INTEGRATING TRAFFIC CULTURES: AN AMISH SAFETY STRATEGIC PLAN

OTEC: October 2016

KEVIN R. MILLER, P.E., PTOE – PRINCIPAL, LJB INC.
Geauga County, Ohio

- 2nd largest Amish settlement in Ohio
- 4th largest in U.S.
- 12% of population in Amish community
PROJECT OVERVIEW

- Improve safety for Amish highway users
  - Horse-driven buggy vehicles
  - Bicyclists
  - Pedestrians

- Primary goal:
  - Multi-agency strategic plan
55 mph (motor vehicles) vs. 5-8 mph (buggies)

Rural roadways = narrow, minimal room to maneuver

Minimal crash protection for buggies & occupants

Pedestrians on rural roads
PREVIOUS STUDIES

- **ODOT**
  - Focus: roadway design and maintenance
  - Included public opinion survey

- **ODPS**
  - Focus: driver education & enforcement
STEERING COMMITTEE

- ODOT District 12 (funded)
- Geauga County Engineer’s Office
- Geauga County Sheriff’s Office
- Ohio State Highway Patrol
- Amish Safety Committee
STAKEHOLDERS

- ODOT District 12
- ODOT District 4
- Geauga County
- NOACA
- Amish Safety Committee
- Village of Burton
- Village of Middlefield
- Townships:
  - Burton
  - Claridon
  - Huntsburg
  - Middlefield
  - Parkman
  - Troy
Data Sets for Study Use:

- Vehicular and Buggy Counts
- Crash Data
- Speed Limits
- Shoulder Widths
- Roadway Grades
- School Locations
- Sight Distance
AMISH COMMUNITY SURVEY

More than 1,700 surveys distributed

40% return rate

Information gathered on:

- Activity
- Trip distribution and purpose
- Buggy safety equipment
- Safety concerns
- Solutions (education, roadway improvements, etc.)
Example: Reasons for Buggy Use/Walking

Trips/Month by Travel Purpose

- Work
- Market
- School
- Church
- Social

Buggy Trips/Month vs. Pedestrian Trips/Month
Example: Types of Buggy Safety Equipment Used

- Reflective Tape - Rear
- SMV Emblem
- LED Lights
- Turn Signals
- Reflective Tape - Side
- Reflectors on Harness
- Strobe/Flashers
- Lighted SMV
- Reflective Tape - Front
- No Equipment
Concerns and Improvements

Ranking of Critical Safety Concerns

Ranking of Most Helpful Roadway Improvements

- Truck Traffic
- Hills/Curves
- Aggressive Drivers

- Widen Shoulders 2-4'
- Pull Off Lanes
- Warning Signs
- Flashing Beacons
AMISH COMMUNITY SURVEY

Top Pedestrian Sections

- Critical Segment (Walking)

- School Route-Walking

Bar charts showing pedestrian sections with the highest critical segment and school route-walking values.
Top Intersections

Critical Intersection (Buggies)

SR 608 at Burton Windsor Road
SR 87 at Hayes Rd
SR 608 at Nauvoo Road

Critical Intersection (Walking)

Newcomb Rd at Shedd Rd
SR 168 at Nash Rd
SR 87 at Hayes Rd
SR 608 at Burton Windsor Road
COUNTERMEASURES

- Develop Comprehensive List of Feasible Improvements
- Identify Specific Factors that Drive Where To Implement Improvements
- Compare Data and Feedback on Each Segment to Prioritize

