July 12, 2024

Colleen Monahan, P.E., LEED AP
Site Leader | Group Leader – Land Development
HR Green
1975 Research Parkway | Suite 160
Colorado Springs, CO 80920

Re: Roundabout Design Report
Eastonville Road/Rex Road
EPC PCD File No. CDR2321
LSC #224380

Dear Colleen,

We are pleased to submit this roundabout design report for the proposed intersection of Eastonville Road/Rex Road in Grandview Reserve community (Phase 1) in the Falcon area of El Paso County, Colorado. This intersection will be constructed as a modern roundabout intersection. The roundabout has been designed for one through lane in each direction on each approach.

Roundabout Layouts

The attached Figure 1 and "Roundabout Critical Design Parameters" table show the geometric layout and roundabout design parameters. The overall ("inscribed circle") diameter is 150 feet and the entry phi angles are between 16.0 and 22.5 degrees on each of the approaches.

Design Vehicles

The roundabout Figures 2 through 5 show vehicle turning paths through the proposed roundabout for all approaches. The design vehicle is WB-67 per the El Paso County *Engineering Criteria Manual* (*ECM*). The results show the WB-67 vehicle type could be accommodated. A minimum of one foot of clearance is maintained between all wheel paths and vertical curbs.

Design Speeds

The attached Figures 6 through 9 show the estimated fastest path radii for each of the approaches to the proposed roundabout. These paths are drawn in accordance with the

methodology outlined in the Wisconsin Department of Transportation (WSDOT) *Facilities Development Manual* (Chapter 11, Section 26). The fastest entry path should generally be no more than about 25 miles per hour (mph) for single-lane approaches and 30 mph for two-lane approaches (not applicable at this roundabout). The fastest entry path for each of the four approaches meets the 25-mph criteria.

Pedestrian Safety and Accessibility

Pedestrian crossings with pedestrian refuge areas on the splitter islands have been designed on all four approaches. The WSDOT *Facilities Development Manual* (Chapter 11, Section 26) gives recommendations for placement and design of pedestrian crossings. The recommendations given in the WSDOT *Facilities Development Manual* (Chapter 11, Section 26) were followed in the proposed design, including the following:
- Pedestrian refuge widths are a minimum of 6 feet;
- Pedestrian refuge widths that will accommodate bicycles should be increased to a minimum of 10 feet;
- Pedestrian crossings are generally set back 25 feet from the yield line.

In addition, detached sidewalks should be provided on the corners of the roundabout that provide pedestrian crossings. The following recommendations are given when designing the vertical aspects of the proposed roundabout:
- Pedestrian refuge areas should be designed at street level rather than elevated to the height of the splitter island;
- Ramps should be provided and designed in accordance with ADA standards on each end of the crosswalk;
- Detectable warning surfaces in accordance with ADA standards should be provided at ramps and the pedestrian refuge area of the splitter islands;
- The truck apron should be textured and raised above the circulating roadway. The truck apron width (18.5') is shown on Figure 1. The specific design will be determined as part of the construction plans.

Sight Triangles

The sight triangles are shown in Figure 8. The sight triangles represent areas in which no items taller than two feet that would restrict sight distance should be located. The general Eastonville Road corridor design speed is 50 mph.

* * * * *

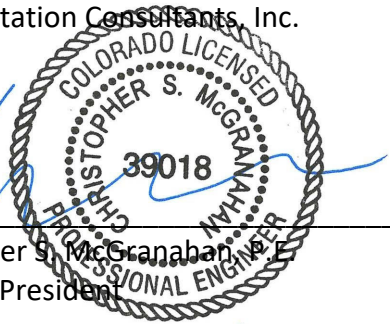We trust that our findings and recommendations will assist in the planning and design of the proposed roundabout. Please call if we can be of further assistance.

Respectfully submitted,

LSC Transportation Consultants, Inc.

By:_____
     Christopher S. McGranahan, P.E.
     Principal/President

CSM/JCH:jas

Enclosures: Roundabout Critical Design Parameters Table
                Roundabout Figures 1-10

ROUNDABOUT CRITICAL DESIGN PARAMETERS

	LEG 1	LEG 2	LEG 3	LEG 4	LEG 5	LEG 6
DESIGN PARAMETERS						
Approach Width, FT	16.8	17.0	17.0	18.4		
Entry Width, FT	21.4	21.5	21.4	21.5		
Entry Angle, PHI Φ, DEG	20.0	21.0	16.0	22.5		
Inscribed Circle Diameter, FT	150.0	150.0	150.0	150.0		
Exit Width, FT	20.0	21.0	20.0	21.0		
Circulating Roadway Width Upstream of Entry, FT	18.0	18.0	18.0	18.0		

FASTEST SPEED PATH												
R_1, Radius/Speed, FT/MPH	140	23	128	22	128	22	135	23				
R_2, Radius/Speed, FT/MPH	130	22	100	20	95	20	96	20				
R_3, Radius/Speed, FT/MPH	330	31	410	33	433	34	1000	<40				
R_4, Radius/Speed, FT/MPH	60	17	60	17	60	17	60	17				
R_5, Radius/Speed, FT/MPH	115	21	110	21	128	22	95	20				
Bypass R_5, Radius/Speed, FT/MPH												

MINIMUM SIGHT PARAMETERS												
Approach Design Speed, MPH	50.0		50.0		50.0		50.0					
Horizontal **S**topping **S**ight **D**istance, FT	368.0		368.0		368.0		368.0					
Circulating **I**ntersection **S**ight **D**istance, FT/MPH	125	17	124	17	125	17	125	17				
Entering **I**ntersection **S**ight **D**istance, FT/MPH	156	24	163	24	154	24	154	24				

Design Vehicle: WB-67

Truck Apron Width: 18.5

OSOW Accommodations: N/A

Circulating Roadway Cross-Slope: 2% or less

Access Control: N/A

Parking Control: No Parking

Bicycle & Pedestrian Accommodations: Ped ramps and sidewalks

Designer: *Matt Romero*
Reviewer: *Chris McGranahan, P.E.*

SIGNATURE: _____   DATE: 7/12/2024

NAME: Christopher S. McGranahan, P.E.

