

Roundabout Design Report





November 10, 2017

Mr. Jeff Mark
The Landhuis Company
212 N. Wahsatch Avenue, Suite 301
Colorado Springs, CO 80903

Re: Lorson Ranch East
Roundabout Report
El Paso County, CO
LSC #164360

Dear Mr. Mark:

We are pleased to submit this roundabout design report for the intersection of Fontaine Boulevard and Lamprey Drive in El Paso County, Colorado.

Roundabout Layout

Figure 1 shows the conceptual roundabout design parameters. The overall diameter is 150 feet and the entry angles are between 31 and 34 degrees on each of the approaches.

Design Vehicle

Figures 2 through 5 show WB-50 truck paths through the proposed roundabout for the various approaches. A minimum of one foot of clearance is maintained between all wheel paths and vertical curbs.

Figure 6 shows a WB-67 truck path through the proposed roundabout. Many movements will likely traverse over the outside curb or into the center or splitter islands. A larger truck apron should be considered to better accommodate the occasional WB-67.

Design Speeds

Figures 7 through 10 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 *Roundabout Informational Guide* (NCHRP 672). The fastest entry path should generally be no more than about 25 mph for single-lane approaches and 30 mph for two-lane approaches. The fastest entry path for each of the four approaches meets this criteria.

Has it been revised?

15.5 and 17 per FDM 30.5.23

Pedestrian Safety and Accessibility

Pedestrian crossings with pedestrian refuge areas on the splitter islands have been provided on all four approaches. The *Roundabout Informational Guide* (NCHRP 672) gives recommendations for placement and design of pedestrian crossings. The recommendations given in the *Roundabout Informational Guide* (NCHRP 672) 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 ten 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 specific design will be determined as part of the construction plans.

Sight Distance

Figure 11 shows the areas that should remain free of obstacles that would limit sight distance for vehicles, bicycles, and pedestrians.

Address sight distance control/clear sight window limits.

Bike Lanes

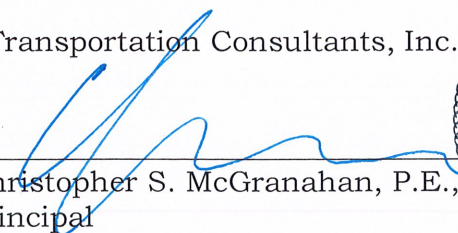
There are on-street bike lanes proposed along Fontaine Boulevard. As on-street cyclists approach the roundabout, they will enter the vehicle lane and traverse the roundabout as a vehicle or use the bike lane ramps to exit the bike lane onto the adjacent multi-use path and traverse the roundabout as a pedestrian.

* * * * *

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., P.C.E.
Principal



11-10-17

CSM/wc

Enclosures: Figures 1 - 11

Y:\LSC\Projects\2016\164360-LorsonRanch\RoundaboutReport-111017.wpd

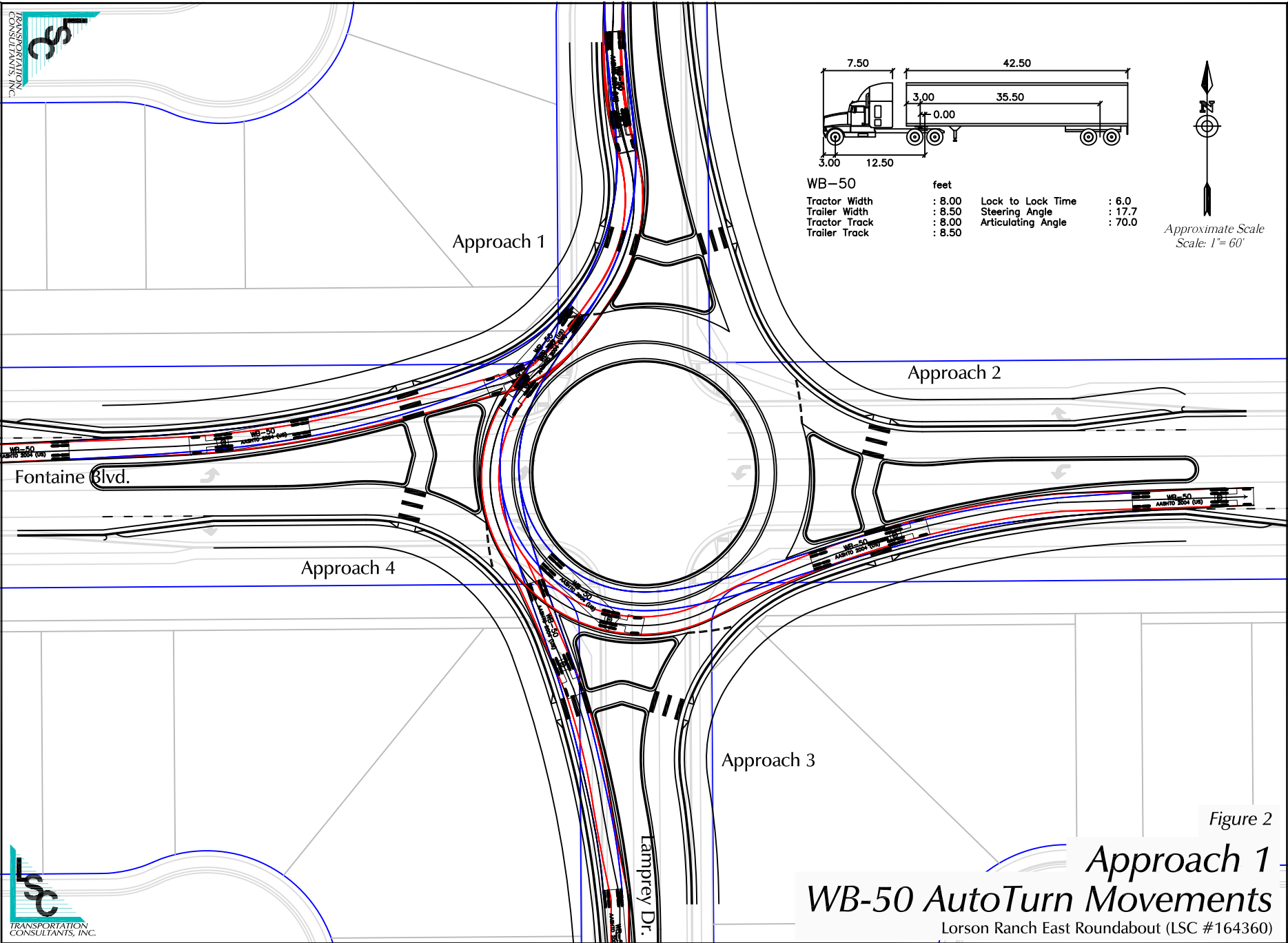


Figure 2

Approach 1
WB-50 AutoTurn Movements
Lorson Ranch East Roundabout (LSC #164360)