<table>
<thead>
<tr>
<th>Roadway Segment</th>
<th>Log Points</th>
<th>Length (miles)</th>
<th>Shoulder Width</th>
<th>Vehicular ADT</th>
<th>Buggy Count</th>
<th>Crash Rate (Buggy)</th>
<th>Speed Limit</th>
<th>Amish Survey (Critical - Buggy)</th>
<th>Rank</th>
<th>Cost</th>
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<tbody>
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<td>1.32</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>1</td>
<td>$ 2,244,000</td>
</tr>
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<td>18.20 to 19.74</td>
<td>1.54</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>2</td>
<td>$ 2,618,000</td>
</tr>
<tr>
<td>SR 608 - SR 528 to CR 124/Georgia Rd</td>
<td>0.00 to 1.24</td>
<td>1.24</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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Note: SR 87 - Hayes Rd to Trumbull CL is under design for construction of full buggy lane in 2018.
COUNTERMEASURES

- Roadway segments
- Spot improvements (at specific locations)
- Educational programs
- Law enforcement
- Snowplows
### Signage – School Zone Signing/Upgrade Warning Signs

<table>
<thead>
<tr>
<th>Roadway Segment</th>
<th>No. of schools - 1/4 mile buffer</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newcomb Road - Nash Rd to Patch Rd</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Newcomb Rd - Shedd Rd to Georgia Rd</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Mumford Rd - Patch Rd to SR 168</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

- **Roadway Segment**

<table>
<thead>
<tr>
<th>Roadway Segment</th>
<th>Vehicular ADT</th>
<th>Buggy Count</th>
<th>Crash Rate (All)</th>
<th>Crash Rate (Buggy)</th>
<th>Amish Survey (Critical - Buggy)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 87 – SR 608 to SR 528</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>1</td>
</tr>
<tr>
<td>SR 608 - SR 528 to CR 124/Georgia Rd</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>2A</td>
</tr>
<tr>
<td>SR 608 - CR 124/Georgia Rd to Tare Creek/Button St</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>2B</td>
</tr>
<tr>
<td>SR 608 - Tare Creek/Button St to Burton Windsor Rd</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>2C</td>
</tr>
<tr>
<td>SR 87 – Tare Creek Road to SR 608</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>2D</td>
</tr>
<tr>
<td>SR 87 - SR 528 to Bundysburg Road/Trumbull CL</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>3</td>
</tr>
<tr>
<td>Nauvoo Rd - SR 608 to SR 528</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>4</td>
</tr>
<tr>
<td>CR 6/Old State Road - Trumbull CL to SR 528</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>5</td>
</tr>
</tbody>
</table>
Buggy Detection Systems (Signals/Segments)

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Crash Rate (Buggy)</th>
<th>Buggy Volume</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 87 at SR 608</td>
<td>●</td>
<td>●</td>
<td>1</td>
</tr>
<tr>
<td>SR 87 at SR 528</td>
<td>○</td>
<td>●</td>
<td>2</td>
</tr>
<tr>
<td>SR 528 at SR 608</td>
<td>○</td>
<td>○</td>
<td>3</td>
</tr>
<tr>
<td>SR 528 at US 422</td>
<td>○</td>
<td>●</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roadway Segment</th>
<th>Vehicle ADT</th>
<th>Buggy Count</th>
<th>Crash Rate (All)</th>
<th>Crash Rate (Buggy)</th>
<th>Sight Distance Deficiency</th>
<th>Vertical Curvature - Crest Curve</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old State Road near Trumbull CL (3 crests)</td>
<td>●</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>●</td>
<td>1</td>
</tr>
<tr>
<td>SR 88 - East of Bundysburg Road (1 crest)</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>●</td>
<td>2</td>
</tr>
<tr>
<td>SR 168 - South of Nash Road (crest/hor. Curves)</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>●</td>
<td>3</td>
</tr>
<tr>
<td>Burton Windsor - West of SR 608 (hor. curve)</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>●</td>
<td>4</td>
</tr>
</tbody>
</table>
### COUNTERMEASURES

