The Dimondale Mini–Roundabout: First Mini in the States
Presenter:

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**All views expressed are those of the presenter, and do not represent official statements of the State of Michigan or the Michigan Department of Transportation.**
The Dimondale Mini

- Opened May 30, 2001
- Built by Village of Dimondale
- 21-Meter (69’) Inscribed Circle
- Fit Within Existing Curbs
- 4-Meter Traversable Central Island
- Illuminated Bollards
- Cost $47,000
- and it Works.
Features

- LOW Cost
- Reduced Speed
- Saves Time
- Saves Gas
- Reduces Emissions
- Operates Safely
- Applicable at Many Locations
What’s a Mini-Roundabout?

- Inscribed Circle Diameter 14 to 28 meters
- Central Island 4 Meters or Less
- Traversable for Large Vehicles
- Can’t Install Signs on Traversable Island
- Pavement arrows show Movement Pattern
- Recommended in 30 MPH Zones
Where did Mini-Roundabouts Come From?

- Developed in 1960’s by Road Research Laboratory, UK Department of Transport
- Frank Blackmore’s Experiments
- The Authorities said NOT to build one
- Frank was a World War II RAF Wing Commander    NO FEAR!
- UK now has 2,000 Minis
- US has 2
Dimondale Location:
Southwest Metro Lansing
Dimondale:

- Incorporated Village
- Population 1200
- Founded 1848
- 19th-Century Layout

- Mixed Land Use
- Popular for Walking and Bicycling
- Traffic conflicts with Peds and Bikes
Creyts Rd./East Rd. Intersection
Creyts / East Intersection:

- 45-Degree WYE
- Entry to Village from Lansing
- All 2-lane Roads
- Speed Limit 25
- North and East Legs Stop-Controlled
- West Leg Uncontrolled
- Scheduled for Reconstruction in 2001
- Intersection Type to be Determined
Previous Safety:

- No significant crash history
- Complaints about speeding eastbound
- Eastbound Left turners cutting off southbound Creyts
- Dimondale’s Main Pedestrian Corridor
Constraints and Alternatives

Site Constraints:
- Small corner donated by the gas station
- Right-of-way for only a 21-meter inscribed circle
- A central island would block trucks

Infeasible Alternatives:
- **No Action** – Speeding and Ped Safety Concerns
- **Signal** - Did not meet signal warrants
- **Roundabout**: - Raised Island Wouldn’t Fit
Practical Alternatives:

- **All-Way-Stop Control (AWSC)**
  - Cheap
  - Eastbound Not Accustomed to Stopping
  - Feared Crashes

- **Mini-Roundabout**
  - Nothing Known

- **Which was the Better Investment?**
Traffic:

- 1998 entering ADT: 5,550
- 2020 forecast ADT: 9,550
- About 4% Trucks
- Major AM Move: West to North
- PM is the Reverse
UK Safety Reports:

- Walker and Pittam (1989)

  139 3-Leg, Domed Mini-roundabouts

  3-Leg Minis, 30 MPH zones: 0.1 Injury Crash / MEV

  Mini Injury Rate Less than any other intersection

- Other Reports also Very Favorable
Capacity and Delay:

- HCS 2000 estimate for all-way-stop
- Lab Report 942 (RODEL-1 at 50% CL) for mini-roundabout
- Max 2020 V/C Ratio: .37

### Control Delay of AWSC vs. Mini (Seconds)

<table>
<thead>
<tr>
<th></th>
<th>AM Peak</th>
<th>PM Peak</th>
<th>Off Peak</th>
<th>TOTAL 2020 (Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-Way Stop</td>
<td>9.6</td>
<td>14.7</td>
<td>8.6</td>
<td>9,287</td>
</tr>
<tr>
<td>Mini</td>
<td>3.4</td>
<td>3.9</td>
<td>3.3</td>
<td>3,291</td>
</tr>
<tr>
<td>Time Saved</td>
<td>6.2</td>
<td>10.8</td>
<td>5.3</td>
<td>5,986 hrs</td>
</tr>
</tbody>
</table>
What’s it Worth? Plenty.

<table>
<thead>
<tr>
<th>20-Year Life-Cycle Delay Cost</th>
<th>Total Delay 2002-2021 (Hours)</th>
<th>Net Present Value (2001 Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All-Way-Stop</strong></td>
<td>144,060 Hours</td>
<td>$1,118,340</td>
</tr>
<tr>
<td><strong>Mini</strong></td>
<td>53,956 Hours</td>
<td>$422,973</td>
</tr>
<tr>
<td><strong>Savings:</strong></td>
<td>90,104 Hours</td>
<td><strong>$695,367</strong></td>
</tr>
</tbody>
</table>

- **Assumptions:**
  - AM and PM Peaks each occur 522 times per year
  - Off Peak occurs 5531 times per year
  - Time Value: $11.93 per hour
  - Discount Rate: 4%
Comparison:

- Eliminates Delay Equal to 1 Vehicle Idling at a Stop Sign ... FOR 10 YEARS!
- Low Cost + Safety + Reduced Delay
- Village Directed Staff to Build a Mini
Design Phase