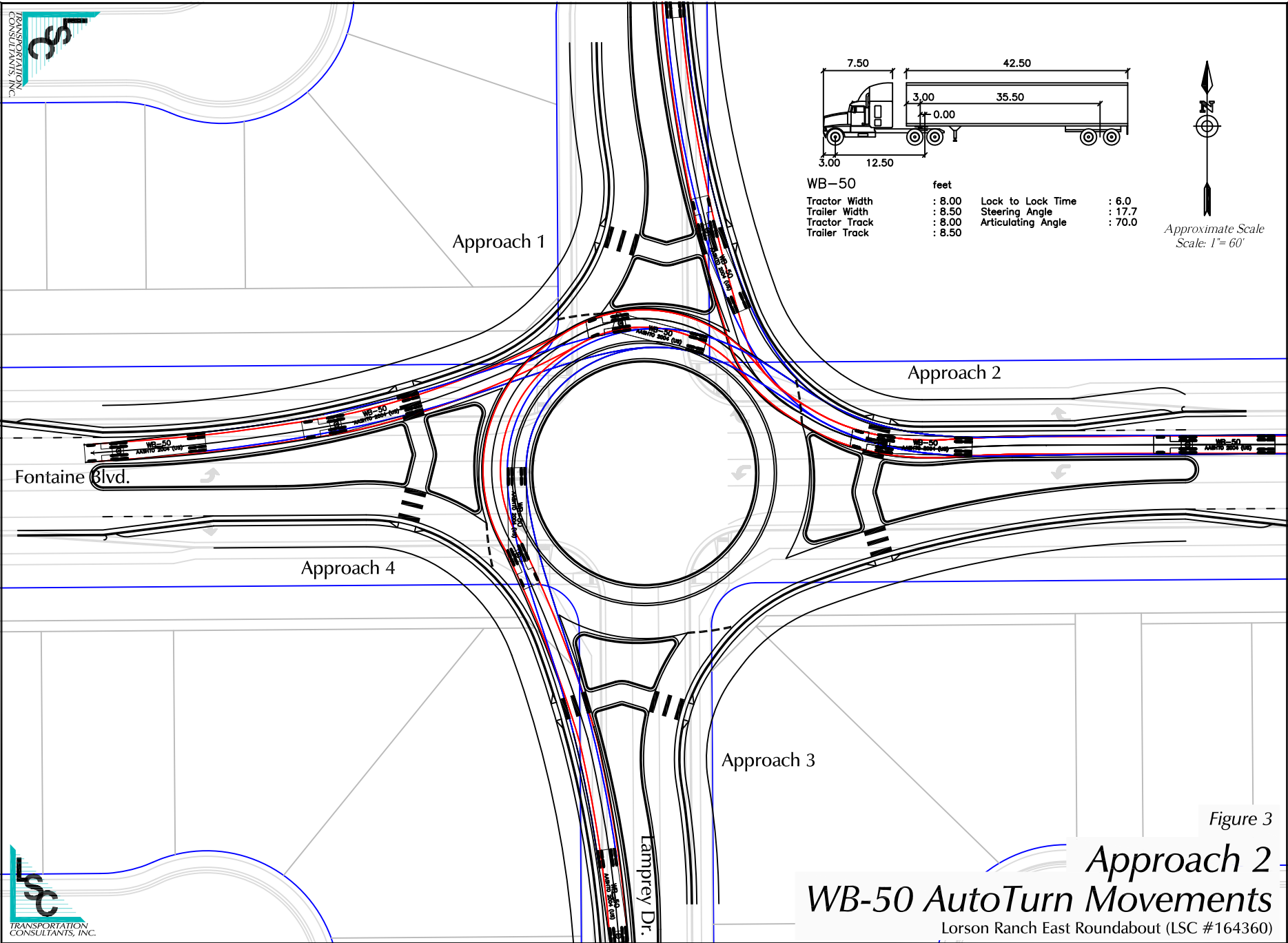


Figure 3

Approach 2
WB-50 AutoTurn Movements
Lorson Ranch East Roundabout (LSC #164360)

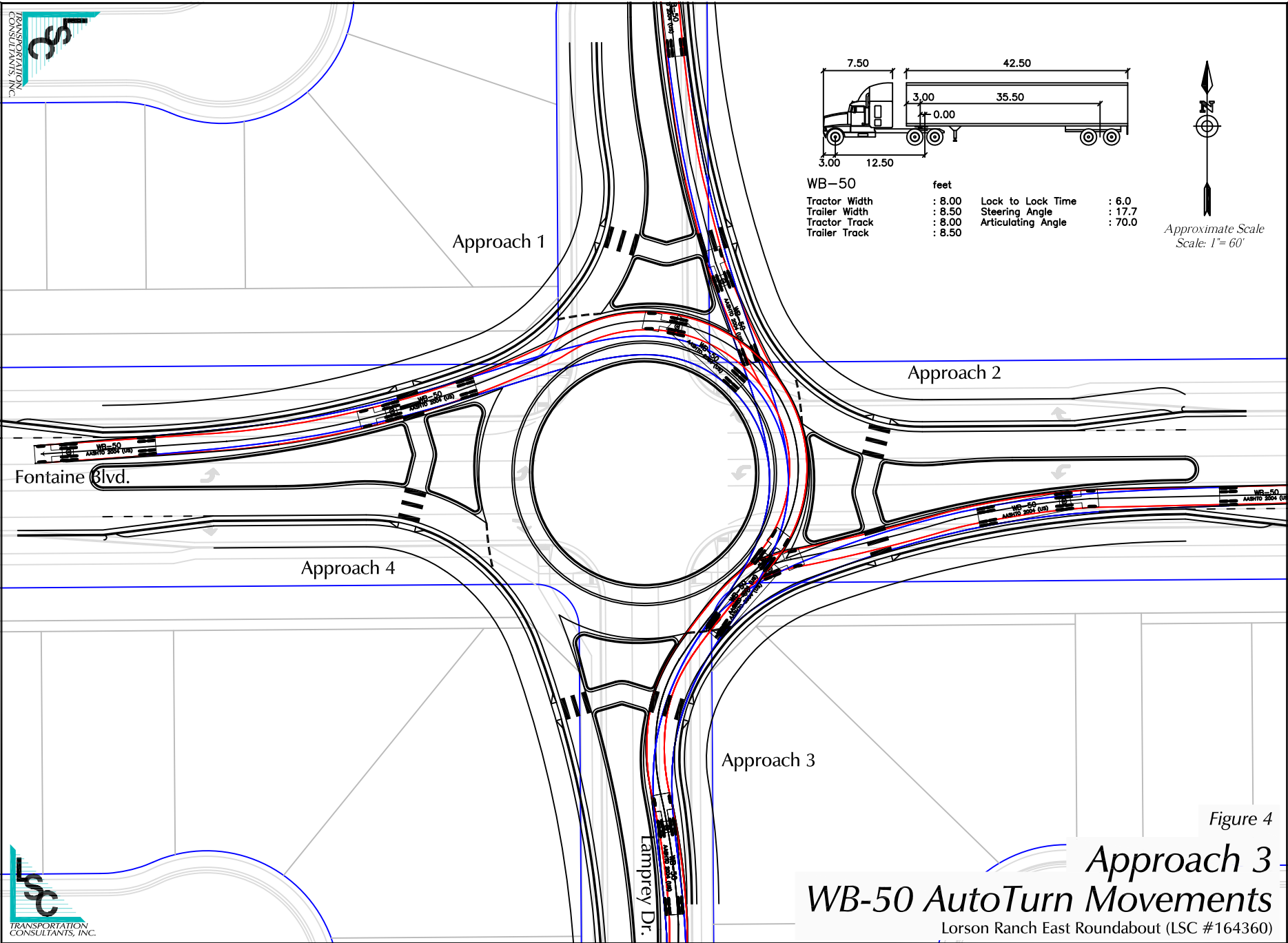
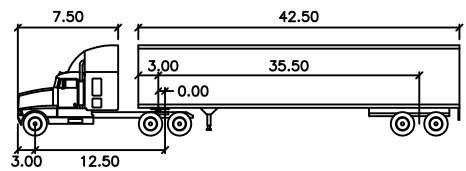


Figure 4

Approach 3
WB-50 AutoTurn Movements
Lorson Ranch East Roundabout (LSC #164360)



WB-50		feet	
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

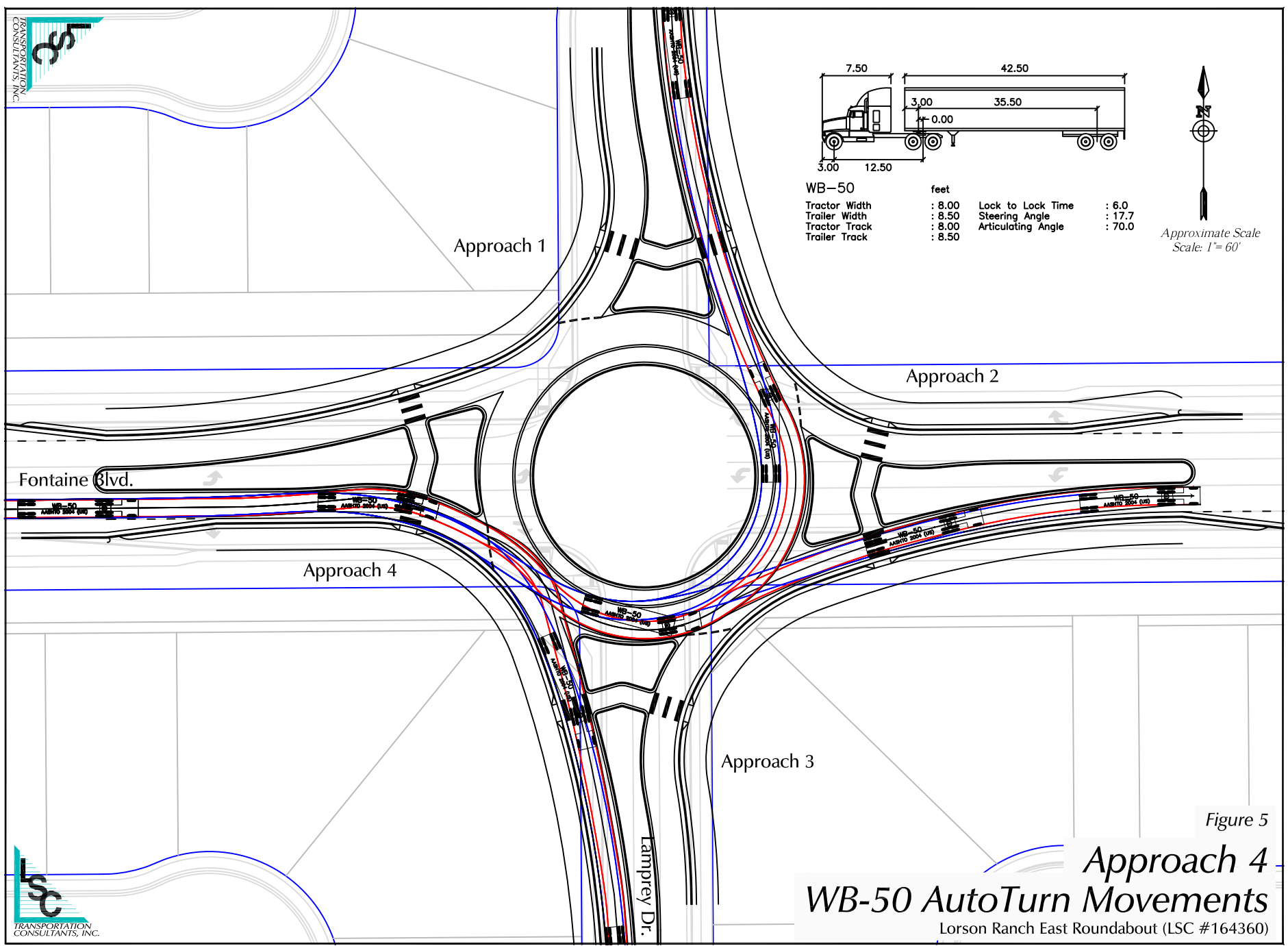
