

The Dimondale Mini-Roundabout: First Mini in the States



Presenter:

**Ed Waddell, Transportation Planner
Michigan Dept. of Transportation****

**E-copies of the Full Report are Available
from: waddelle@michigan.gov**

****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
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Previous Safety:

- ❑ No significant crash history
 - ❑ Complaints about speeding eastbound
 - ❑ Eastbound Left turners cutting off southbound Creyts
 - ❑ Dimondale's Main Pedestrian Corridor
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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
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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**

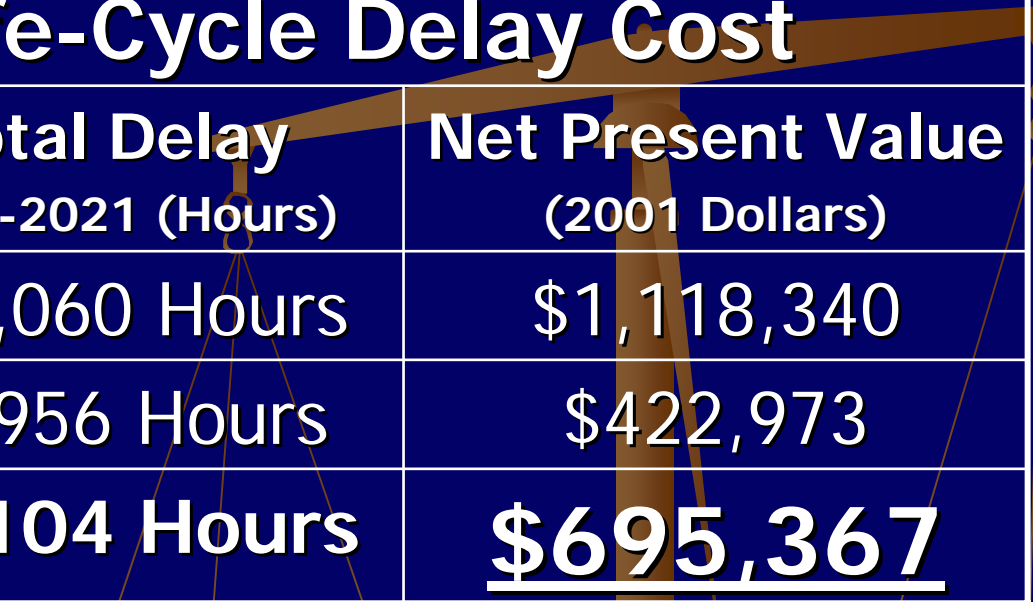
Capacity and Delay:

- 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)

	AM Peak	PM Peak	Off Peak	TOTAL 2020 (Hours)
All-Way Stop	9.6	14.7	8.6	9,287
Mini	3.4	3.9	3.3	3,291
Time Saved	6.2	10.8	5.3	5,986 hrs

What's it Worth? Plenty.



