Roundabout Evaluation Process

Presented By

Lori Epperson, E.I.

Jeff Cicerello, P.E.

Quarterly Quality Forum
April 20th, 2017

Overview

- Introduction
- Who to Contact
- Evaluation Process
  - Screening Tool
  - Benefit/Cost Evaluation
  - Geometric and Operational Analysis
- Design Considerations

Floating bicycle roundabout in Eindhoven, Netherlands

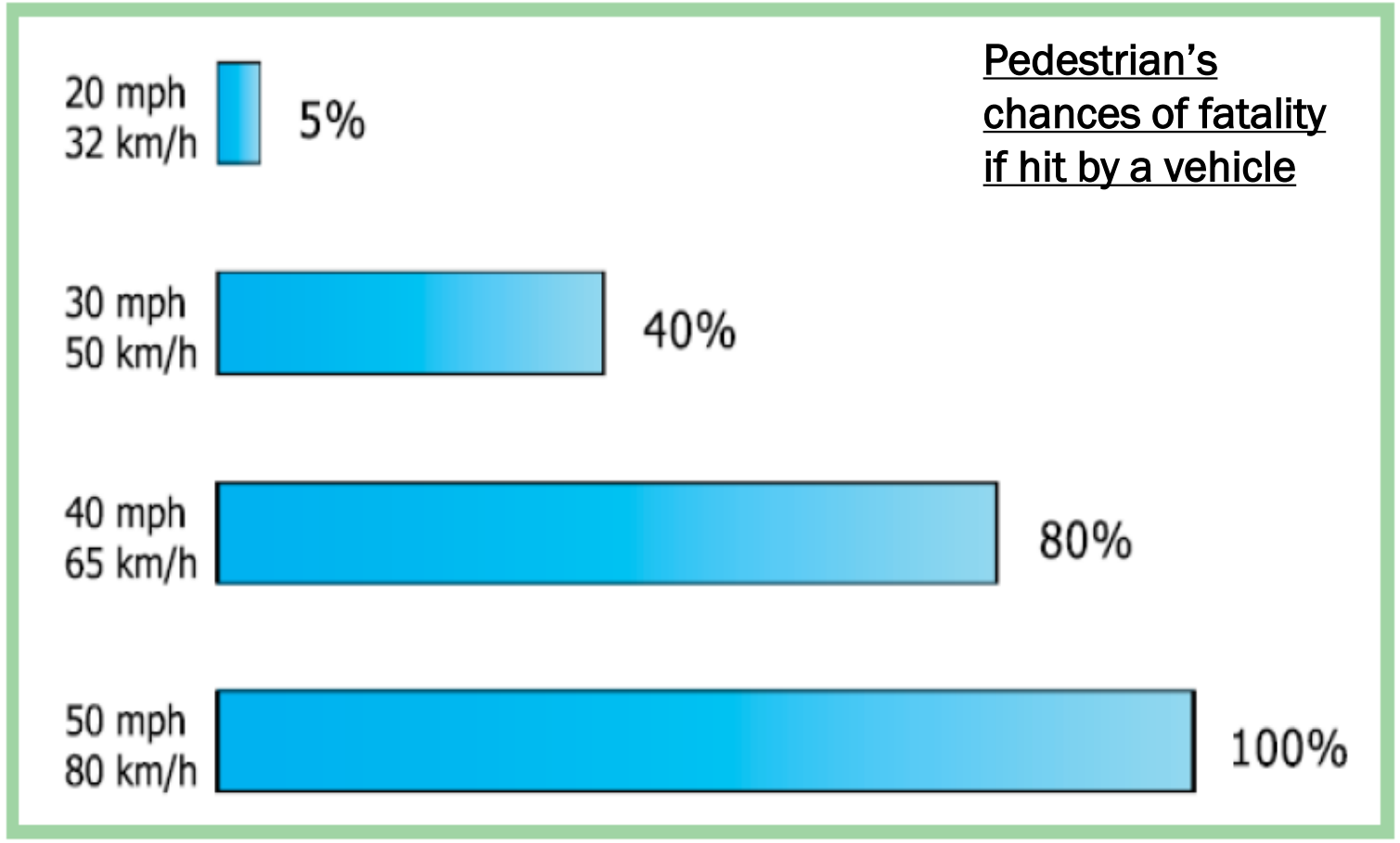
Introduction

2-way stop control — Roundabout
- 82% ⬇ in severe crashes
- 44% ⬇ in overall crashes

Signalized — Roundabout
- 78% ⬇ in severe crashes
- 48% ⬇ in overall crashes

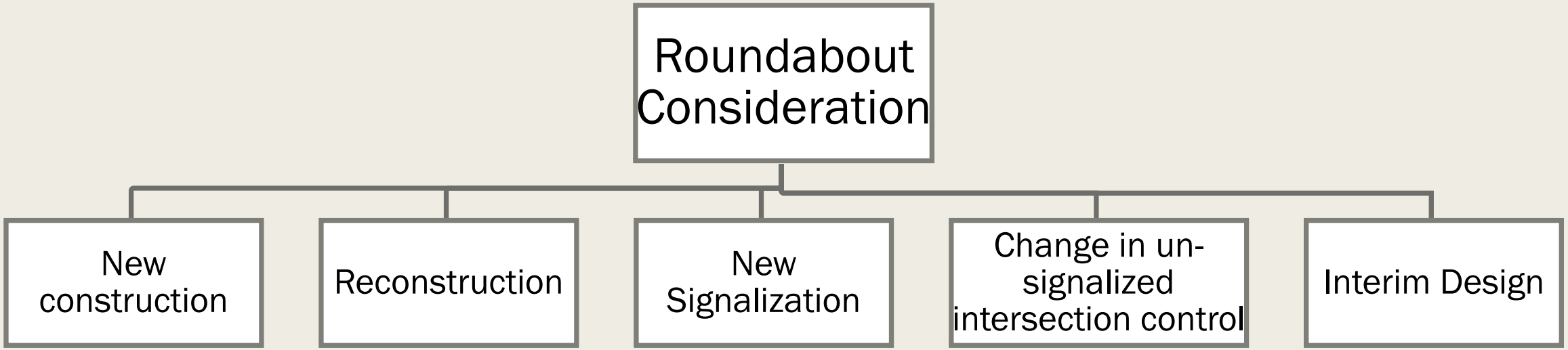
Per the Florida Intersection Design Guide 2015, page 7-2

Introduction



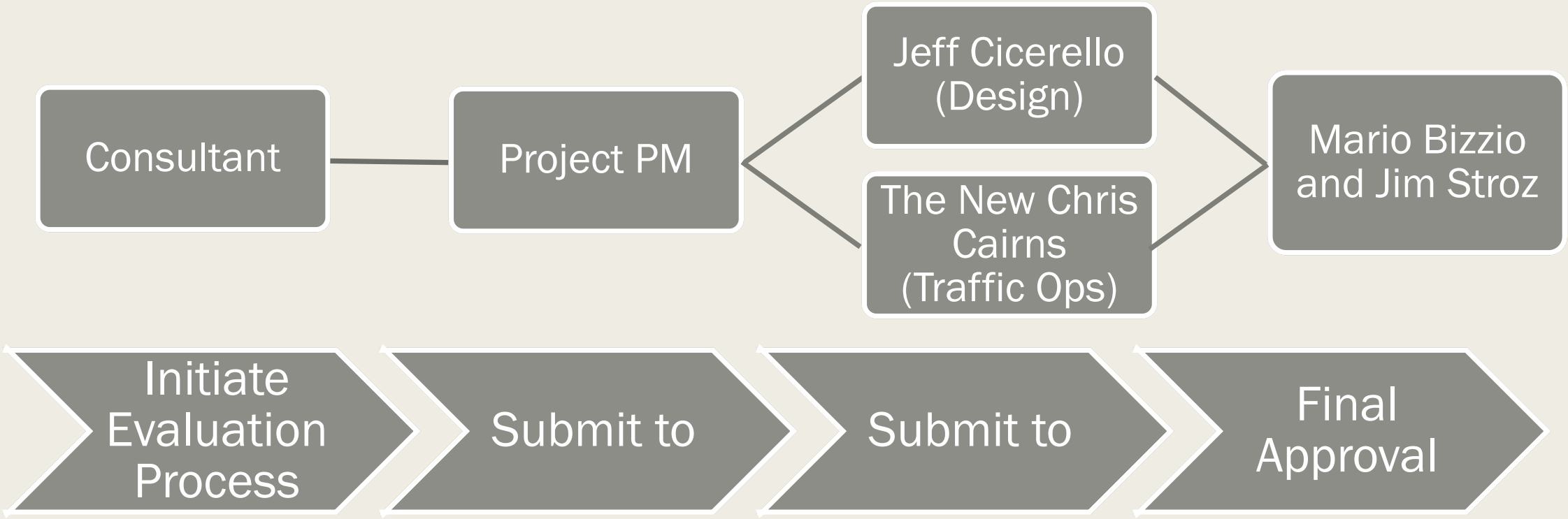
Source: NHTSA 1999

Introduction



Per Section 2.13.1 of the PPM, Volume 1

Who to Contact



Evaluation Process

Step 1
Screening
Tool

Step 2
Benefit/Cost
Ratio

Step 3
Summary
Report

Is it Possible?

Is it Feasible?

Is it Efficient?

Evaluation Process
Step 1: Screening Tool

FLORIDA DEPARTMENT OF TRANSPORTATION
STEP 1 - ROUNDABOUT SCREENING

Prepared by:		Date Prepared:	
Financial Project ID:		Project Name:	
FAP No.:		State Road:	
County:		Intersecting Road:	

EXISTING CONTROL/PROJECT CLASSIFICATION

Control: ☐ Signal ☐ All Way Stop ☐ 2 Way Stop ☐ Yield ☐ None

Classification: ☐ Design. ☐ Traffic Operations ☐ Other

SCREENING CRITERIA

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6. Would the installation of a roundabout create impacts to historical, 4(f), or environmentally sensitive sites? Would the relocation of residences or businesses be required? *(comment below if "yes")* ☐ yes ☐ no

Step 2 evaluation is required if no is checked for all criteria. Level 2 is optional if yes is checked for one or more of the criteria.

Advance Roundabout Alternative to step 2 Roundabout b/c Evaluation ☐ yes ☐ no

Approved by: ☐ DDE or ☐ DTOE

Signature: _____ Date: _____

FLORIDA DEPARTMENT OF TRANSPORTATION
STEP 1 - ROUNDABOUT SCREENING

Prepared by:		Date Prepared:	
Financial Project ID:		Project Name:	
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Evaluation Process
Step 1: Screening Tool

FLORIDA DEPARTMENT OF TRANSPORTATION
STEP 1 - ROUNDABOUT SCREENING

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Evaluation Process
Step 1: Screening Tool

FLORIDA DEPARTMENT OF TRANSPORTATION
STEP 1 - ROUNDABOUT SCREENING

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Approved by: ☐ DDE or ☐ DTOE

Signature: _____ Date: _____

SCREENING CRITERIA

1. Does the intersection have physical or geometric constraints that would limit visibility or complicate construction? *(comment below if "yes")* ☐ yes ☐ no

- Type of obstruction or constraint is important.
- Is mitigation simple or complex?
- This will play a key factor in additional costs.

Evaluation Process
Step 1: Screening Tool

FLORIDA DEPARTMENT OF TRANSPORTATION
STEP 1 - ROUNDABOUT SCREENING

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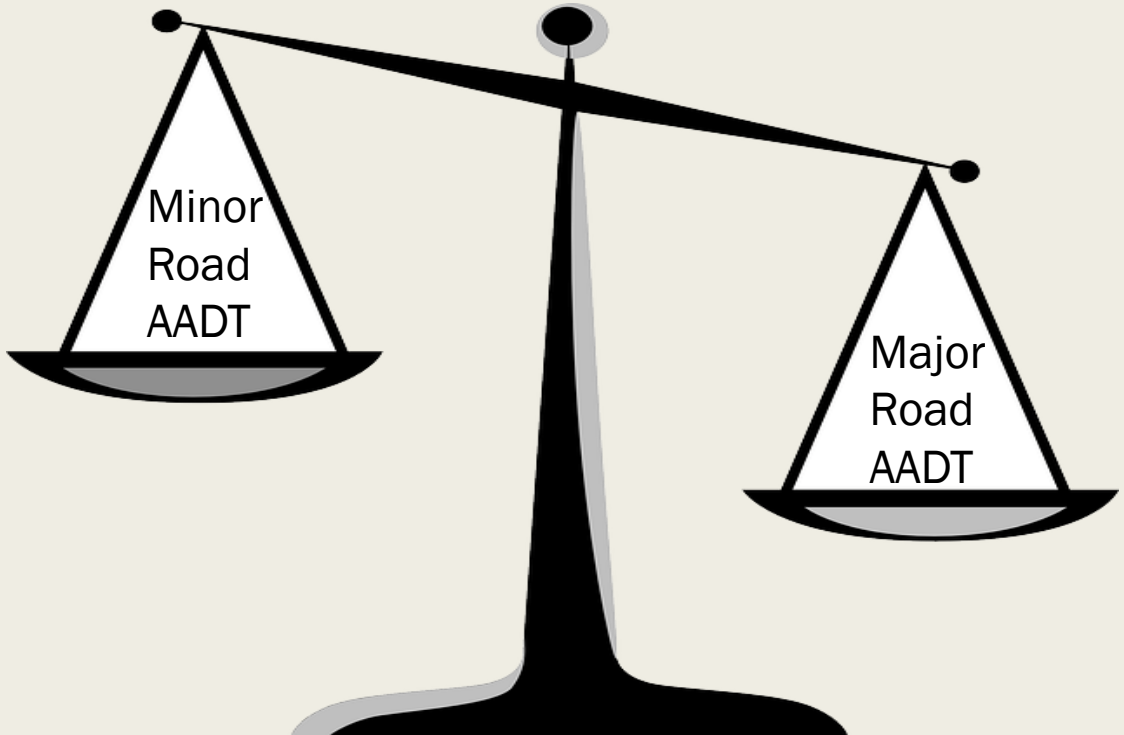
2. Does the major roadway AADT exceed 90% of the total intersection AADT? ☐ yes ☐ no
(comment below if "yes")



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Step 1: Screening Tool

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STEP 1 - ROUNDABOUT SCREENING

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3. Does the intersection have pedestrians with special needs that would have difficulty crossing the road? *(comment below if "yes")* ☐ yes ☐ no

→ Coordinate with stakeholders

→ Contact ADA Coordinator: George Borchik

Evaluation Process
Step 1: Screening Tool

FLORIDA DEPARTMENT OF TRANSPORTATION
STEP 1 - ROUNDABOUT SCREENING

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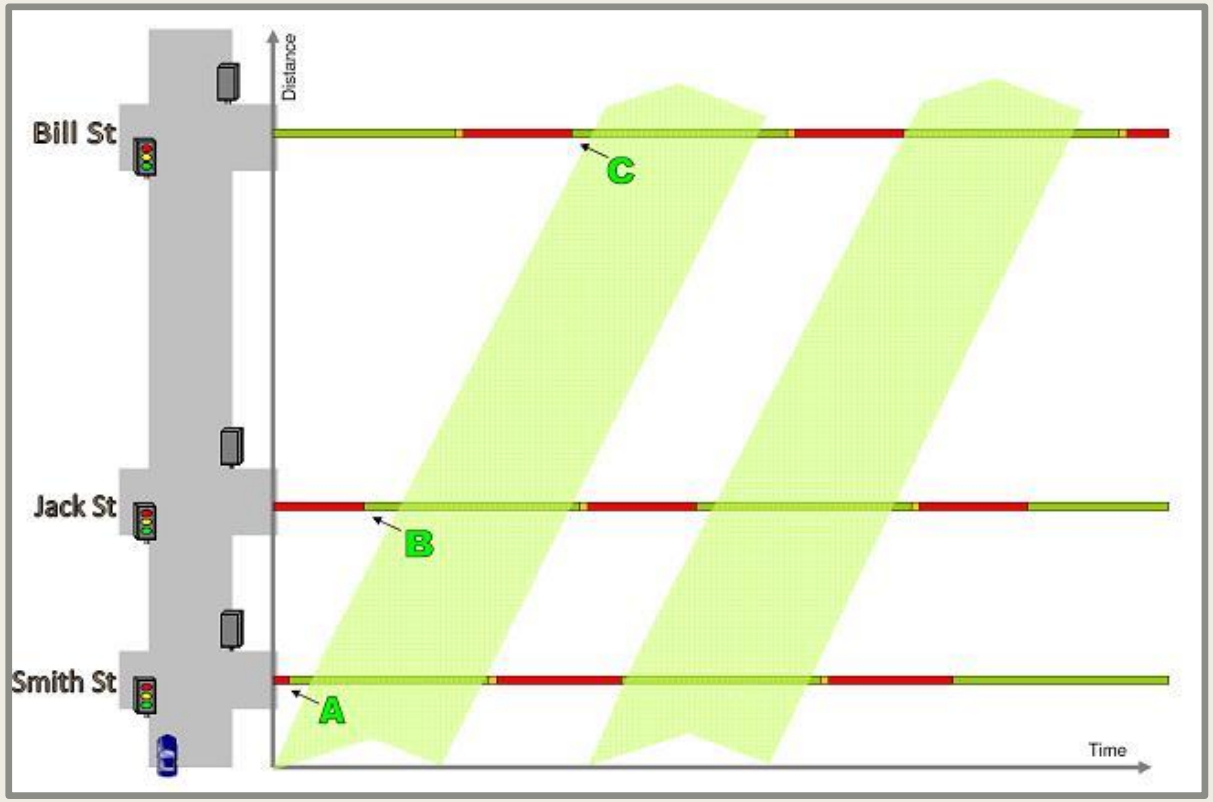
4. Is the intersection located within a coordinated signal network? *(comment below if "yes")* ☐ yes ☐ no



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Evaluation Process
Step 1: Screening Tool

FLORIDA DEPARTMENT OF TRANSPORTATION
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Evaluation Process
Step 1: Screening Tool

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 1 - ROUNDABOUT SCREENING

Prepared by:		Date Prepared:	
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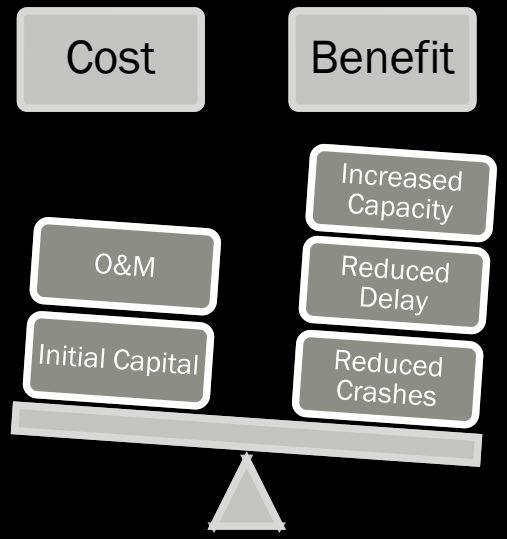
Signature: _____ Date: _____

Evaluation Process
Step 2: Benefit/Cost Evaluation

LIFECYCLE BENEFIT/COST RATIO	
Safety Benefit of a Roundabout	$ 1,091,786
Delay Reduction Benefit of a Roundabout	$ (231,663)
Total Benefit	$ 860,124
Added O & M Costs of a Roundabout	$ (41,161)
Added Capital Costs of a Roundabout	$ 400,000
Total Cost	$ 358,839
Life Cycle Benefit/Cost Ratio	**2.4**



Initial Capital Costs
+ Annual Costs (Design Life)
= Total Life Cycle Costs

> 1.0

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 2 - b/c EVALUATION

Prepared by:		Date Prepared:	
Financial Project ID:		Project Name:	
FAP No.:		State Road:	
County:		Intersecting Rd:	

ANNUAL COSTS		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 58,408	$ 131,794
Delay Cost	$ 33,470	$ 22,438
O & M Cost	$ 2,750	$ 5,517
Initial Capital Cost		
Preliminary Engineering	$ -	$ 60,000
Right-of-way and Utilities	$ -	$ 200,000
Construction	$ 1,000,000	$ 340,000

TOTAL DISCOUNTED LIFE CYCLE COSTS (OPENING YEAR)		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 868,971	$ 1,960,757
Delay Cost	$ 702,871	$ 471,208
O & M Cost	$ 40,913	$ 82,074
Initial Capital Cost	$ 1,000,000	$ 600,000
Total Life Cycle Costs	$ 2,612,755	$ 3,114,039

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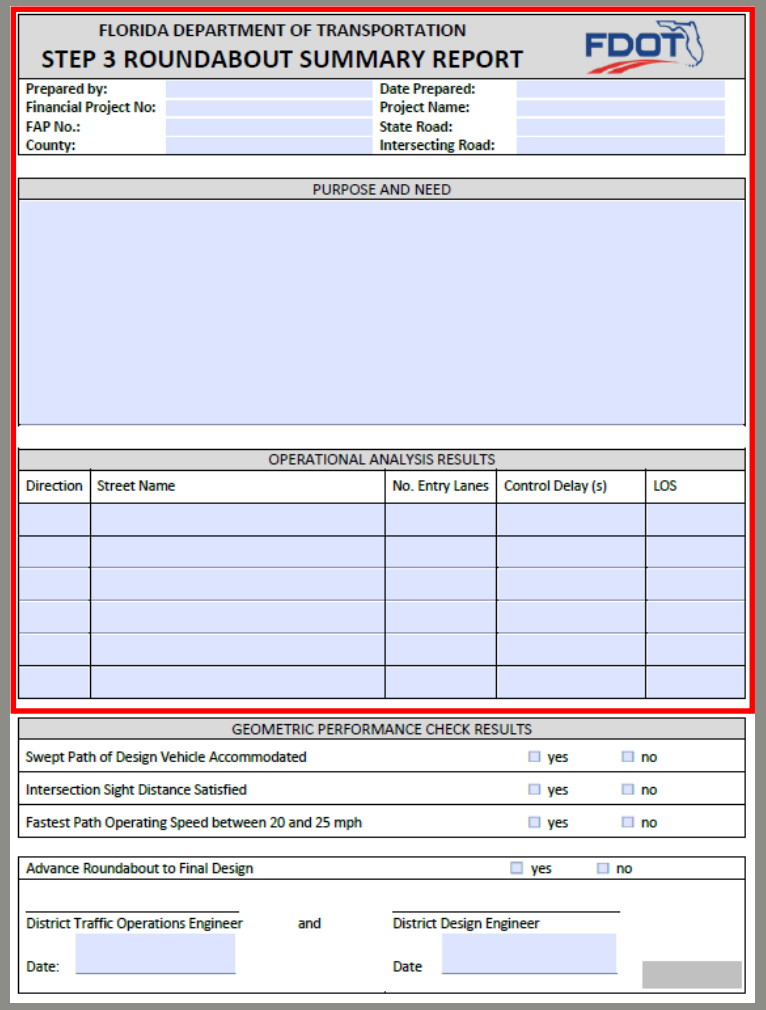
Advance to Level 3 Geometric and Operational Analysis: ☐ YES ☐ NO

Approved by: ☐ DDE or ☐ DTOE

Signature:_____ Date:_____

Evaluation Process
Step 3: Geometric and Operational Analysis



FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:		Date Prepared:	
Financial Project No:		Project Name:	
FAP No.:		State Road:	
County:		Intersecting Road:	

PURPOSE AND NEED

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	☐ yes	☐ no
Intersection Sight Distance Satisfied	☐ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	☐ yes	☐ no

Advance Roundabout to Final Design ☐ yes ☐ no

District Traffic Operations Engineer and District Design Engineer

Date: Date

- General Project Information
- Summary of purpose and need
- Operational Analysis Results from Step 2
  - Number of Lanes
  - Delay
  - LOS

Evaluation Process
Step 3: Geometric and Operational Analysis

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:		Date Prepared:	
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PURPOSE AND NEED

OPERATIONAL ANALYSIS RESULTS

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Per FHWA-SA-10-006

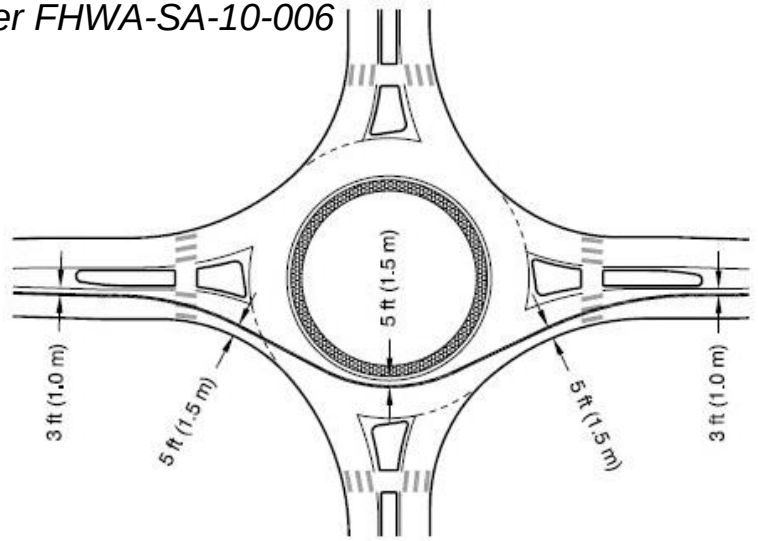

Figure 7: Fastest Vehicle Path Through a Single-Lane Roundabout

Evaluation Process
Step 3: Geometric and Operational Analysis

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

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Date: Date

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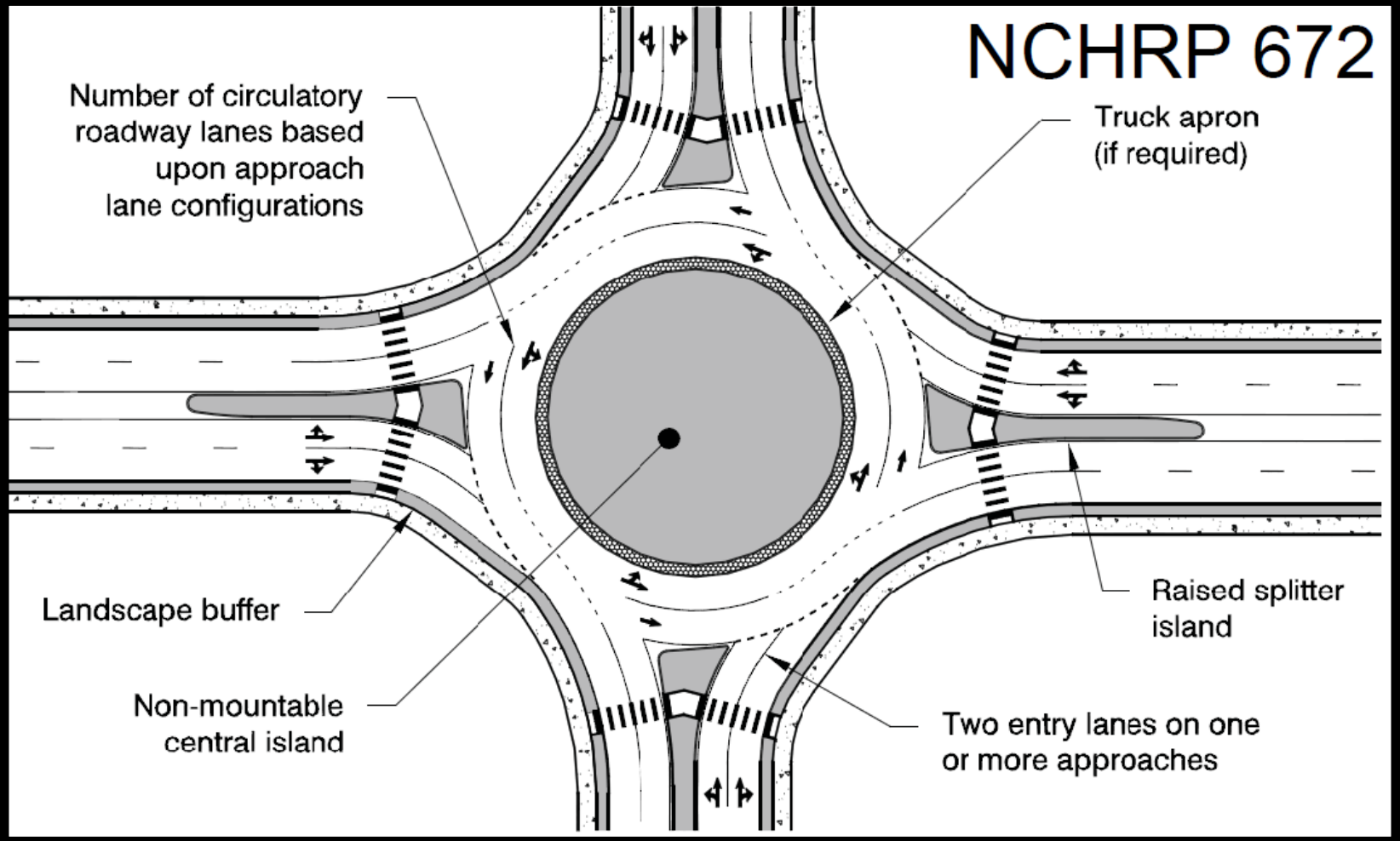
Design Considerations
Key Features



Design Considerations
Entry Path / Path Overlap

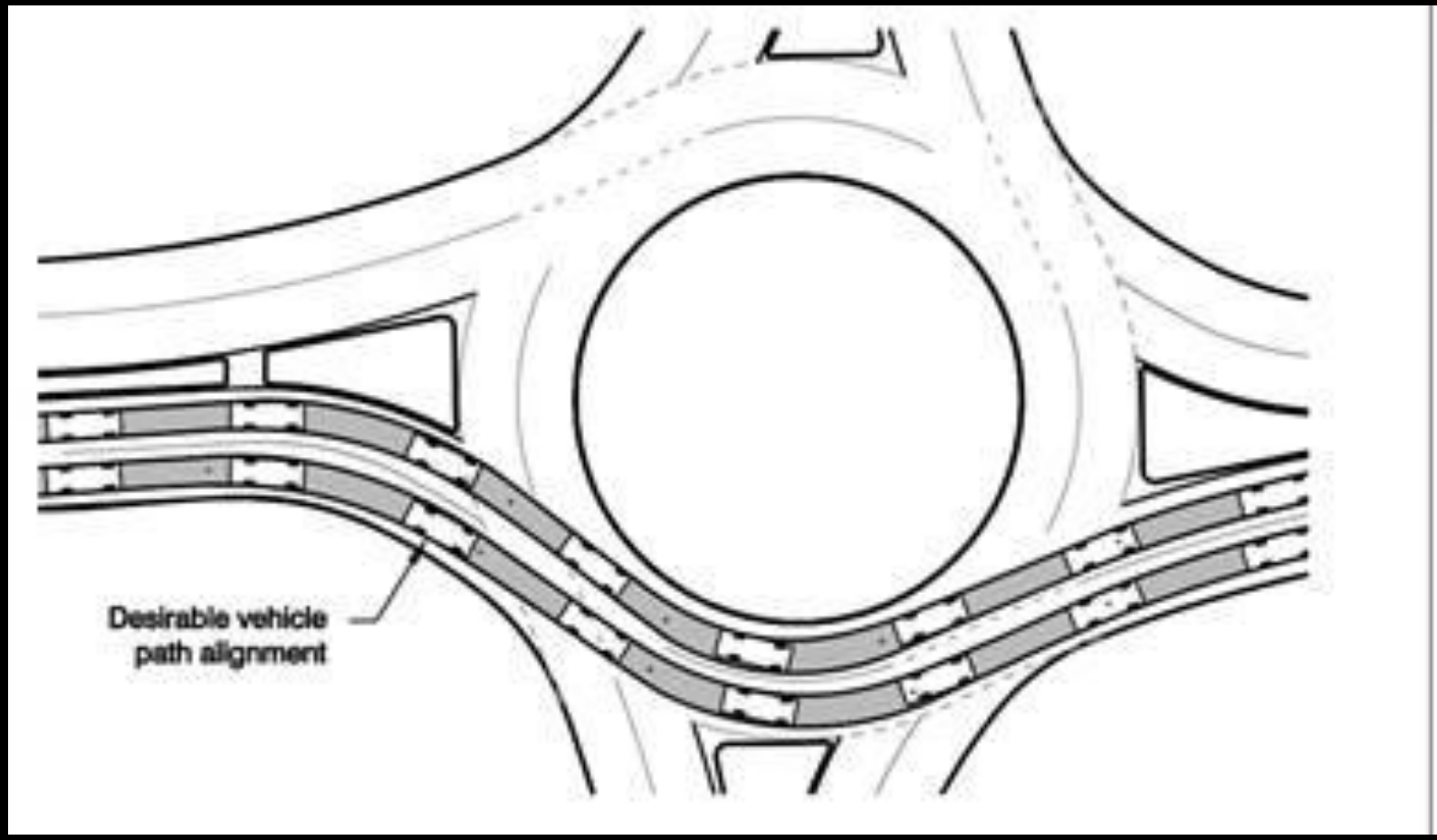


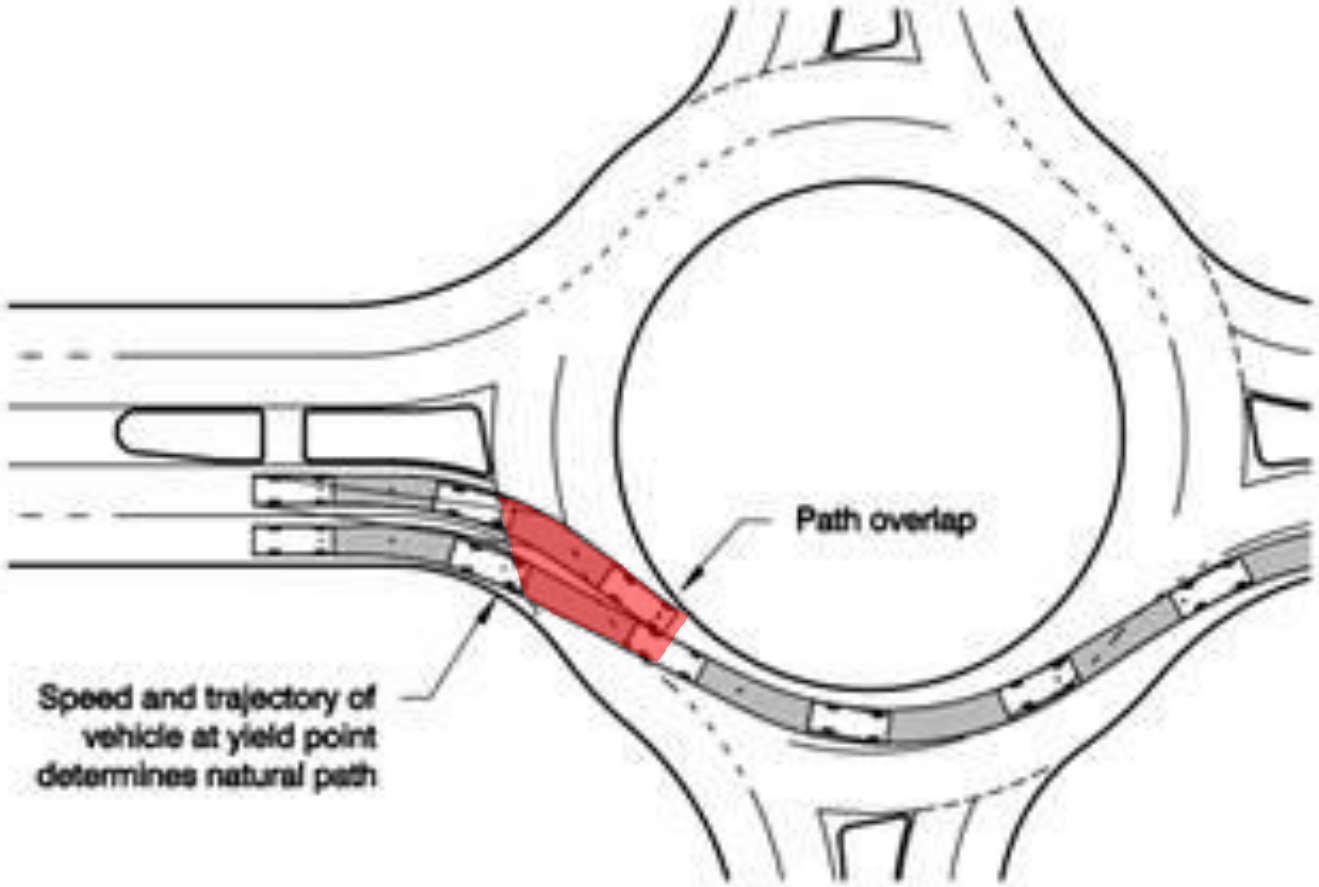
Exhibit 6-29
Desirable Vehicle Path Alignment