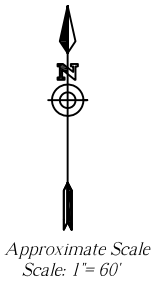
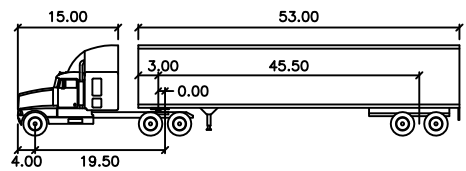
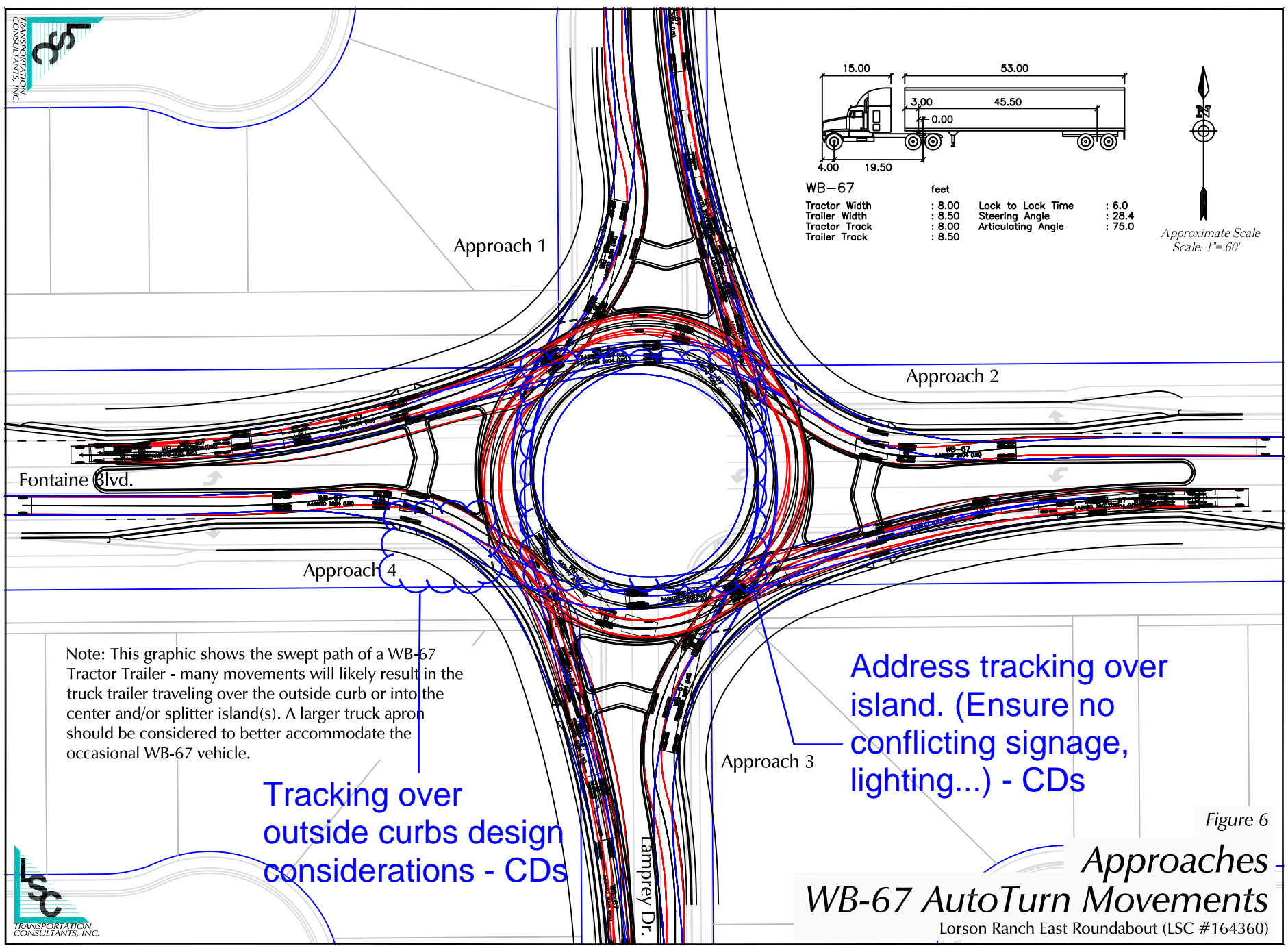
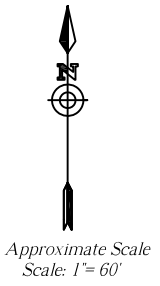