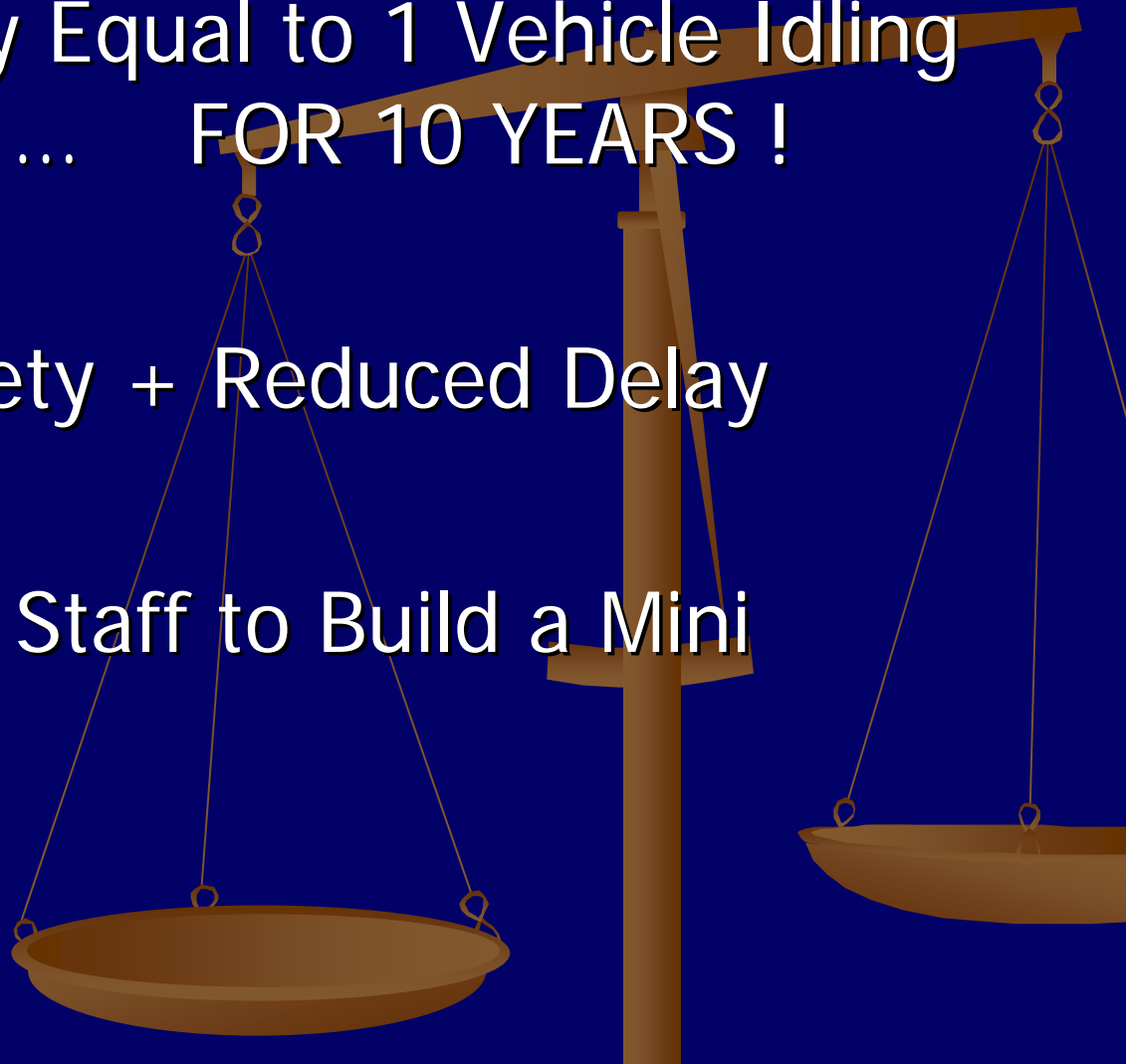
20-Year Life-Cycle Delay Cost		
	Total Delay 2002-2021 (Hours)	Net Present Value (2001 Dollars)
All-Way-Stop	144,060 Hours	\$1,118,340
Mini	53,956 Hours	\$422,973
Savings:	90,104 Hours	<u>\$695,367</u>

- 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.
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Design Cont'd