The reviewer's signature on this document indicates that the design has been reviewed and is in general compliance with good roundabout principals. The critical design elements have been addressed. The project design engineer in responsible charge of final plan development will stamp the plans when applicable.

W:\LSC\Projects\2022\224380 - Eastonville Roundabouts Design\July-2024\Eastonville & Rex - Roundabout Design Parameters Table-071224

7/12/2024,1:48 PM

Approach 1

Approach 4

Approach 2

Approach 3

Rex Road

Rex Road

Eastonville Road

Eastonville Road

Ø150.0

52.0
17.0
21.0
20.0
40.0
21.4
14.0
40°
18.0
18.5
42°
18.0
21.0
14.0
21.5
45°
18.5
18.0
32°
18.0
21.0
17.0
21.0
20.0
14.0
21.4
21.0
17.0
52.0
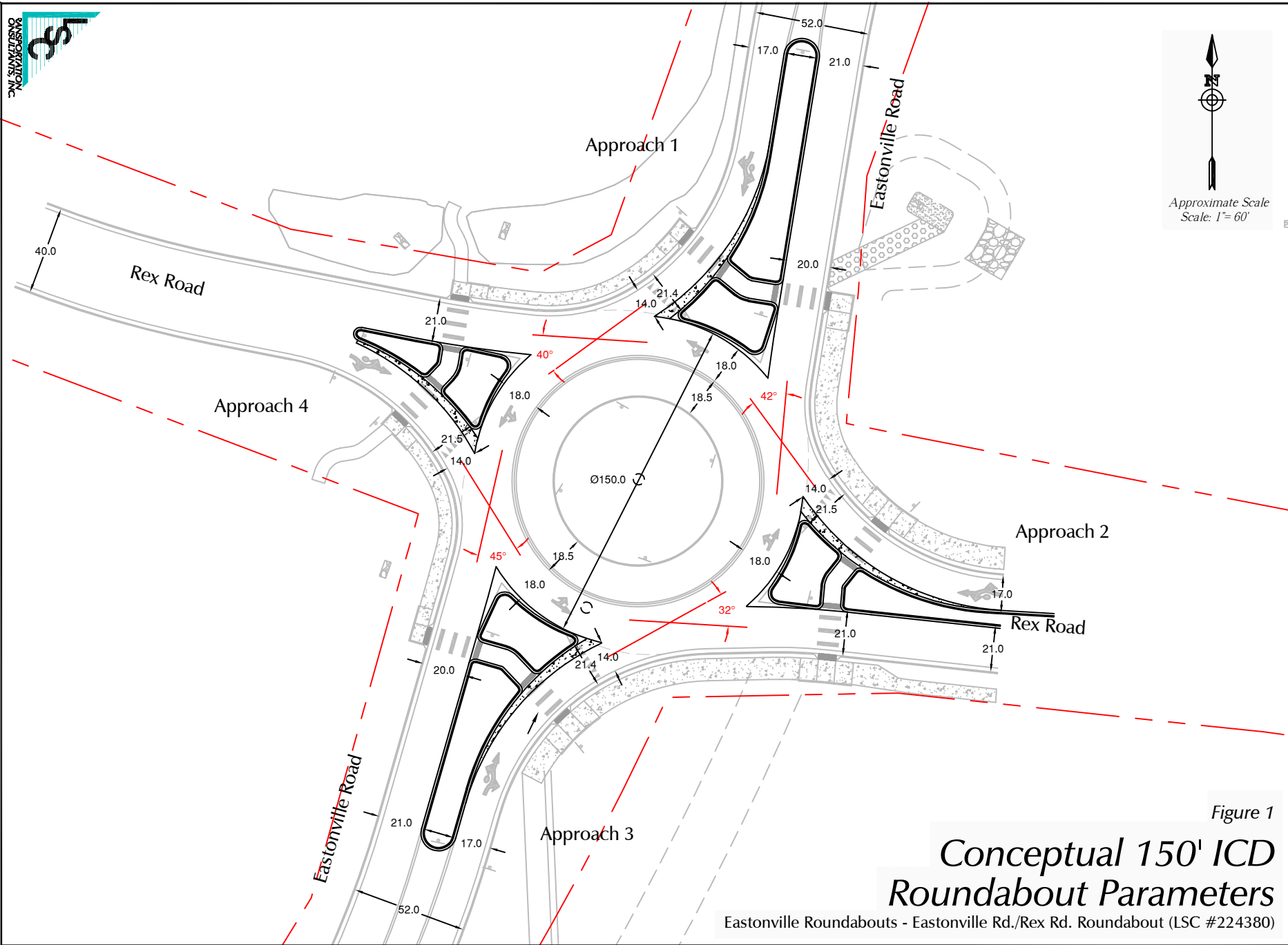
Approximate Scale
Scale: 1"= 60'

Figure 1

Conceptual 150' ICD
Roundabout Parameters

Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

Approach 1

Eastonville Road

Approximate Scale
Scale: 1"= 60'

Rex Road

Approach 4

LEGEND:

· · · · · · · = Vehicle Body Clearance (1 foot) (Dot)
————— = Vehicle Body
————— = Front Tires
————— = Rear Tires

Approach 2

Rex Road

Approach 3

Eastonville Road

| | 15.00 | | 53.00 | |
| 3.00 | 45.50 |
| 0.00 |
| 4.00 | 19.50 |

WB-67

feet

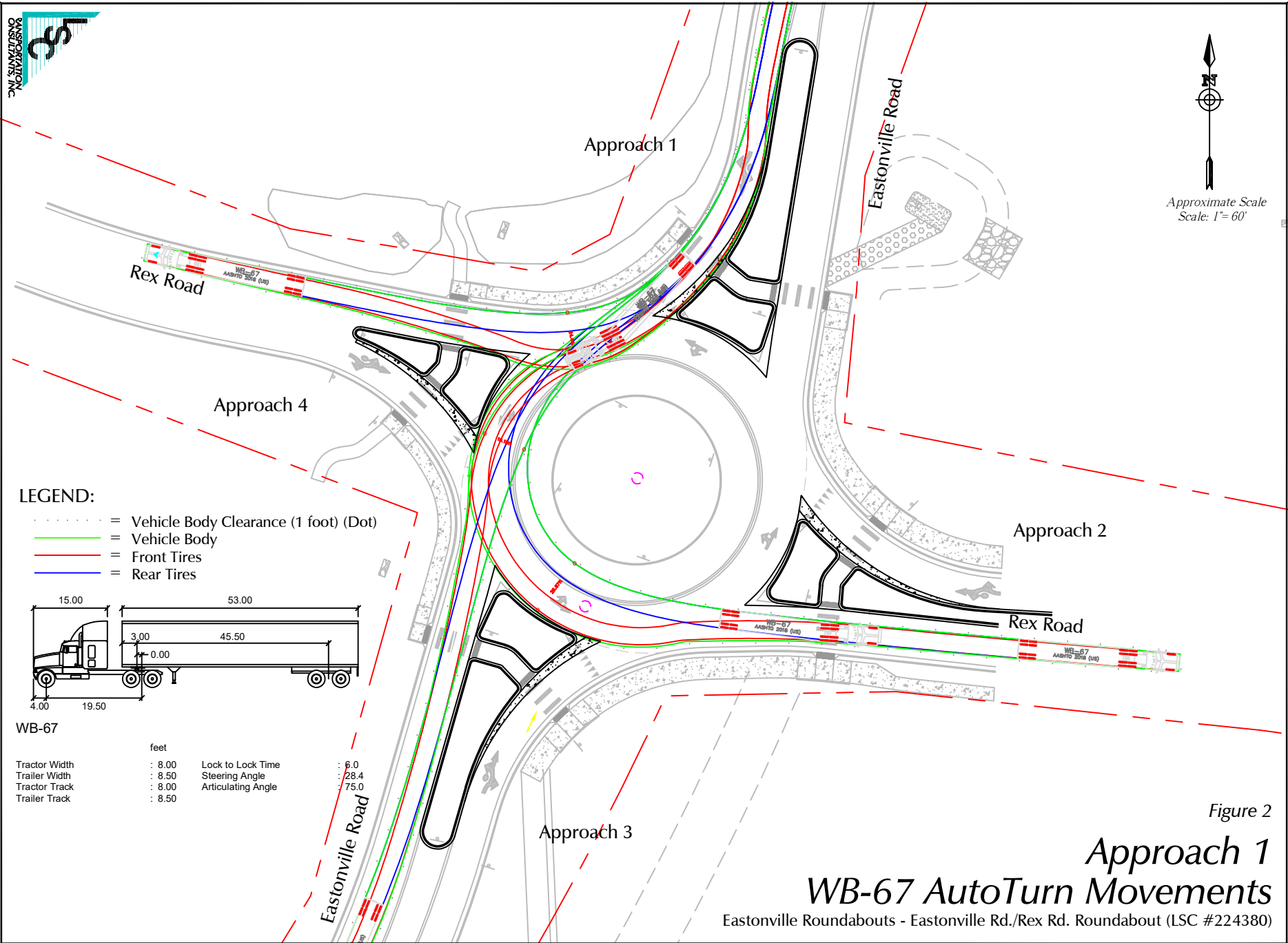| | | | | |
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 75.0
Trailer Track	: 8.50		

Figure 2

Approach 1
WB-67 AutoTurn Movements
Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

Approach 1

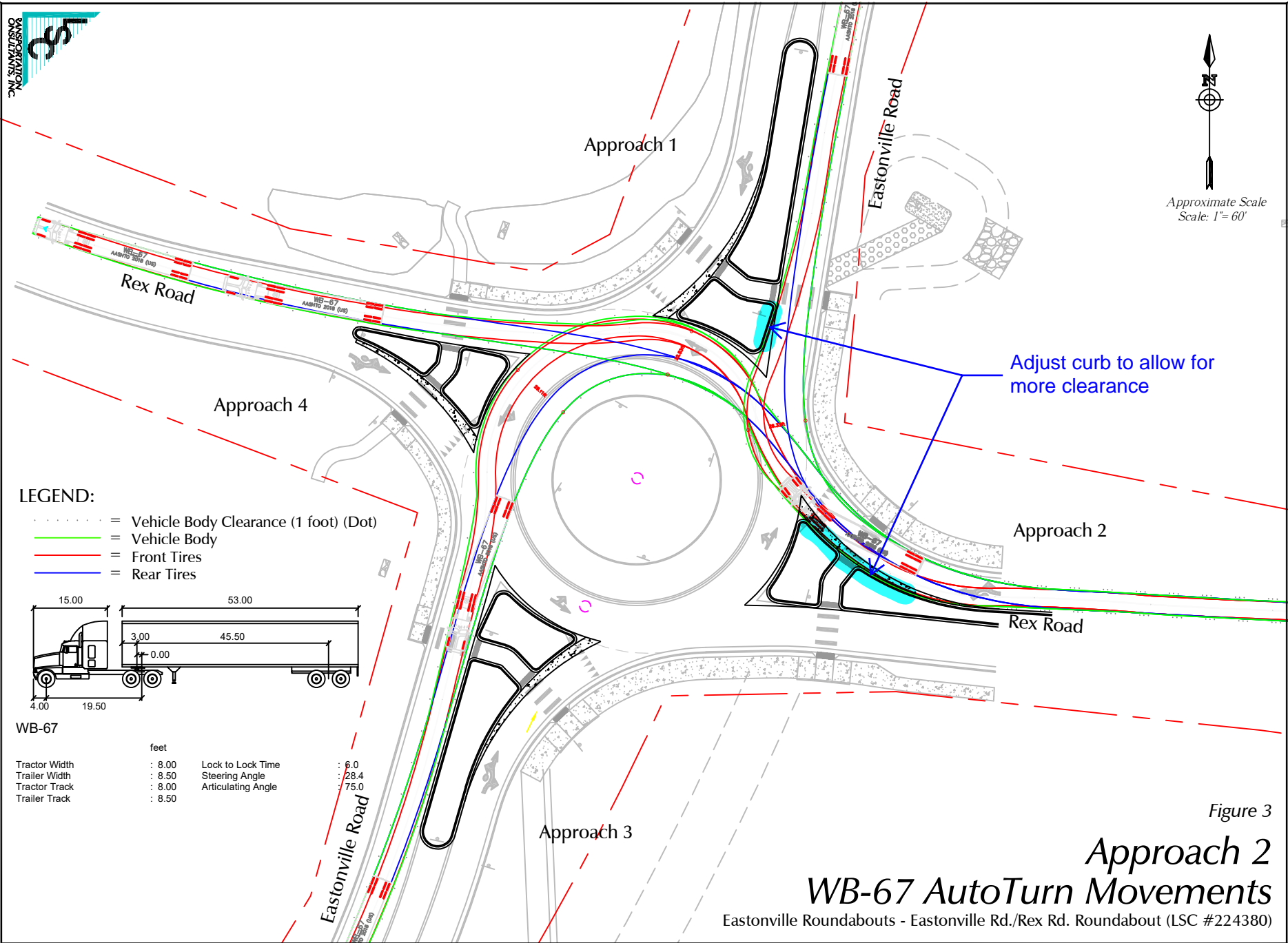Eastonville Road

Approximate Scale
Scale: 1"= 60'

Rex Road

Adjust curb to allow for
more clearance

Approach 4

Approach 2

LEGEND:

.... = Vehicle Body Clearance (1 foot) (Dot)
——— = Vehicle Body
——— = Front Tires
——— = Rear Tires

15.00   53.00

3.00   45.50
0.00

4.00   19.50

WB-67

	feet		
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 75.0
Trailer Track	: 8.50		

Rex Road

Figure 3

Approach 3

Eastonville Road

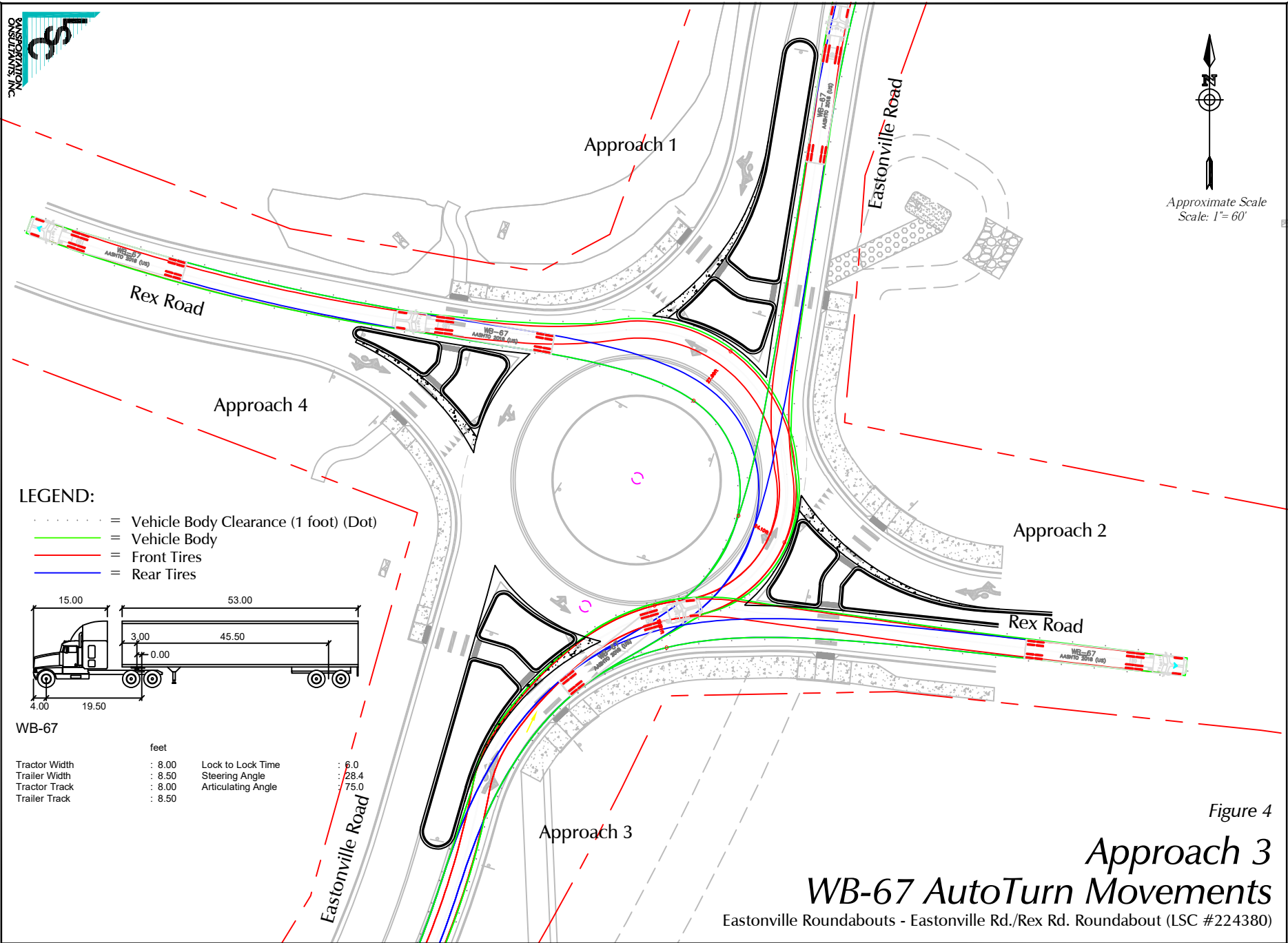*Approach 2*
WB-67 AutoTurn Movements
Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

Approach 1

Eastonville Road

Approximate Scale
Scale: 1"= 60'

Rex Road

Approach 4

LEGEND:

· · · · · · · = Vehicle Body Clearance (1 foot) (Dot)
──────── = Vehicle Body
──────── = Front Tires
──────── = Rear Tires

Approach 2

Rex Road

15.00		53.00
3.00	45.50	
0.00		
4.00	19.50	

WB-67

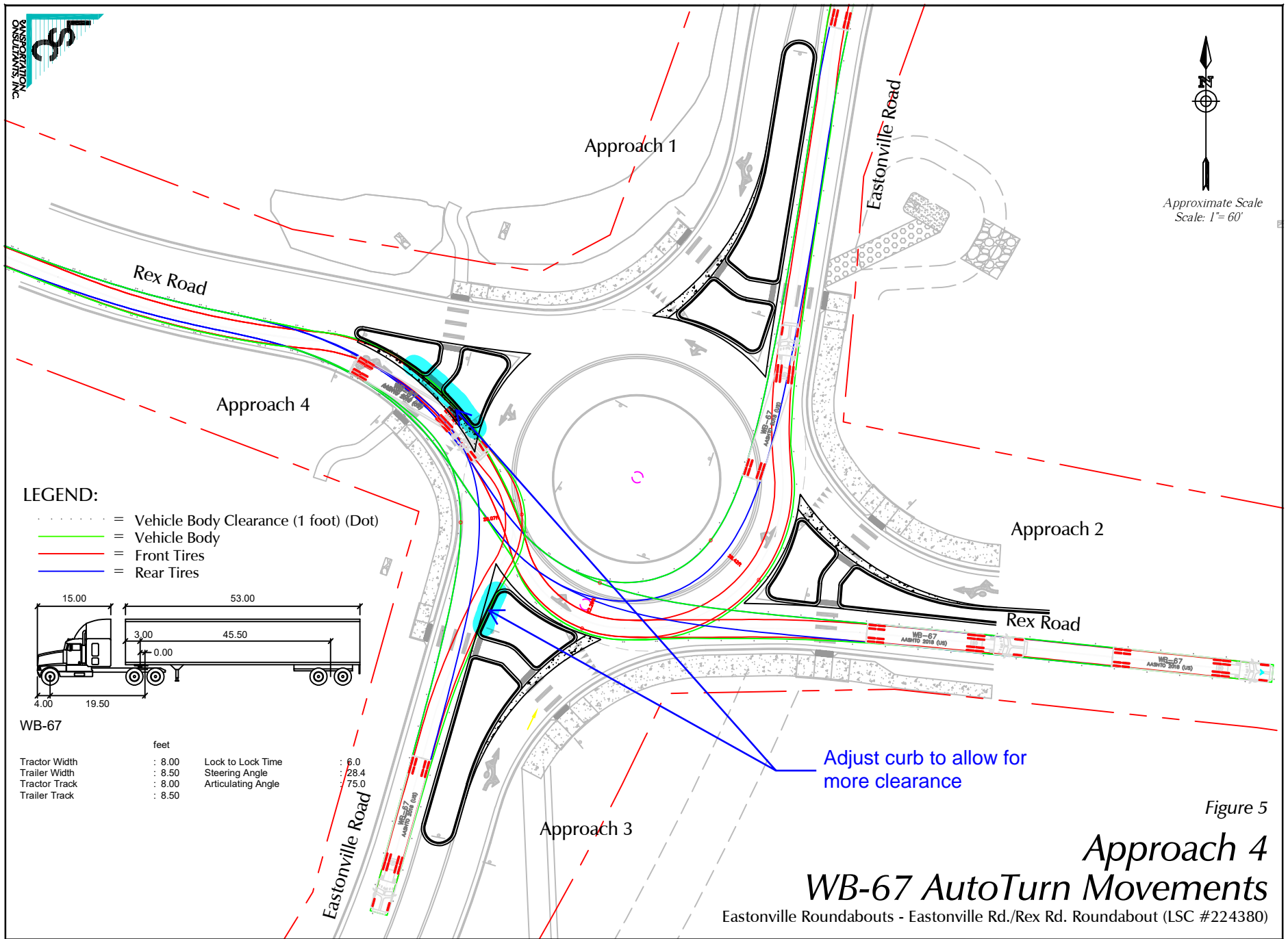|		feet			
Tractor Width	:	8.00	Lock to Lock Time	:	6.0
Trailer Width	:	8.50	Steering Angle	:	28.4
Tractor Track	:	8.00	Articulating Angle	:	75.0
Trailer Track	:	8.50			

Eastonville Road

Approach 3

Figure 4

Approach 3
WB-67 AutoTurn Movements
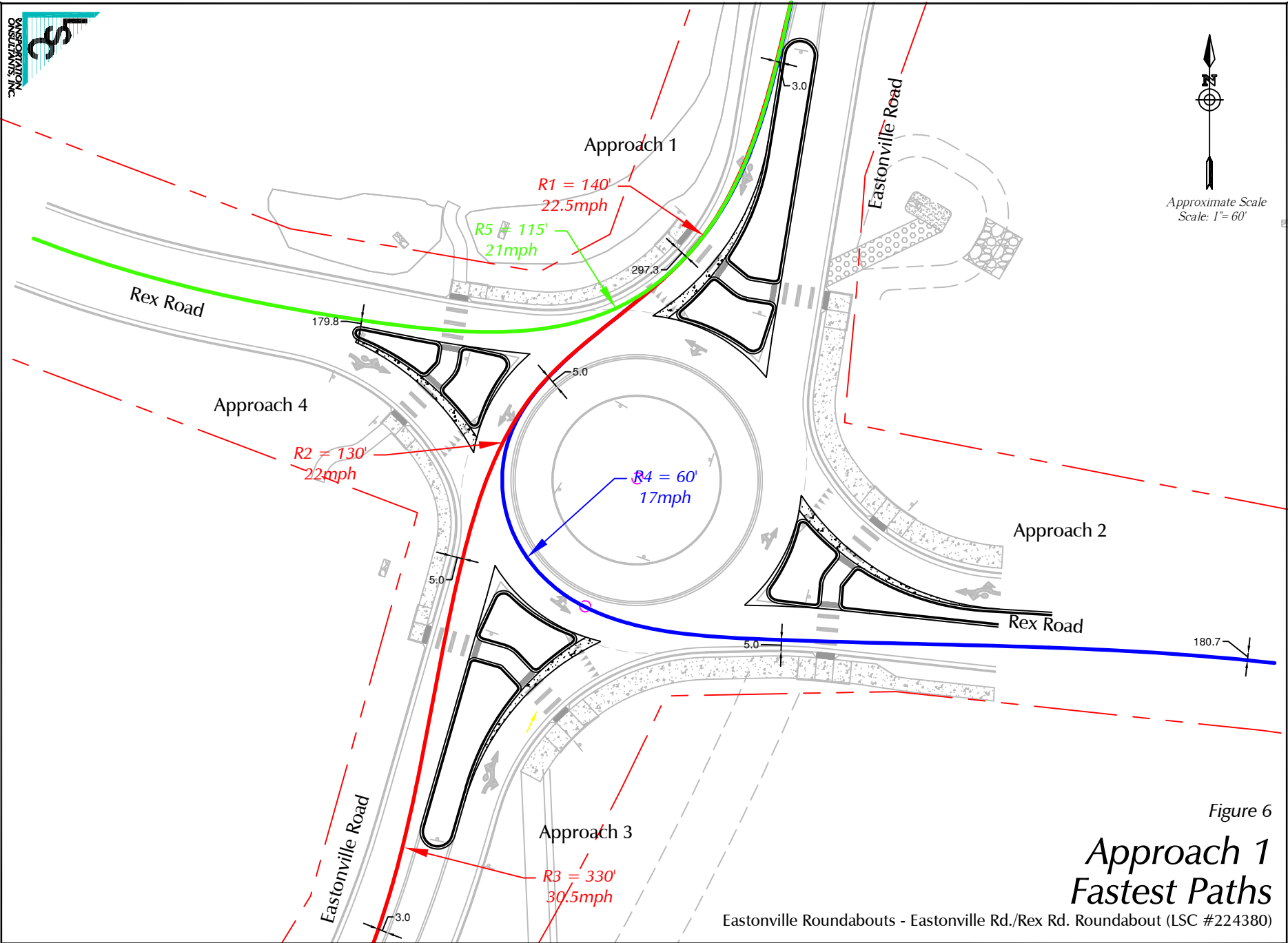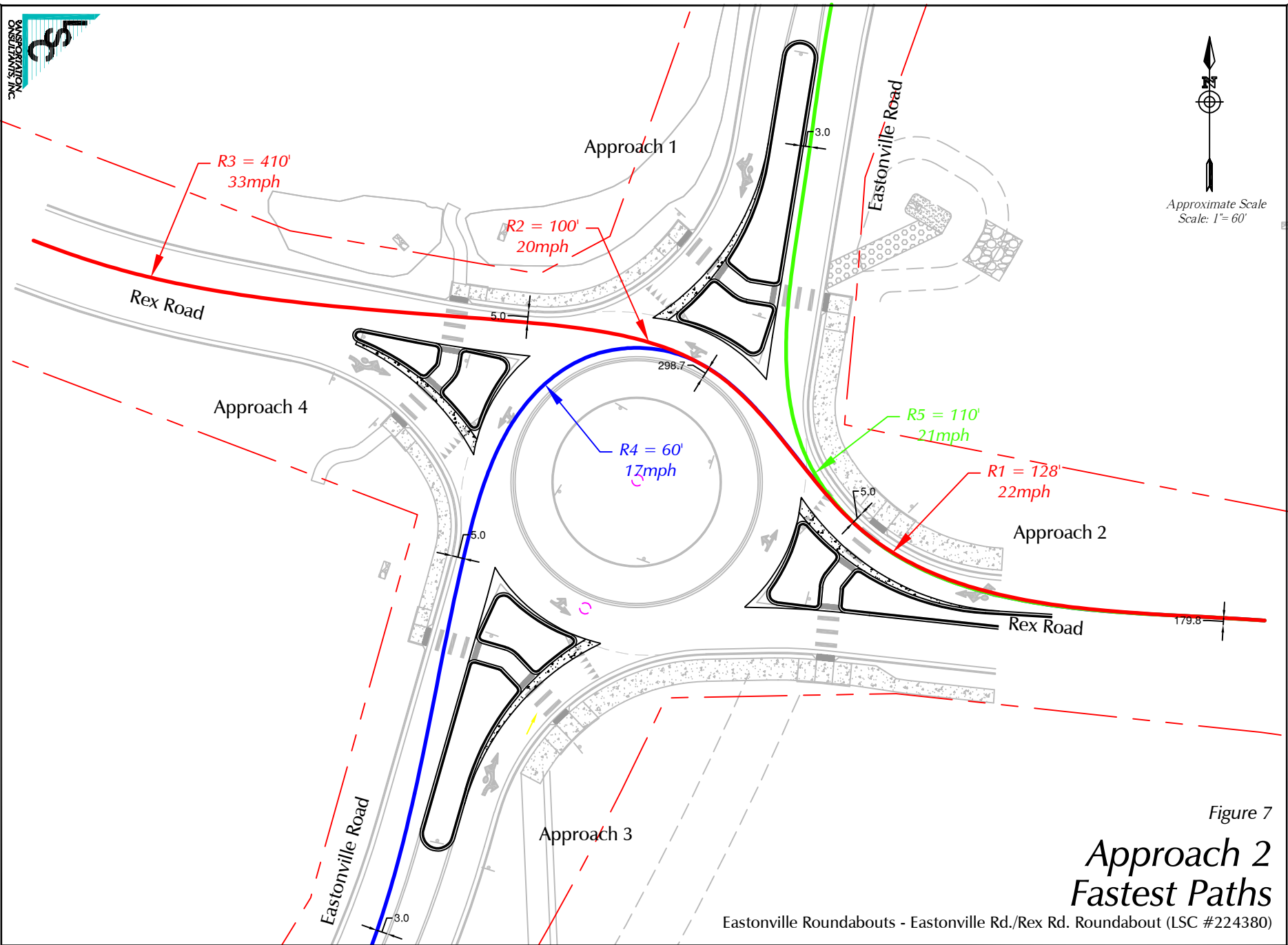Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

Approach 1

Eastonville Road

Approximate Scale
Scale: 1"= 60'

Rex Road

Approach 4

LEGEND:

· · · · · · · = Vehicle Body Clearance (1 foot) (Dot)
——————— = Vehicle Body
——————— = Front Tires
——————— = Rear Tires

Approach 2

Rex Road

15.00   53.00

3.00   45.50

0.00

4.00   19.50

WB-67

feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 75.0
Trailer Track	: 8.50		

Adjust curb to allow for
more clearance

Eastonville Road

Approach 3

Figure 5

Approach 4
WB-67 AutoTurn Movements

Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

Approach 1

R1 = 140'
22.5mph

R5 = 115'
21mph

Rex Road

297.3

179.8

Approach 4

R2 = 130'
22mph

R4 = 60'
17mph

Approach 2

5.0

5.0

Rex Road

180.7

5.0

Eastonville Road

Approach 3

R3 = 330'
30.5mph

3.0

3.0

Eastonville Road

Approximate Scale
Scale: 1"= 60'

Figure 6

Approach 1
Fastest Paths

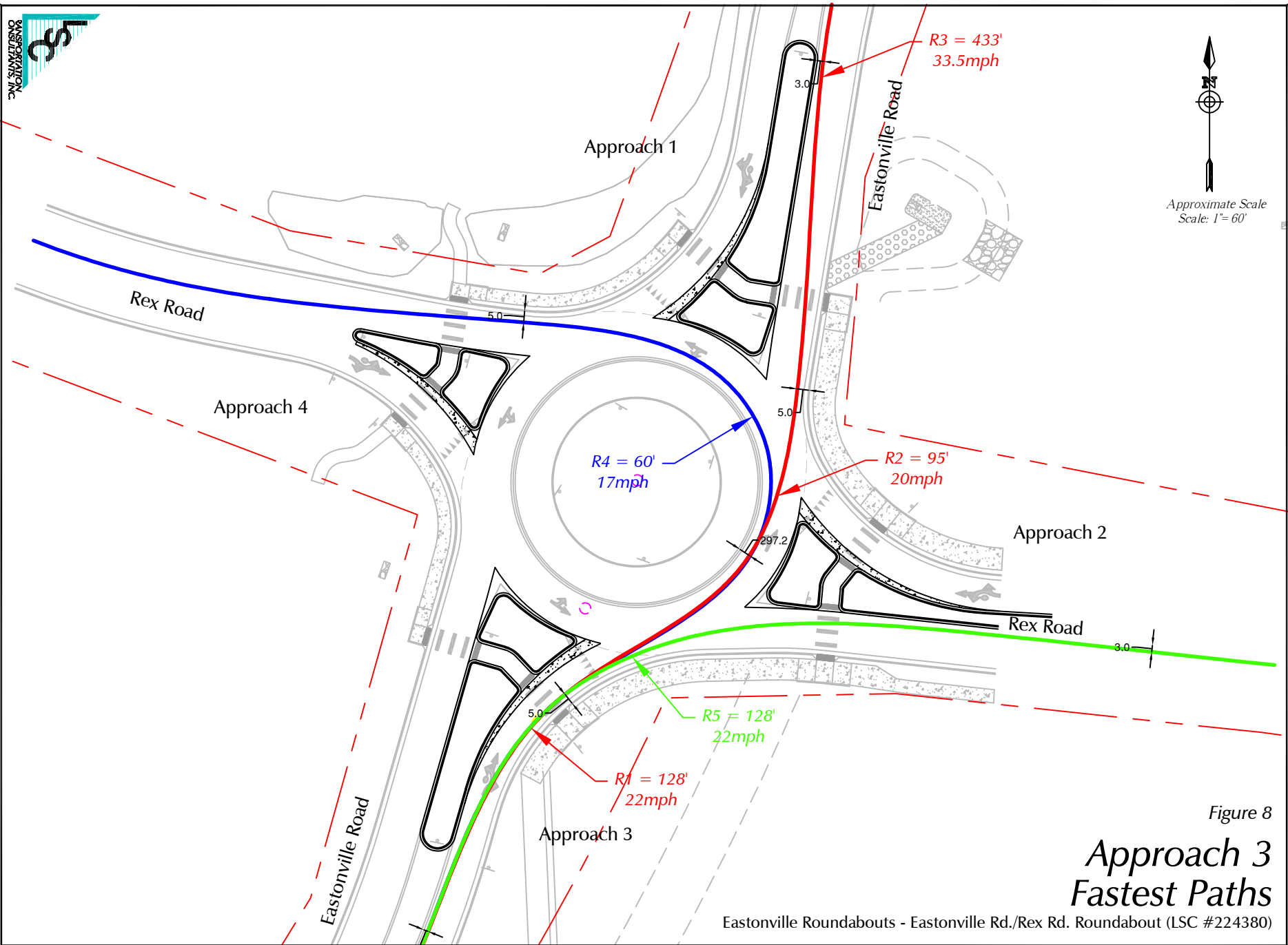Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

Approach 1

Eastonville Road

R3 = 410'
33mph

R2 = 100'
20mph

Rex Road

3.0

Approximate Scale
Scale: 1"= 60'

Approach 4

5.0

298.7

R5 = 110'
21mph

R4 = 60'
17mph

R1 = 128'
22mph

5.0

Approach 2

5.0

Rex Road

179.8

Eastonville Road

Approach 3

3.0

Figure 7

Approach 2
Fastest Paths

Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

Approach 1
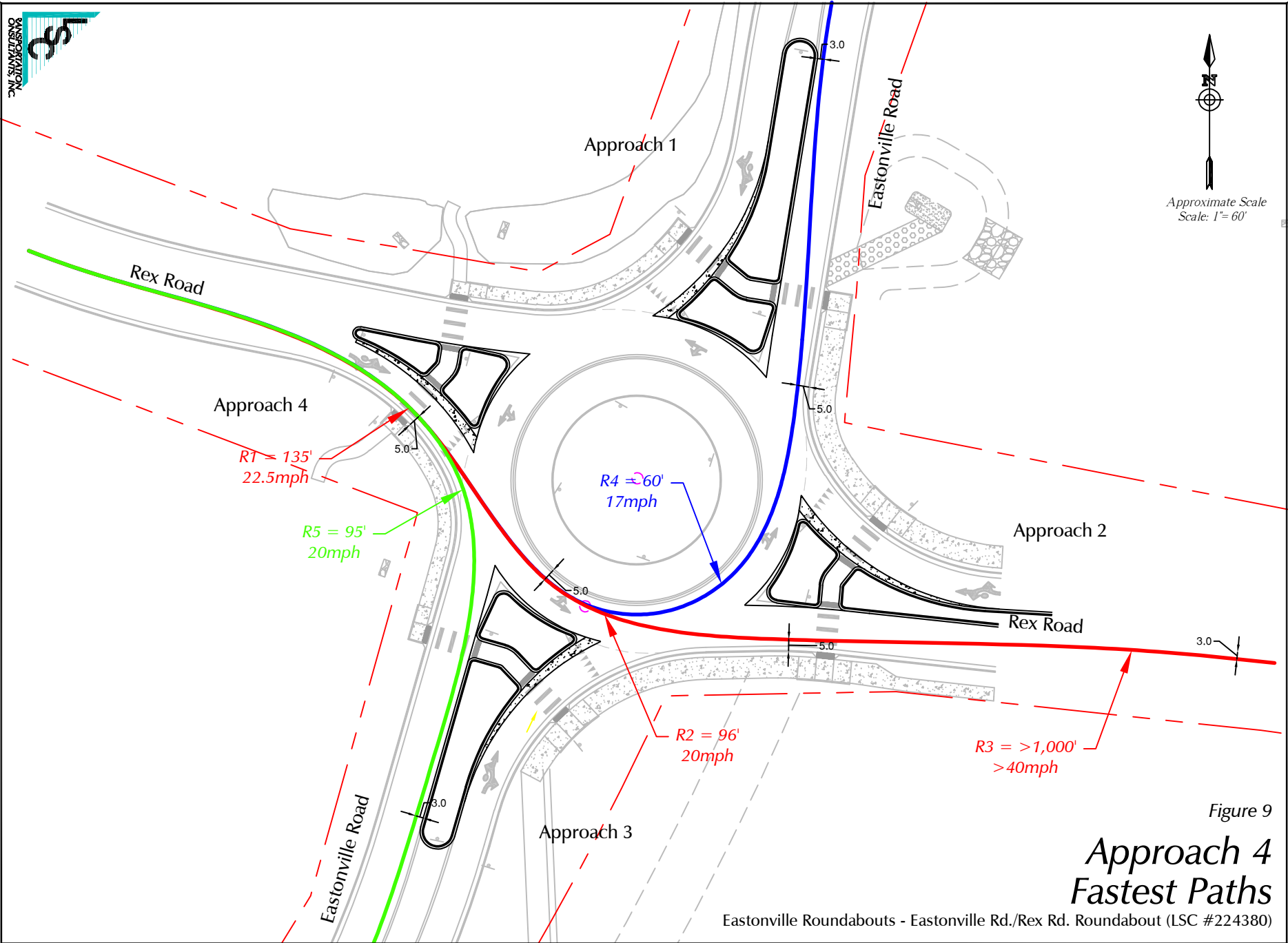
Approach 4

Approach 2

Approach 3

Rex Road

Rex Road

Eastonville Road

Eastonville Road

R3 = 433'
33.5mph

R2 = 95'
20mph

R4 = 60'
17mph

R5 = 128'
22mph

R1 = 128'
22mph

3.0

5.0

5.0

297.2

3.0

5.0

3.0

Approximate Scale
Scale: 1"= 60'

Figure 8

Approach 3
Fastest Paths

Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

Approach 1

Eastonville Road

Rex Road

Approach 4

R1 = 135'
22.5mph

R5 = 95'
20mph

R4 = 60'
17mph

Approach 2

Rex Road

R2 = 96'
20mph

R3 = >1,000'
>40mph

Eastonville Road

Approach 3

Approximate Scale
Scale: 1"= 60'

N

3.0

5.0

5.0

5.0

3.0

3.0

Figure 9

Approach 4
Fastest Paths

Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

Approach 1

Rex Road

Eastonville Road

Approach 4

Approach 2

Rex Road

Approach 3

Eastonville Road

Approximate Scale
Scale: 1"= 120'

Figure 10

Sight Triangles

Eastonville Roundabouts - Eastonville Rd./Rex Rd. Roundabout (LSC #224380)

V3_TIS - Rex Roundabout.pdf Markup Summary

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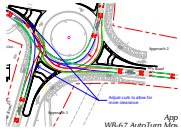
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Author: Jeff Rice - EPC Engineering Review
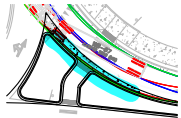**Date:** 9/4/2024 3:59:10 PM
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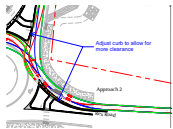
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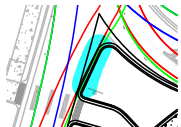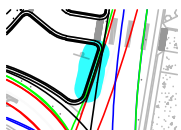Adjust curb to allow for more clearance

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