Figure 5
Approach 4
WB-50 AutoTurn Movements
Lorson Ranch East Roundabout (LSC #164360)



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		



Note: This graphic shows the swept path of a WB-67 Tractor Trailer - many movements will likely result in the truck trailer traveling over the outside curb or into the center and/or splitter island(s). A larger truck apron should be considered to better accommodate the occasional WB-67 vehicle.

Tracking over outside curbs design considerations - CDs

Address tracking over island. (Ensure no conflicting signage, lighting...) - CDs

Figure 6

Approaches
WB-67 AutoTurn Movements
Lorson Ranch East Roundabout (LSC #164360)



Approximate Scale
Scale: 1" = 60'

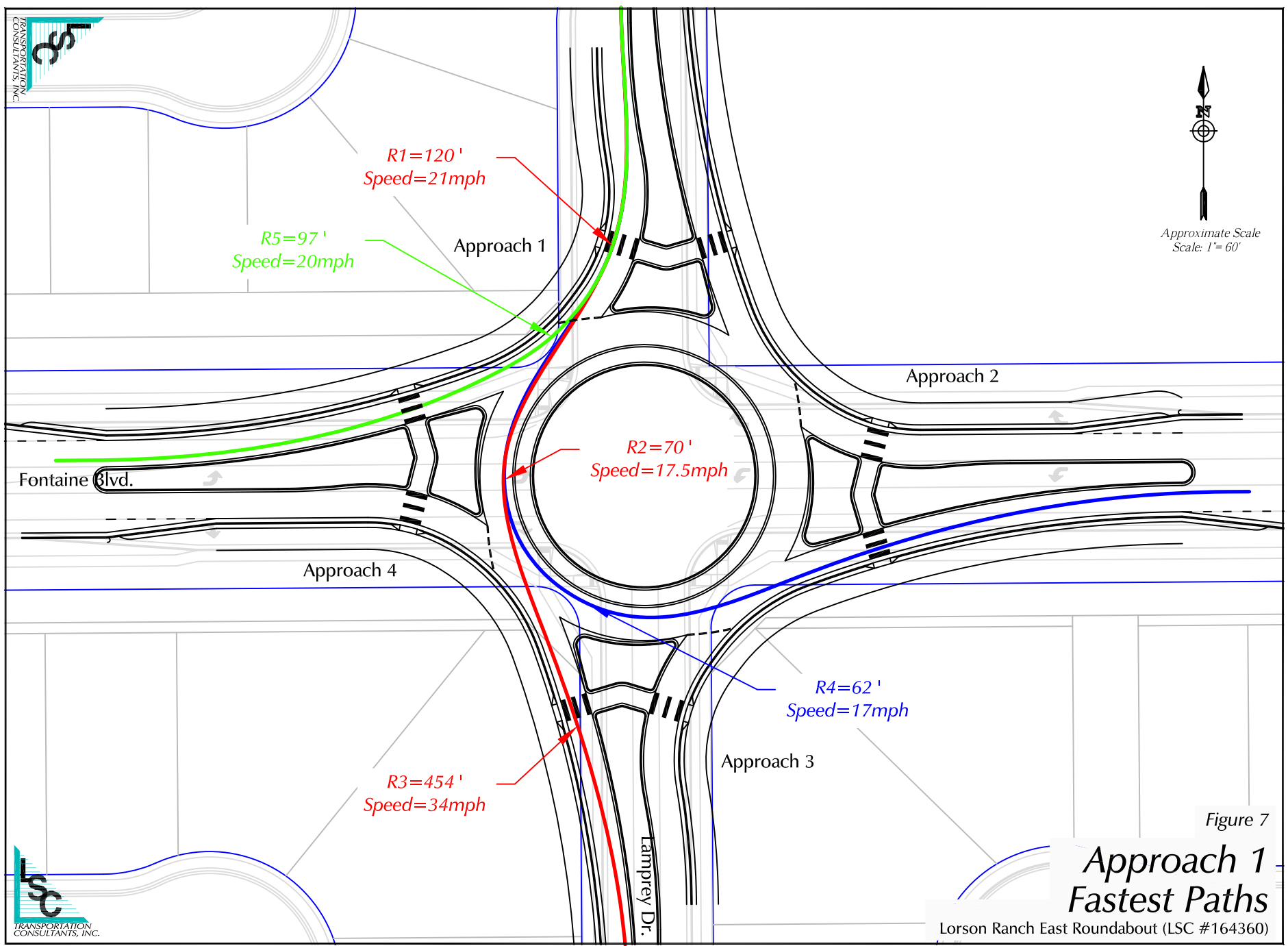


Figure 7

Approach 1 Fastest Paths

Lorson Ranch East Roundabout (LSC #164360)



Approximate Scale
Scale: 1" = 60'

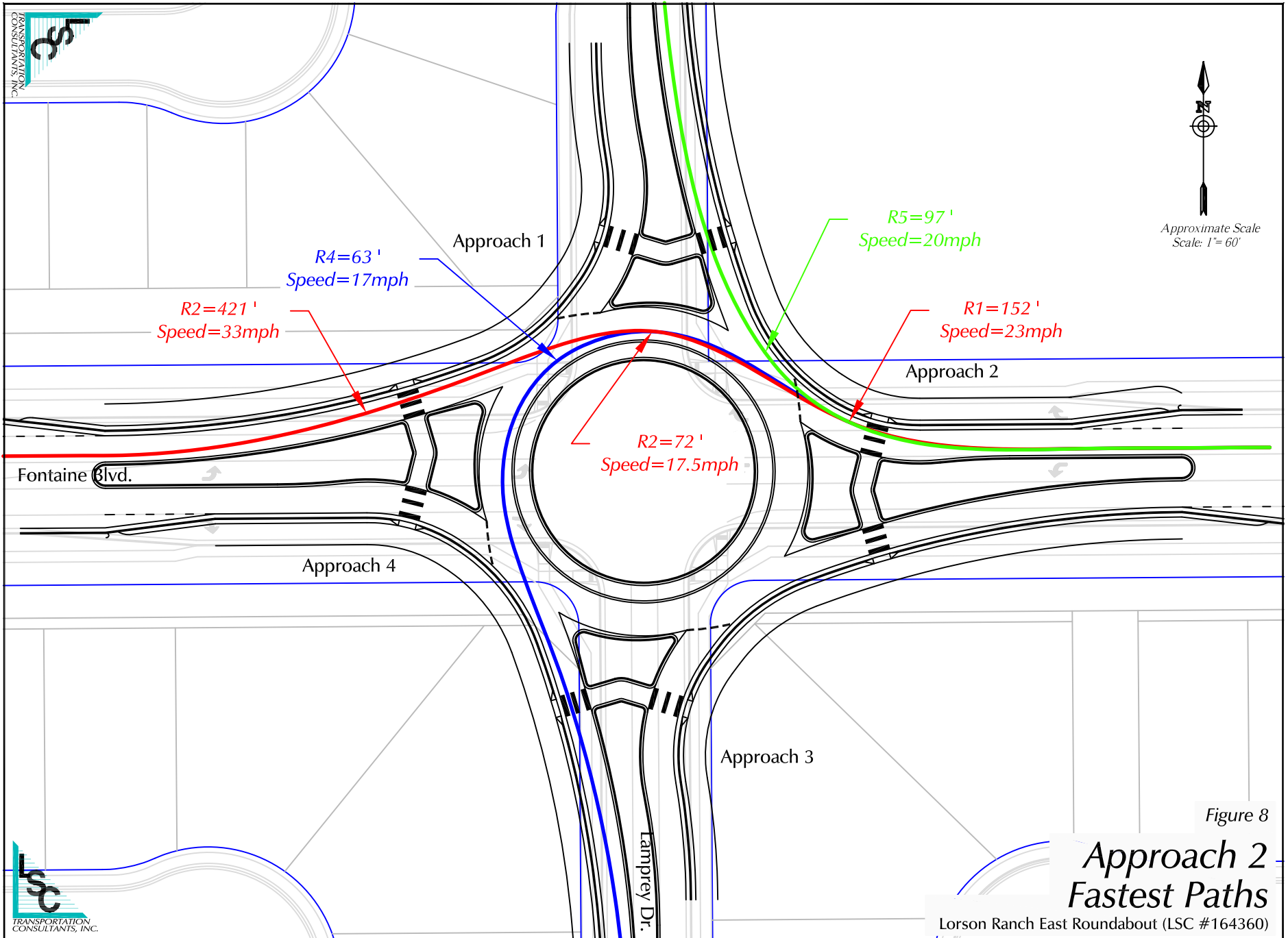


Figure 8

Approach 2 Fastest Paths

Lorson Ranch East Roundabout (LSC #164360)