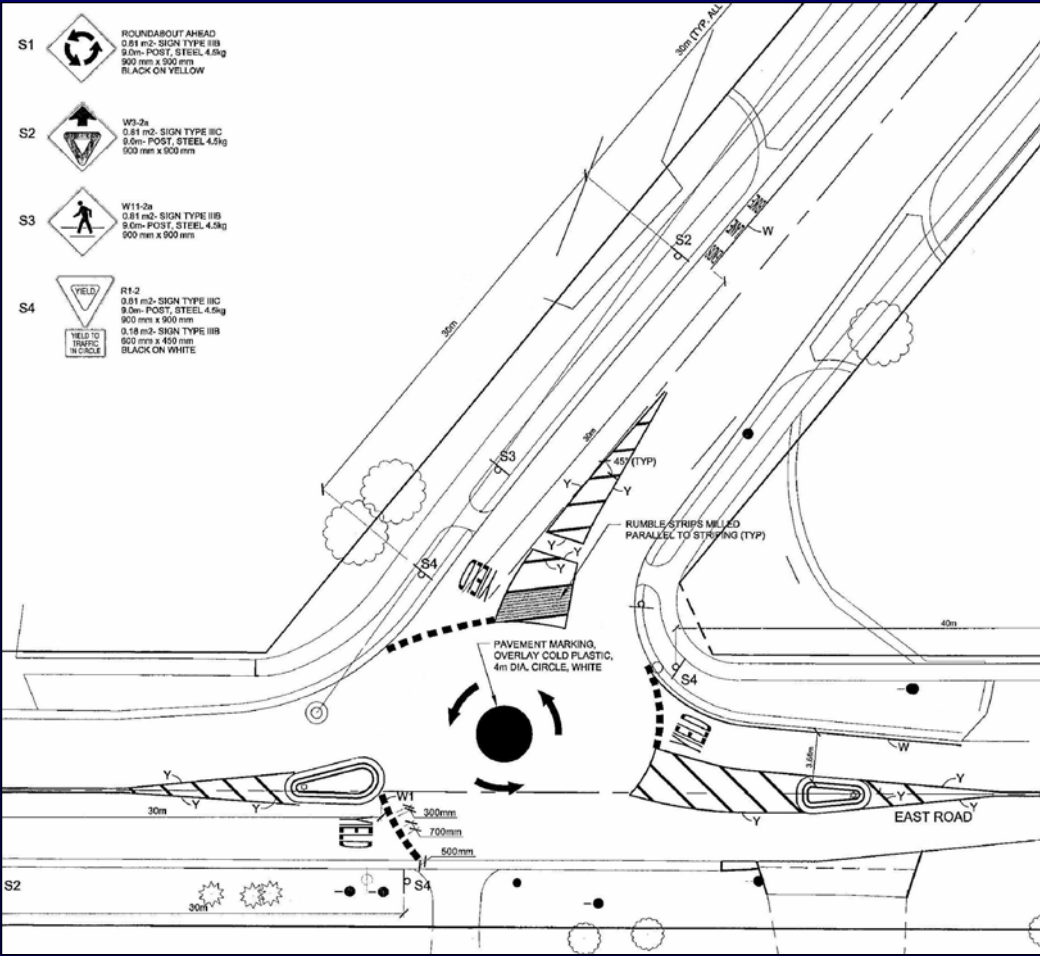
- One lane entry was adequate
 - Laid Out Inscribed circle
 - Drew curbs and swept paths
 - Established Westbound Deflection
 - Located Blob and Splitter Islands
 - 5-meter entries for Farm Equipment
 - Bike Lanes end 100' from Yield Line
 - Sent it to Barry Crown (mini designer)
 - He Saved Us
-



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
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Intersection Diagram





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
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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
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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
- ❑ Attractive. Indestructible. A great Idea.





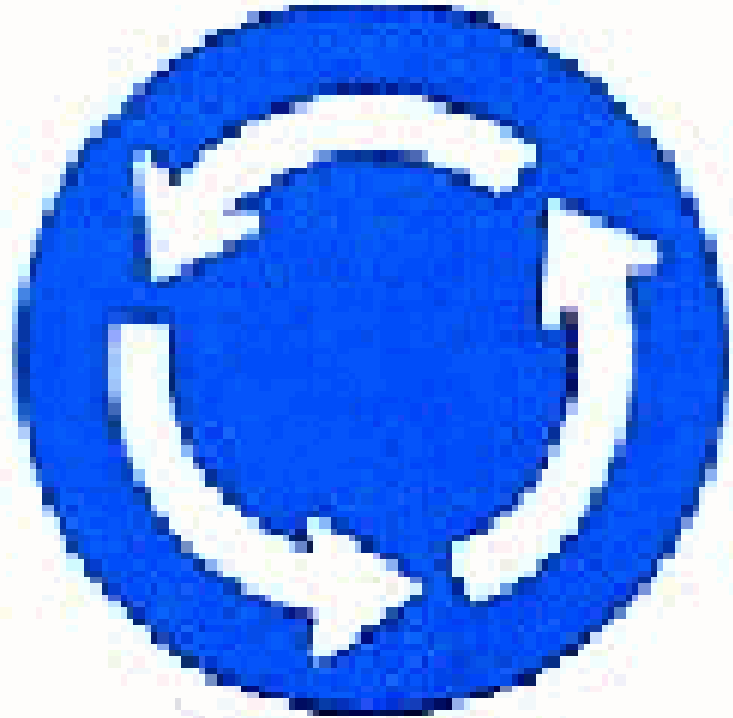
Signs and Markings:

- ❑ 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
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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)