GOOD DESIGN

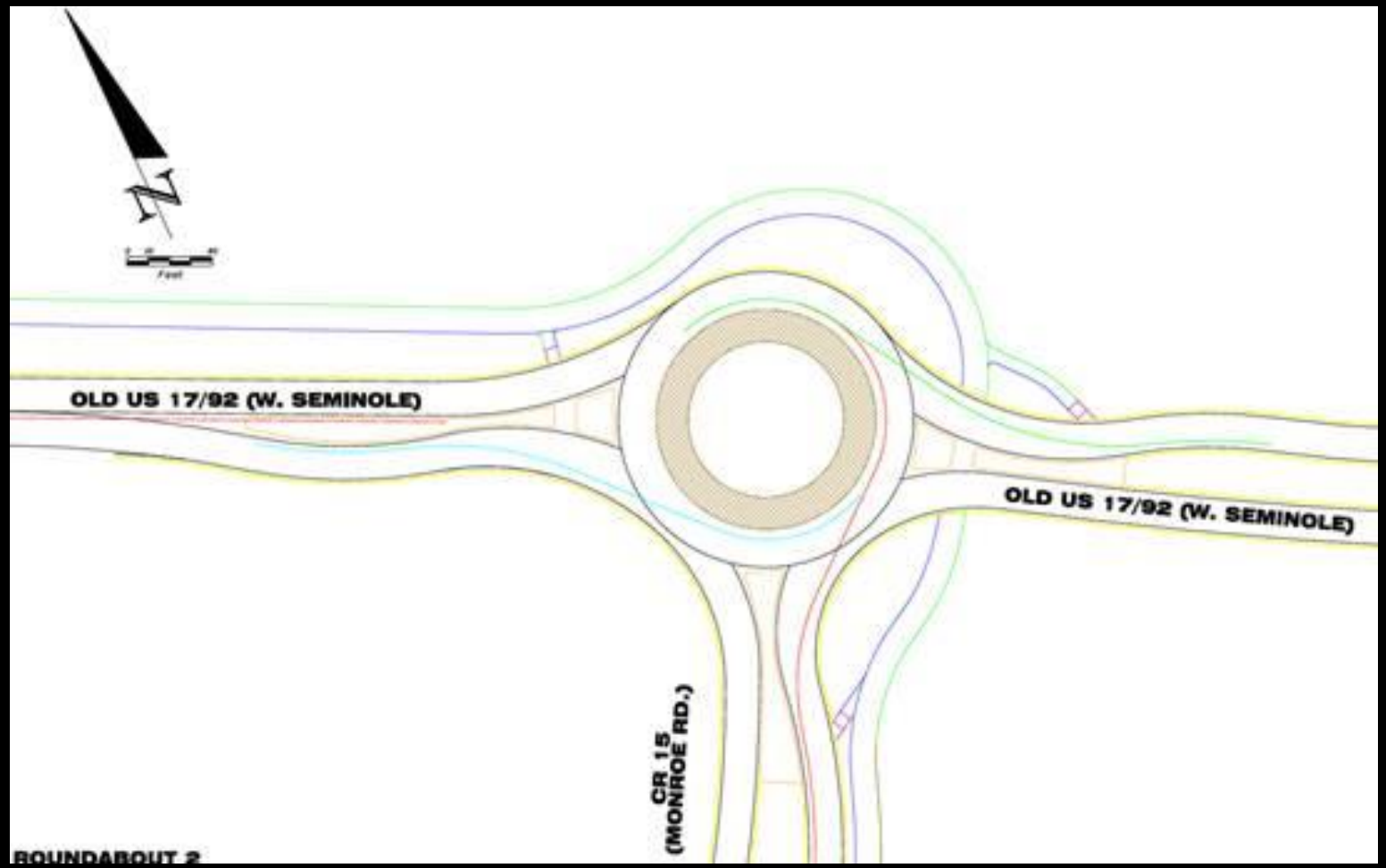
Design Considerations
Entry Path / Path Overlap

Exhibit 6-28
Entry Vehicle Path Overlap

POOR
DESIGN



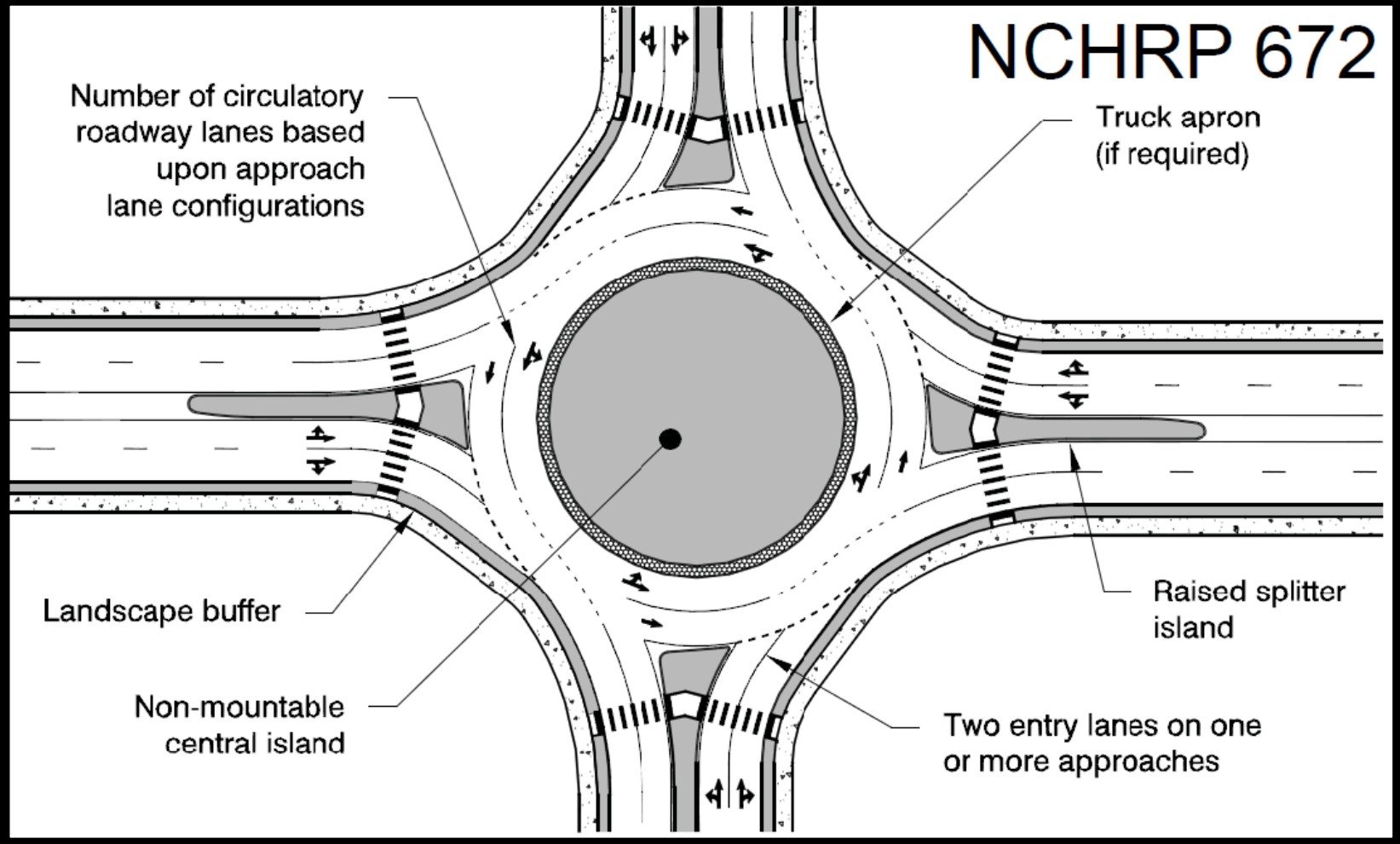
Design Considerations
Approach Geometry



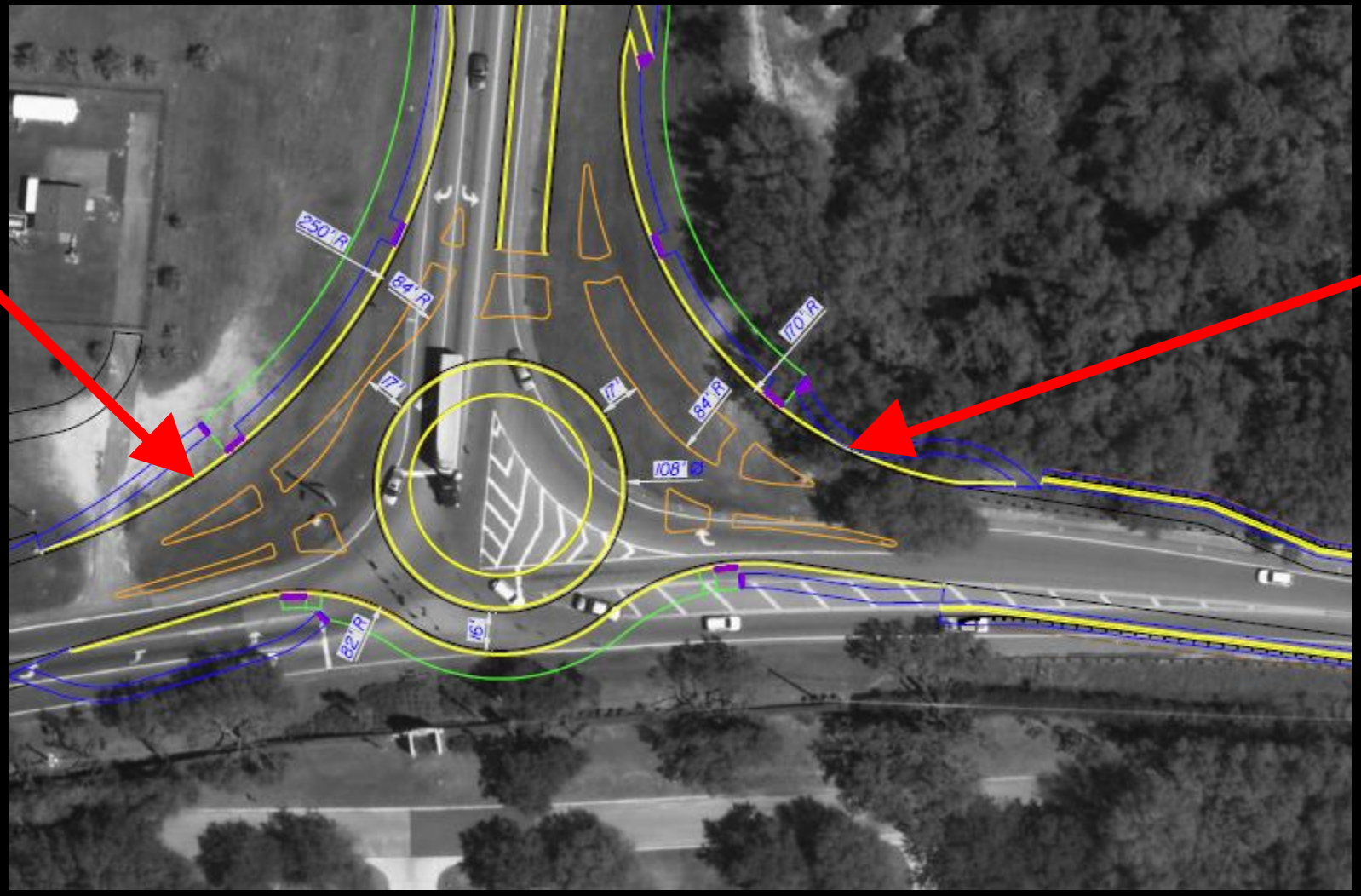
GOOD DESIGN

Design Considerations
Approach Geometry

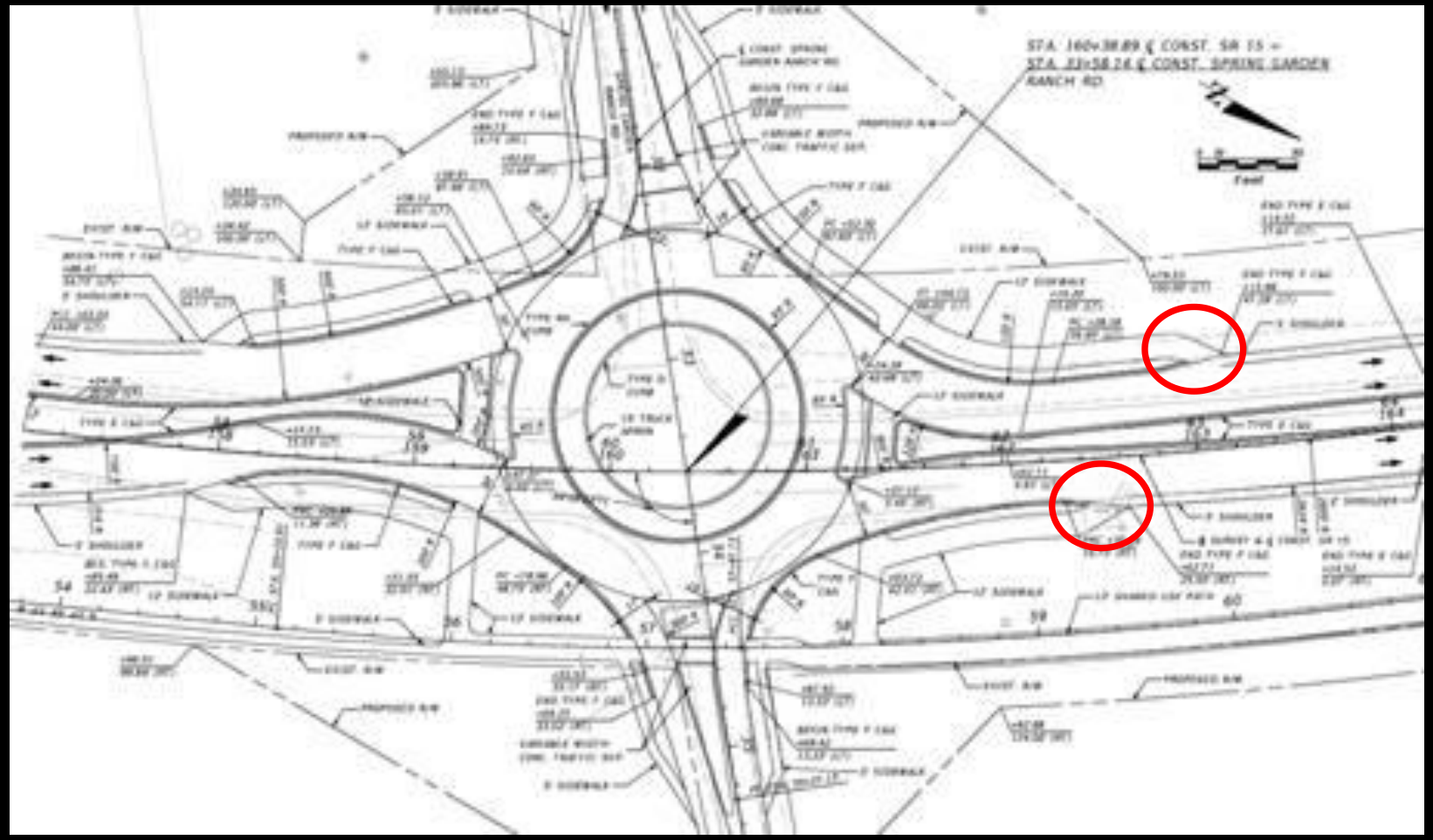
POOR
DESIGN



Design Considerations
No Bypasses



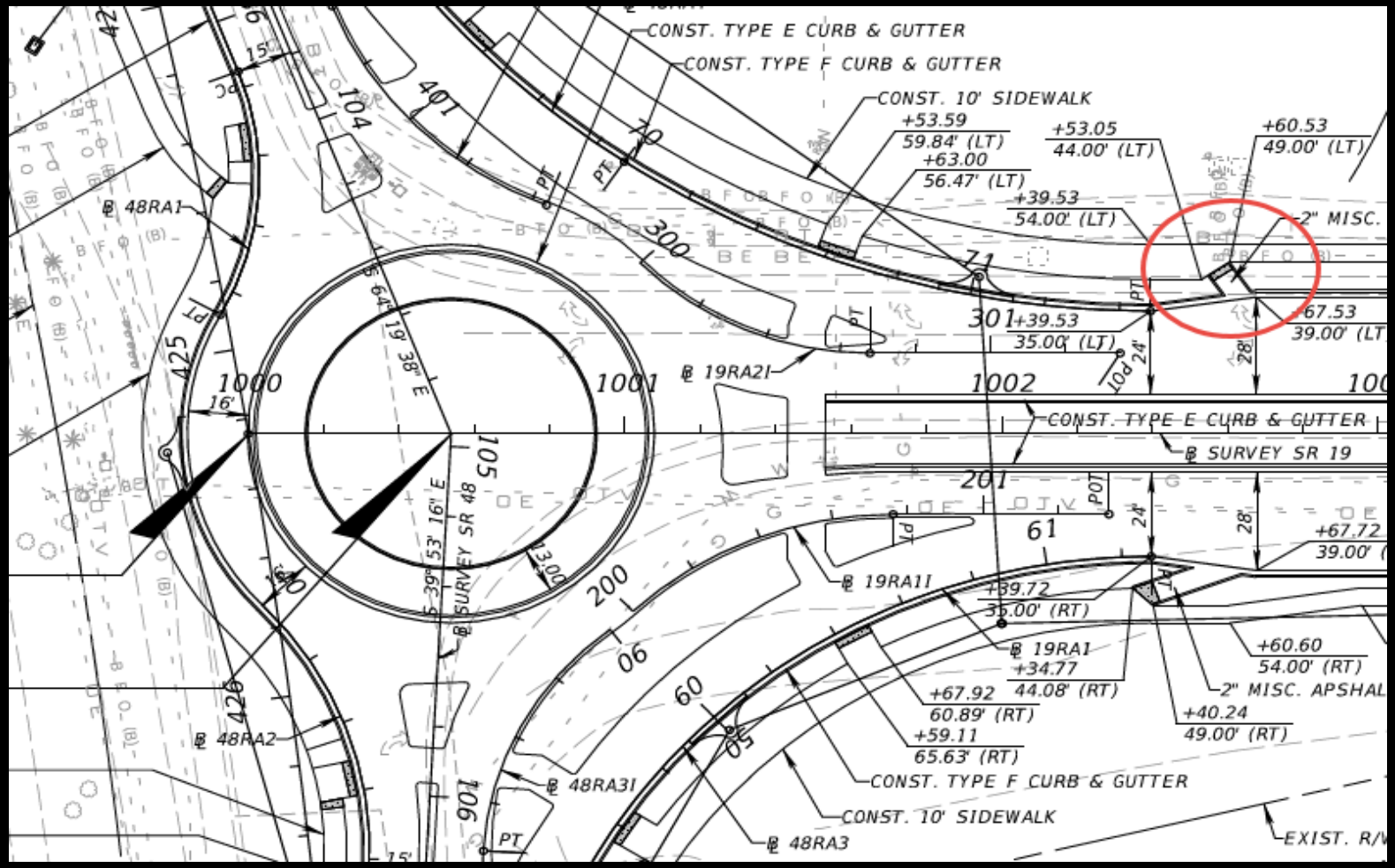
Design Considerations
Bicycle Bailouts



GOOD
DESIGN

Design Considerations
Bicycle Bailouts

POOR
DESIGN



Design Considerations
Other Considerations

- Sidewalk Width
- Utility Strip Width
- Permit Truck Considerations

Evaluation Process Takeaways

- No means Yes!
- Comments are a Good Thing
- Look for Path Overlap
- Incorporate Reverse Curves into Approaches
- Talk to Us!

Challenge

Thank you

Presentation can be found at:
http://www.dot.state.fl.us/projectmanagementoffice/Districts/D5/qqfm.shtm