compressed Project Schedule
- Overlapping Construction Closures
- Foxconn Labor Estimates and Routing
Overall Analysis Approach

**Regional**
- SEWRPC
- TDM
- RADIUS

**Project Level**
- Quadro
- FDM Delay
- Synchro
- VISSIM
SEWRPC TDM

- **2018 Construction Scenario**
  - Assumptions
    - 2 lanes in each direction
    - NB service ramp closures
    - Cross street closures at I-94
  - Main Diversion Routes
    - CTH H and CTH V = 33%
    - WIS 31 and WIS 38 = 34%
    - USH 45 = 17%
  - Freeway Diversion
    - Northbound = 11.3%
    - Southbound = 13.7%
Quadro – Work Zone Volumes

<table>
<thead>
<tr>
<th>Day</th>
<th>Quadro-Field Volume Difference</th>
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<tbody>
<tr>
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<td>NB</td>
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<td>Weekday</td>
<td>10%</td>
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<td>Friday</td>
<td>9%</td>
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<td>Sunday</td>
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Quadro – Work Zone Volumes

I-41 SB/94 EB - October 2018 Comparison

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Quadro Estimate
Field Data

Graph showing traffic volume differences for Weekday, Friday, and Sunday.
Quadro - Diversion

I-41 NB/94 WB - October 2018 Comparison

Weekday  Friday  Sunday

Volume (veh)

0  200  400  600  800  1000  1200

Time

12:00 AM  4:00 AM  8:00 AM  12:00 PM  4:00 PM  8:00 PM  12:00 AM  4:00 AM  8:00 AM  12:00 PM  4:00 PM  8:00 PM

Quadro Estimate  Field Estimate
Quadro - Diversion

I-41 SB/94 EB - October 2018 Comparison

Weekday  Friday  Sunday

Volume (veh) 1200 1000 800
600 400 200
0 12:00 AM 4:00 AM 8:00 AM 12:00 PM 4:00 PM 8:00 PM 12:00 AM 4:00 AM 8:00 AM 12:00 PM 4:00 PM 8:00 PM

Quadro Estimate  Field Estimate

A Case Study of I-94 NS and Local Roads
FDM Capacity and Delay

- HCM procedure to estimate adjusted capacity
- Findings
  - Under estimates work zone capacities
  - Over estimates delay and queues
- Delay and queue procedure updated (FDM 11-50-30.7)
  - Quadro
  - Microsimulation
Overall Analysis Approach

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RADIUS Model
Calibration of Sub-Area Model

- Weekday Peak Period Model
  - 6-10 AM
  - 3-7 PM
- >200 directional traffic counts
  - Full coverage of I-94 Mainline and Ramps
  - Local roads in project area
  - Spot arterial locations buffering I-94
Calibration of Sub-Area Model

PM Peak Hour

MODEL

COUNT

Refined  Original
RADIUS Model – Scenario Modeling

- Construction Stages
  - 2018 - 2020
- Foxconn Development Trips
  - Labor trips
  - Routing restrictions
  - Haul route trucks
RADIUS Model – December 2018

- South Segment Closures:
  - NB WIS 11 Ramps
  - CTH KR
  - NB CTH KR Ramps
  - NB CTH E Entrance Ramp
  - SB CTH E Exit Ramp

Foxconn Site
RADIUS Model – PM December 2018

East Frontage Road
Count: 500 veh
Model: 450 veh

WIS 31
Count: 250 veh
Model: 400 veh
RADIUS Model – December 2018

- Central Segment Closures:
  - NB CTH K Ramps
  - Golf Road
  - Kraut Rd
RADIUS Model – PM December 2018

USH 45
Count: 300 veh
Model: 150 veh

Frontage Roads
Count: 850 veh
Model: 1250 veh
Synchro – Intersection Operations

Inputs → RADIUS → NCHRP 765 → Peak Period Turn Movements → Synchro, Temp Signal Warrants, Stop Control Warrants
VISSIM – Ramp Metering

- Sub-area of larger network
- Focused on WIS 20 Interchange
  - PM Period NB Entrance Ramp
    - Diversion and haul route
    - Two lanes on I-41 NB/94 WB
- Evaluate 2018 Operational Impact
  - Freeway
  - Local Road
- Findings
  - Improved mainline speeds and flow
  - Significant ramp meter queue
Lessons Learned

- Incident Modeling
- Seasonal Volumes verses Annual Average
- Day of Week Work Zone Capacities
- Utilized Full Suite of Analysis Tools
Questions?