Concrete Roundabouts

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## Terminology

<table>
<thead>
<tr>
<th><strong>Concrete</strong></th>
<th><strong>Asphalt</strong></th>
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<tr>
<td>- Rigid</td>
<td>- Flexible</td>
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<tr>
<td>- Uses cement as binder</td>
<td>- Uses liquid asphalt as binder</td>
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<tr>
<td>- Pro: longer lasting</td>
<td>- Pro: usually lower cost</td>
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<tr>
<td>- Con: higher cost</td>
<td>- Con: requires frequent maintenance &amp; rehabilitation</td>
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Why Concrete Roundabouts?

Realize there is a choice

- Materials
- Performance (future maintenance)
- Economics
- Constructability
- Safety
- Aesthetics
Why Concrete Roundabouts?

Let’s ask the questions...

1. Where do we typically use concrete pavement? (situations, traffic conditions, applications, etc.)

2. What performance characteristics of concrete pavement make it the best choice for roundabouts?
Where is Concrete Pavement Used?

Answers:

- High traffic areas
- Areas with lots of turning movements
- Situations where we need a “long-term fix”
- Situations where future maintenance must be kept to an absolute minimum
- Areas where future disruption to traffic must be kept to a minimum
- Areas where safety is a priority
Why Concrete for Roundabouts?

**Answers:**

- Long service life
- Minimal maintenance requirements
- Resistance to surface deformation
  - Doesn’t rut or shove
  - Maintains drainage characteristics
  - No future overlays required (grade issues)
- Ease of construction (constructability)
Why Concrete (cont.)

Answers:

- Superior safety aspects
  - Drainage
  - Skid resistance
  - Lighting
- More aesthetically pleasing
- Faster construction
- Economical over long-term (LCC)
Why Concrete Roundabouts?

Concrete is the perfect material for roundabout applications.
Benefits of Concrete Pavements

- Strength
- Durability
- Ease of Construction
- Life Cycle Cost
- Lighting/Reflectivity
- Safety
- Environmentally Friendly
- Aesthetics
Design of Concrete Roundabouts

- Thickness Design
- Joint Design
  - Layout locations
  - Allow adjustments
- Construction
Pavement Thickness Design

- AASHTO
  - 1993 Pavement Design Guide
    - Most current
  - New Mechanistic-Empirical Design Guide
    - Under calibration/implementation

- PCA (ACPA)
  - StreetPave software; will be released Fall 2005
Jointing for Concrete Roundabouts

- Decide on joint layout philosophy
  - Like normal intersection
  - Isolate circle from legs
  - Pave through, isolate two legs
- Follow 10-step method
- Joints in circular portion radiate from center
- Joints in legs are normal (perpendicular)
Layout Joints as Normal

Good for small roundabouts or traffic circles?
Isolate Circle from Legs

Ideal for large roundabouts with full detour
Pave Through

Ideal for roundabouts requiring fast construction under traffic
Concrete Roundabout Jointing

- Develop a jointing plan
  - Bird’s eye view
- Remember rules
- Follow the steps
- Be practical!
## The Rules of Jointing

**Things to Do**
- Match existing joints or cracks
- Cut at the proper time
- Place joints to meet in-pavement structures
- Understand can make adjustments joint location!
- Be Practical

**Things to Avoid**
- Slabs < 1 ft (0.3 m) wide
- Slabs > 15 ft (5.0 m) wide
- Angles < 60° (~90° is best)
  - Do this by dog-legging joints through curve radius points
- Creating interior corners
- Odd Shapes (keep slabs square or pie-shaped)
Recommended Max. Joint Spacing

- 24 x T
  - If concrete placed on unstabilized base (i.e. compacted aggregate or granular base)

- 21 x T
  - If concrete placed on stabilized base (i.e. asphalt- or cement-treated)

- 15 ft absolute maximum for street & highway pavements
Step 1

Draw all pavement edge and back-of-curb lines in the plan view.

Draw locations of all manholes, drainage inlets, and valve covers so that joints can intersect these.
Step 2

Draw all lane lines on the legs and in the circular portion.

- If isolating circle from legs, do not extend these through the circle.
- If using “pave-through” method, determine which roadway will be paved through.

Make sure no distance is greater than the maximum recommended width.
Step 3

In the circle, add “transverse” joints radiating out from the center of the circle. Make sure that the largest dimension of a pie-shaped slab is smaller than the maximum recommended.

Extend these joints through the back of the curb & gutter.
Step 4

On the legs, add transverse joints at all locations where a width change occurs in the pavement (at bullnose of median islands, begin & end of curves, tapers, tangents, curb returns, etc.).

Extend these joints through the back of the curb & gutter.
Step 5

Add transverse joints beyond & between those added in Step 4. Space joints out evenly between other joints, making sure to not violate maximum joint spacing.
Step 6

Make adjustments for in-pavement objects, fixtures, and to eliminate L-shapes, small triangular slabs, etc.
Case Study

- Roundabout at 110th Street & Lamar Avenue in Overland Park, Kansas
  - Part of new convention center (showcase)
- National Pavement Award Winner for Excellence in Concrete Pavements
Rough Grading
- Subgrade preparation & base course construction complete
- Concrete curb under construction
Curb Placement – Widened Gutter
Concrete Roundabout
Opened to Traffic
More Info


Questions?

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