#### Widening for Pedestrians (4’Shoulder/Sidewalks)

<table>
<thead>
<tr>
<th>Roadway Segment</th>
<th>Vehicular ADT</th>
<th>No. of schools - 1/4 mile buffer</th>
<th>Amish Survey (Walking)</th>
<th>Amish Survey (School Route)</th>
<th>Committed projects</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newcomb Road – Shedd Road to Georgia Rd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>SR 168 - Patch Rd to Shedd Rd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td>4</td>
</tr>
<tr>
<td>Other Potential Candidates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR 608 - Tare Creek/Button St to Burton Windsor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shedd Rd - SR 168 to SR 528</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR 6/Old State Rd - SR 528 to Trumbull CL</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
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</table>

#### Other Potential Candidates

- SR 608 - Tare Creek/Button St to Burton Windsor
- Shedd Rd - SR 168 to SR 528
- CR 6/Old State Rd - SR 528 to Trumbull CL

Note: Sidewalks exist. Sidewalk extension: North side - 0.38 mi, south side - 0.61 mi

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</table>
| SR 87 – SR 608 to SR 528* | 1.1 |               |                                  |                                    |                  | 1

*Sidewalks exist. Sidewalk extension: North side - 0.38 mi, south side - 0.61 mi
### Improve Sight Triangles

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Sight Distance Deficiency</th>
<th>No. of schools - ¼ mile buffer</th>
<th>Amish Survey (Critical - Intersection)</th>
<th>Buggy Volume</th>
<th>Crash Rate (All)</th>
<th>Contributing Factor</th>
<th>Proposed Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 608 at Burton Windsor Road</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
<td>Signs, Embankment on the north side</td>
<td>Relocate signs, Regrade embankments</td>
</tr>
<tr>
<td>SR 87 at Bensusberg Road</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
<td>Tall grass, signs/poles - NW, SE &amp; SW quadrant</td>
<td>Clear Vegetation, relocate poles/signs</td>
</tr>
<tr>
<td>SR 168 at Gingerich Road</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
<td>tree lawn, north side</td>
<td>Clear Vegetation</td>
</tr>
<tr>
<td>SR 168 at Shedd Road</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
<td>Intersection skew angle, trees - SE quadrant</td>
<td>Clear Vegetation</td>
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<td>SR 528 at Burton Windsor Road</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
<td>Embankment - NW quadrant, EB approach - skew angle</td>
<td>Regrade/Realign EB approach to reduce deflection through intersection</td>
</tr>
<tr>
<td>CR 6 at Bensusberg Road</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
<td>Tall grass, trees-all 4 corners</td>
<td>Clear Vegetation</td>
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<td>SR 528 at SR 168</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
<td>Trees-SW quadrant</td>
<td>Clear Vegetation</td>
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<td>SR 528 at US 422</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
<td>Building-NW quadrant</td>
<td>Under design on PID 78343 for construction in 2018</td>
</tr>
<tr>
<td>SR 608 at Georgia Road</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
<td>Tractors parked</td>
<td>Move outside ROW or further</td>
</tr>
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## COUNTERMEASURES

### 8’ Wide Buggy Lanes

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Note: SR 87 - Hayes Rd to Trumbull CL is under design for construction of full buggy lane in 2018.
Educational Efforts (PCMS, Snow Plowing, Safety Equip.)
Short-term (2017)

- Funding applications
- Standardize buggy safety equipment requirements
- Portable CMS signs during targeted periods
- Signage updates (1 school and 5 warning)
- Sight triangle improvements (low cost)
- Enhanced buggy detection at 3 signals
RECOMMENDATIONS

Medium term (2018-2022)

- Buggy lane addition
- Widened shoulders
- Buggy warning detection systems
- Lighting & crosswalk marking and equipment upgrades
- Speed zone studies/address speed violations
- Top 2 hill climbing/pull-off locations
- Street lighting and remaining signal upgrades
RECOMMENDATIONS

- Long-term (2023-2030)
  - Buggy lane additions
  - Sight-triangle improvements (requiring ROW)
  - Remaining shoulder widening (top 4)
  - Sidewalk network
FOR MORE INFORMATION

Kevin Miller, P.E., PTOE

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- (937) 259-5166
- LJBinc.com
- @LJBinc
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