Roundabouts and the **Jointing Process**

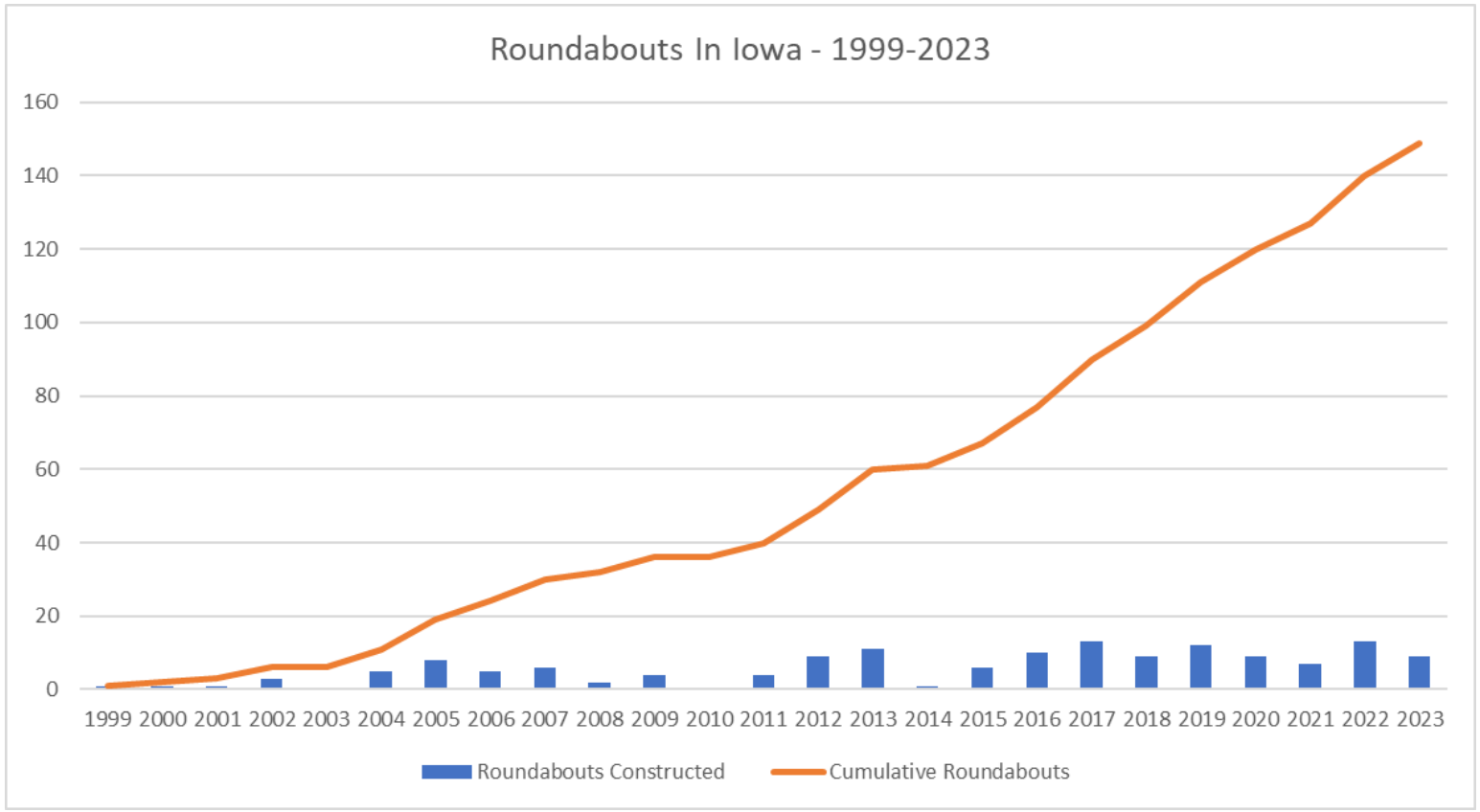
Presentation Outline

- Trends
- Roundabout
  - Elements
  - Types
  - Design features
- Jointing Layout
  - Joint Types and Patterns
  - Process
  - Tips

Roundabout Trends

- Number of Roundabouts in Iowa

Kittleson and Associates, https://roundabouts.kittelson.com/Home/Map

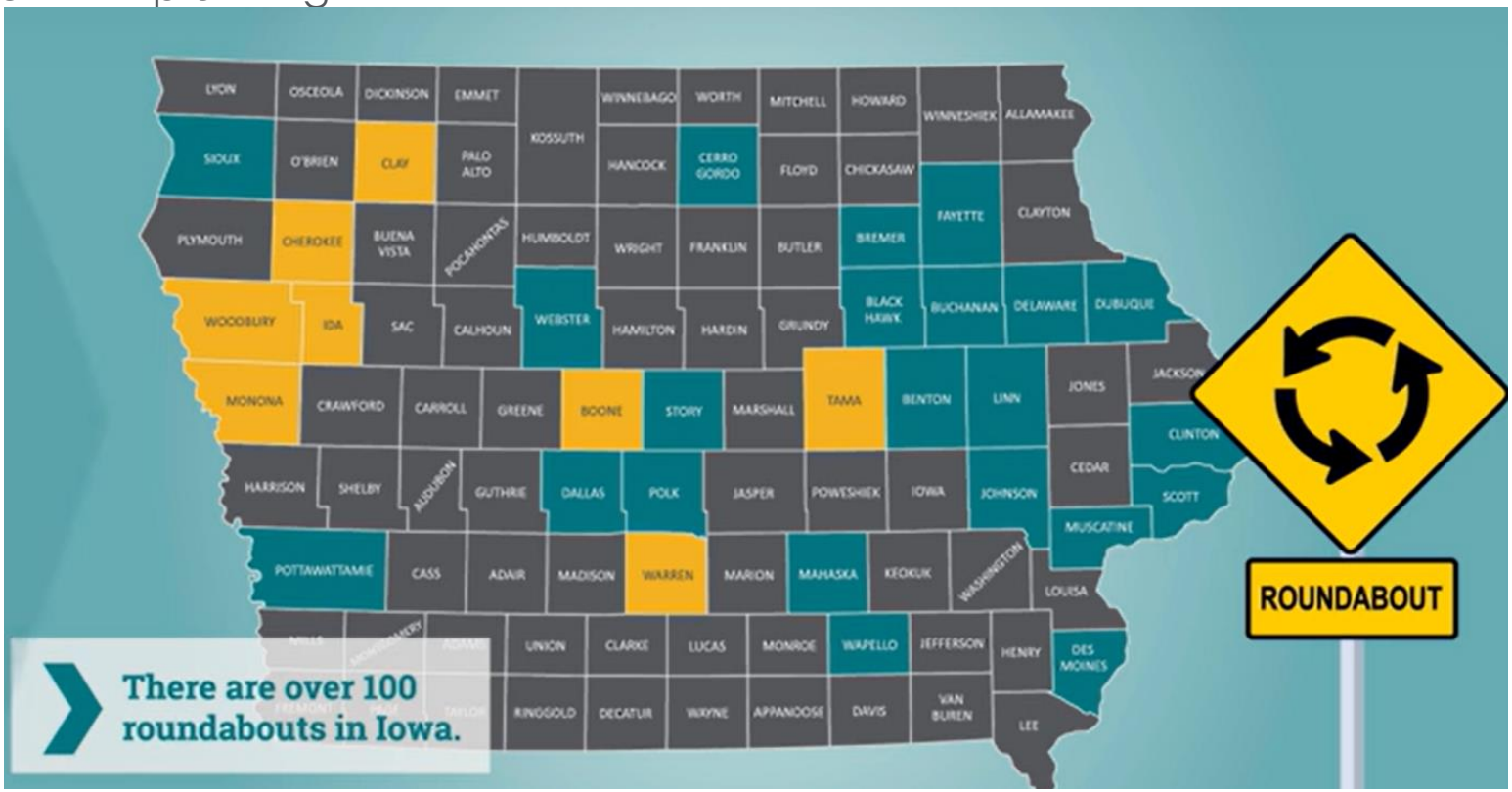


Roundabout Trends

- Roundabout locations

Blue = Current Roundabouts

Yellow = In planning



What is a Roundabout?

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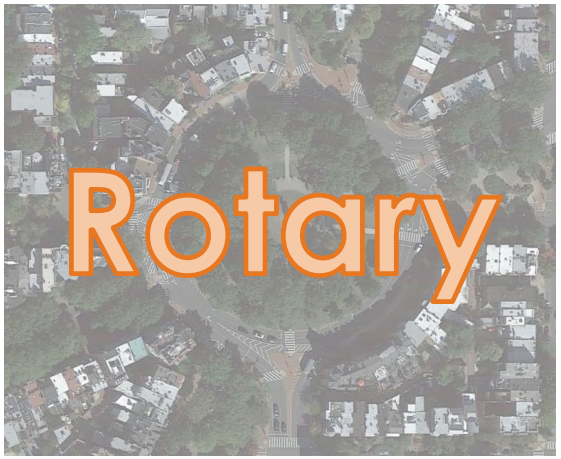

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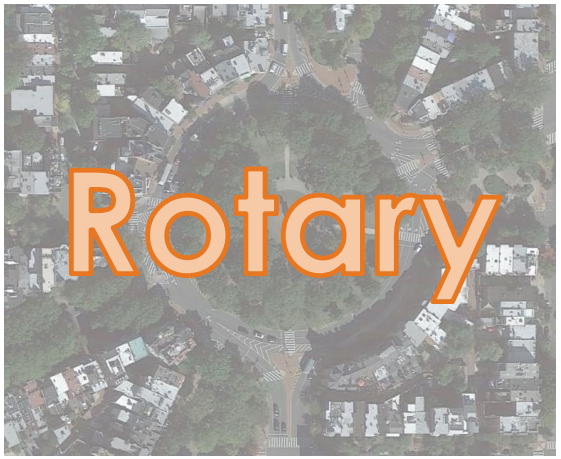
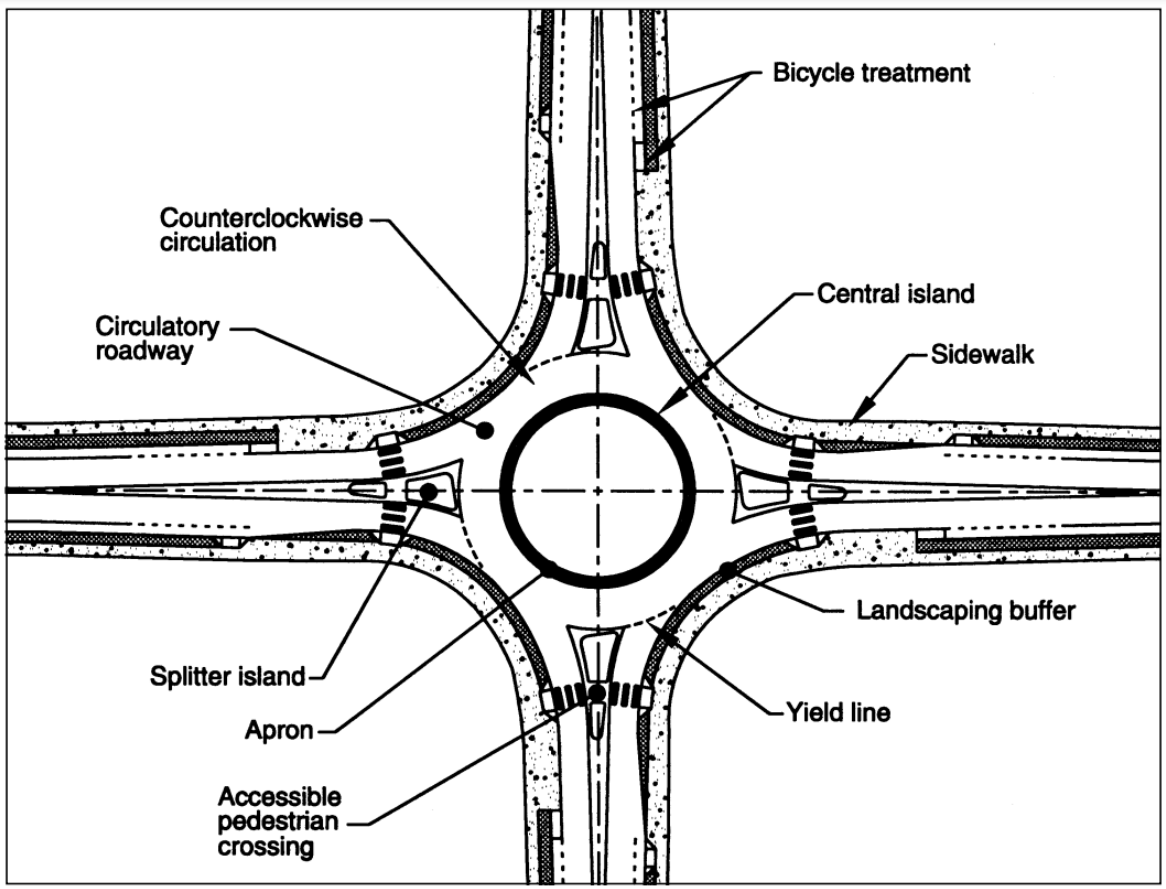
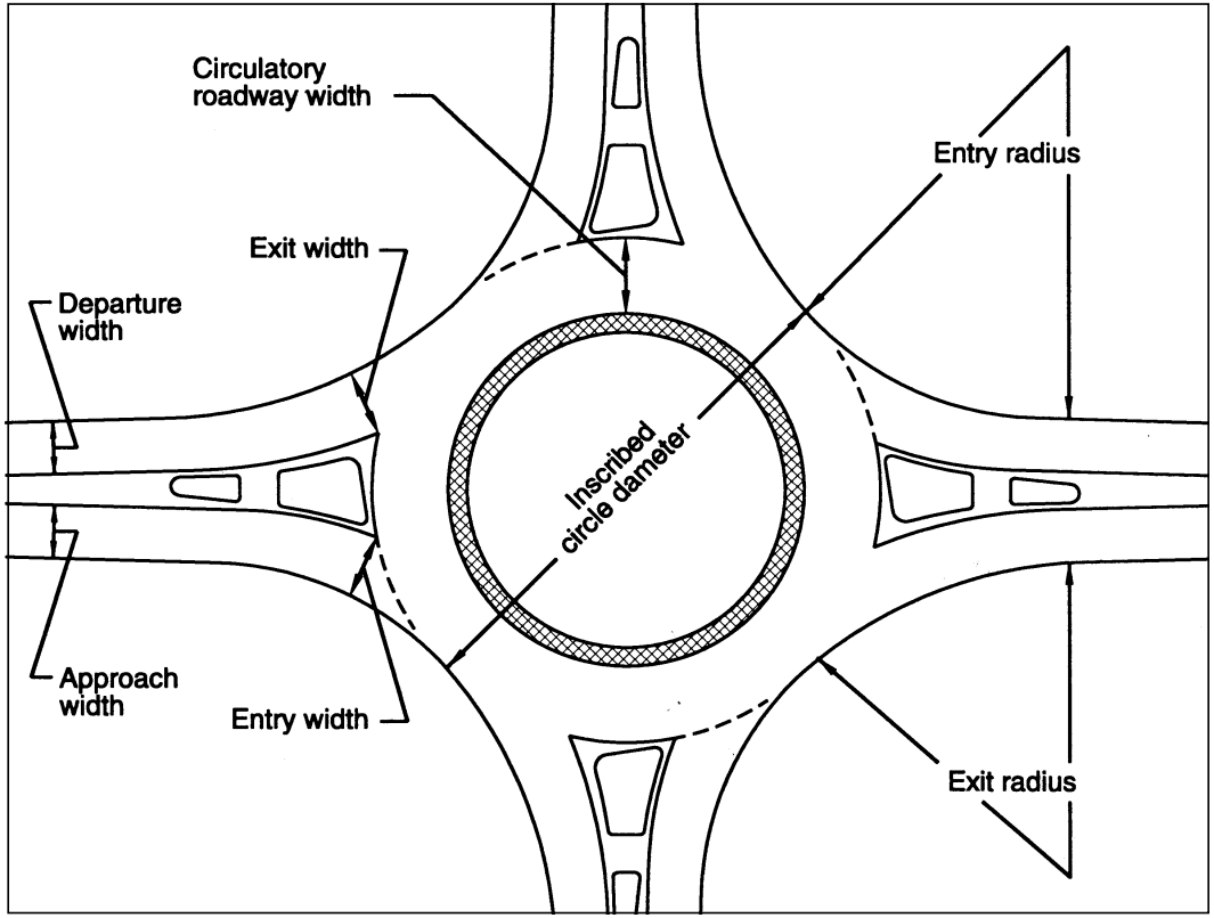


Elements of a Roundabout



Elements of a Roundabout



Types of Roundabout

Mini-Roundabout

- 15 mph Design Speed
- 45 to 80 ft Diameter
- Painted or mountable splitter islands
- Mountable central island
- Similar footprint to a traditional intersection
- Maximum capacity of 10,000 veh/day
- Maximum approach speed of 30 mph

Types of Roundabout

Compact Roundabout

- 15 mph Design Speed
- 80 to 100 ft Diameter
- Raised splitter islands
- More pedestrian and bicyclist friendly
- Meets all the design requirements of effective roundabouts
- Maximum capacity of 15,000 veh/day

Types of Roundabout

Single-Lane Roundabout

- 20-25 mph Design Speed
- 100 to 130 ft Diameter
- Approach speeds of up to 60 mph
- Maximum capacity of 20,000 veh/day

Types of Roundabout

Two-Lane Roundabout with One- and Two-Lane Approaches

- 25 mph Design Speed
- 150 to 200 ft Diameter
- Capacity of 20,000+ veh/day

Types of Roundabout

Two-Lane Roundabout

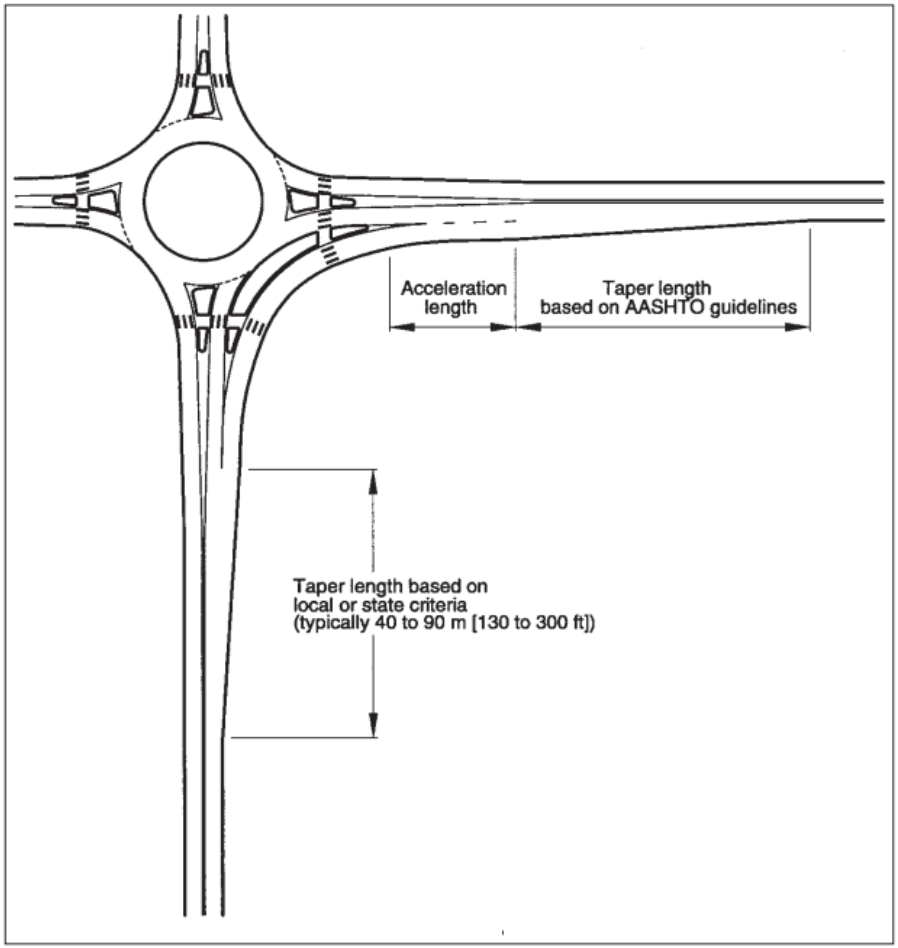
- 25 mph Design Speed
- 150 to 200 ft Diameter
- Capacity of 20,000+ veh/day

Types of Roundabout

Turbo Roundabout

- Potential replacement for two-lane roundabout
- Two currently in the US
  - Jacksonville, FL
  - Gilroy, CA
- Raised lane separator to help channelize traffic

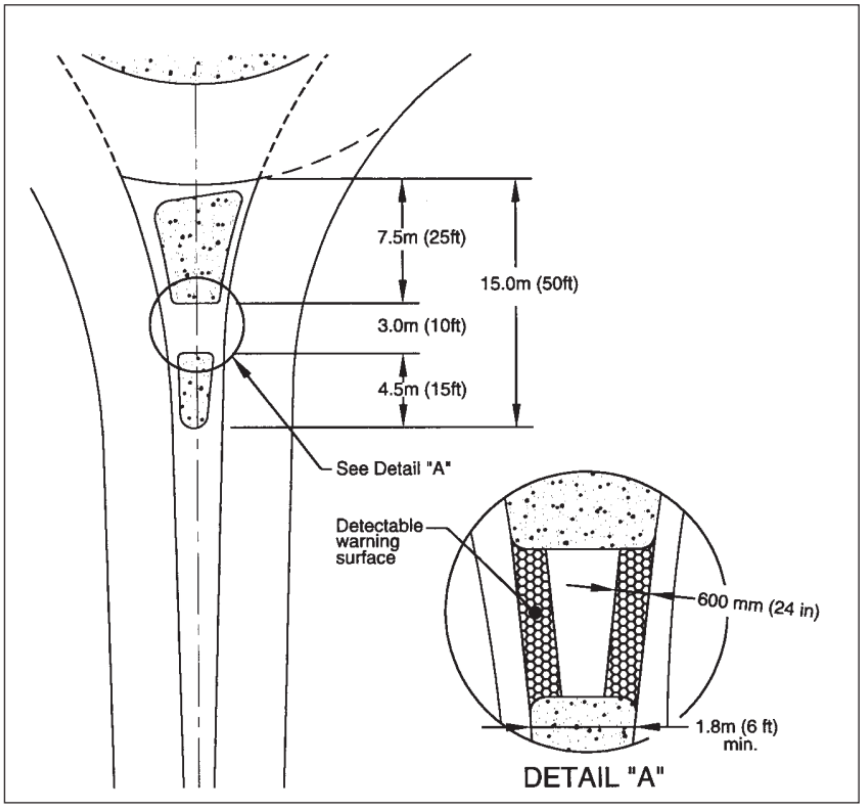
Roundabout Design



Bypass Lanes

- Increases capacity with significant amount of traffic turning right
- Increases conflicts with pedestrians and bicyclists

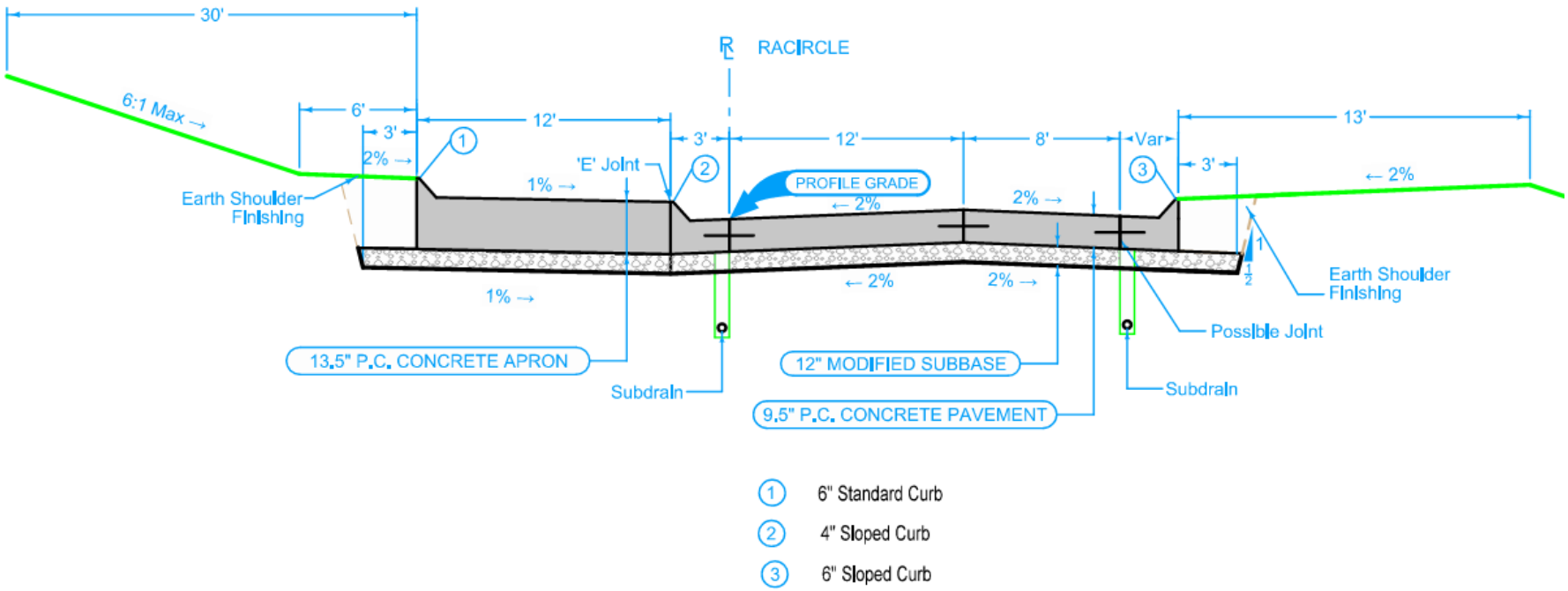
Splitter Islands



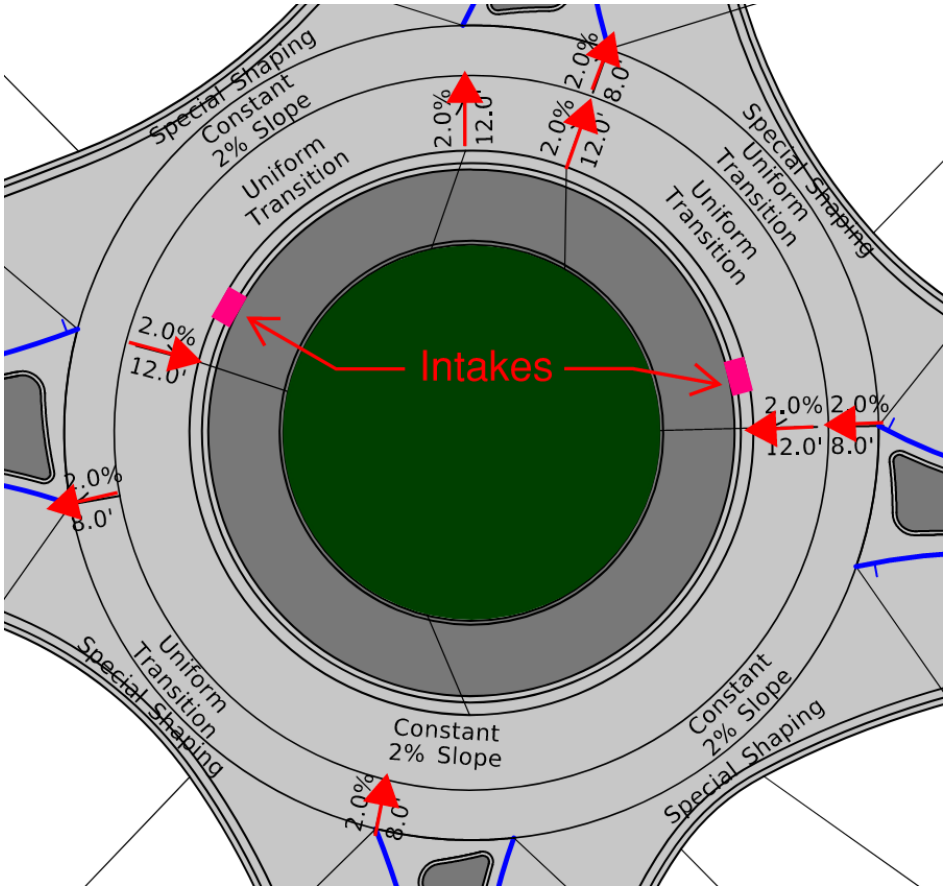
Features

- Provides a refuge area for pedestrians
- TAS recommends constructing pedestrian crossings
- 50’ minimum length
  - 200’ recommended

Circulating Roadway



Circulating Roadway



Features

- Start with typical slopes
- Add staking if needed based on the site conditions

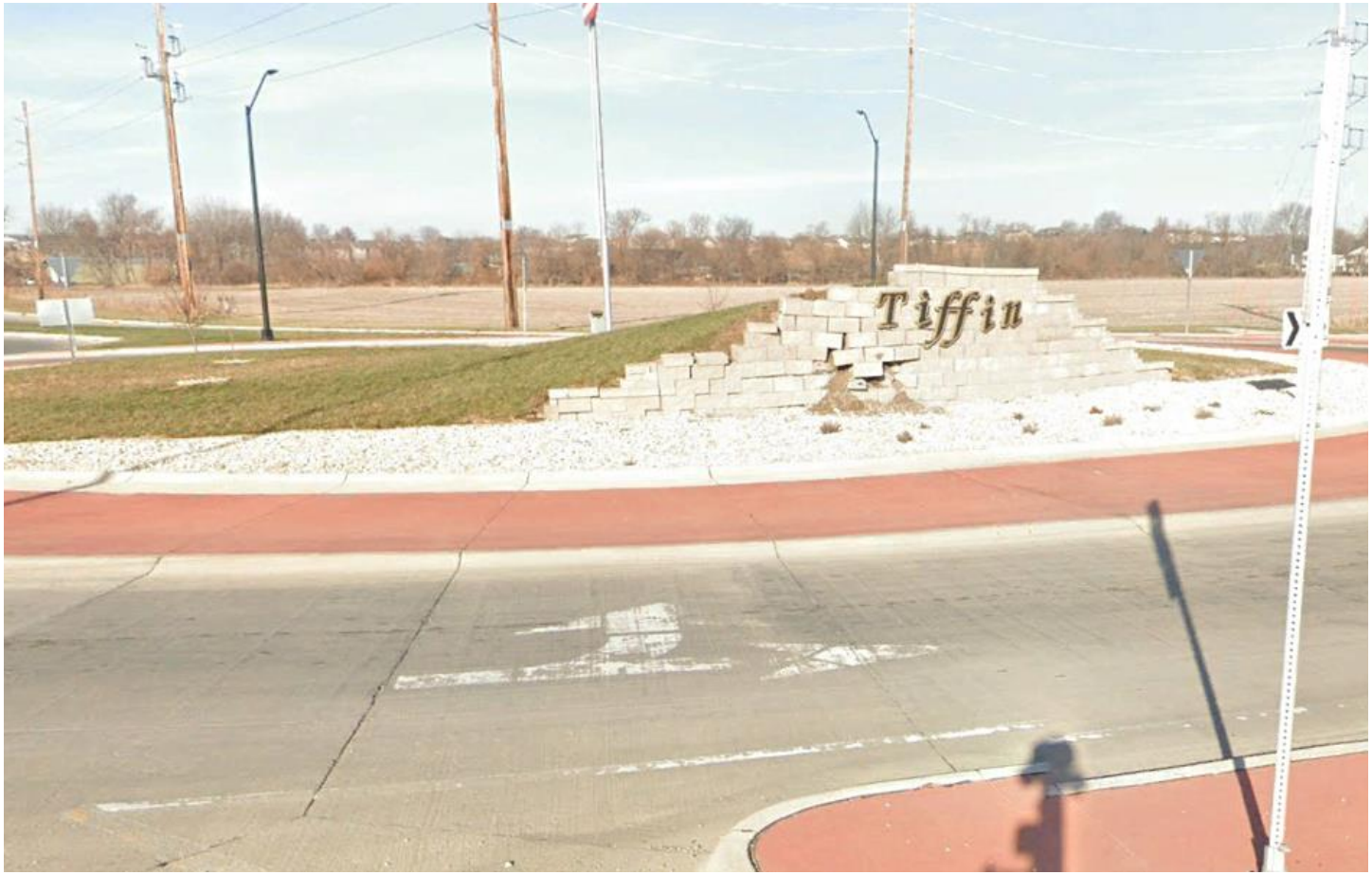
Truck Apron

Features

- Mountable curb between the circulating roadway and the apron
- Typically, colored concrete
- Size and shaped based on the design vehicle

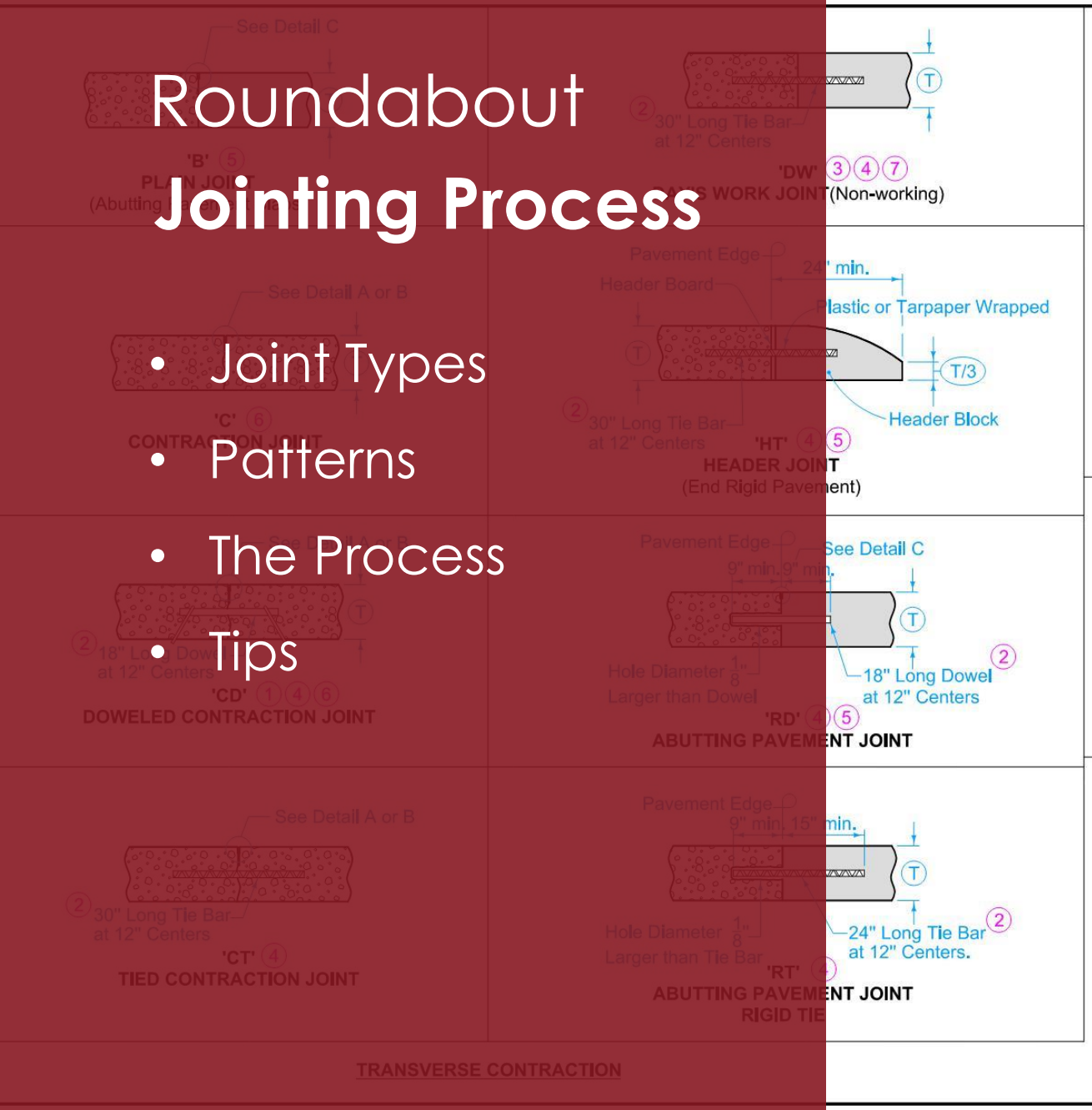
Center Island Design

Center Island Design

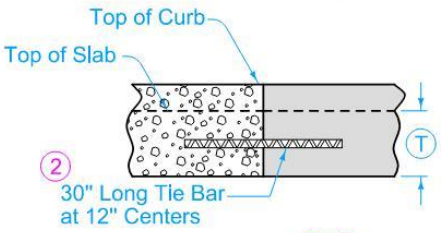


Roundabout **Jointing Process**

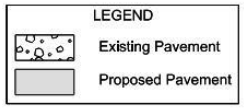
- Joint Types
- Patterns
- The Process
- Tips



1. See dowel assemblies for fabrication details.
2. See Bar Size Table for Contraction Joints on Sheet
3. Locate 'DW' joint at a mid-panel location between fu 'C' or 'CD' joints. Place no closer than 5 feet to a 'C' or 'CD' joint.
4. Place bars within the limits shown under dowel assemblies.
5. Edge with 1/8 inch tool for length of joint. For HT joi remove header block and board when second slab i placed.
6. Unless specified otherwise, use 'CD' transverse contraction joints in mainline pavement when T is greater or equal to 8 inches. Use 'C' joints when T less than 8 inches.
7. 'RT' joint may be used in lieu of 'DW' joint at the end the days work. Remove any pavement damaged du the drilling at no additional cost to the Contracting Authority.



'DW - CG' 3 4
DAY'S WORK JOINT
CURB AND GUTTER UNIT



SUDAS | IOWADOT | REVI 11

FIGURE 7010.101 | STANDARD ROAD PLAN | PV- SHEET

REVISIONS: Modified circle note 32.

Paul D. Wigand
SUDAS DIRECTOR

DESIGN METHODS EN

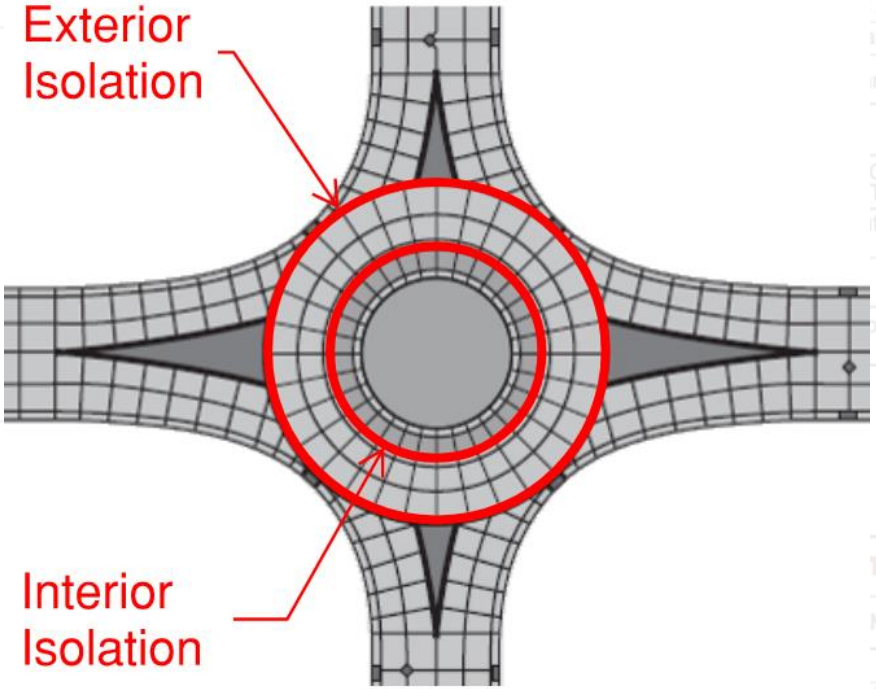
JOINTS

Joint Types

- KT, L, CD, C, and E
- Design Manual, Chapter 7a
- Standard Road Plan, PV-101
- 'E' joint
  - Used for isolation of circulating roadway

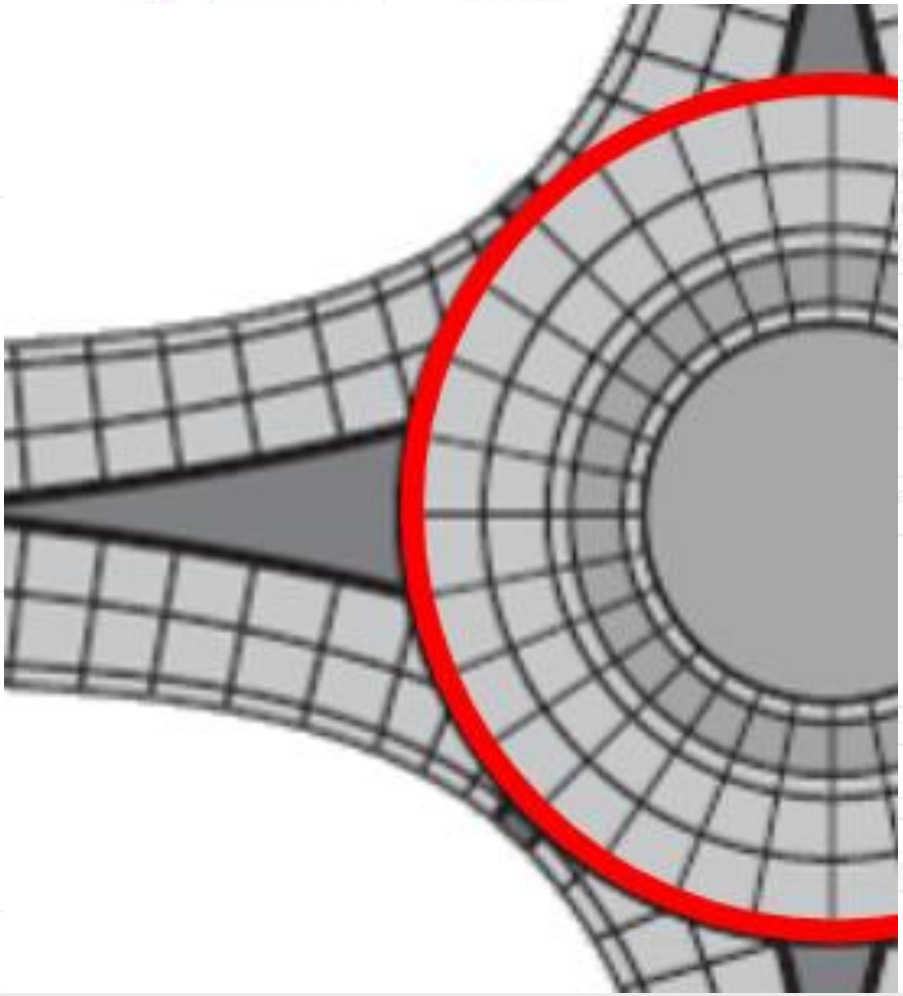
Isolation Joint Locations

- Interior Location
  - Between Circulating Roadway and Truck Apron
- Exterior Location
  - Outer edge of Circulating Roadway
  - Not used by Iowa DOT



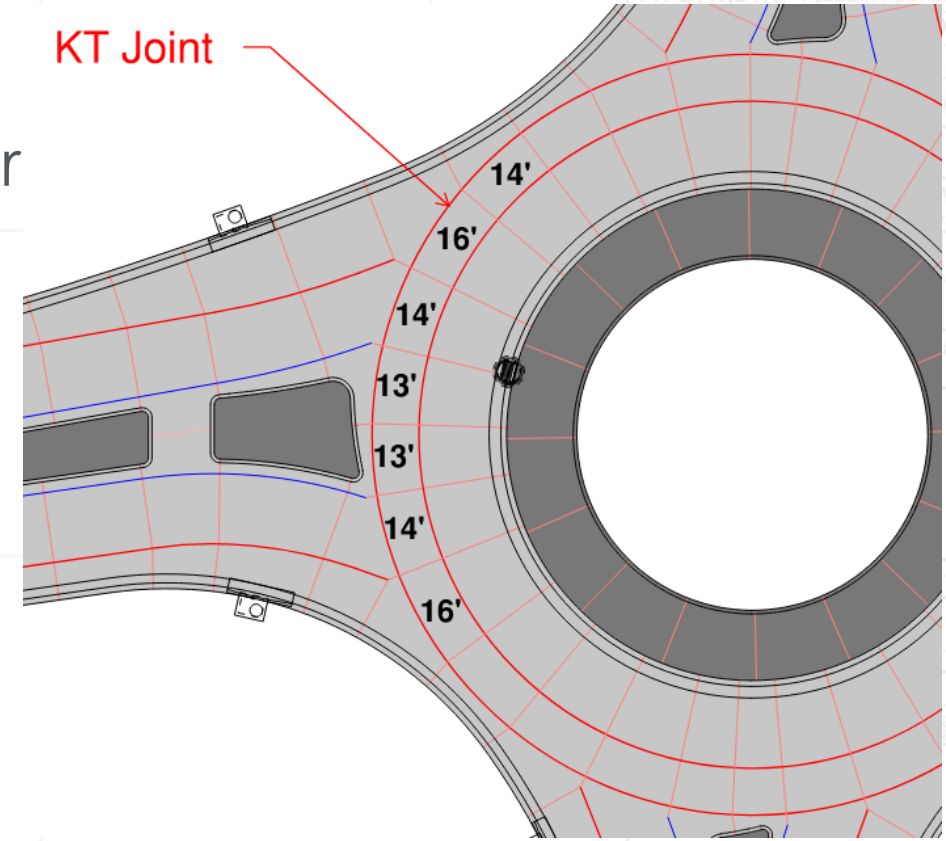
With Exterior Isolation

- Isolates circulating pavement
- Circulating joints do not have to align with approach legs
  - But try to align if possible
- Uniform joint spacing
- No load transfer
- Not used by Iowa DOT



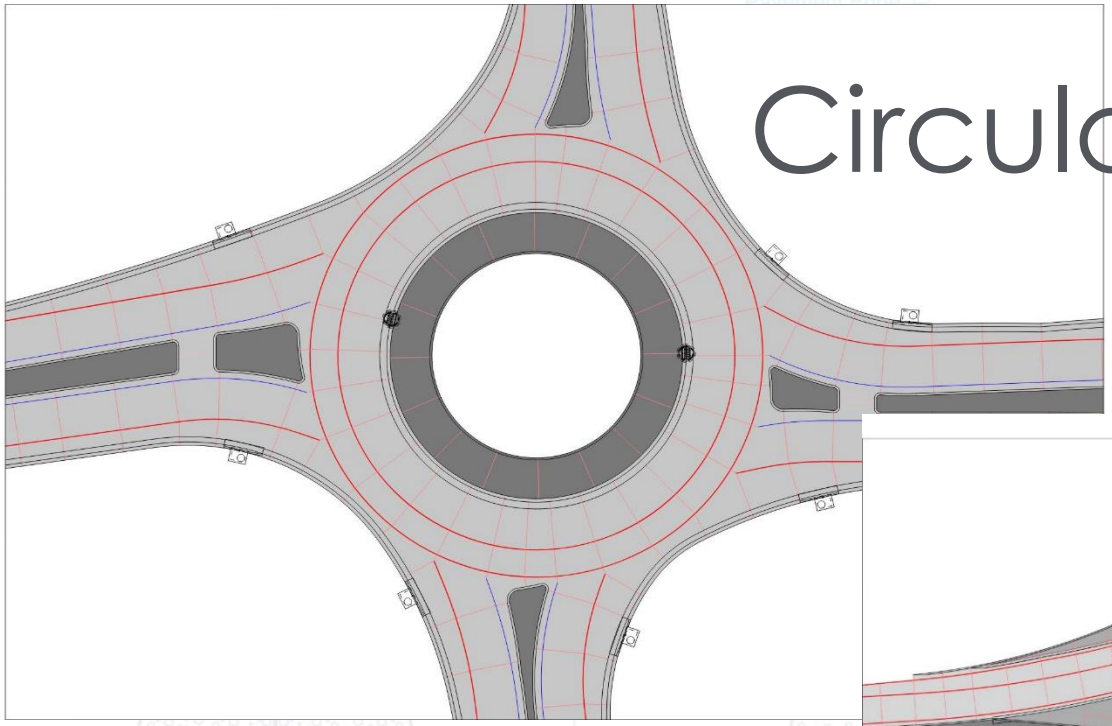
Without Exterior Isolation

- Used by Iowa DOT
- Use KT Joint
- Some load transfer
- Ties pavement together
- Irregular panel shapes

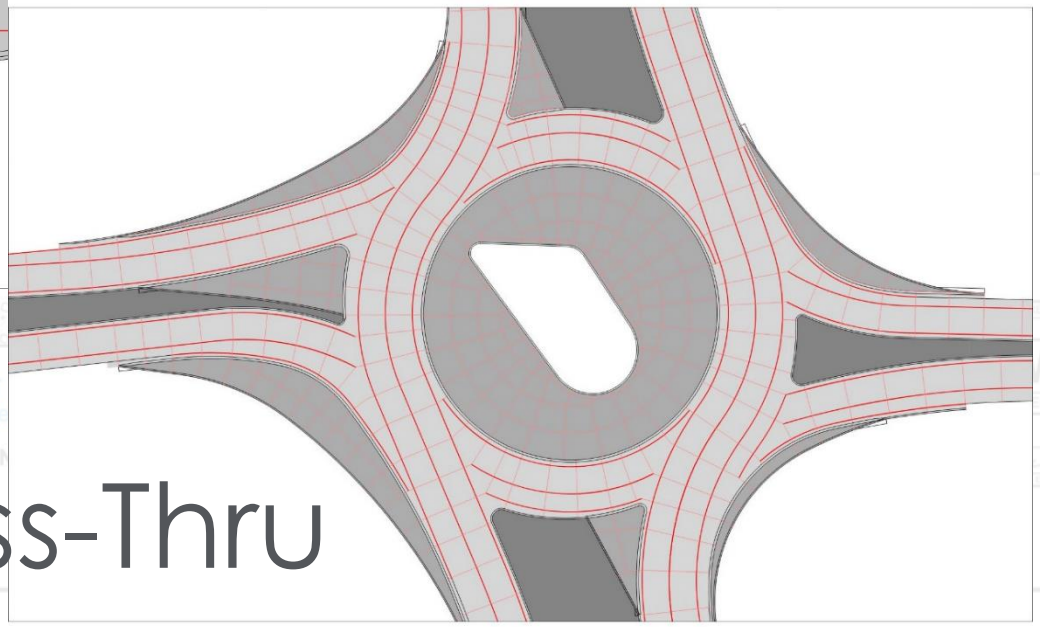


Joint Patterns

Circular

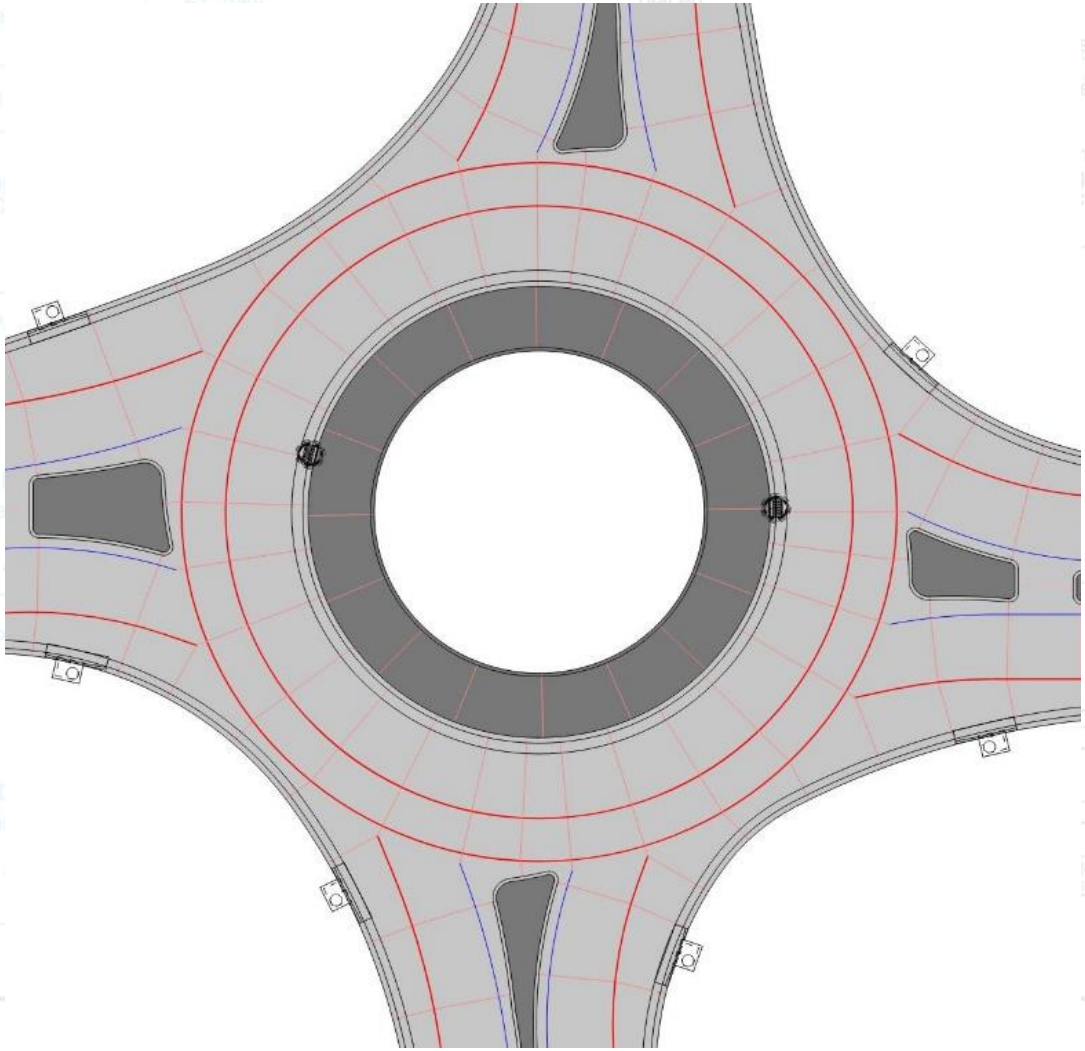


Pass-Thru



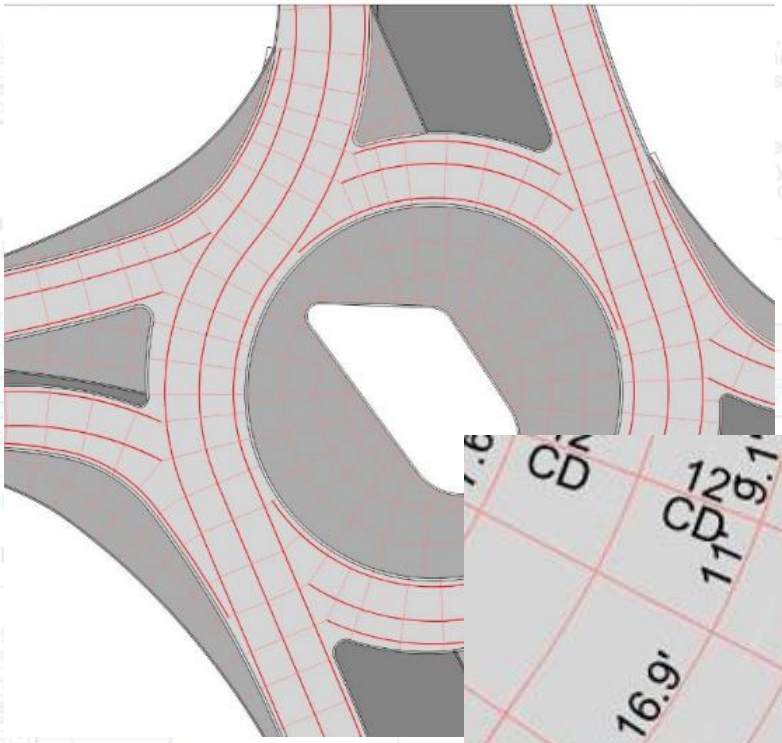
Circular Pattern

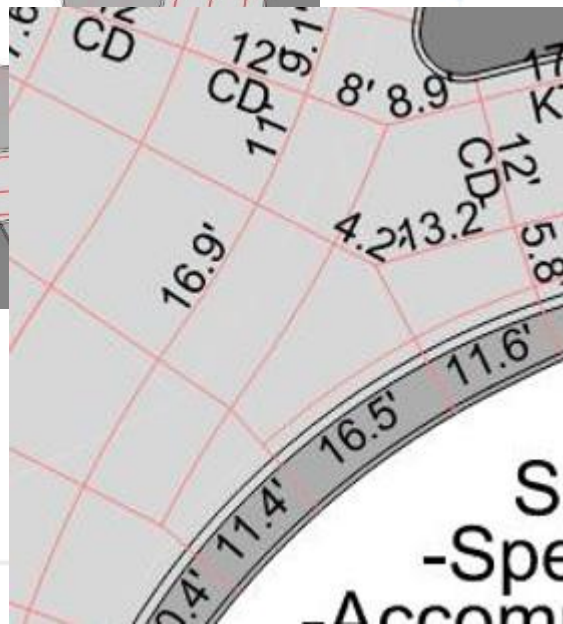
- Most Common
- Easier to joint at intersections
- Easily adaptable
- Difficult to slip-form



Pass-Through Pattern

- Common for dominant movement
- Easier to slipform
- Easier for staging
- Positive delineation for travel
- Challenging to joint



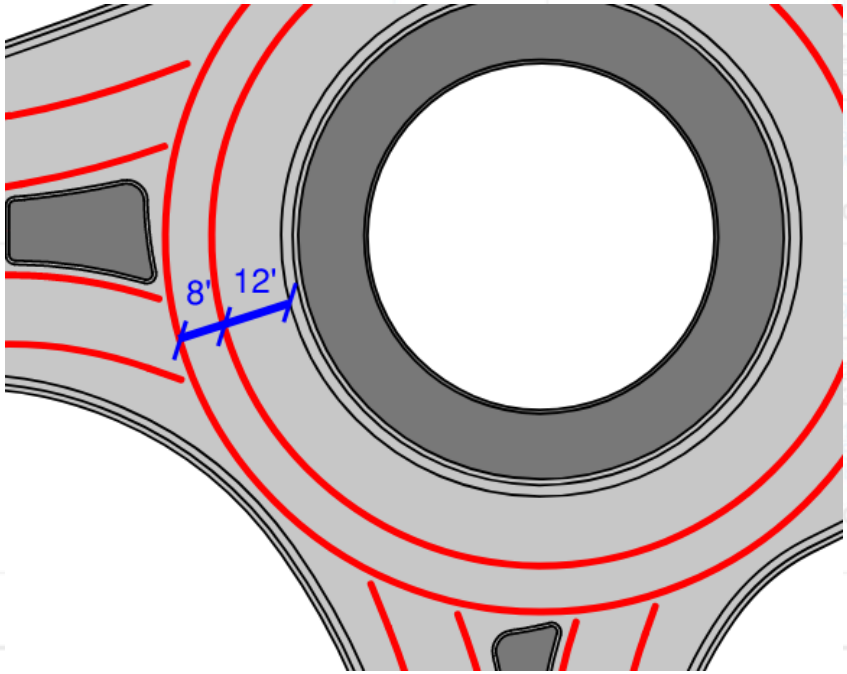


Longitudinal Joints

Circular Pattern*

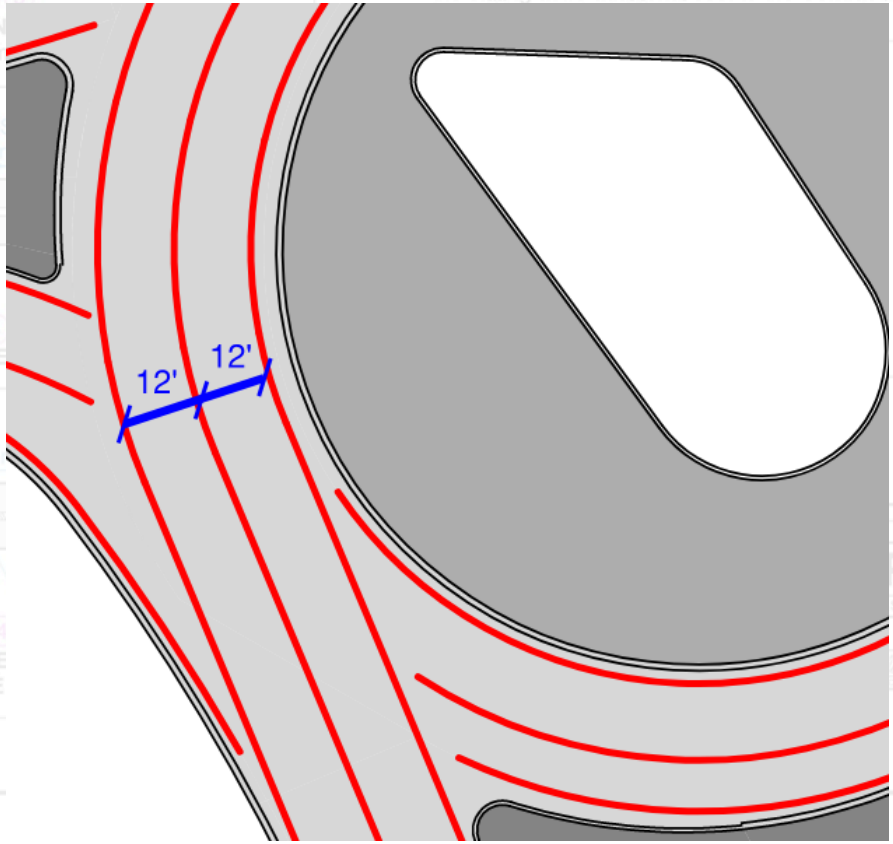
- 12’ wide inside circle
- 8’ wide outside circle

*based on 20’ circulating travel path



Pass-Through Pattern

- Match approach legs



Longitudinal Joints

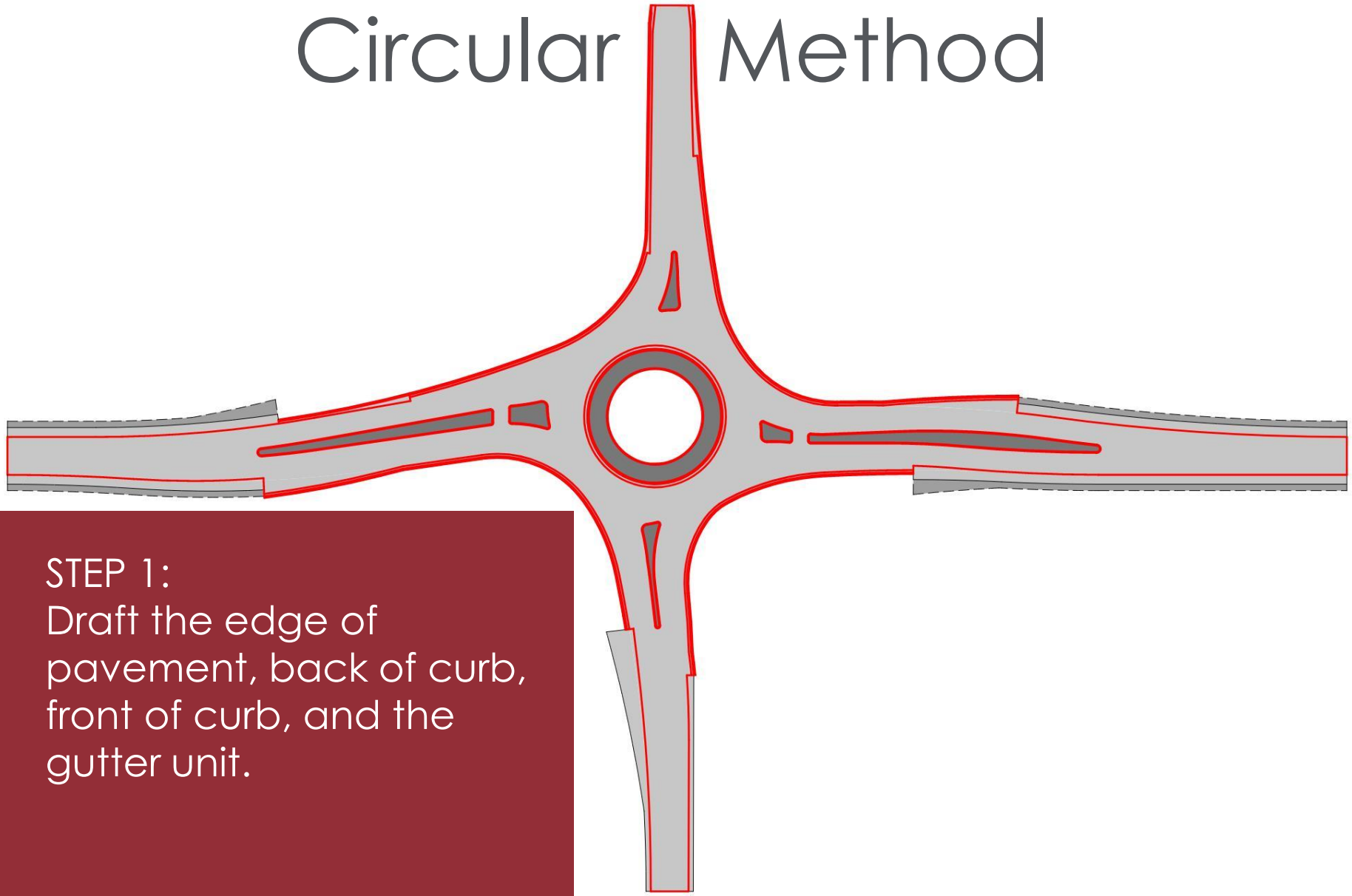
Avoid wide panels

- DOT tries to keep its panels no wider than 12’

Jointing Process

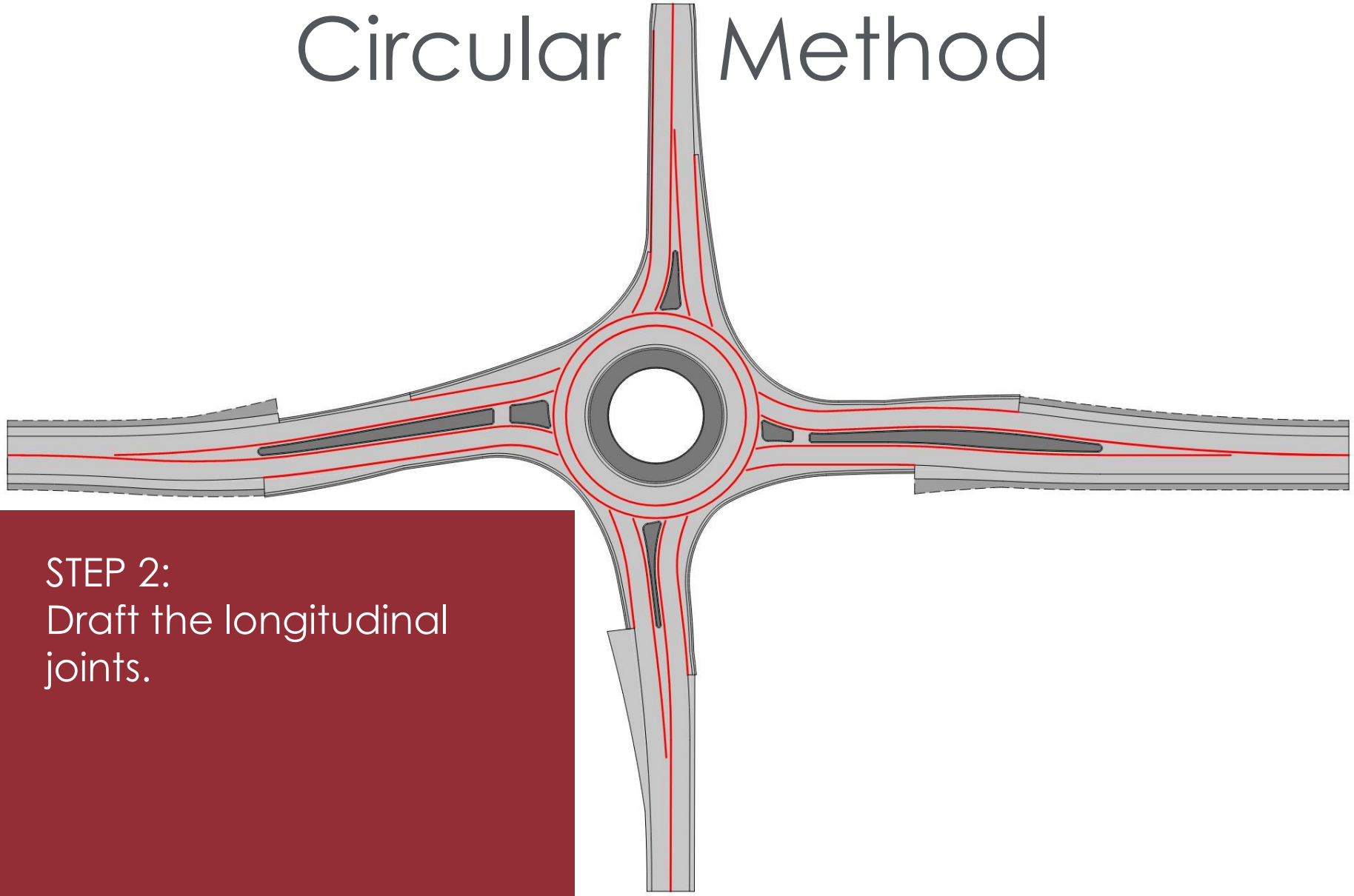
- Resources
  - WikiPave
    - https://wikipave.org/index.php/Joint_Layout
  - Iowa DOT Design Manual
    - coming soon

Circular Method



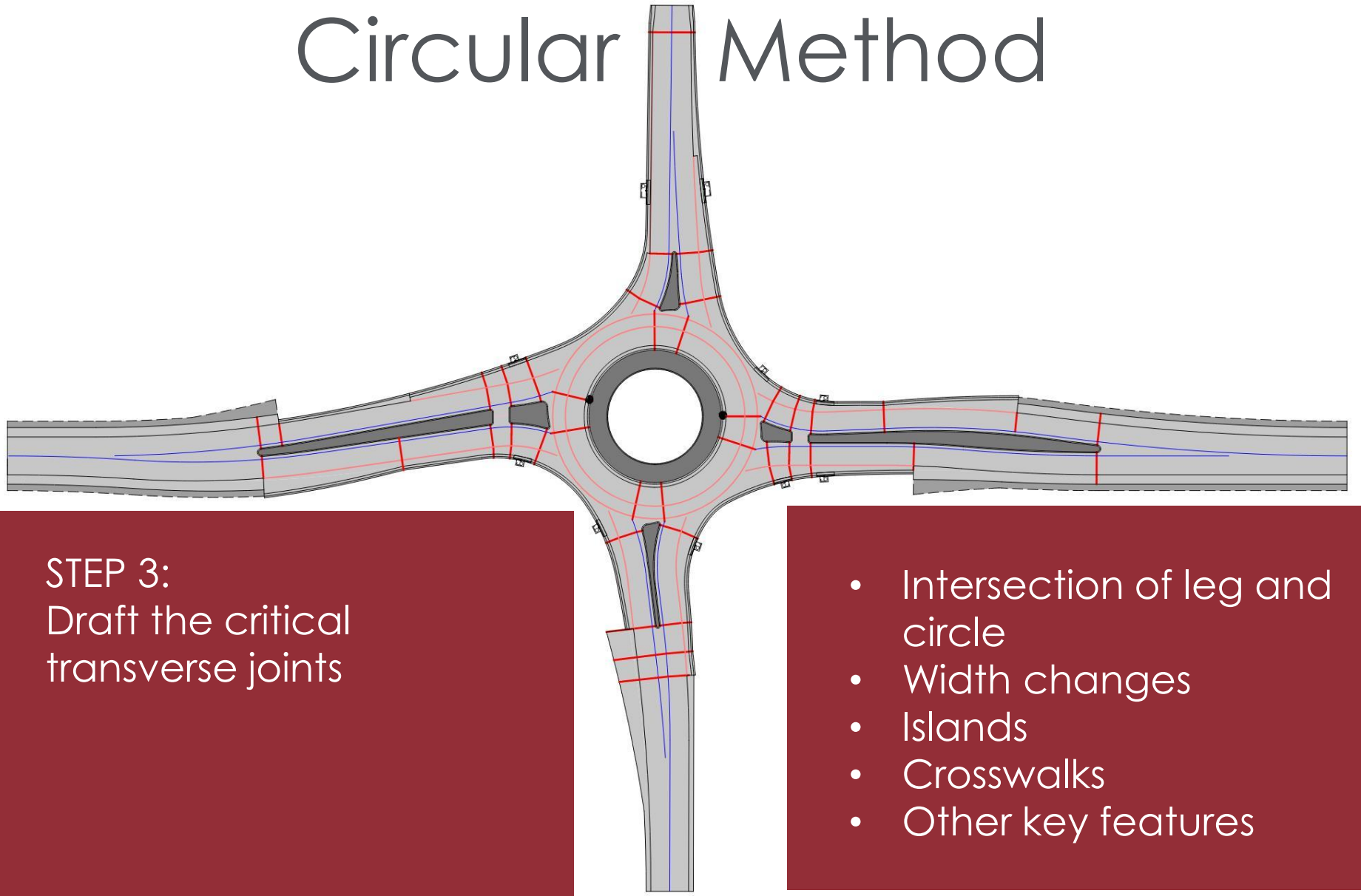
STEP 1:
Draft the edge of pavement, back of curb, front of curb, and the gutter unit.

Circular Method



STEP 2:
Draft the longitudinal joints.

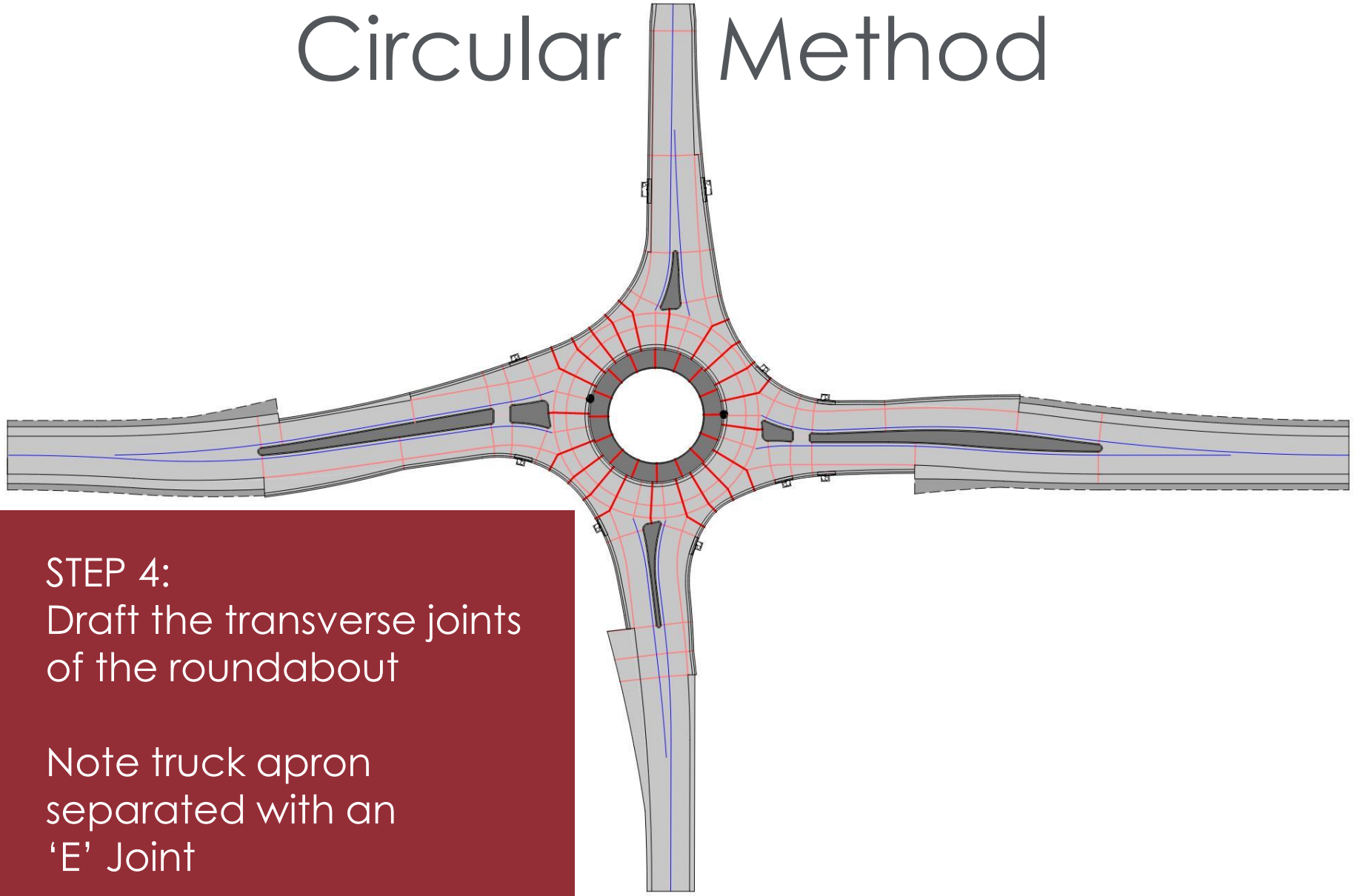
Circular Method



STEP 3:
Draft the critical transverse joints

- Intersection of leg and circle
- Width changes
- Islands
- Crosswalks
- Other key features

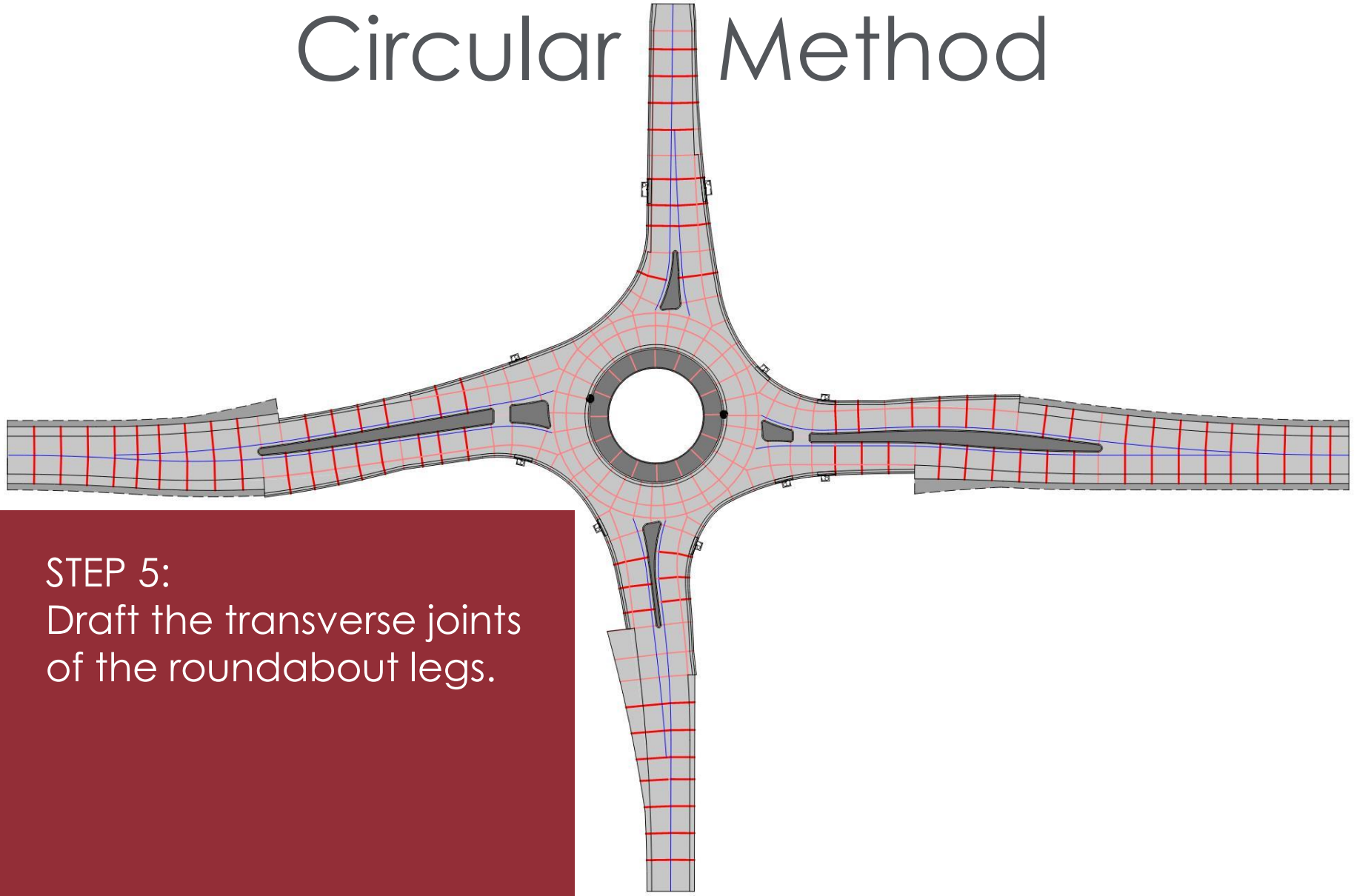
Circular Method



STEP 4:
Draft the transverse joints of the roundabout

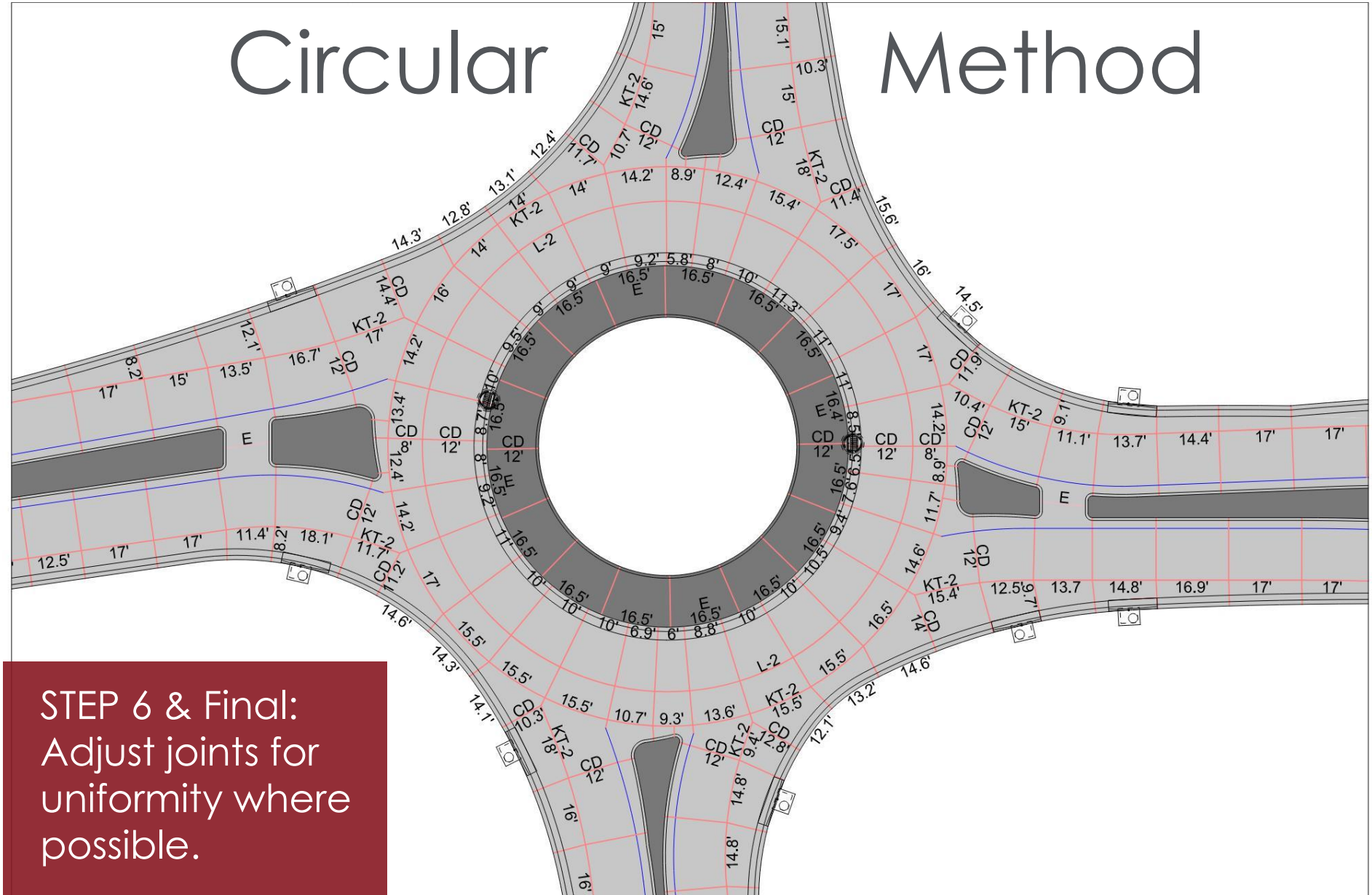
Note truck apron separated with an ‘E’ Joint

Circular Method

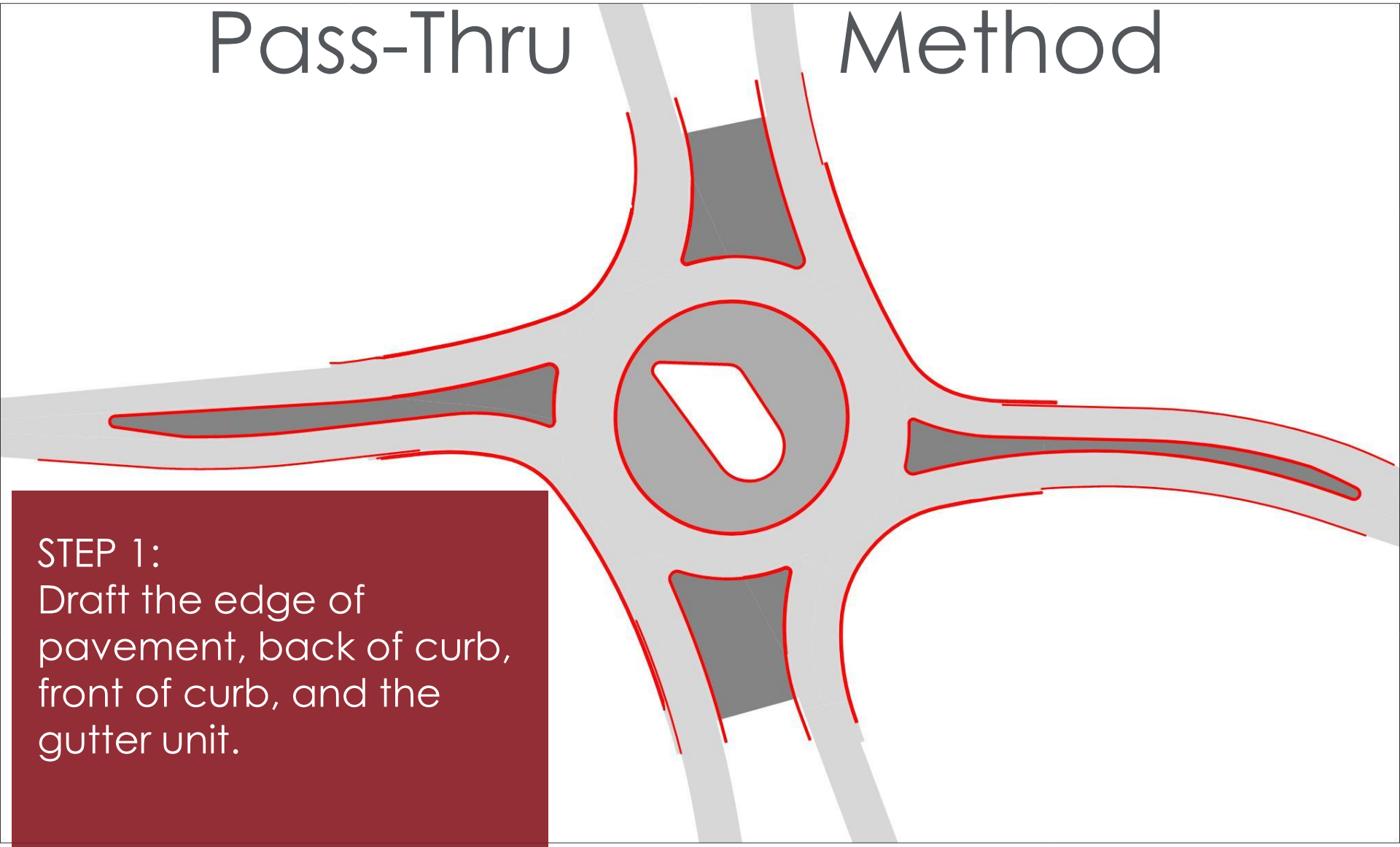


STEP 5:
Draft the transverse joints of the roundabout legs.

Circular Method

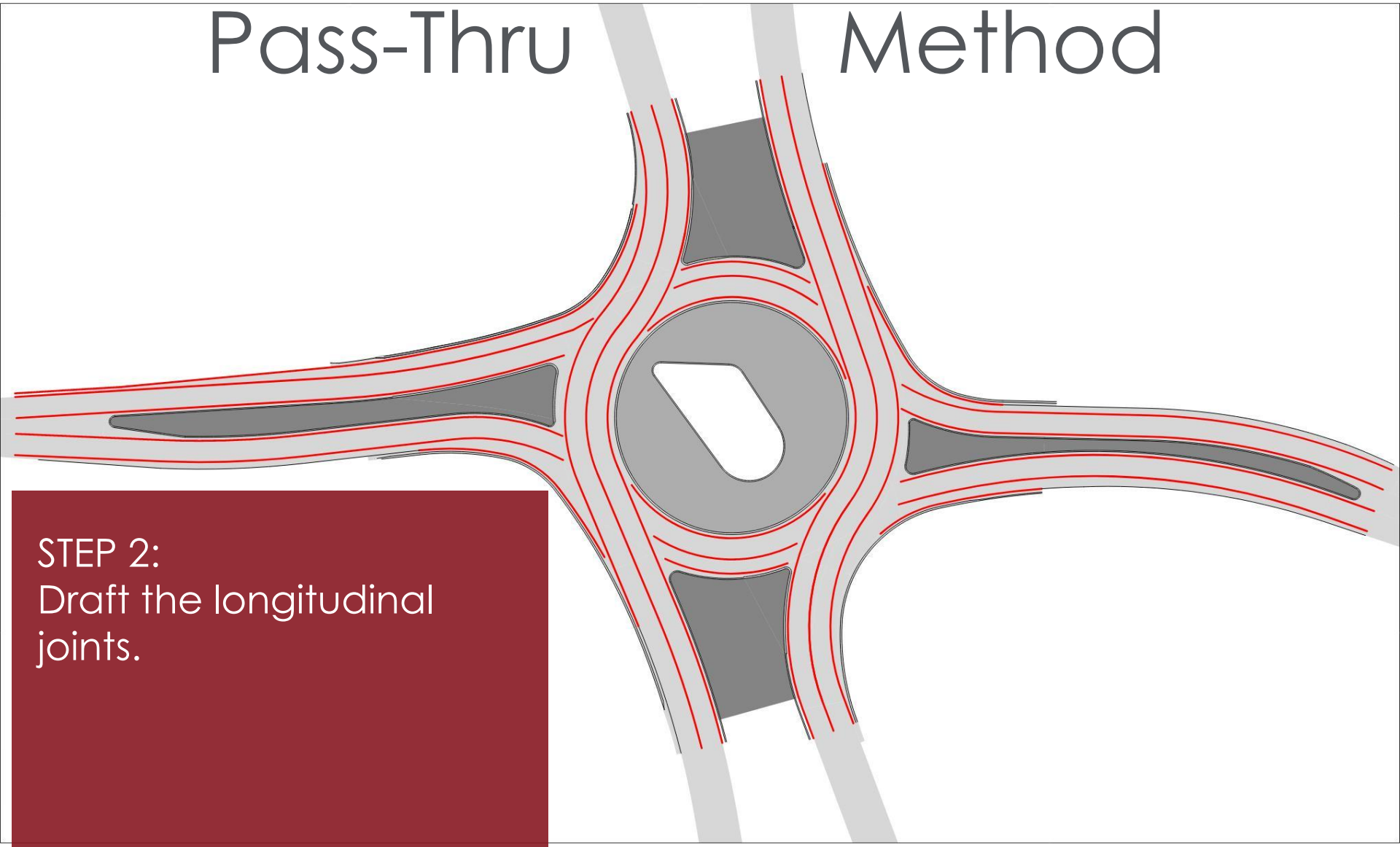


Pass-Thru Method



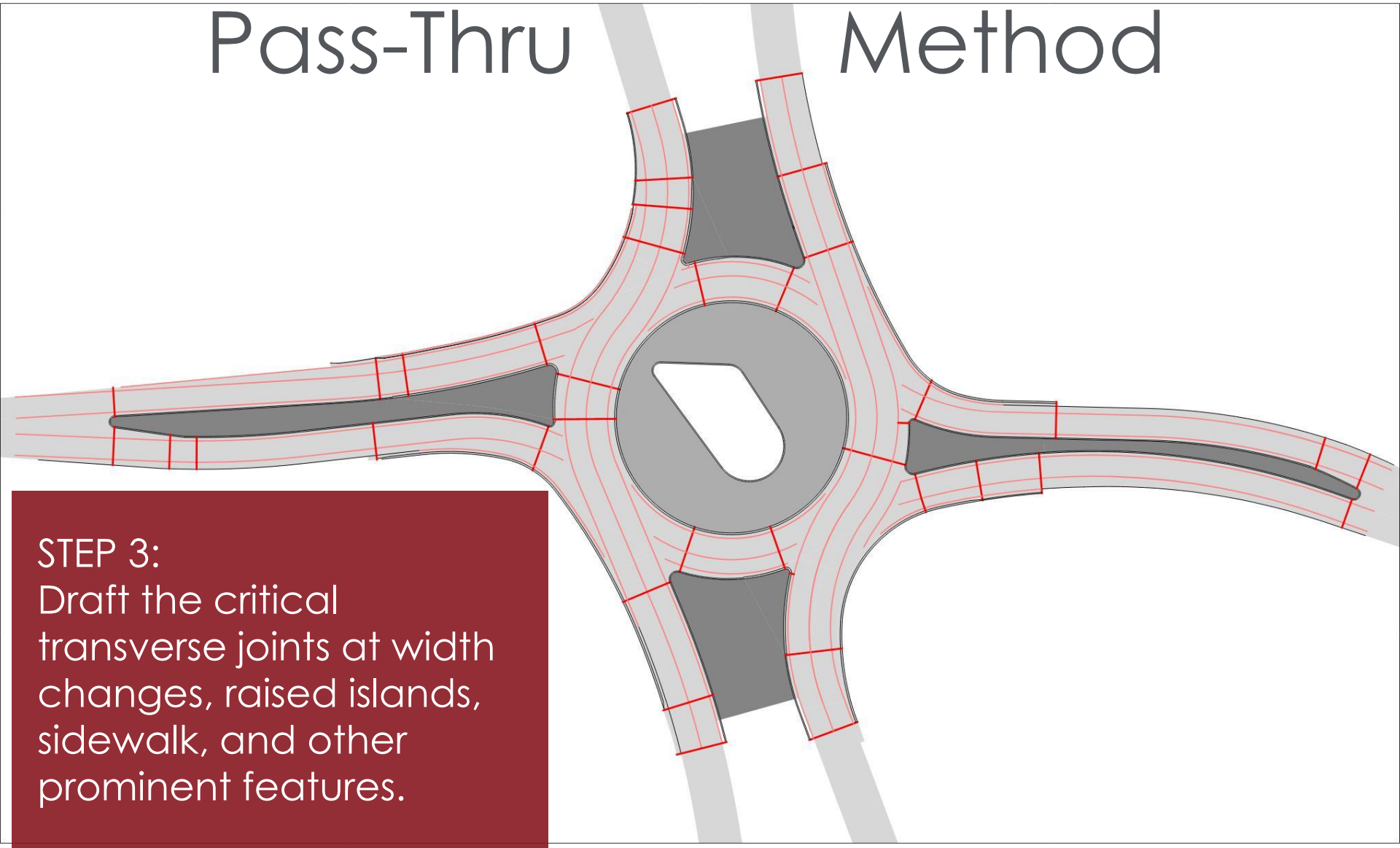
STEP 1:
Draft the edge of pavement, back of curb, front of curb, and the gutter unit.

Pass-Thru Method



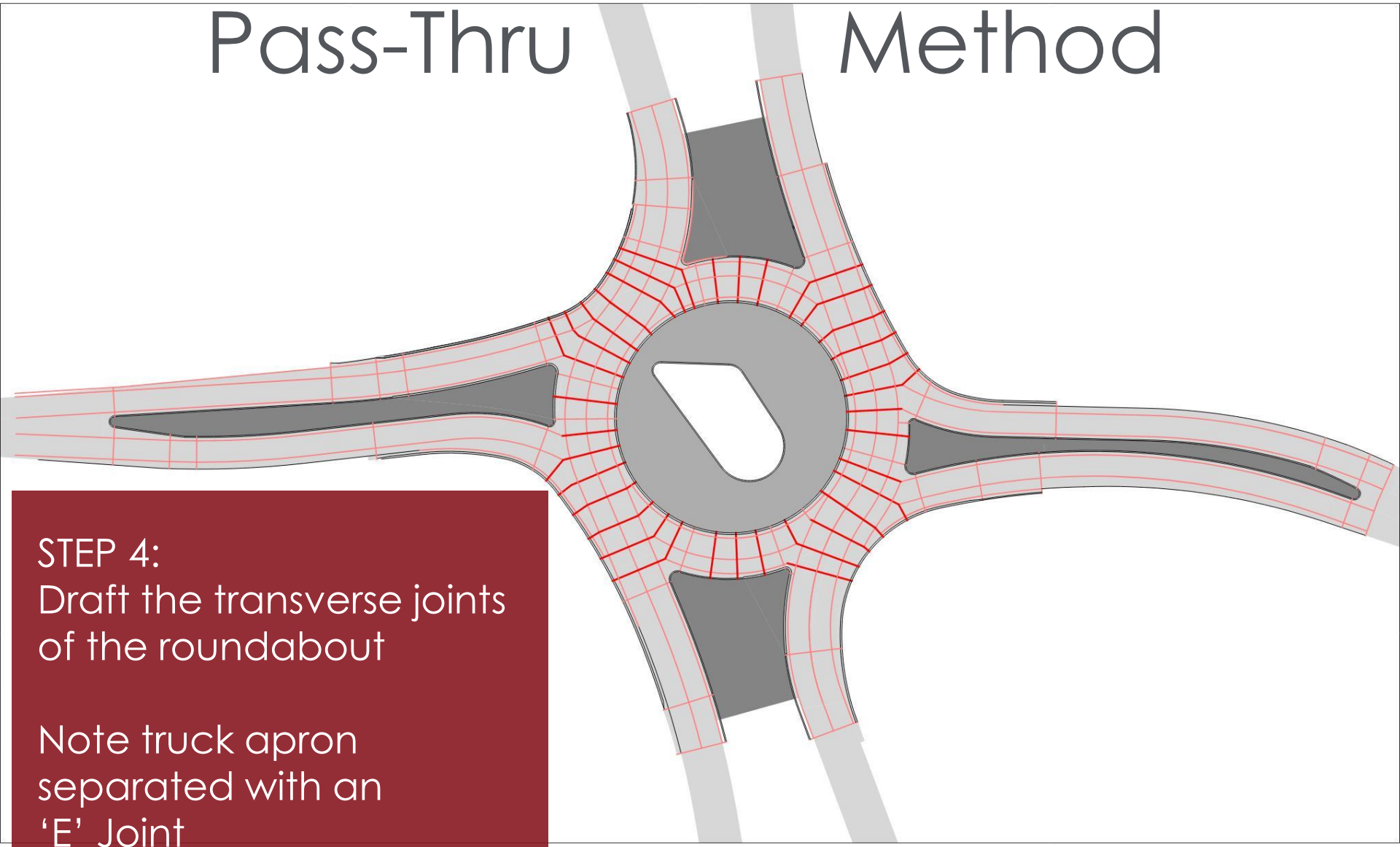
STEP 2:
Draft the longitudinal joints.

Pass-Thru Method



STEP 3:
Draft the critical transverse joints at width changes, raised islands, sidewalk, and other prominent features.

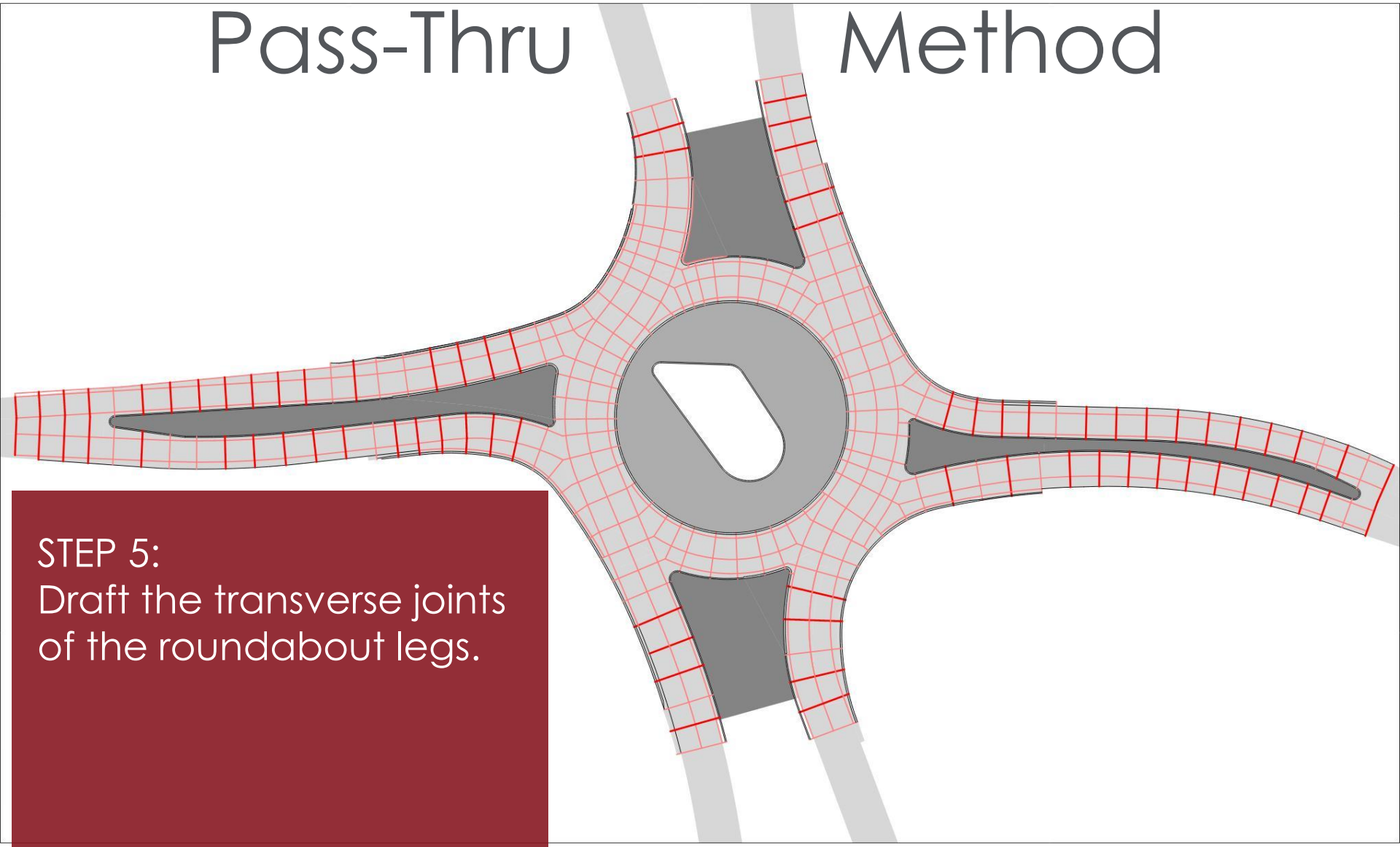
Pass-Thru Method



STEP 4:
Draft the transverse joints of the roundabout

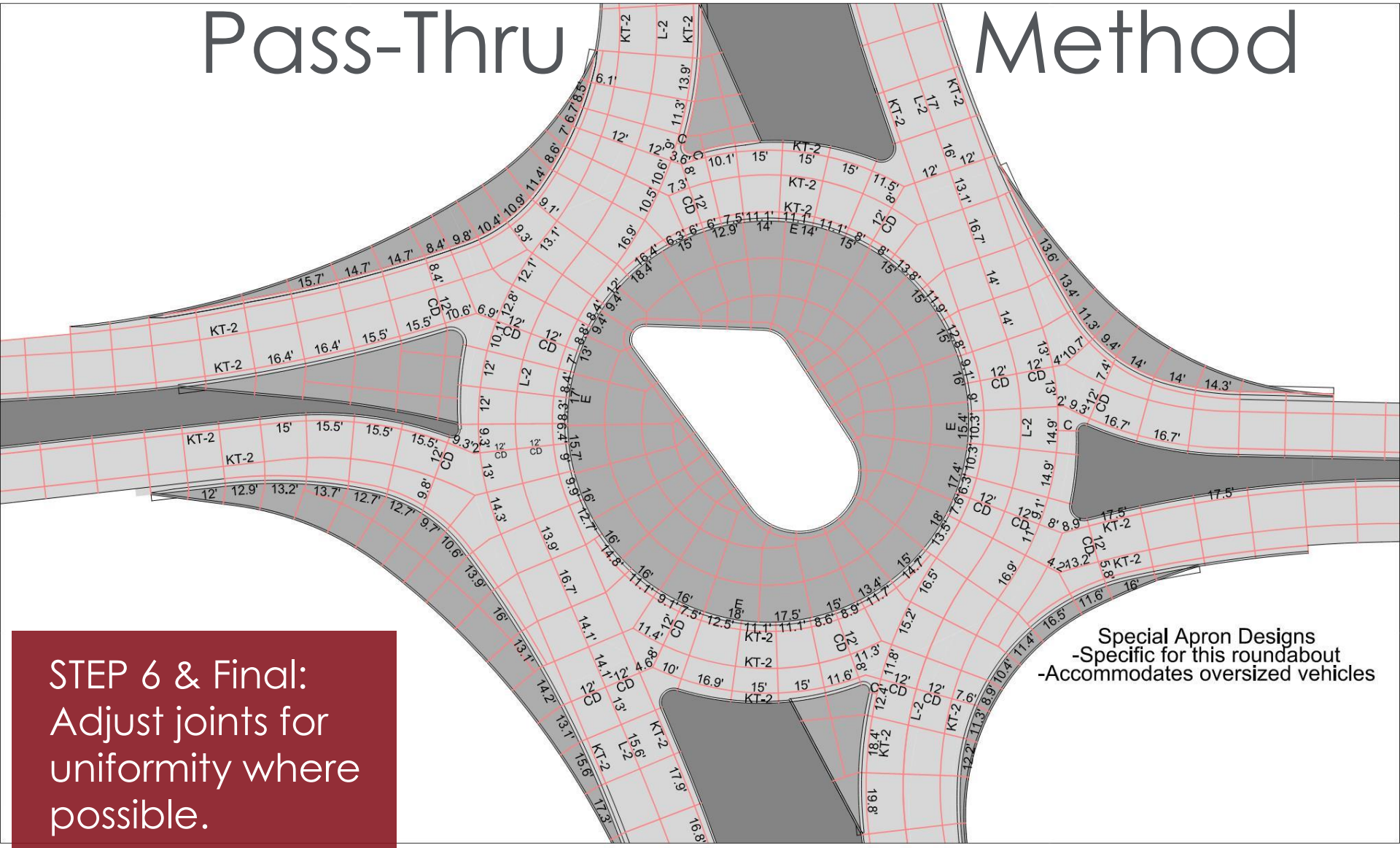
Note truck apron separated with an 'E' Joint

Pass-Thru Method



STEP 5:
Draft the transverse joints of the roundabout legs.

Pass-Thru Method



STEP 6 & Final: Adjust joints for uniformity where possible.

Summary of Jointing Process

1. Draft the edge of pavement, back of curb, front of curb, and the gutter unit.
2. Draft the longitudinal joints.
3. Draft the critical transverse joints at intersection of legs and circle, width changes, raised islands, crosswalk, and other prominent features.
4. Draft the transverse joints of the roundabout. Truck apron joints are isolated with an E Joint.
5. Draft the transverse joints of the roundabout legs.
6. Adjust joints for uniformity where possible.

Tips

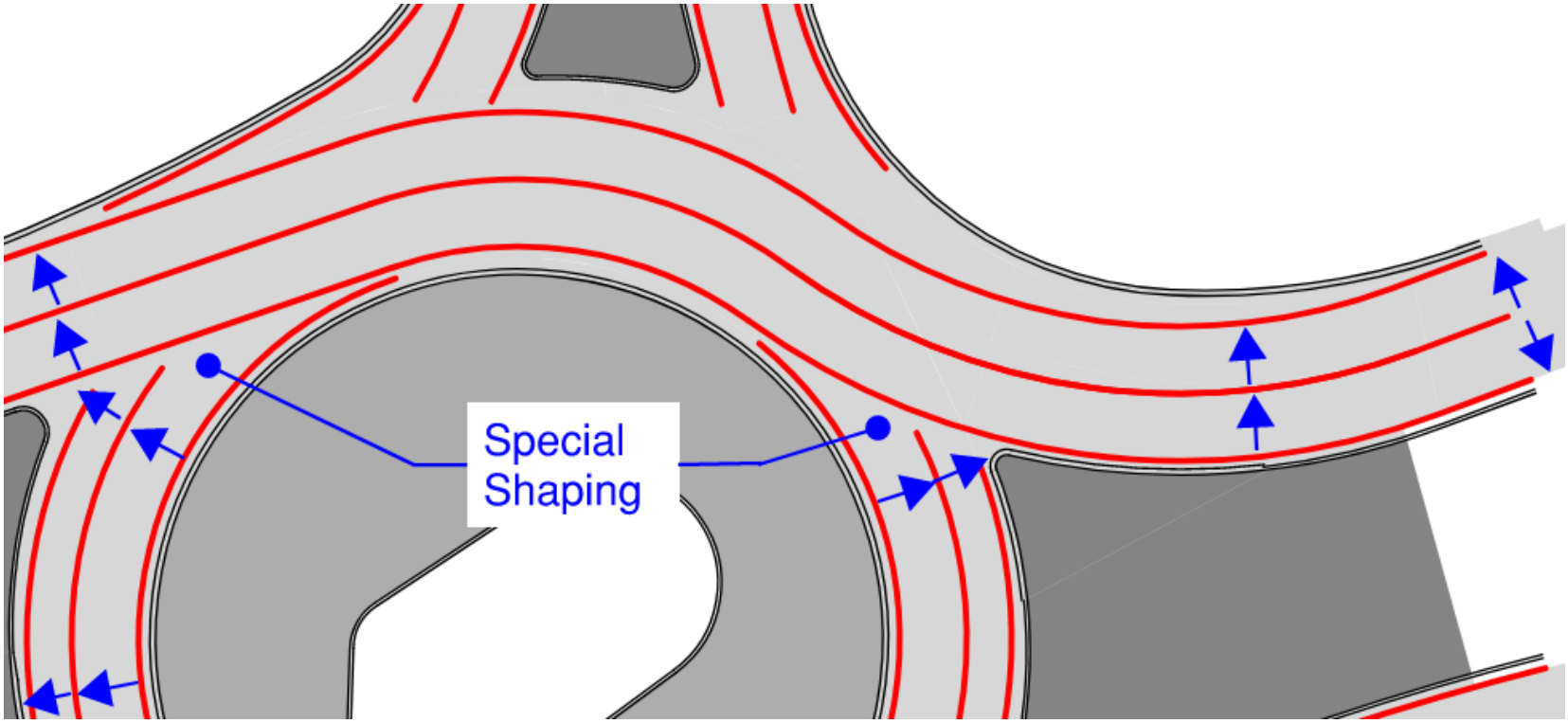
Remember the Rules

- 90-degree angles
  - Minimum 70-degree angles
- Avoid long panels
  - Minimize small panels
  - Controlled by pavement thickness
- Minimum length of joint is 2’
- Minimize odd shapes

Tips

Joint Early

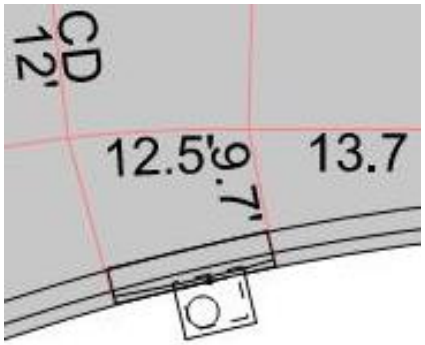
- Don't wait until final plans
- Pass-Through pattern vs. Circle Pattern Staking

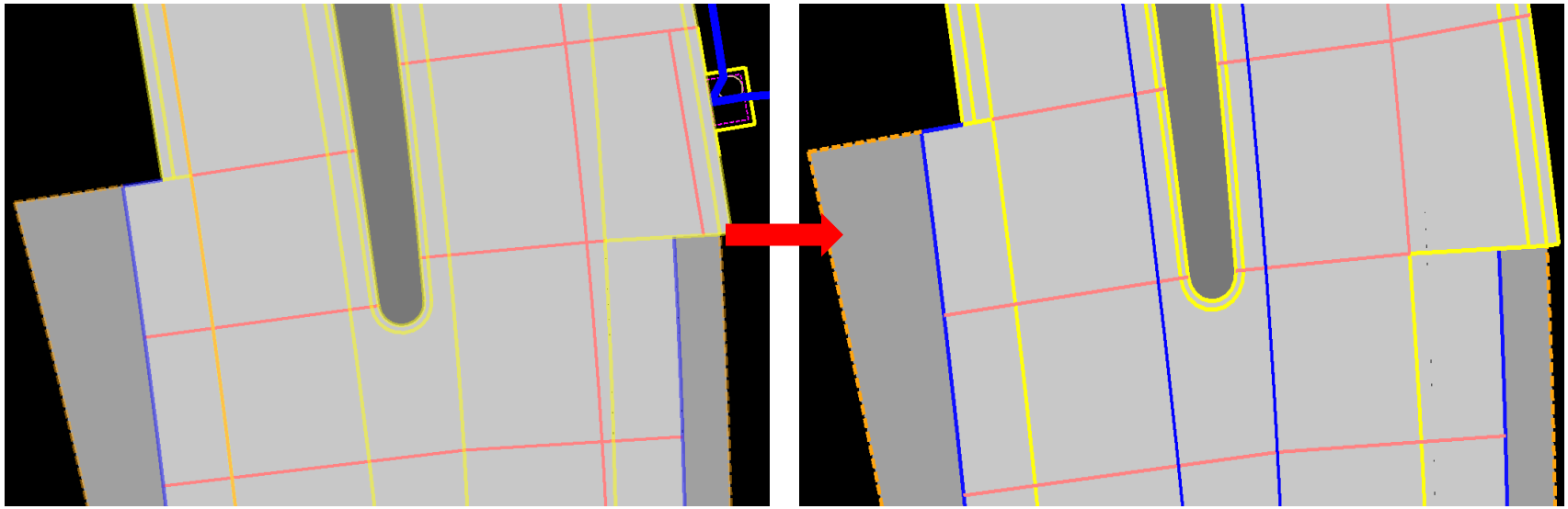


Tips

Let jointing impact other elements

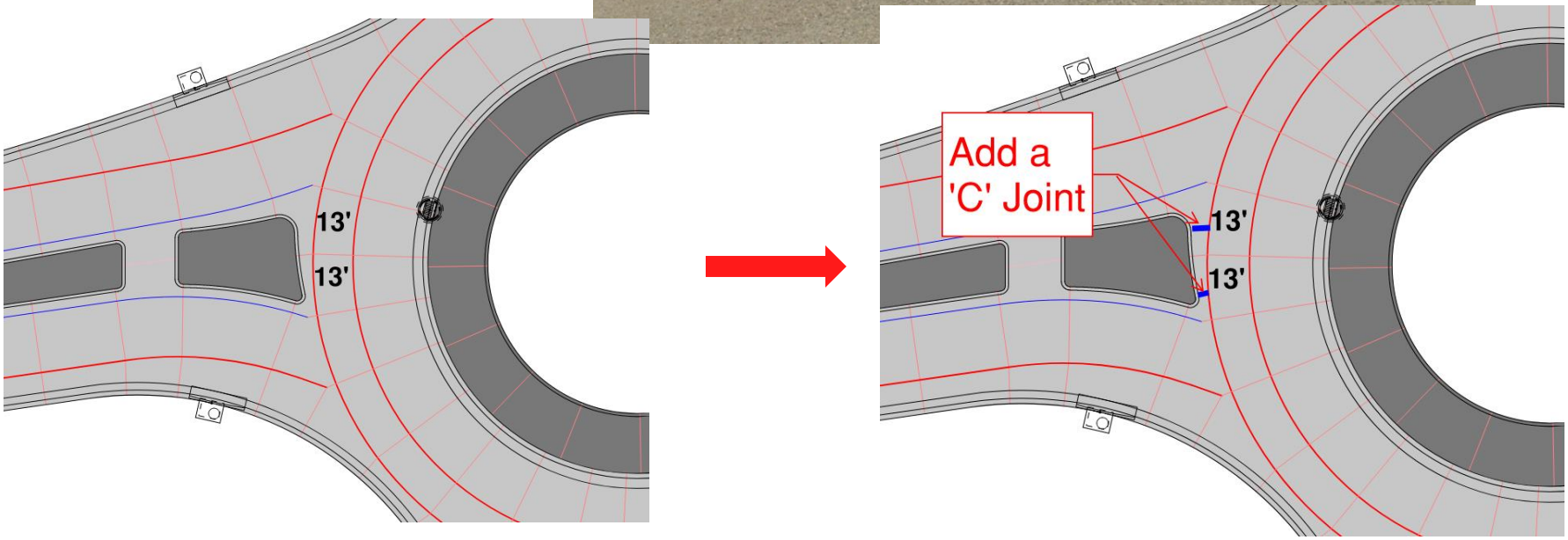
- Intake locations
- Curb to shoulder transitions
- Island locations





Tips

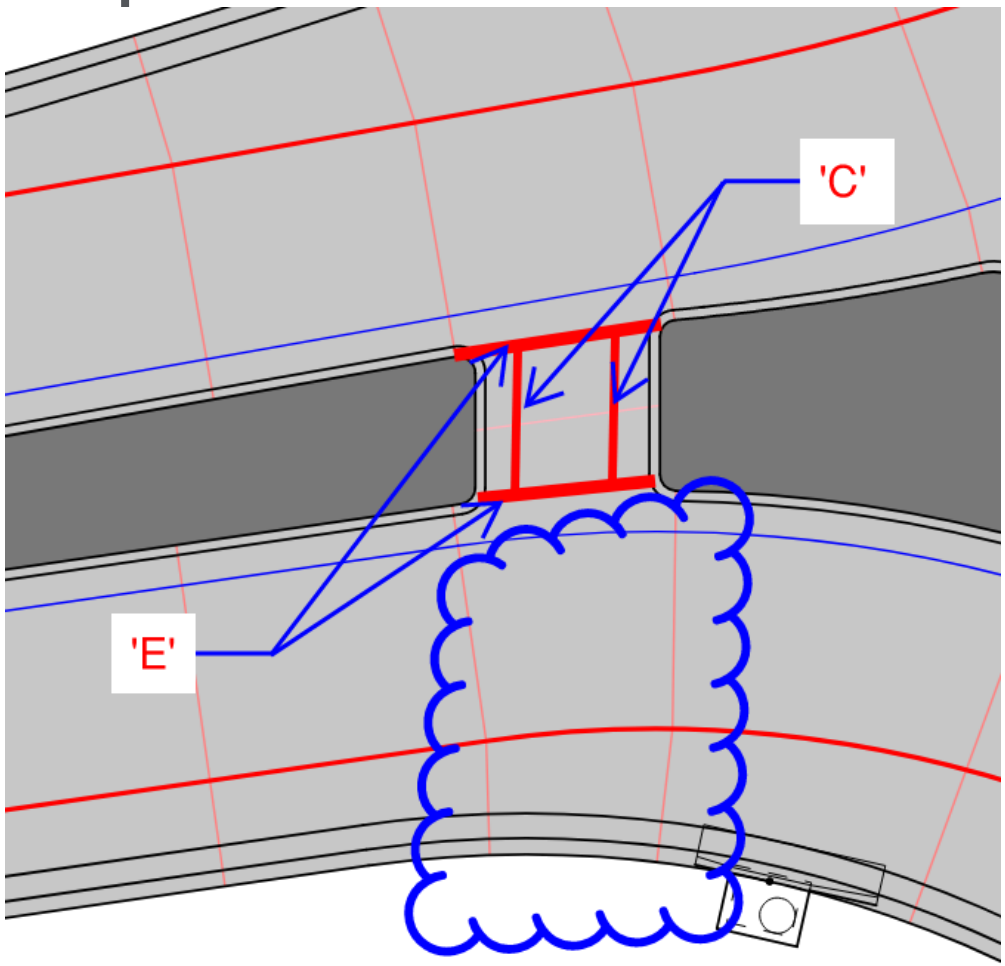
Box outs at island corners



Tips

Remember the Crosswalks

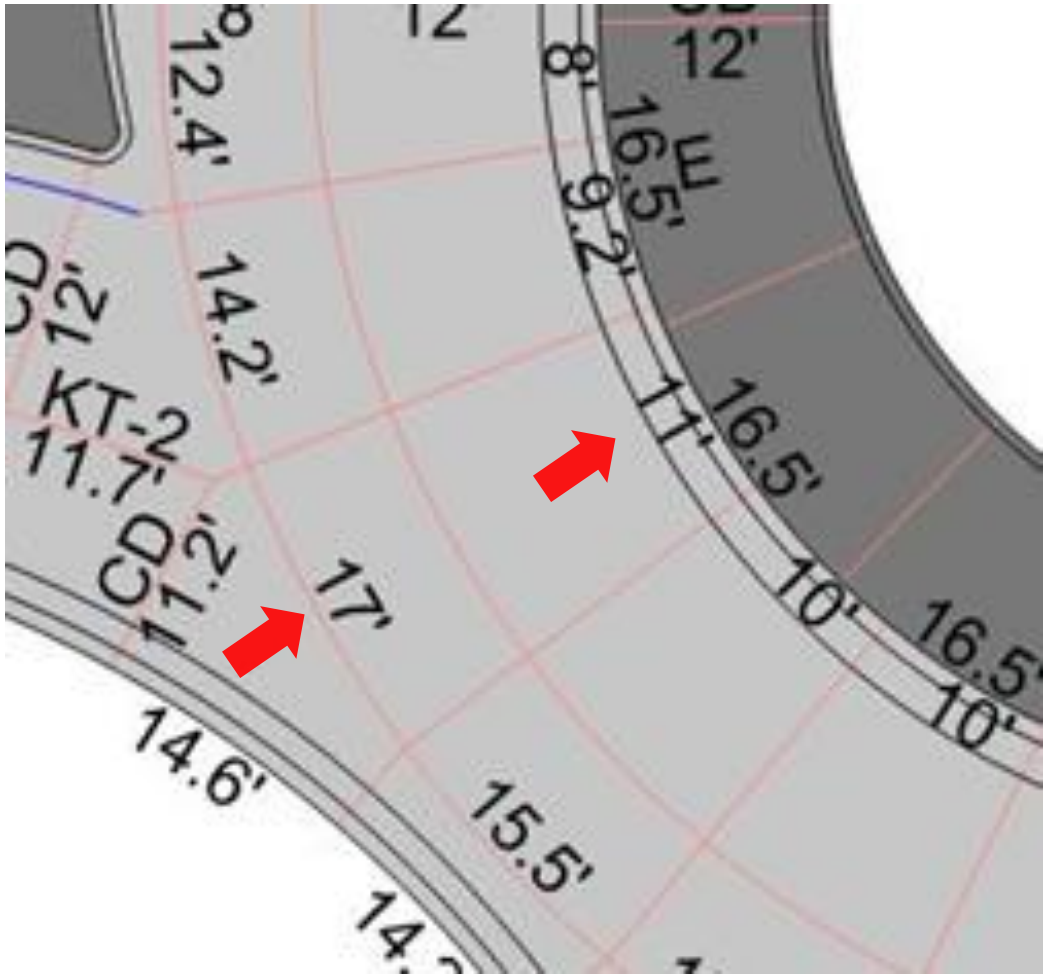
- Isolate crossing refuge area
- Align transverse joints with outside edge of crosswalk



Tips

Dimensions

- Circulating Roadway
  - – Outside
    - … and Inside



THANK YOU FOR YOUR TIME AND ATTENTION

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ROUNDABOUTS AND THE JOINTING PROCESS

ROUNDABOUTS AND THE JOINTING PROCESS

References/notes

- ✓ E. Ferrebee. "Roundabout Design and Construction" intrans.iastate.edu [Online]. Available: https://intrans.iastate.edu/app/uploads/sites/7/2020/10/Ferrebee-Roundabout_Design_Const_10-20-2020.pdf
- ✓ ACPA Concrete Pavement Wiki, "Joint Layout," [Online]. Available: https://wikipave.org/index.php/Joint_Layout
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