

## MEMORANDUM

To: El Paso County

From: Sean Hays, PE  
Kimley-Horn and Associates, Inc.

Date: May 2nd, 2022

Subject: Design Documentation - Proposed Roundabout at Meadowbrook Pkwy and Newt Dr

A new roundabout is proposed at the intersection of Meadowbrook Pkwy and Newt Dr in El Paso County, Colorado. This memo summarizes the design criteria and critical design parameters for the proposed roundabout.

The design of this roundabout is based upon the criteria established in the Wisconsin Department of Transportation Facilities Development Manual, Chapter 11 Section 26 (Wisconsin DOT FDM 11-26).

### Lane Configuration and Geometrics

The Crossroads Mix Use Traffic Study Letter (dated 6-13-2021) prepared by Kimley-Horn recommends a roundabout with a single circulatory lane and one lane entering on each approach at the project intersection. The report shows that the roundabout will operate at a Level of Service (LOS) of B in design year 2040. Refer to the traffic impact study for additional details.

To meet the criteria in the Wisconsin DOT FDM 11-26, the proposed roundabout was designed with the geometry displayed in Table 1. A graphical representation of the roundabout with supporting dimensions, is included as Exhibit 2 at the end of this memo.

**TABLE 1 ROUNDABOUT GEOMETRICS**

Inscribed Circle Diameter (ICD)	95 feet
Minimum lane width (on approach)	12 feet
Circulatory roadway width	18 feet

### Fastest Path Speeds

Fastest path performance is an evaluation of the geometric elements that control driver negotiation speeds. Two primary elements were evaluated to determine the fastest path speed:

- Estimated vehicle speeds at critical path radii on the fastest path
- Speed consistency between the critical path radii

PCD File No SF2129

Fastest paths were reviewed in CADD with spline curves based on a technique described in the Wisconsin DOT FDM 11-26 Attachment 50.2.

Estimated vehicle speeds for entry, circulating, exit, left turn and right turn paths were calculated using standard estimation of +2%/-2% cross slope / superelevations for vehicles traveling on the estimated fastest path.

Graphical representations of the estimated fastest paths and the locations of the critical path radius used to calculate R1 thru R5 speeds, are included as Exhibits 11-14 at the end of this memo.

Table 2 below summarizes the results of the fastest path evaluation. Table 3 and Figure 1 provide additional information on the design criteria used for the calculation of the fastest paths.

TABLE 2 – FASTEST PATH RESULTS	LEG 1		LEG 2		LEG 3		LEG 4	
	SB	EB	EB	EB	NB	NB	WB	WB
R <sub>1</sub> , Radius/Speed, FT/MPH	141	24	119	22	113	22	128	23
R <sub>2</sub> , Radius/Speed, FT/MPH	100	21	49	16	72	19	107	22
R <sub>3</sub> , Radius/Speed, FT/MPH		26		21		24		27
R <sub>4</sub> , Radius/Speed, FT/MPH	31	14	34	14	34	14	29	14
R <sub>5</sub> , Radius/Speed, FT/MPH	48	16	43	15	65	18	48	16

TABLE 3 FASTEST PATH PERFORMANCE CRITERIA

Path offset from curb face	5 feet
Path offset from centerline	5 feet
Path offset from painted edge of travel way	3 feet
Single lane entry (maximum)	25 mph
Speed consistency	10-15 mph

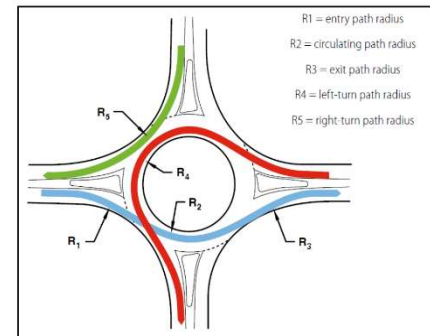


Figure 1 Typical Vehicle Speed Paths

### Design Vehicle

Design vehicle paths were evaluated for likely design vehicles and their associated path required to navigate the roundabout. Vehicle profile, path and tire tracking offsets are shown in Exhibits 3-10 included at the end of this memo. The following design vehicles and design criteria were used to evaluate the tire tracking offsets:

**TABLE 4 DESIGN VEHICLES**

<b>Vehicle</b>	<b>Category</b>	<b>Case</b>	<b>Notes</b>
WB-50	Accommodate	Case 1	Full Access
WB-67	For Information Only	Case 1	Full Access

Due to the existing roadway geometrics, and in order to accommodate these design vehicles as described, the northbound entry to the roundabout is wider than the others (22'). Entries wider than 20' present an opportunity for drivers to mistakenly interpret the entry as providing 2 lanes. It is not anticipated that the proposed roundabout will present issues with multiple drivers attempting to enter the roundabout at the same time, due to the limited lane width (12') in advance of the entry, and the acceptable fastest paths identified above.

Category and case shown above refer to criteria established in the Wisconsin DOT FDM 11-26. Information is provided below on the criteria. For additional details refer to the Wisconsin DOT FDM 11-26.

- **Category – Accommodate:** is used for low percentage of design vehicles of this type. Preferable in low speed, urban environments where pedestrian and bike traffic is prevalent. The vehicle will be able to navigate the roundabout but may do so at reduced speeds and/or encroach on the gutter. Tire tracking offsets should not encroach on non-mountable curb.
- **Case – Case 1:** Design vehicle may encroach and occupy adjacent lanes to navigate the approach, circulating and departure lanes.
- **Category – For Information Only:** is used for a very low percentage of design vehicles of this type. Design vehicles are not anticipated to use the intersection except in rare situations. The vehicle may navigate the roundabout at reduced speeds and/or while encroaching on curb and gutter. Vertical site features have been adjusted to avoid conflicts.

**MEADOWBROOK PARKWAY ROUNDABOUT**

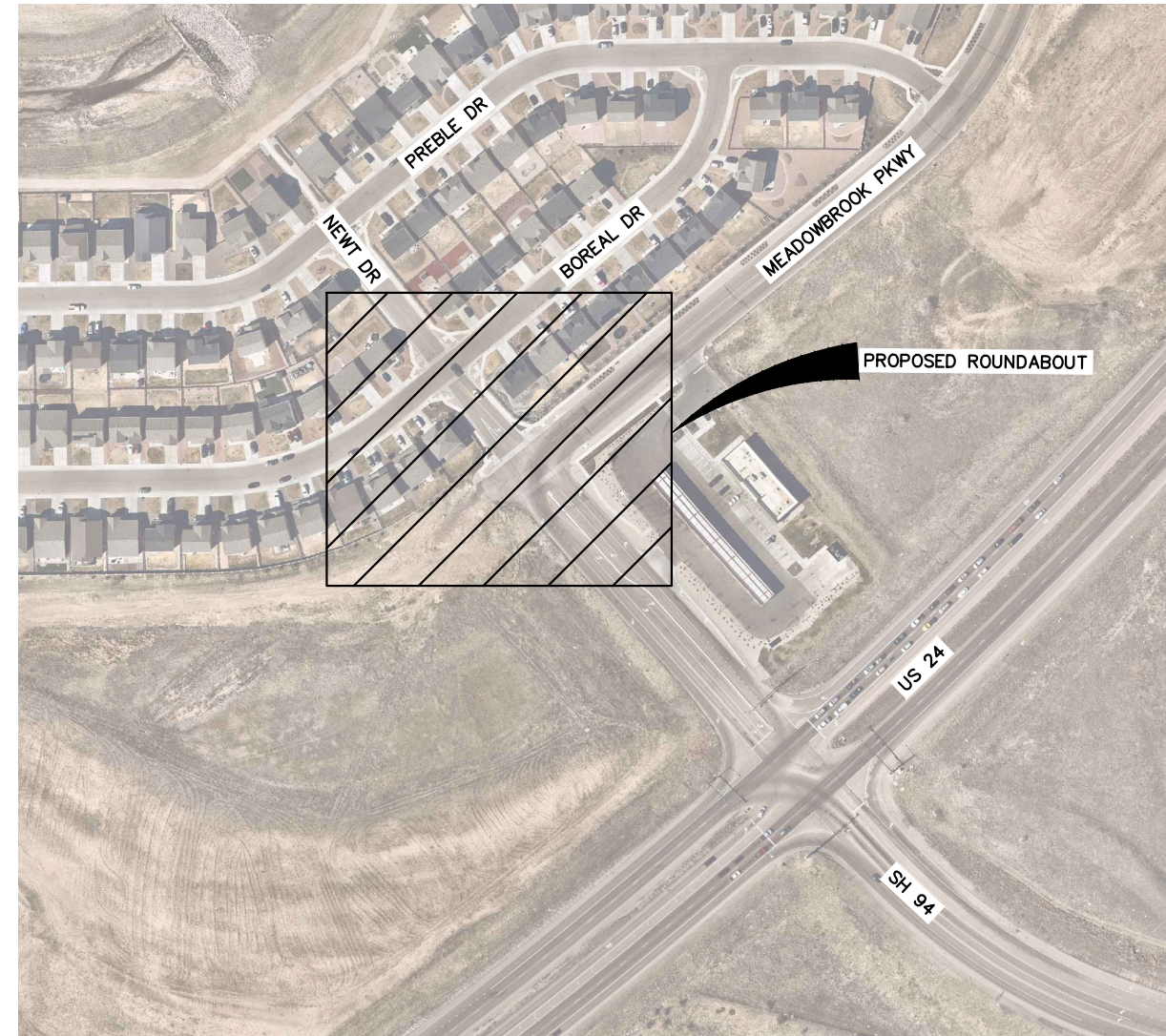
**MEADOWBROOK PKWY & NEWT DR**

**COLORADO SPRINGS, COLORADO**

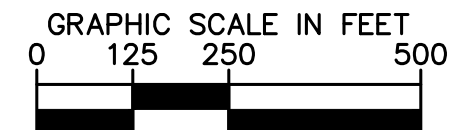
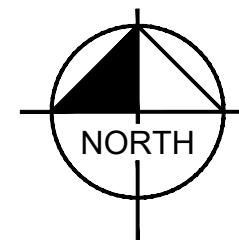
**MAY 5th, 2022**

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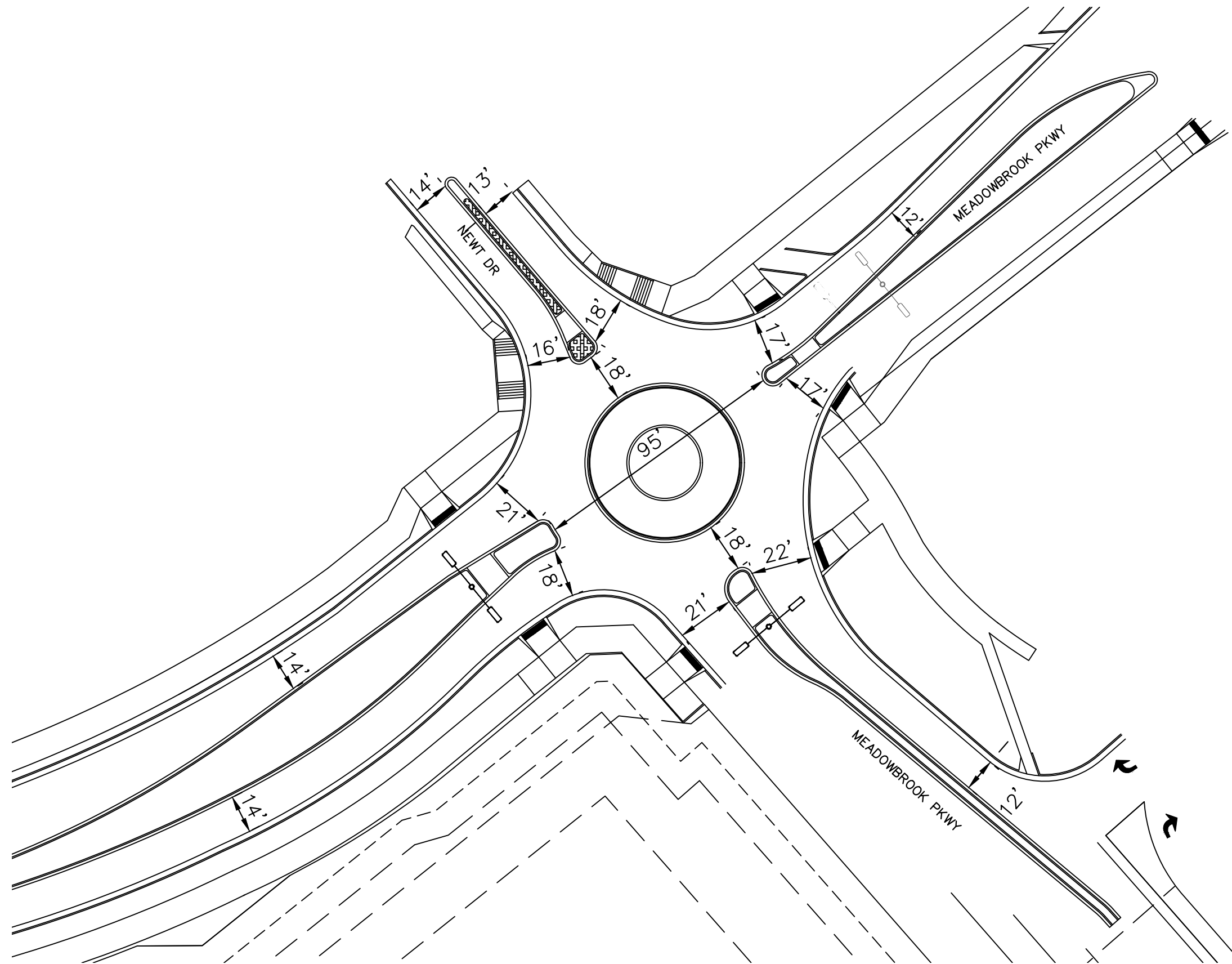
- 1**    **TITLE SHEET**
- 2**    **ROUNDABOUT LAYOUT**
- 3**    **VEHICLE PATH - DESIGN VEHICLE WB-50**
- 4**    **VEHICLE PATH - DESIGN VEHICLE WB-50**
- 5**    **VEHICLE PATH - DESIGN VEHICLE WB-50**
- 6**    **VEHICLE PATH - DESIGN VEHICLE WB-50**
- 7**    **VEHICLE PATH - DESIGN VEHICLE WB-67**
- 8**    **VEHICLE PATH - DESIGN VEHICLE WB-67**
- 9**    **VEHICLE PATH - DESIGN VEHICLE WB-67**
- 10**    **VEHICLE PATH - DESIGN VEHICLE WB-67**
- 11**    **EB FASTEST PATH**
- 12**    **SB FASTEST PATH**
- 13**    **WB FASTEST PATH**
- 14**    **NB FASTEST PATH**
- 15**    **TYPICAL SECTIONS**



**LOCATION MAP**







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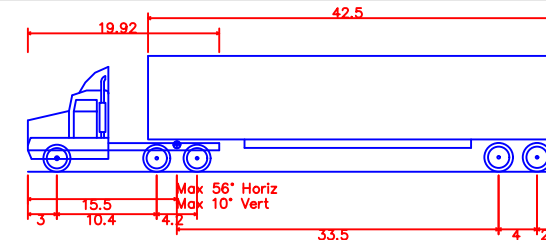
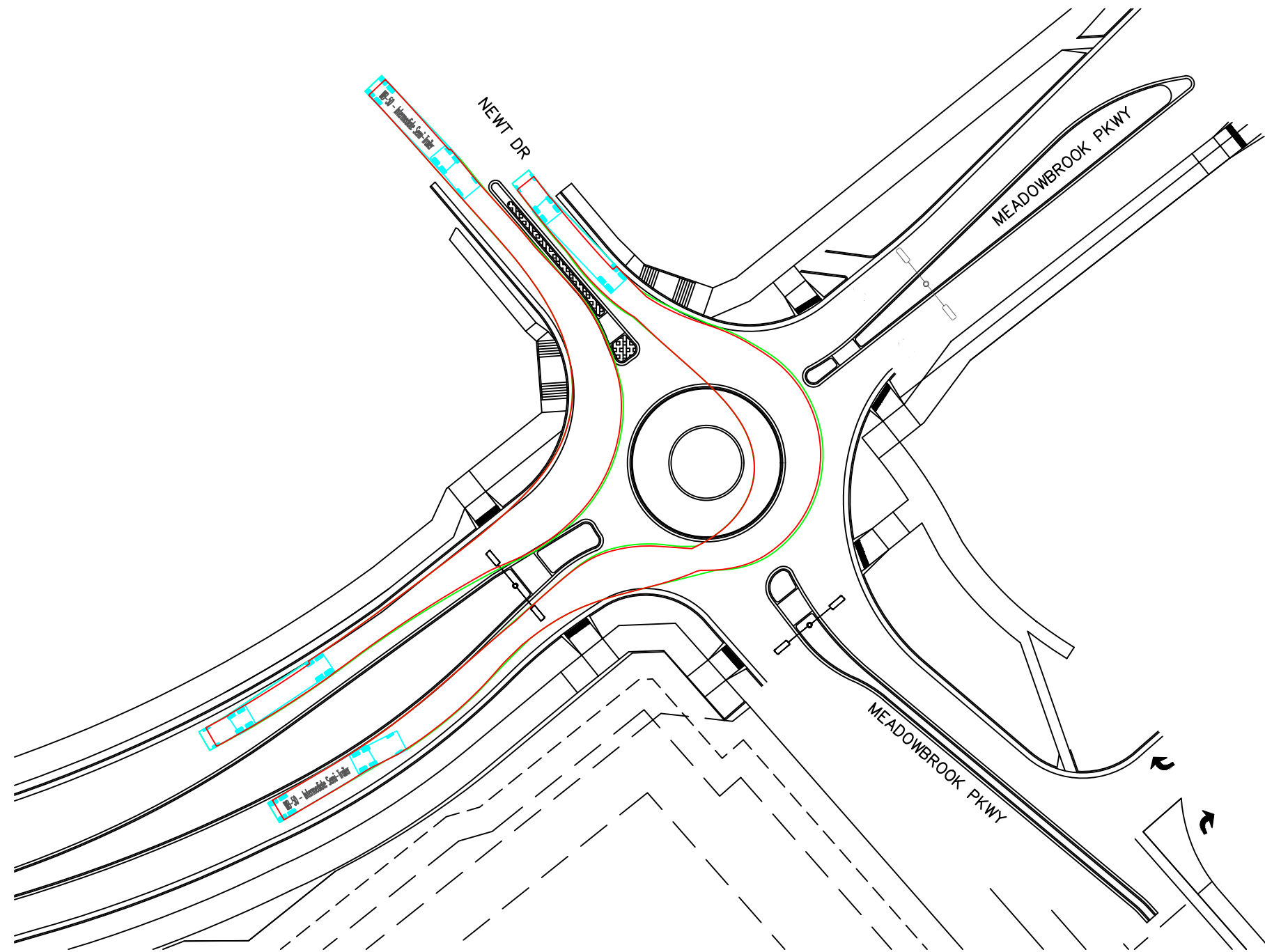
# MEADOWBROOK PARKWAY ROUNDABOUT

## ROUNDABOUT OVERVIEW



EXHIBIT:

2



WB-50 - Intermediate Semi-Trailer	
Overall Length	55.00ft
Overall Width	8.50ft
Overall Body Height	12.052ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	17.90°

LEGEND:

- TRUCK TIRE TRACKING OFFSET
- TRUCK BODY TRACKING OFFSET



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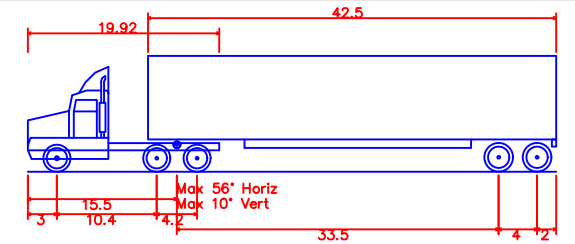
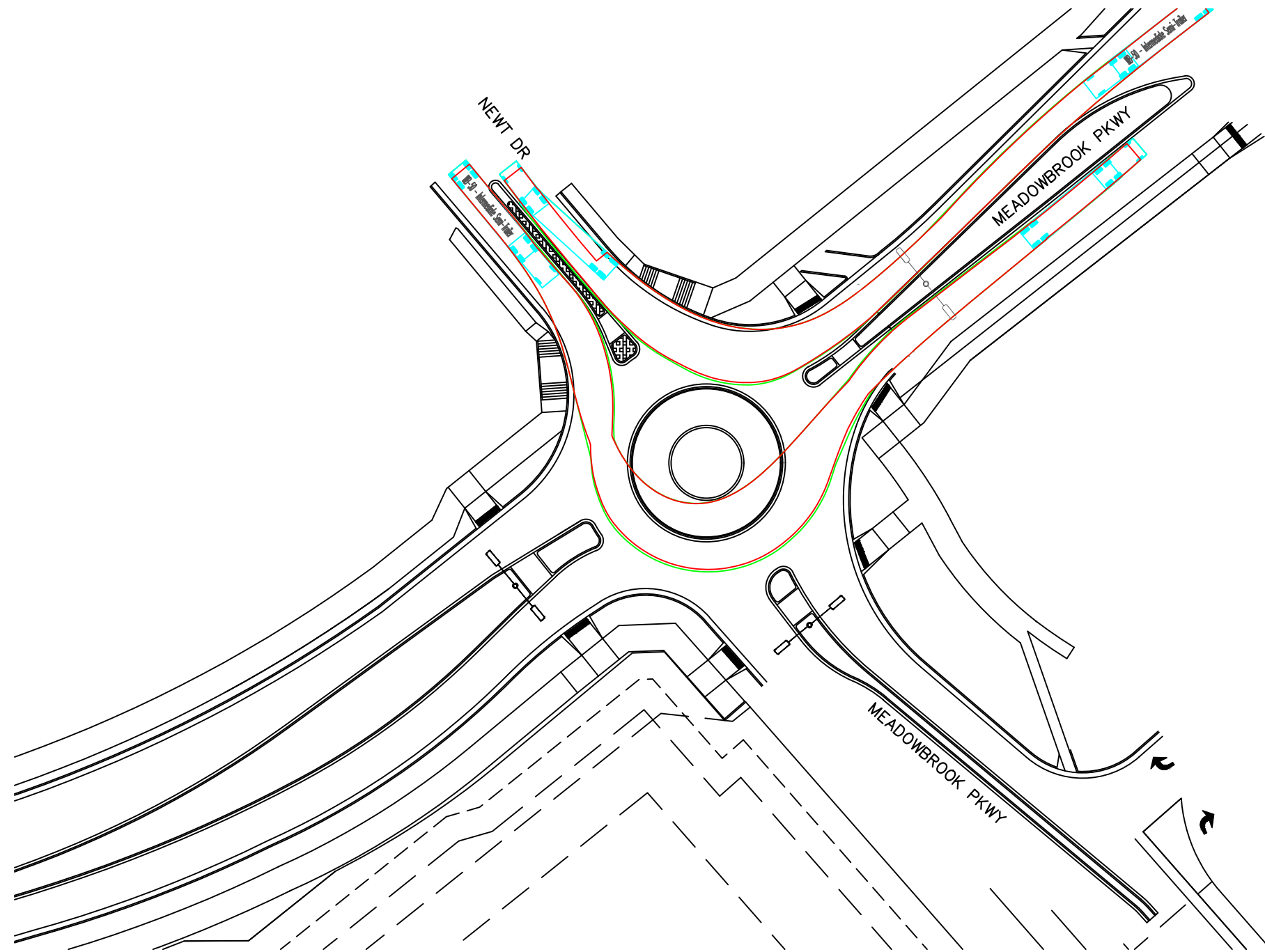
## MEADOWBROOK PARKWAY ROUNDABOUT

VEHICLE PATH - DESIGN VEHICLE: WB-50



EXHIBIT:

3



WB-50 - Intermediate Semi-Trailer	
Overall Length	55.00ft
Overall Width	8.50ft
Overall Body Height	12.052ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
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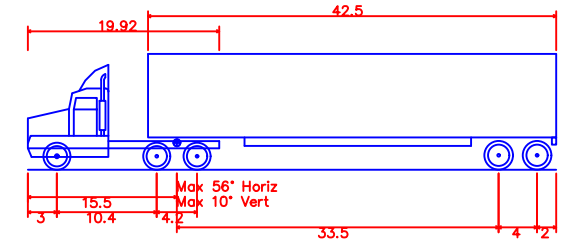
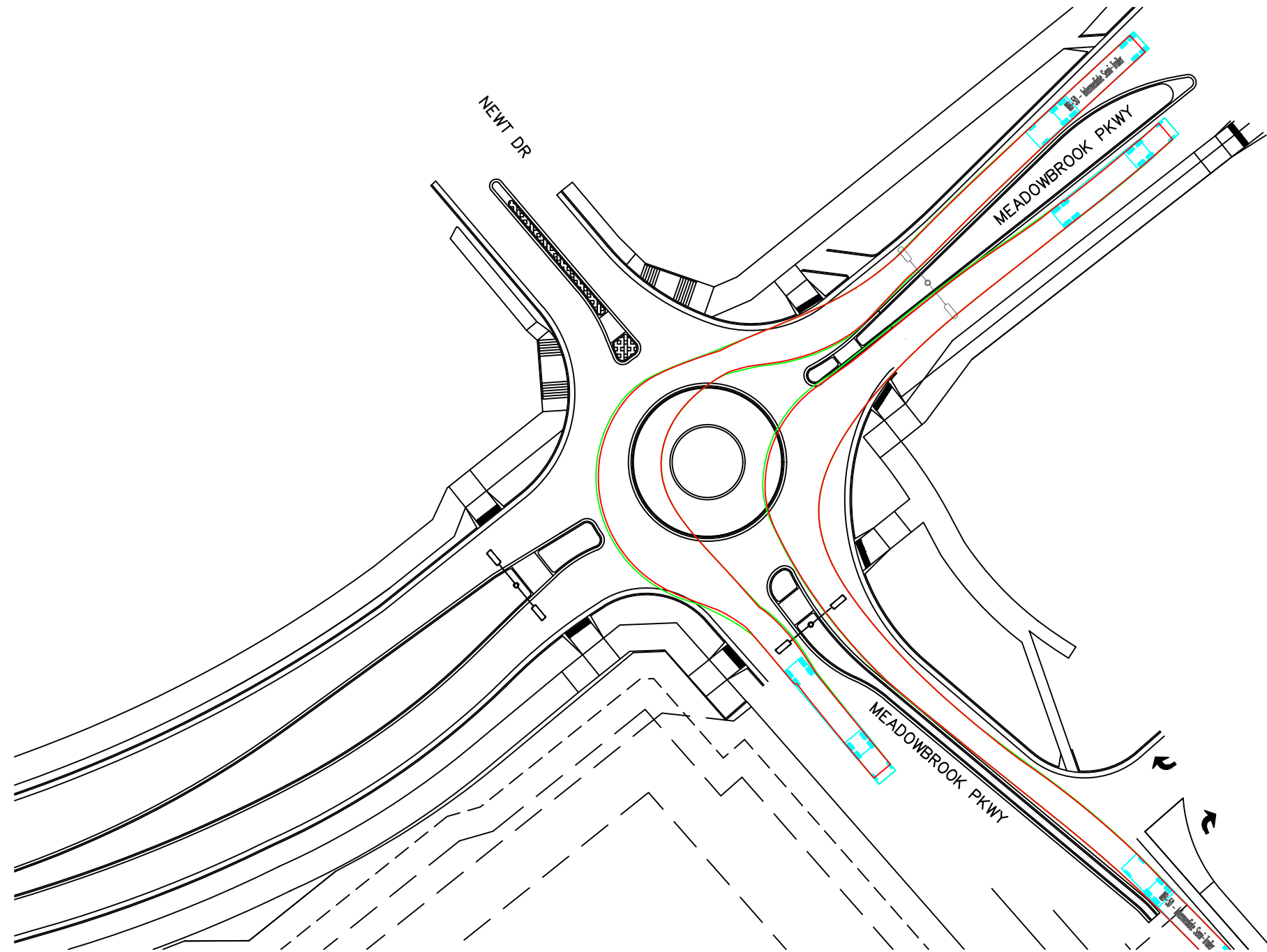
## MEADOWBROOK PARKWAY ROUNDABOUT

VEHICLE PATH - DESIGN VEHICLE: WB-50



EXHIBIT:

4



WB-50 - Intermediate Semi-Trailer	
Overall Length	55.00ft
Overall Width	8.50ft
Overall Body Height	12.05ft
Min Body Ground Clearance	1.33ft
Max Track Width	8.50ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	17.90°

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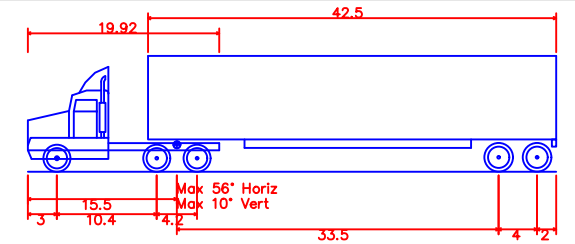
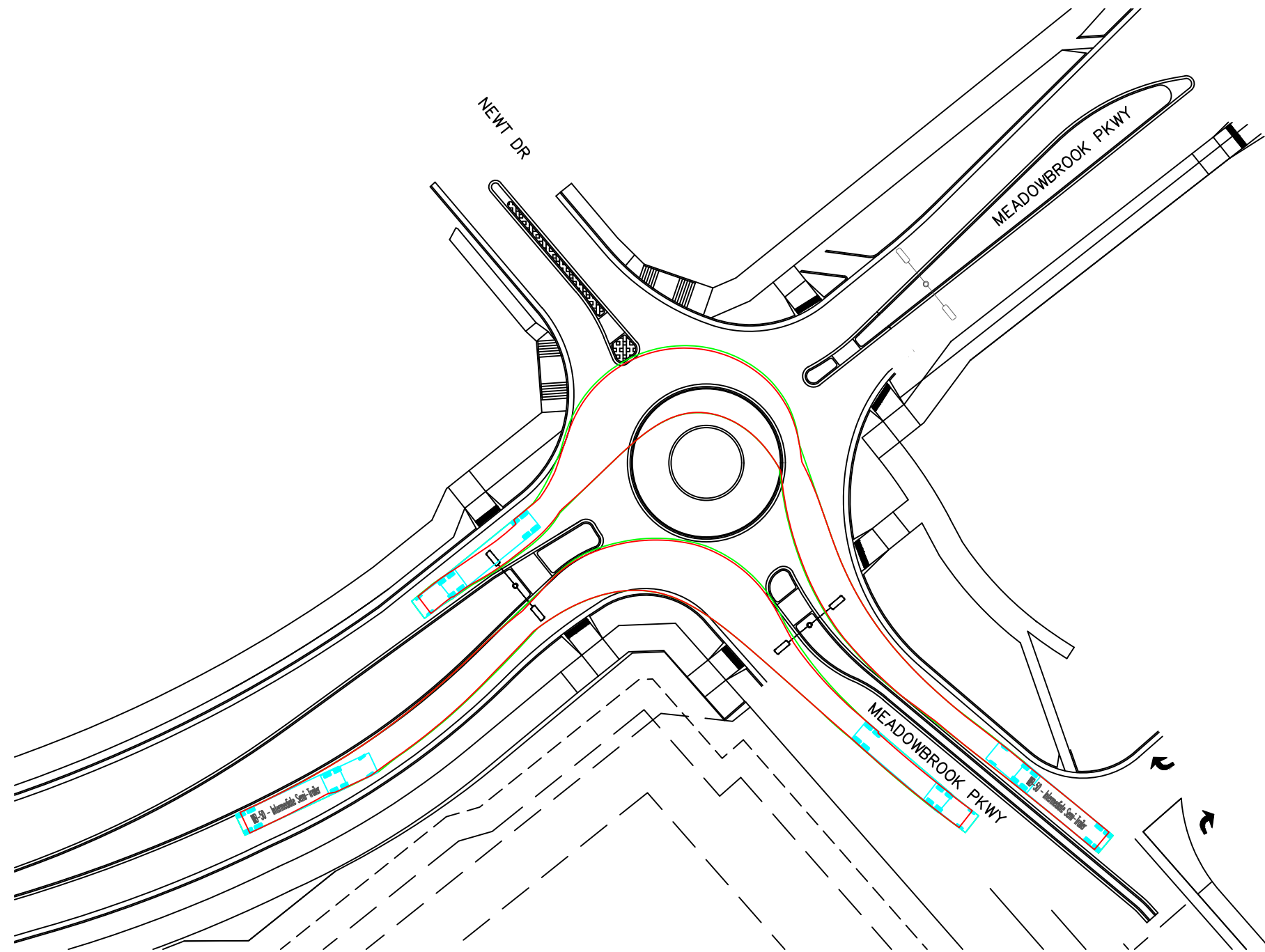
VEHICLE PATH - DESIGN VEHICLE: WB-50



EXHIBIT:

5





WB-50 - Intermediate Semi-Trailer	
Overall Length	55.00ft
Overall Width	8.50ft
Overall Body Height	12.052ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	17.90°

LEGEND:

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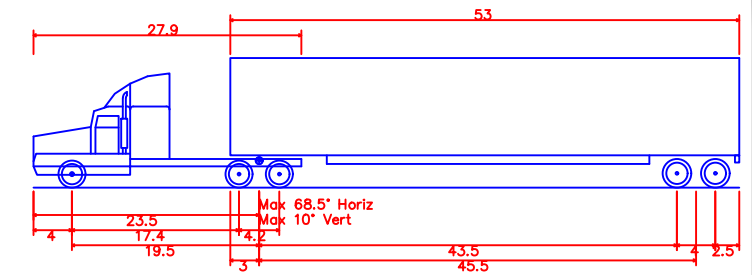
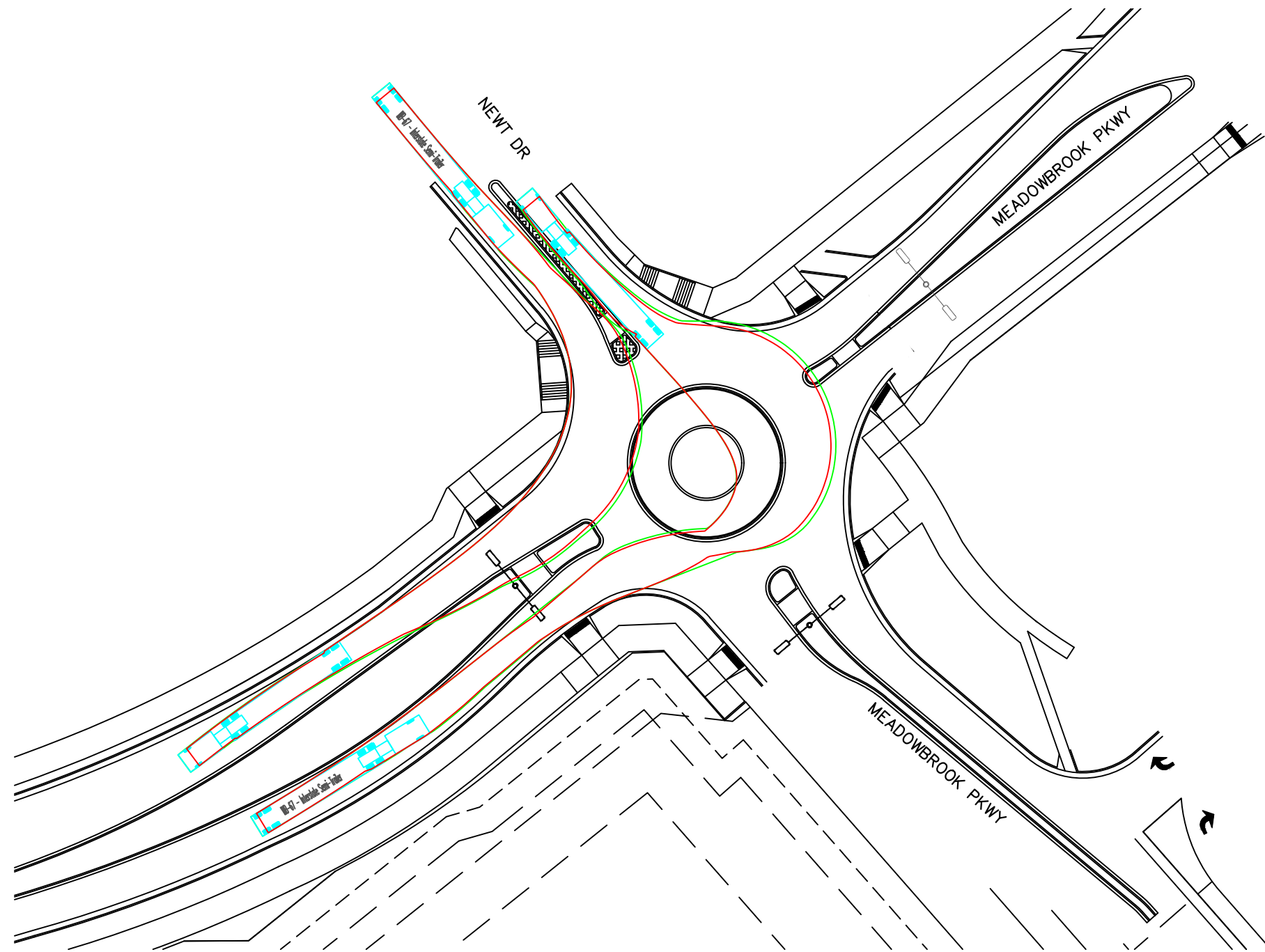
## MEADOWBROOK PARKWAY ROUNDABOUT

VEHICLE PATH - DESIGN VEHICLE: WB-50



EXHIBIT:

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WB-67 - Interstate Semi-Trailer	73.501ft
Overall Length	73.501ft
Overall Width	8.500ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	28.40°

LEGEND:

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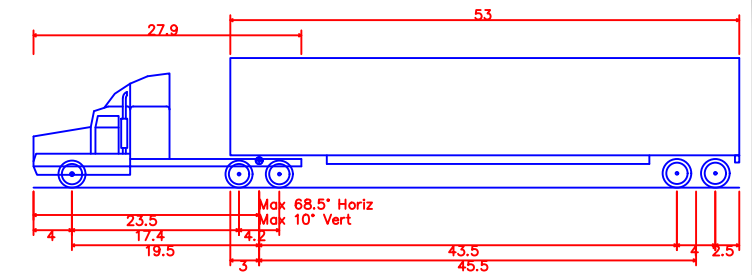
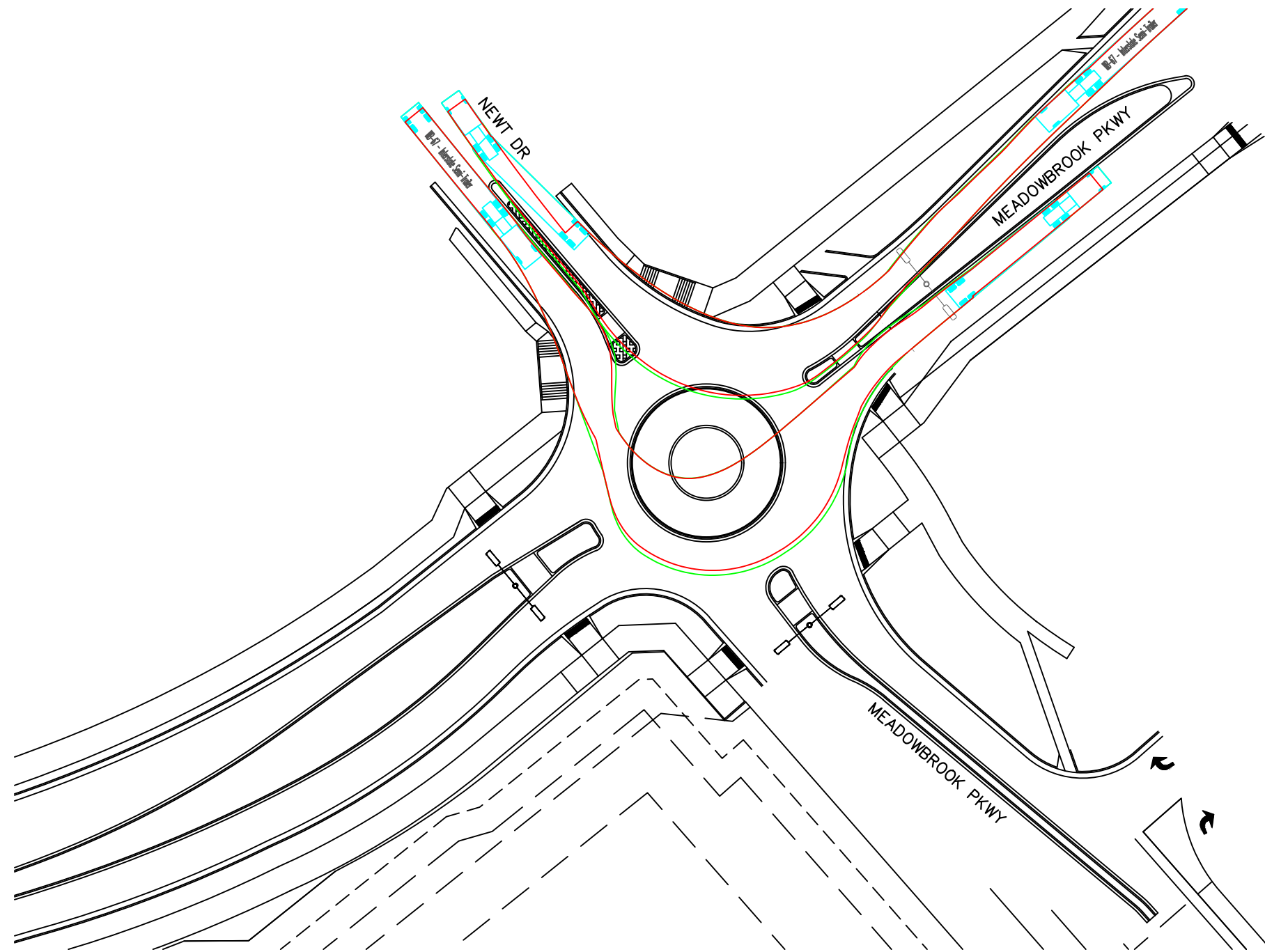
## MEADOWBROOK PARKWAY ROUNDABOUT

VEHICLE PATH - DESIGN VEHICLE: WB-67



EXHIBIT:

7



WB-67 - Interstate Semi-Trailer	73.501ft
Overall Length	73.501ft
Overall Width	8.500ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	28.40°

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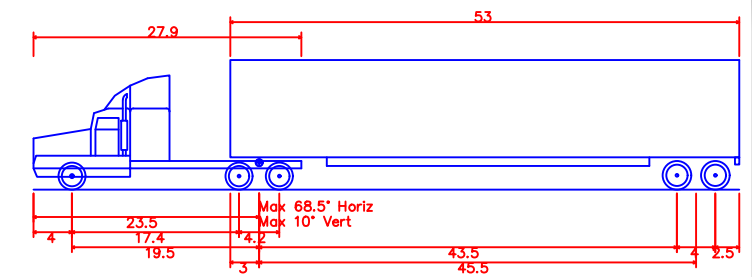
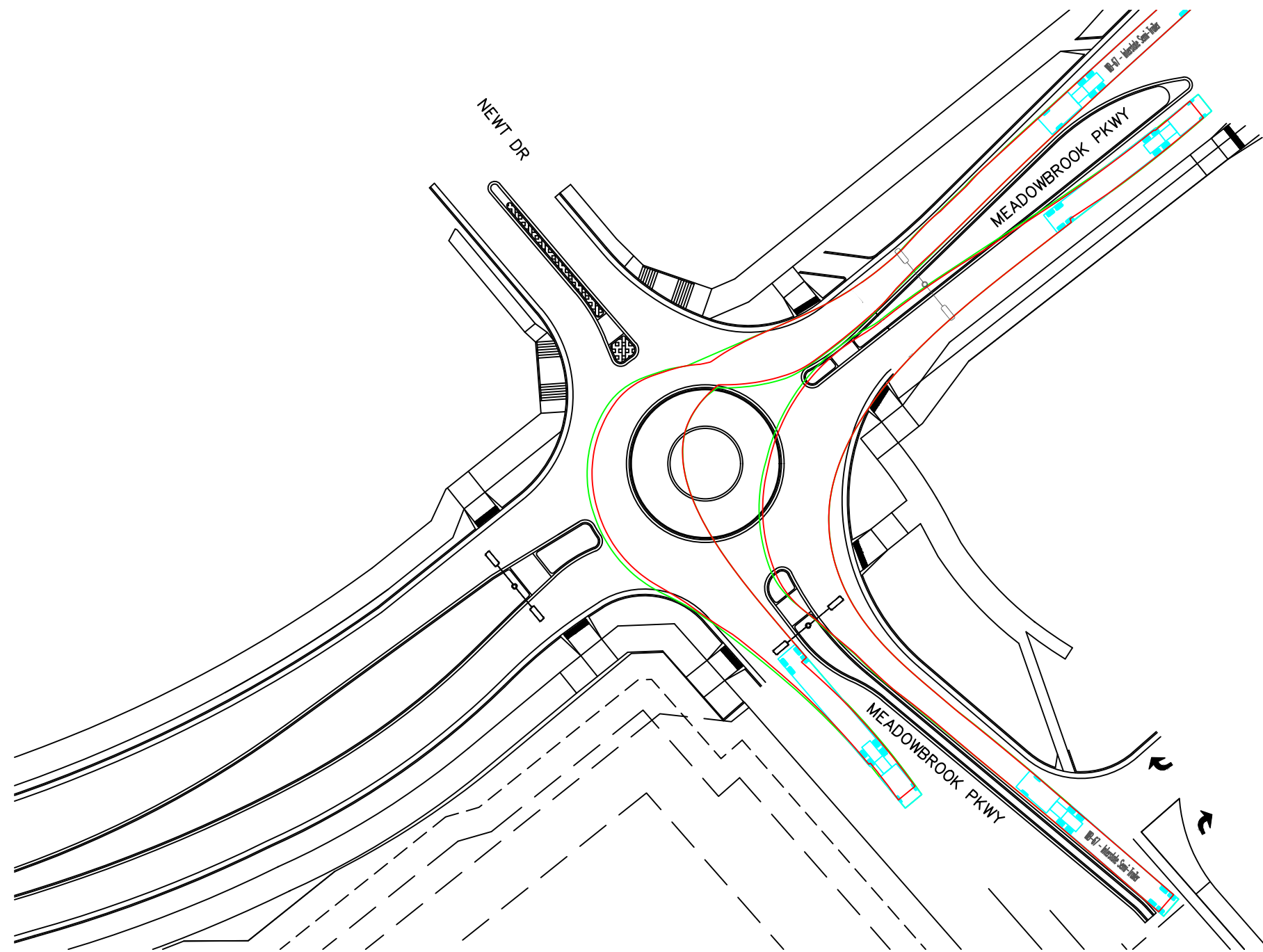
# MEADOWBROOK PARKWAY ROUNDABOUT

VEHICLE PATH - DESIGN VEHICLE: WB-67



EXHIBIT:

8



WB-67 - Interstate Semi-Trailer	73.501ft
Overall Length	73.501ft
Overall Width	8.500ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	28.40°

LEGEND:

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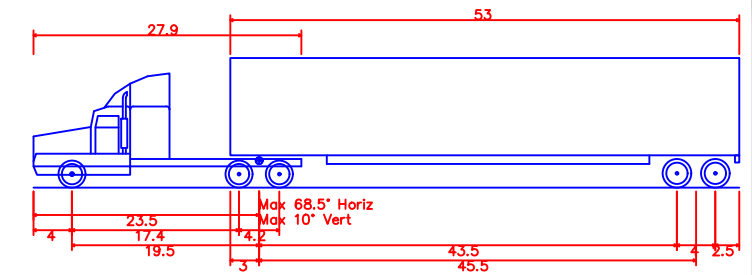
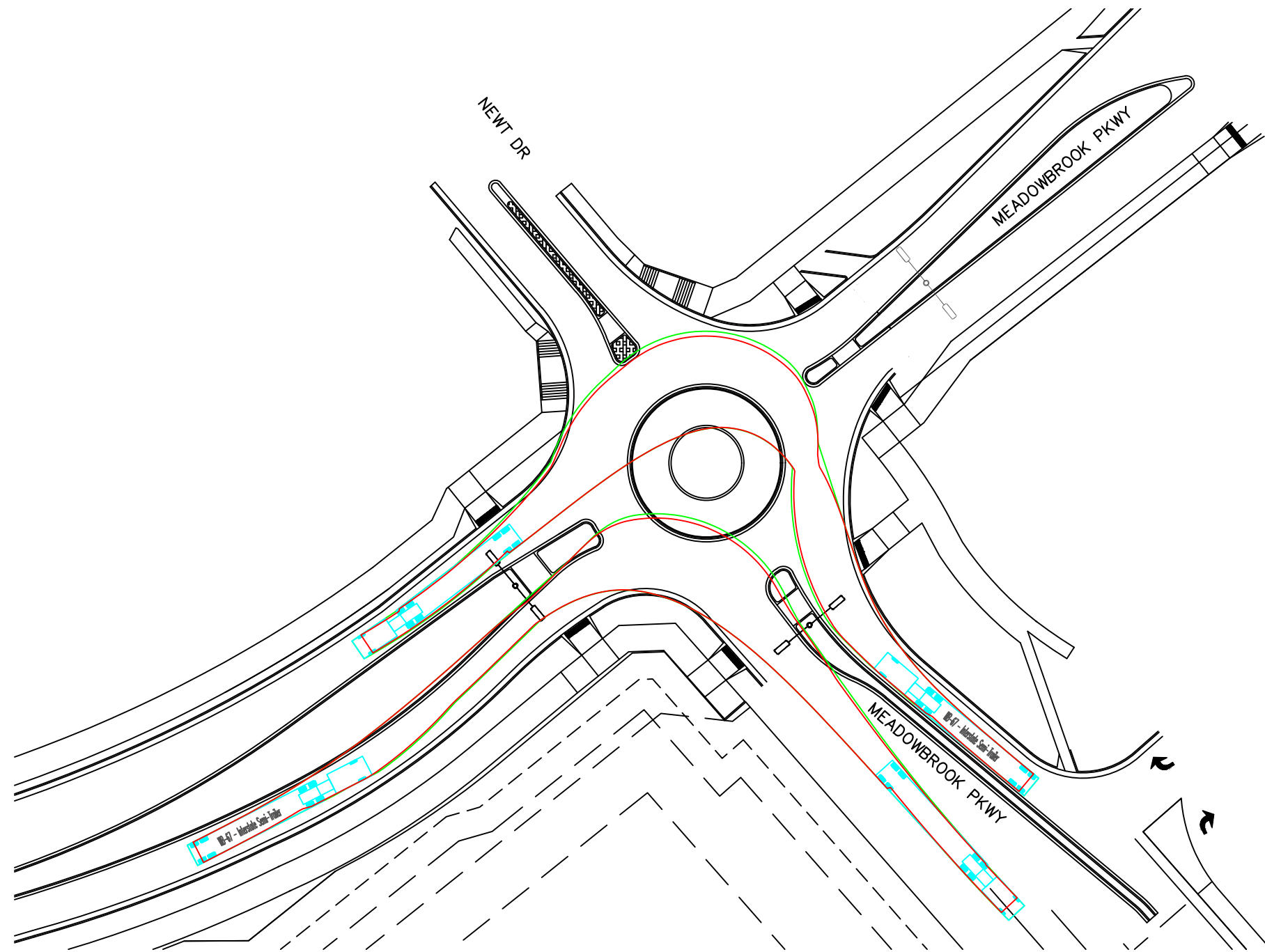
VEHICLE PATH - DESIGN VEHICLE: WB-67



EXHIBIT:

9





WB-67 - Interstate Semi-Trailer	73.501ft
Overall Length	73.501ft
Overall Width	8.500ft
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