<input type="checkbox"/> Planning	-	\$ 250
<input type="checkbox"/> Design	-	\$7,000
<input type="checkbox"/> ROW	-	Donated
<input type="checkbox"/> Construction	-	\$40,100
<input type="checkbox"/> <u>Total</u>	-	<u>\$47,350</u>
<input type="checkbox"/> Maintenance	-	\$200/Year

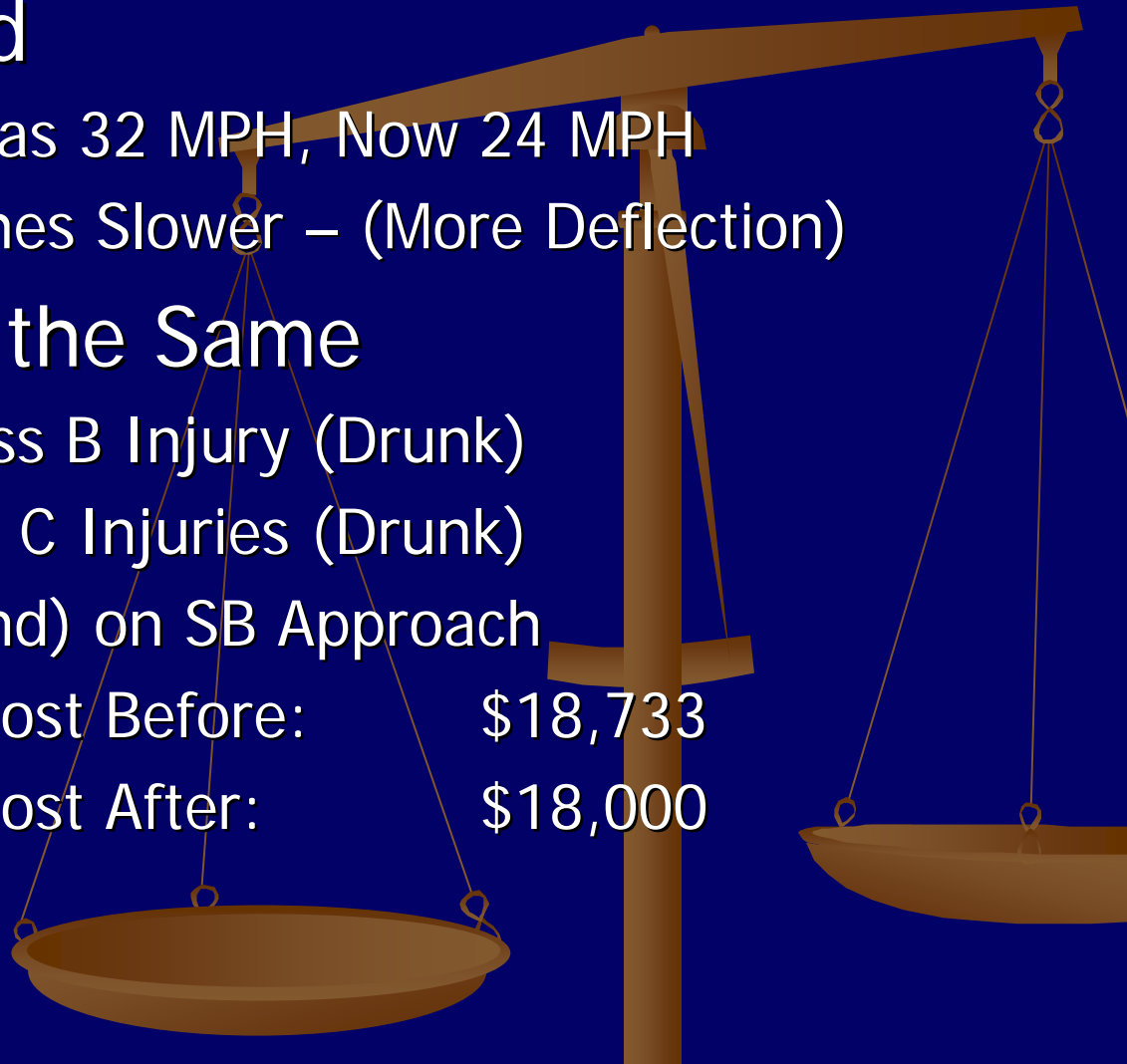
Effects:

■ 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



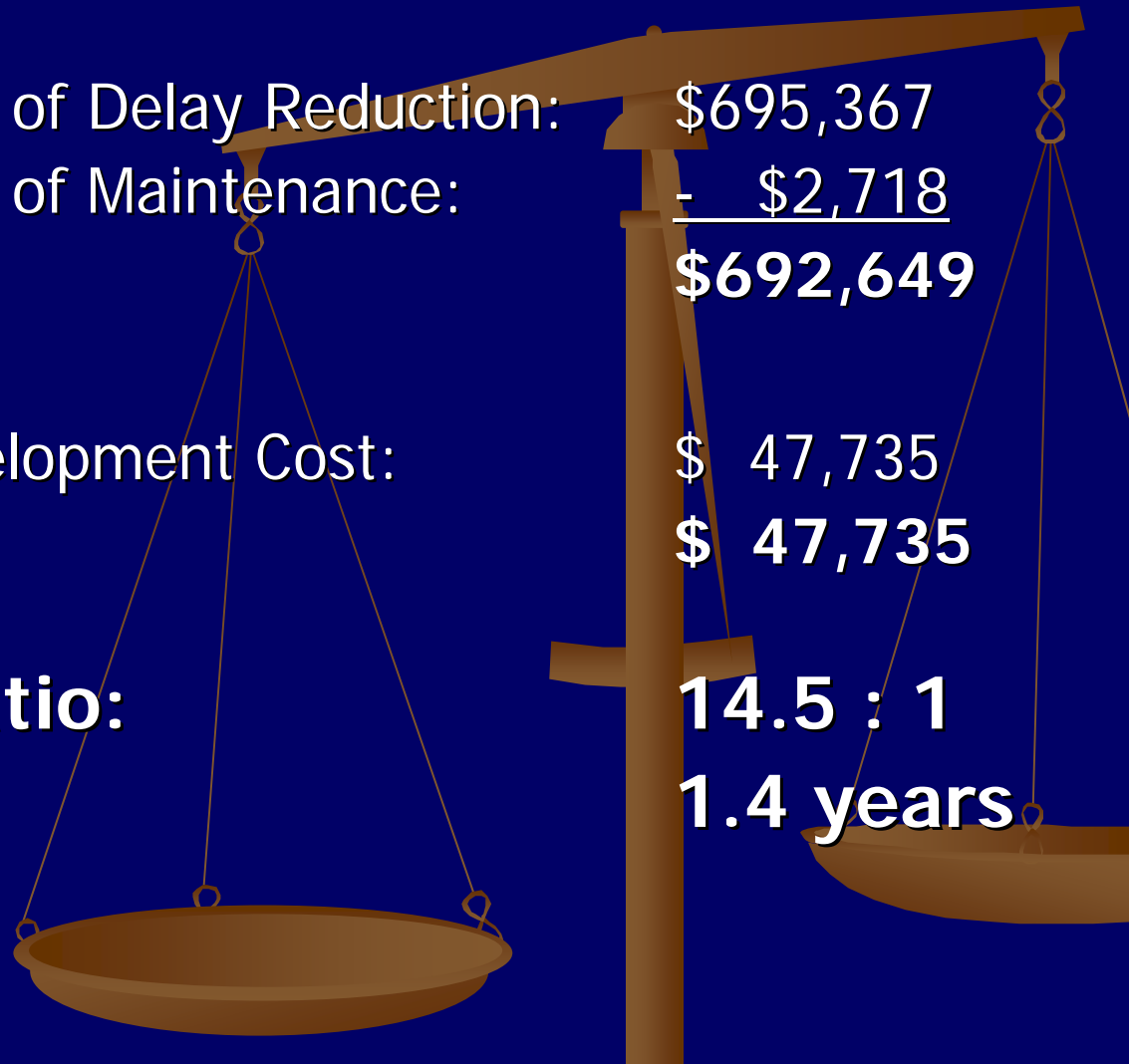
Benefit/Cost & Time of Return:

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





Public Opinion and Driver Behavior

- 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.
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Conclusions:

- 1. A Mini has been Built in Michigan
- 2. Delay Superior to All-Way-Stop or Signal
- 3. Reduces Fuel Consumption /Emissions.
- 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**
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Major Implications:

- National Energy Implications
- A Cheap Solution
- Uncle Sam Needs New Thinking from us.
- Higher Capacity Sites:

