Scoping and Design Considerations for APS and ADA Curb Ramps

Adam Tyra, PE
INDOT Greenfield District Traffic
Background and Perspective

• Scoping and Asset Management for traffic signals for INDOT’s Greenfield District

• Caveat: other DOTs and local gov’ts may have different needs or requirements

• This presentation will provide items that need to be considered in scoping and design. If these are not considered early on, it could lead to
  • Scope changes
  • Project delays
  • Cost overruns
  • Sub-standard final products
Need for Pedestrian Facilities

• No ramps if:
  • No sidewalk or
  • No accessible paved area (such as a parking lot) on a corner and
    • It is not a refuge between two diagonal corners

• No pedestrian heads or pushbuttons if:
  • No curb ramps or sidewalk on BOTH corners of a potential crossing

• Where feasible, pedestrians should be proactively accommodated, especially at those locations that are likely to be used by people with disabilities (such as hospitals, government buildings, and elderly communities).
Example: US 40 & Apple St, Greenfield, IN

Aerial: Google Maps
Northwest and Southwest corners have existing pedestrian facilities (sidewalk and trail)

Should be brought up to current standards for pedestrian-related improvements, if necessary

Example: US 40 & Apple St, Greenfield, IN

Aerial: Google Maps
Example: US 40 & Apple St, Greenfield, IN

- Southeast corner has no sidewalk or other paved area to tie into and
- Therefore, should not have pedestrian improvements if sidewalks would not be built prior to/during project construction
Example: US 40 & Apple St, Greenfield, IN

- Northeast corner has a paved parking lot.
- Could be considered for a ramp and other pedestrian improvements for crossing to northwest corner based on:
  - Likely pedestrian need
  - Local Feedback
  - Right-of-way
  - Business owner’s desires

Aerial: Google Maps
Curb Ramps: Things to Look For

- Geometric
  - Narrow sidewalks, possibly with buildings close to the curb line
  - Significant elevation change either along profile or between road and sidewalk
  - Curbs that have been mounted by vehicles regularly (tire tread marks)
  - Poor drainage and water ponding in ramp (anecdotal or visual evidence)
  - Large radii can make achieving an ideal ramp very difficult

- Historic District or Features (brick sidewalks, limestone curbs)

- Some projects that should include curb ramps (based on policy) do not necessarily have the budget or time in the schedule to acquire R/W

- Just because a ramp has raised domes (detectable warning surface) and other features you would find in modern ramps does not mean that it is necessarily up to current standards.

- Conversely, adding a detectable warning surface may be sufficient
Examples of Difficult Curb Ramp Sites

- ∆ Elevation
- Possibly R/W and proximity to building
- Might be eligible for a technical infeasibility finding

Photo: Doug Corey (INDOT)
Examples of Difficult Curb Ramp Sites

- Δ Elevation
- Proximity to building
- Potential drainage issue once a curb ramp is installed
- Fitting both ramps in such close proximity

Photo: Doug Corey (INDOT)
Examples of Difficult Curb Ramp Sites

• Large radius
• Sidewalk stops abruptly
• Ground slope could be a concern if the ramp needs to be much larger to line it up crosswalk
• Possible drainage issues
• Slight tread marks

Photo: Doug Corey (INDOT)
Examples of Difficult Curb Ramp Sites

• Drainage appears to be an issue
• R/W is possibly going to be an issue with the parking lot

Photo: Doug Corey (INDOT)
Examples of Difficult Curb Ramp Sites

• Up to current standards?
  • Check slopes
  • Extend detectable warning surface to edge of curb ramp (grass)

• Heavy Tire Marks

Photo: Doug Corey (INDOT)
Don’t Forget to Look Up for Drainage Concerns

Photo: Unknown
Pedestrian Signal: Things to Look For

**Equipment**
- Old, obsolete, or damaged cabinet
- Not enough spare load bays
- Conduits full/damaged
- Controller is obsolete
- If physical space on the shelves are limited or full with detector racks or other equipment

**Placement**
- Lack of R/W
- Utilities near ramps
- Close and unobstructed path to the push button (*pedestrian clear space*)
- Heads do not necessarily need to be on the same pedestal or pole as the push button.
# Cabinet Sizes

<table>
<thead>
<tr>
<th>Size</th>
<th>R</th>
<th>G</th>
<th>P</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (HxWxD)</td>
<td>78”x44”x27”</td>
<td>40”x24”x17”</td>
<td>55”x44”x27”</td>
<td>51”x30”x18”</td>
</tr>
</tbody>
</table>

Photo: Adam Tyra (INDOT)
## Cabinet Sizes

<table>
<thead>
<tr>
<th>Size</th>
<th>R</th>
<th>G</th>
<th>P</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (HxWxD)</td>
<td>78”x44”x27”</td>
<td>40”x24”x17”</td>
<td>55”x44”x27”</td>
<td>51”x30”x18”</td>
</tr>
</tbody>
</table>

- **G cabinets (upside down here)**
  - Pole-mounted cabinets
  - Were used in urban areas
  - Rare for INDOT at this point and being phased out due to age, size, and inventory
  - Size and compatibility would almost certainly necessitate replacement

Photo: Adam Tyra (INDOT)
## Cabinet Sizes

<table>
<thead>
<tr>
<th>Size</th>
<th>R</th>
<th>G</th>
<th>P</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (HxWxD)</td>
<td>78&quot;x44&quot;x27&quot;</td>
<td>40&quot;x24&quot;x17&quot;</td>
<td>55&quot;x44&quot;x27&quot;</td>
<td>51&quot;x30&quot;x18&quot;</td>
</tr>
</tbody>
</table>

- **M cabinets**
  - Second-most common size cabinet for INDOT
  - Typically found in urban areas with limited R/W
  - Shelf space can be limited
  - Option for a ‘stretch M’ that fits on an M foundation, but with extra shelf space

Photo: Adam Tyra (INDOT)
Cabinet Sizes

- **P cabinets**
  - Are the most common size of cabinet for INDOT, especially in non-urban settings
  - Cabinet size might only be an issue if many other things are run through the cabinet such as ITS or two signals at a single cabinet
  - Can retrofit an M foundation with a P or R if either the larger cabinet or more conduits are needed

<table>
<thead>
<tr>
<th>Size</th>
<th>R</th>
<th>G</th>
<th>P</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dimensions (HxWxD)</td>
<td>78”x44”x27”</td>
<td>40”x24”x17”</td>
<td>55”x44”x27”</td>
</tr>
</tbody>
</table>

Photo: Adam Tyra (INDOT)
## Cabinet Sizes

<table>
<thead>
<tr>
<th>Size</th>
<th>R</th>
<th>G</th>
<th>P</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (HxWxD)</td>
<td>78”x44”x27”</td>
<td>40”x24”x17”</td>
<td>55”x44”x27”</td>
<td>51”x30”x18”</td>
</tr>
</tbody>
</table>

- R cabinets
  - Largest size cabinet for INDOT
  - Fits on a P foundation
  - Rarely used, only needed if there is lots of equipment

Photo: Adam Tyra (INDOT)
Cabinet Interior

• Things to look out for
  • NEMA TS-1 cabinet vs NEMA TS-2 (no BIUs generally means it is a TS-1)
  • Older style controller
  • Adequate number of spare load switch bays (1/ped crossing phase)
  • Shelf space
  • Adequate empty conduit space
Cabinet Interior (Before & After)

• US 40 & Broadway St (2013)
• M-Size Cabinet
• TS-2 (has BIUs)
• Econolite ASC2 Controller
• 4 of 8 load switch bays used
• Difficult to see from picture, but the conduits are very full

Photo: Unknown (INDOT)
Cabinet Interior (Before & After)

- US 40 & Broadway St (2018)
- P-Size Cabinet
- TS-2 (has BIUs)
- Econolite ASC3 Controller
- 8 of 16 load switch bays used

- Separate APS control box
- Excess space in the conduit

Photos: Adam Tyra (INDOT)
Wiring

• 5c/14 for each pedestrian head
  • 1 Spare
  • 1 Ground
  • 2 for Walk/Don’t Walk
  • 1 for Countdown Timer
• 3c/14 for each push button
  • 1 Spare
  • 1 Ground
  • 1 for Push Activation
• Can combine to a single 9c/14

Notes on Conduit:
• 60% of the cross-sectional area of the conduit needs to remain empty after construction
• Spare conduit to first handhole and separate conduit for 3c/8 power
Typical Wiring (US 40 & Broadway in Greenfield, IN)

- Fiber
- 4-7c/14 for vehicle signals (1 per phase)
- 8-7c/14 for pedestrian signals (2 ped heads and push buttons for 4 signalized crossings)
- 3c/8 for power
- 4-2c/16 for detection
- 5 conduits
Complicated Wiring (DDI at I-69 & Campus Pkwy)

- 3c/8 for power
- 22-2c/16 for detection
- 8-7c/14 for vehicle heads
- 8-9c/14 for signalized pedestrian crossings
- 4-3c/14 for emergency vehicle preemption
- 8 conduits in foundation

Photo: Adam Tyra (INDOT)
Right-of-Way (R/W) Example

- Corners with curb ramps may or may not have well-recorded R/W
- Apparent R/W is not necessarily actual R/W
- Note: this is theoretical, not based on record research at this corner
Right-of-Way (R/W) Example

- Expected R/W if the back of sidewalk is the boundary
Right-of-Way (R/W) Example

- Expected R/W if the front of sidewalk is the boundary
- Also possible R/W wasn’t properly recorded, may only own to back of curb
Example: US 35 & SR 931, Kokomo, IN

- Path not aligned with crosswalk, at a slight skew
- Push button is too far away (pedestrian clear space)
- Push button is not the correct type

Photos: Google Maps
• Tall Curb resulting in steep grade
• Sidewalk just turns into shoulder
• Unsignalized crossing is appropriate for this particular crossing, but there are other similar crossings that can and should be signalized at this interchange
• Could add a small curb section to discourage pedestrian use of the shoulder that could also serve as a place for a pedestal

Example: I-465 & Emerson Ave, Indianapolis, IN

Photo: Adam Tyra (INDOT)
Thank you.
Questions?

Adam Tyra, PE
Greenfield District Traffic
adtyra@indot.in.gov