- No Mini Designers in the US
- Phoned the UK
- Mini-roundabouts: Getting them Right!, by Clive Sawers
- Vermont, Michigan, and Maryland arranged seminars by Mr. Sawers
- Barry Crown agreed to help
- USE EXPERIENCED HELP!
Design Cont’d

- Sawers: Advance YIELD lines to swept paths of circulating vehicles
  - Allows wider entry in compact space
  - Intersection more compact
  - Drivers do not overrun the yield line.
- Crown: Advised against advancing that close
  - As Diameter shrinks, intersection acts as all-way stop
- We placed YIELD lines midway between the inscribed circle and the outer swept paths.
Design Cont’d

- One lane entry was adequate
  - Laid Out Inscribed circle
  - Drew curbs and swept paths
  - Established Westbound Deflection
  - Located Blob and Splitter Islands
  - 5-meter entries for Farm Equipment
  - Bike Lanes end 100’ from Yield Line
- Sent it to Barry Crown (mini designer)
- He Saved Us
Effect of the WYE

- Trucks must overrun 2 Splitter Islands
  - Couldn’t use raised curb for north splitter
  - Used rumble strips
  - East Splitter needed raised splitter and bollard for deflection and visibility
    - Crown recommended raised curb on the east end of the splitter
    - Yellow paint delineates the west end of that splitter.
- Not ideal, but necessary
Field Check

- Laid out the Mini with Chalk and Cones
- Took turns driving it
- On Drawing Board, Blob was Dead Center of the Circle
- It Felt Awkward - required backtracking
- We Moved the Blob 1-meter west
- Valuable Step: Field Check the Design
The Blob and Arrows

- Spherical Asphalt Section
- 4m across, 120mm high
- Coated in White Thermoplastic
- Drivers at each Yield Line see the Blob and an Arrow Pointing Right
Bollards:

- Translucent plastic shells
- Fluorescent lamp in base
- Not in the US manual
- UK warned against a mini without bollards
- Blob and Arrows not visible until too late
- Import: $1060
- Installation $4500
- Visible 800’ – Day/Night
Signs and Markings:

- ROUNDABOUT AHEAD 60 meters from yield line
- YIELD AHEAD 30 meters from yield line
- YIELD SIGN at yield line
- YIELD LINES 500mm x 700mm thermoplastic marks with 300mm gap
- YIELD LEGEND at each Yield Line
- “YIELD TO TRAFFIC IN CIRCLE”
  - “YIELD TO CIRCLE TRAFFIC” may have been clearer
  - (We Need the International Roundabout Sign)
- PED XING SIGNS – Later removed
International Roundabout Sign
This is the Roundabout. Circle Traffic has Priority.

• Pavement Markings are Invisible Under Snow
• No Problem with a 3-Leg
• Big Problem with a 4-Leg
• Left Turns Differ
• Use it with the Yield Sign
• Sign Shows Where the Roundabout is
• Shows the Pattern of Movement
• WE NEED THIS SIGN!
## Cost

(2001 Dollars)

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>$250</td>
</tr>
<tr>
<td>Design</td>
<td>$7,000</td>
</tr>
<tr>
<td>ROW</td>
<td>Donated</td>
</tr>
<tr>
<td>Construction</td>
<td>$40,100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$47,350</strong></td>
</tr>
</tbody>
</table>

| Maintenance   | $200/Year |
Effects:

- **Speeds Changed**
  - EB Approach was 32 MPH, Now 24 MPH
  - Other Approaches Slower - (More Deflection)

- **Crashes Stayed the Same**
  - 5 Before, 1 Class B Injury (Drunk)
  - 5 After, 2 Class C Injuries (Drunk)
  - 1 PDO (Rear End) on SB Approach

- Annual Crash Cost Before: $18,733
- Annual Crash Cost After: $18,000
Benefit/Cost & Time of Return:

Benefits:
- Net Present Value of Delay Reduction: $695,367
- Net Present Value of Maintenance: $2,718
- **NET BENEFIT**: $692,649

Costs:
- Total Project Development Cost: $47,735
- **NET COST**: $47,735

- **Benefit/ Cost Ratio**: 14.5 : 1
- **Time of Return**: 1.4 years
Folks made fun of our mini.
- Somebody proposed rubber statue of the Dimondale Street Administrator on the Blob
- People Complain – Human Nature

Complaints in 2001:
- “It was a big waste of money.”
- “It confuses people.”
- “They should have installed a stop sign.”

In 2005
- Local Drivers use it with skill
- Common complaint: “Other drivers” don’t know how to drive it
- Some still do stop unnecessarily
- A new local tradition: Make fun of the mini !
- It works.
Conclusions:

- 1. A Mini has been Built in Michigan
- 2. Delay Superior to All-Way-Stop or Signal
- 4. Minis are Cheap.
- 5. Absence of a problem hurt public support.
- 6. IT WORKS!
Recommendations:

- Cost Can be Reduced
- New Signs are Needed
- Consider “MIDI”- Roundabouts for Four-Leg Layouts
Major Implications:

- National Energy Implications
- A Cheap Solution
- Uncle Sam Needs New Thinking from us.

- Higher Capacity Sites: