



Advancing Roundabout Design with a Fully Automated, Standards-Compliant Workflow

ROUNDABOUTS

DESIGN AUTOMATION

Presentation Outline

This session walks through the current state of roundabout design, identifies the most critical pain points, and introduces an automated workflow that addresses them head-on.

01

Traditional Design Process & Workflow

Understanding the baseline — how roundabout design is currently structured from data collection through final plans.

02

Key Components in Roundabout Design

A deep dive into fastest path, predicted speed, SSD, ISD, path overlap, signs, markings, and landscaping.

03

Roundabout Design Pain Points

Identifying the key challenges: time consumption, standards compliance, and iterative verification demands.

04

New Automation Workflow & Techniques

Introducing the automated design approach, the main interface, and real-time check-and-validate capabilities.

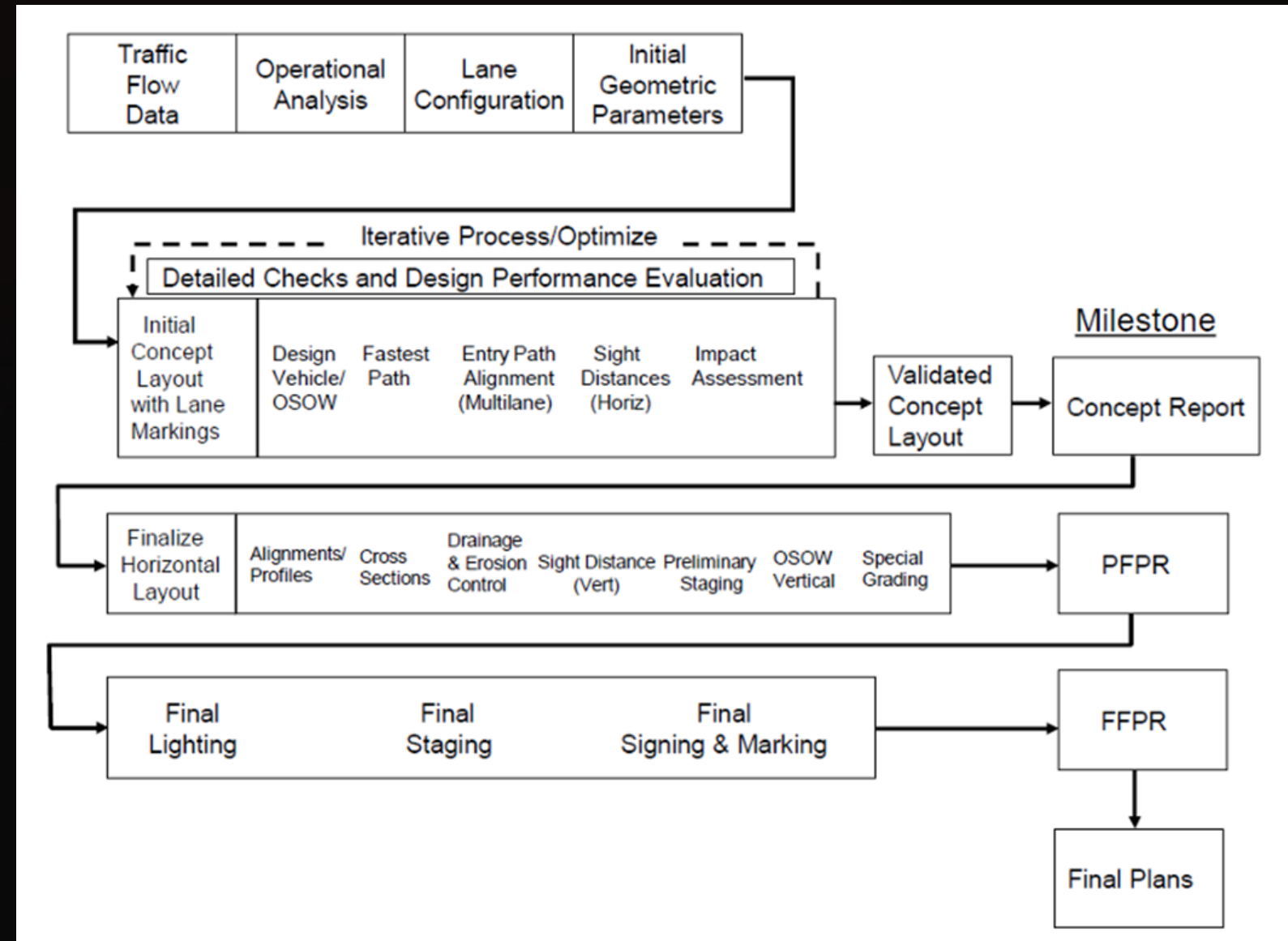
05

Q & A

Open discussion and questions from the audience.

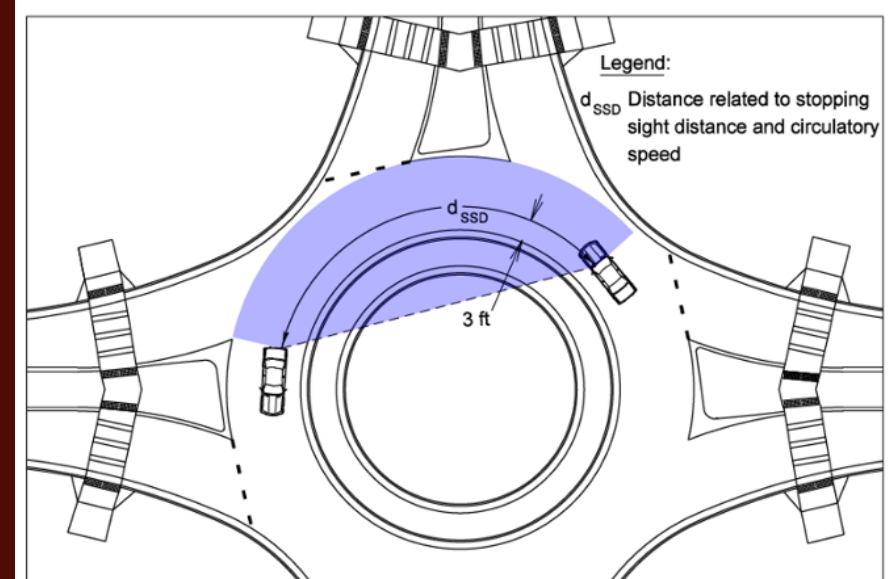
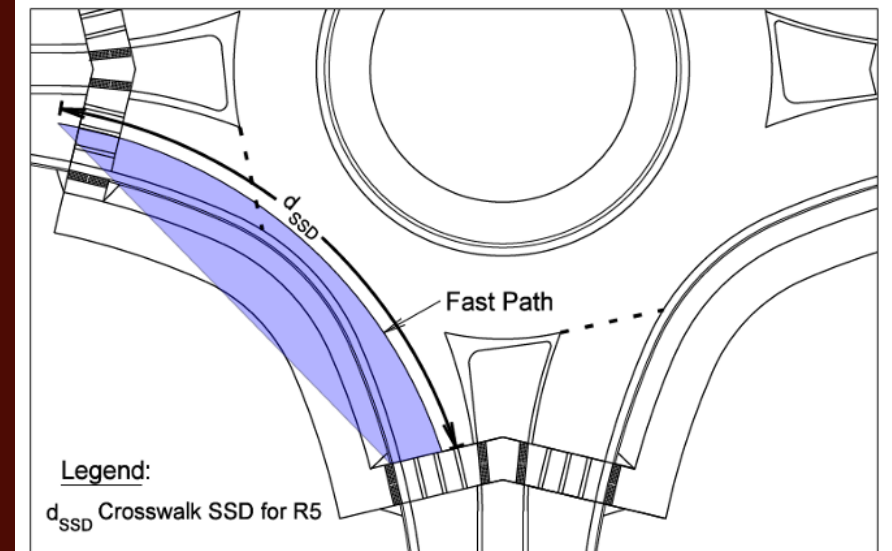
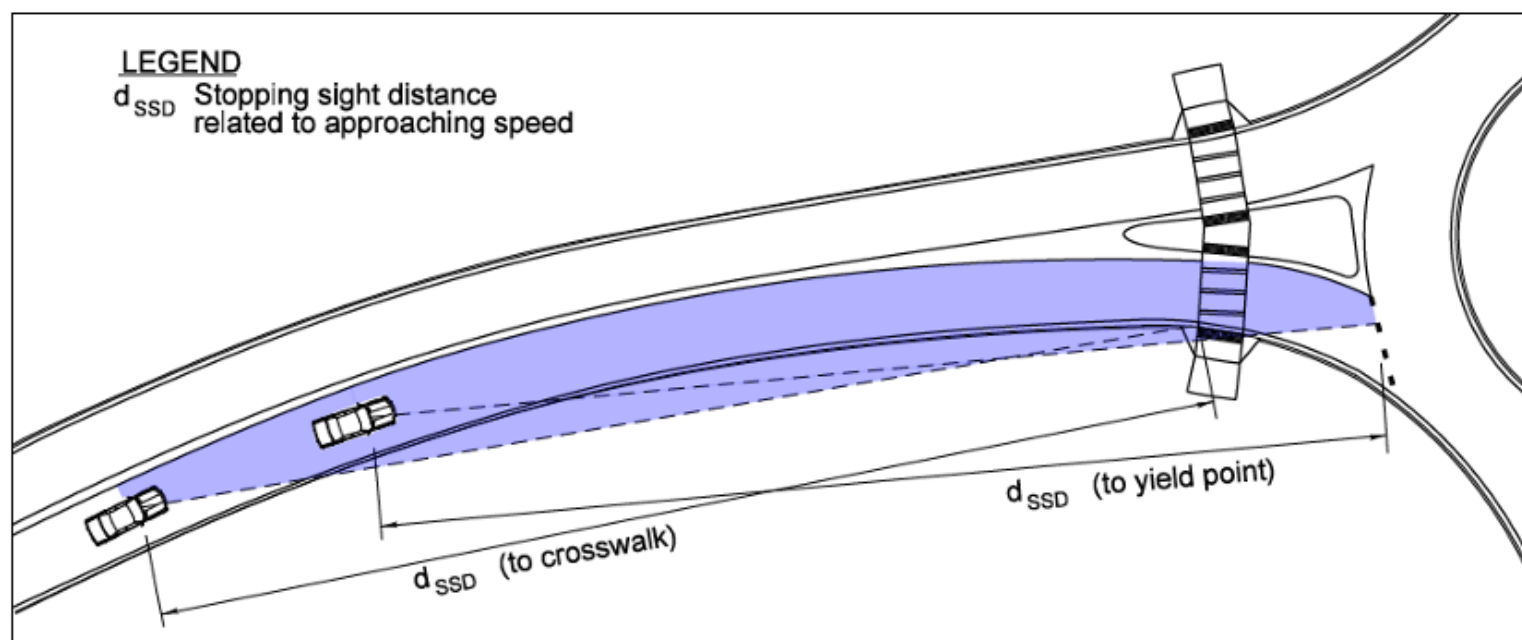
Traditional Design Workflow

The roundabout design process follows a multi-stage workflow that starts with traffic and geometric inputs, followed by iterative performance evaluation (paths, alignment, safety), leading to a validated concept and final design deliverables.



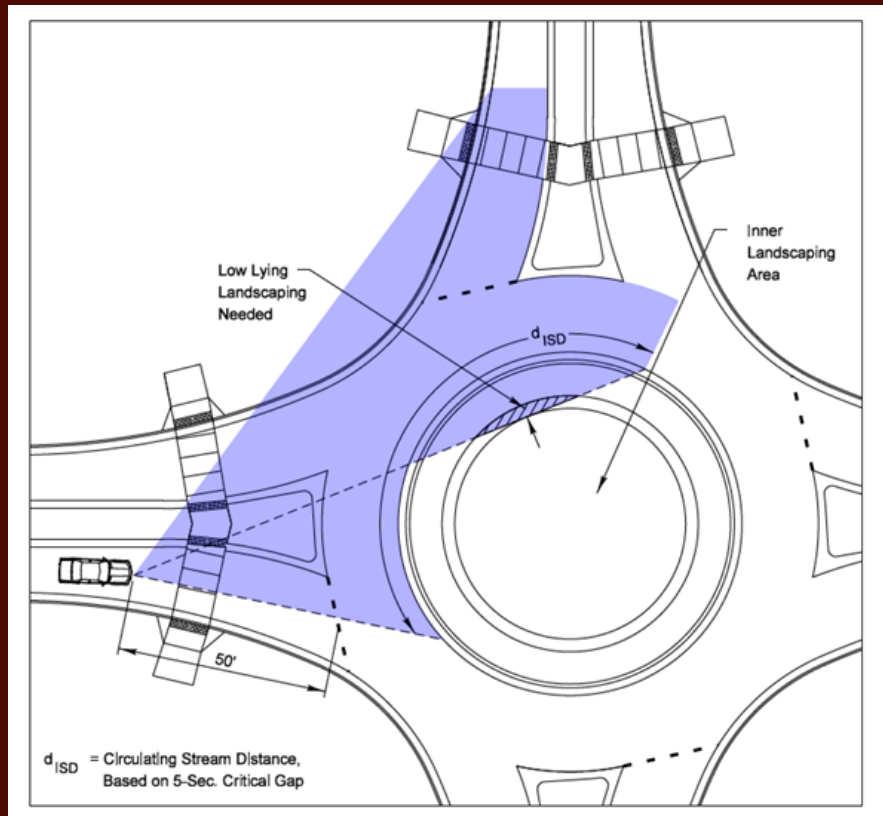
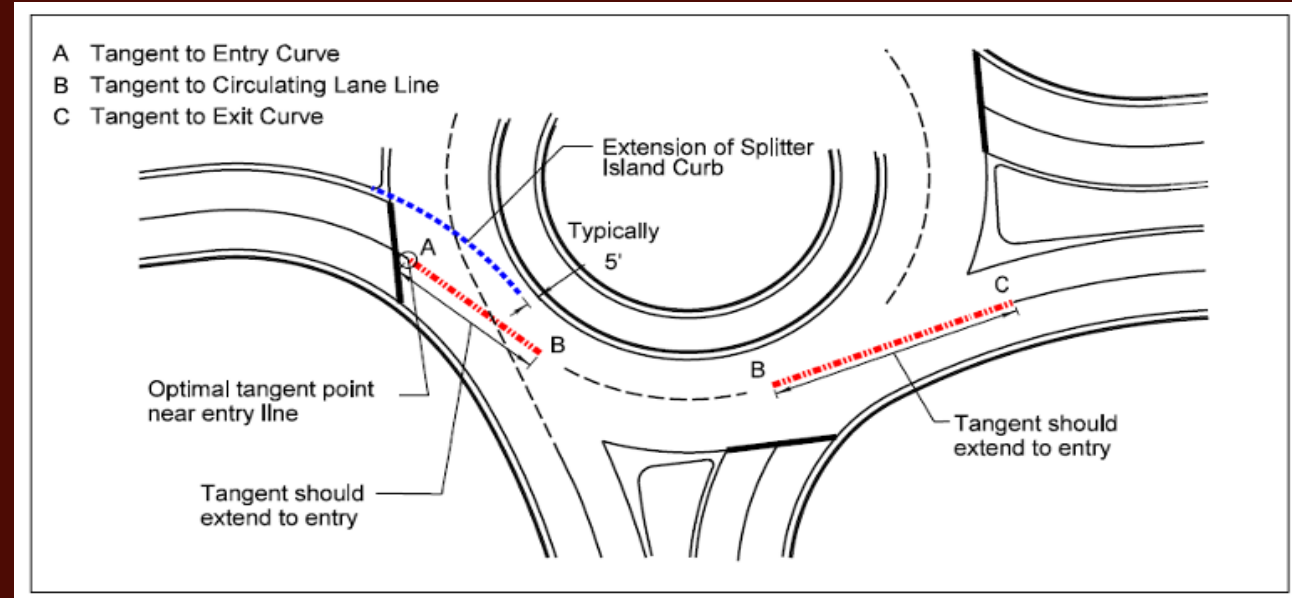
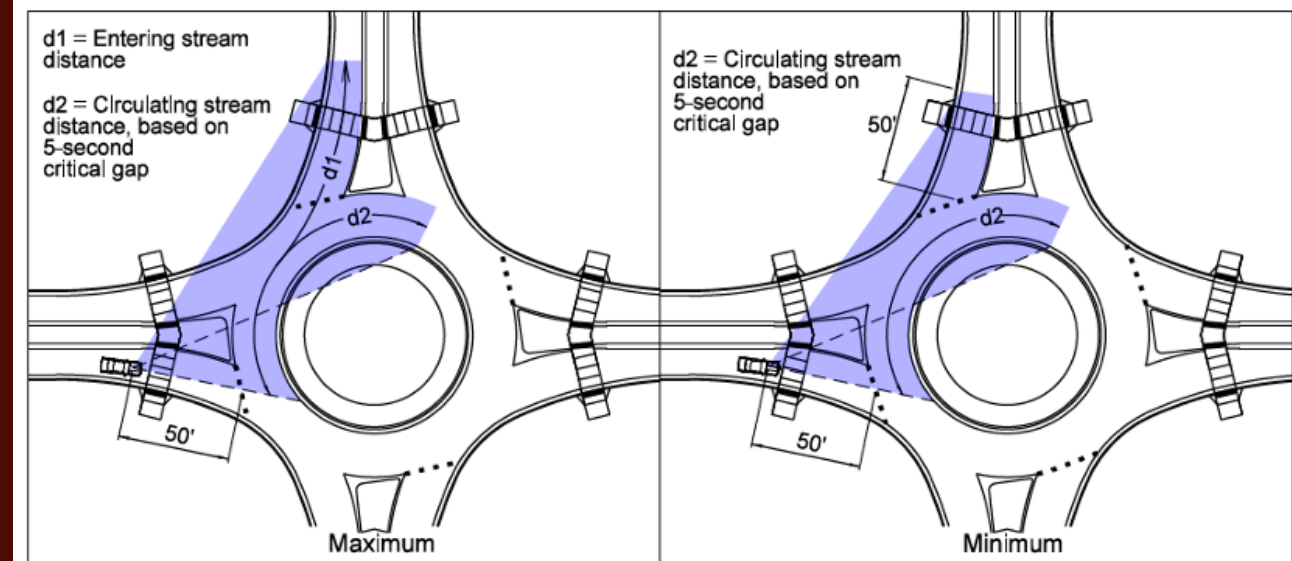
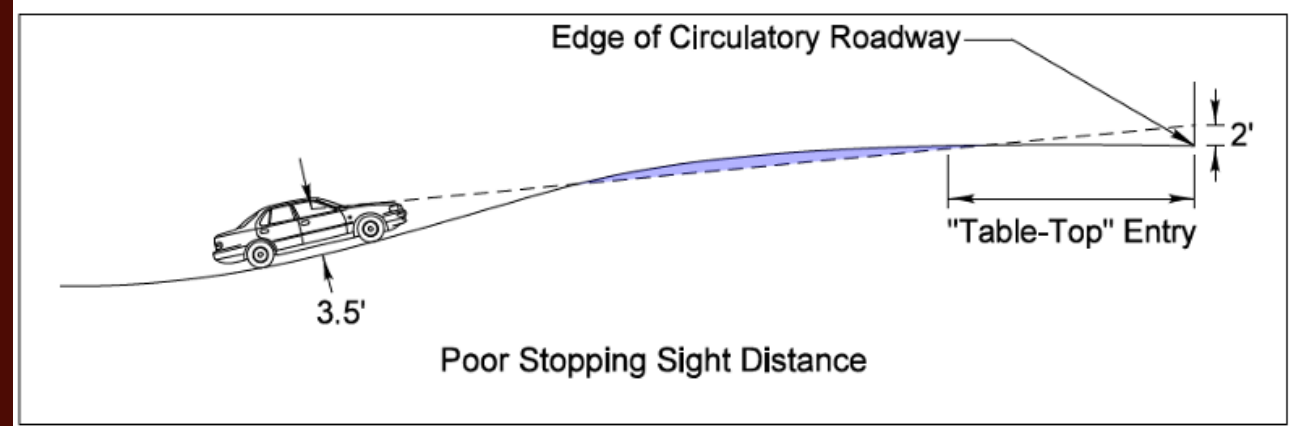
Approach Stopping Sight Distance (SSD)

Evaluate SSD at key locations (yield, crosswalk, circulatory path) to ensure adequate visibility based on predicted speeds



Other Components

- Vertical S S D
- Intersection Sight Distance (I S D)
- Path Overlap
- I S D for Landscaping





Signs and Pavement Marking

- Roundabout signing and marking are geometry-driven and complex
- Each approach includes yield lines, crosswalks, arrows, and signage
- Placement must consider visibility and driver expectation
- Must comply with MUTCD and state standards
- Geometry changes require full plan updates

Pain Points in Roundabout Design

Despite well-established workflows, roundabout design remains one of the most labor-intensive intersection types to produce. Every leg requires individual verification, and even minor geometry changes can cascade through multiple deliverables.

Time-Consuming Process

Manually constructing fastest paths, calculating sight distances, and producing sign/markings plans for every leg and movement is extremely time-intensive, especially on multi-leg or multi-lane roundabouts.

Comprehensive Standards Compliance

Designers must verify fastest path geometry, path overlapping, Intersection Sight Distance (ISD), Stopping Sight Distance (SSD), and other criteria for *all* legs simultaneously — a complex, error-prone manual task.

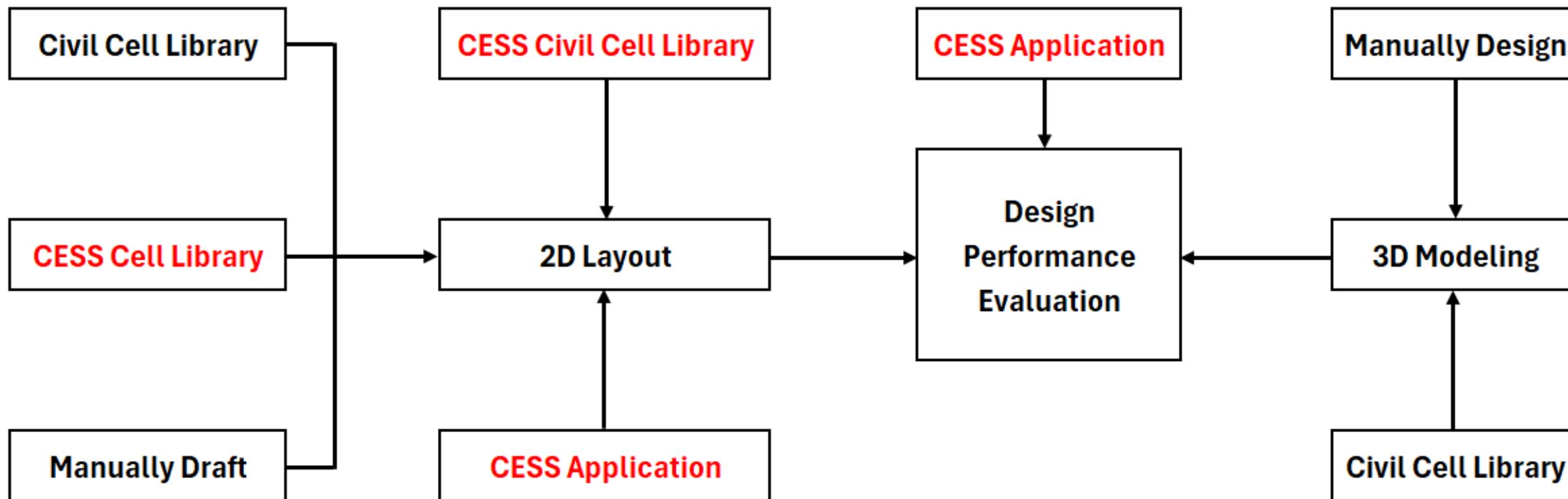
Continuous Change Management

Roundabout geometry changes frequently throughout design development. Every revision requires re-checking and re-verifying all dependent calculations and exhibits, creating a significant quality control burden.

New Automated Design Workflow

The new automation-based workflow replaces the labor-intensive manual process with a streamlined, integrated approach. Data is loaded directly from OpenRoads, eliminating redundant data entry. The workflow diagram below illustrates how automation compresses and connects the traditional multi-phase process into a continuous, real-time feedback loop from initial geometry through final plan deliverables.

CESS Automation Design of Roundabout Workflow



Main Interface - Roundabout

New Roundabouts

Design File: C:\Working\Roundabout Test.dgn Browse...

Central Geometry Information

Roadway Name: Roundabout 1 Number of Legs: 5

Main Alignment: Route97-Extension Design Speed: 25

Category: Urban Multiple-Lane Roundabouts Single Lane Width: 15

Design Vehicle: WB-67 Truck Apron Width: 9

3 Feet Offset from Circulatory Inside ETW: Reference for Roundabout Inside ETW Is Clockwise direction

3 Feet Offset from Circulatory Outside ETW: Reference for Roundabout Outside ETW Is Clockwise direction

Central Location

X: 2320722.82 Inscribed Circle Diameter: 20.5

Y: 759575.47 Central Island: Full Mountable / Nonmountable

Roundabouts Shape

Circle Ellipse Peanut Teardrop Barbell / Dog Bone

Multilane Roundabout Case

Case 1 -- Truck does not stay in-lane on entry or circulating

Case 2 -- Truck stays in-lane on entry, but uses both lanes for circulating

Case 3 -- Trucks in-lane on both entry and circulating

Legs at Roundabout

Leg #	Roadway Name	Direction	Type	Note
1	Roundabout S Leg	S	Deflection LT Approach	
2	Roundabout E Leg	E	Deflection LT Approach	
3	Roundabout N Leg	N	Deflection LT Approach	
4	Roundabout W Leg	W	Deflection LT Approach	

Legend

Note

Test

Traffic Analysis Pavement Marking And Signing SSD and ISD Validation Fastest Path Analyze Design Check and Validation Save Close

Hands-Free Data Loading: All geometry and design parameters are read directly from OpenRoads — no manual input required.

Working.dgn [2D - V8 DGN] - OpenRoads Designer CE 2021 Release 2

File Home Terrain Geometry Site Corridors Model Detailing Drawing Production Drawing Utilities Collaborate View CESS App Help

None Circulating ISD Sight Line of L

Attributes Primary Selection Model Analysis and Reporting Model Import/Export

Explorer View 1, Default

Working.dgn (Default)

3 Feet Offset from Circulatory Inside ETW Reference for Roundabout Inside ETW

3 Feet Offset from Circulatory Outside ETW Reference for Roundabout Outside ETW

Central Location X: 2320722.82 Y: 759575.47 Inscribed Circle Diameter: 20.5

Central Island: Full Mountable Nonmountable

Roundabouts Shape: Circle Ellipse Peanut Teardrop Barbell / Dog Bone

Multilane Roundabout Case: Case 1 -- Truck does not stay in-lane on entry or circulating Case 2 -- Truck stays in-lane on entry, but uses both lanes for circulating Case 3 -- Trucks in-lane on both entry and circulating

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Traffic Analysis Pavement Marking And Signing SSD and ISD Validation Fastest Path Analyze Design Check and Validation Save Close

Distance: Total: True Flatten to File Z

Demo Video

Questions?

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