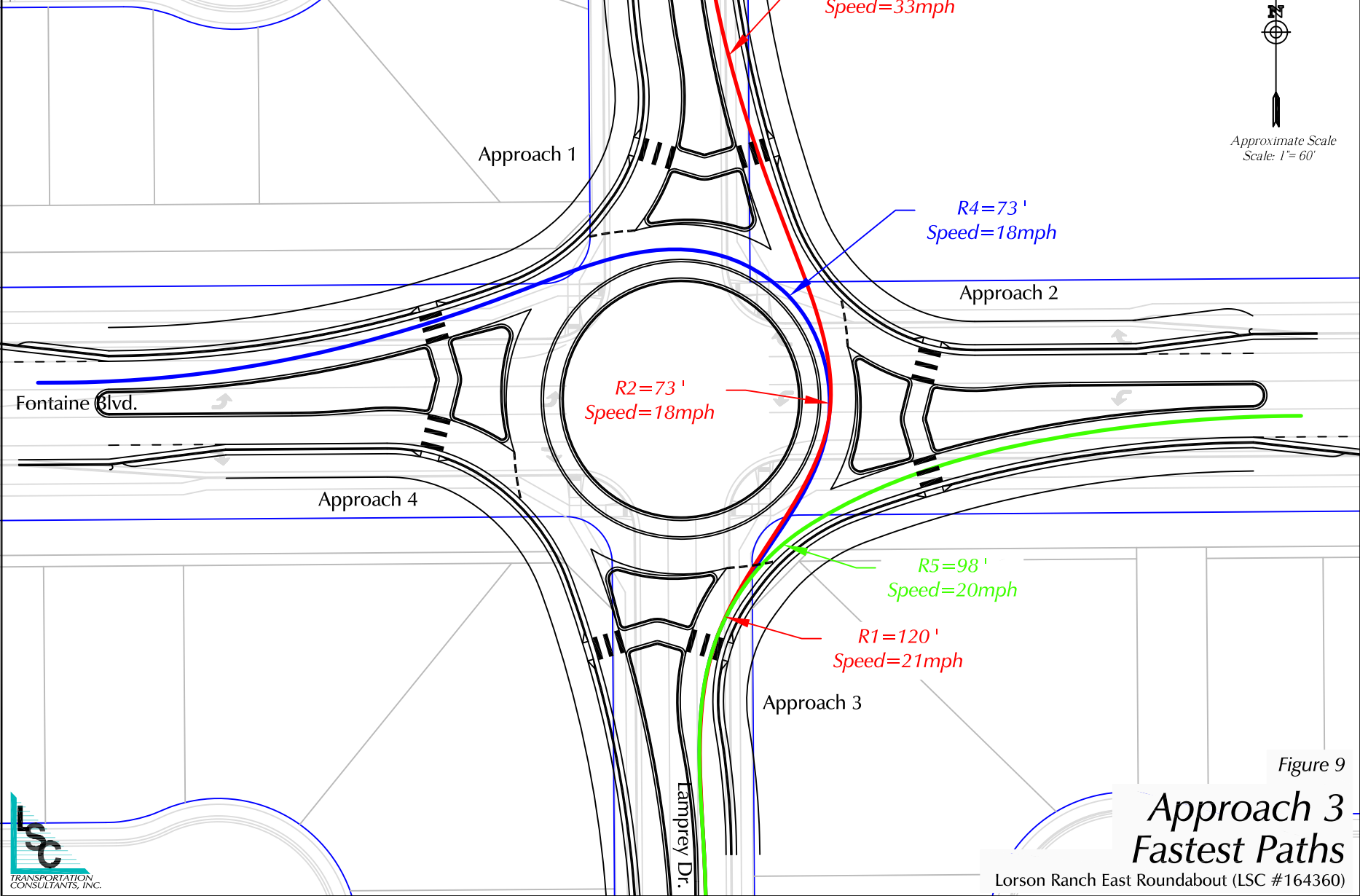


Figure 9

Approach 3 Fastest Paths

Lorson Ranch East Roundabout (LSC #164360)





Approximate Scale
Scale: 1" = 60'

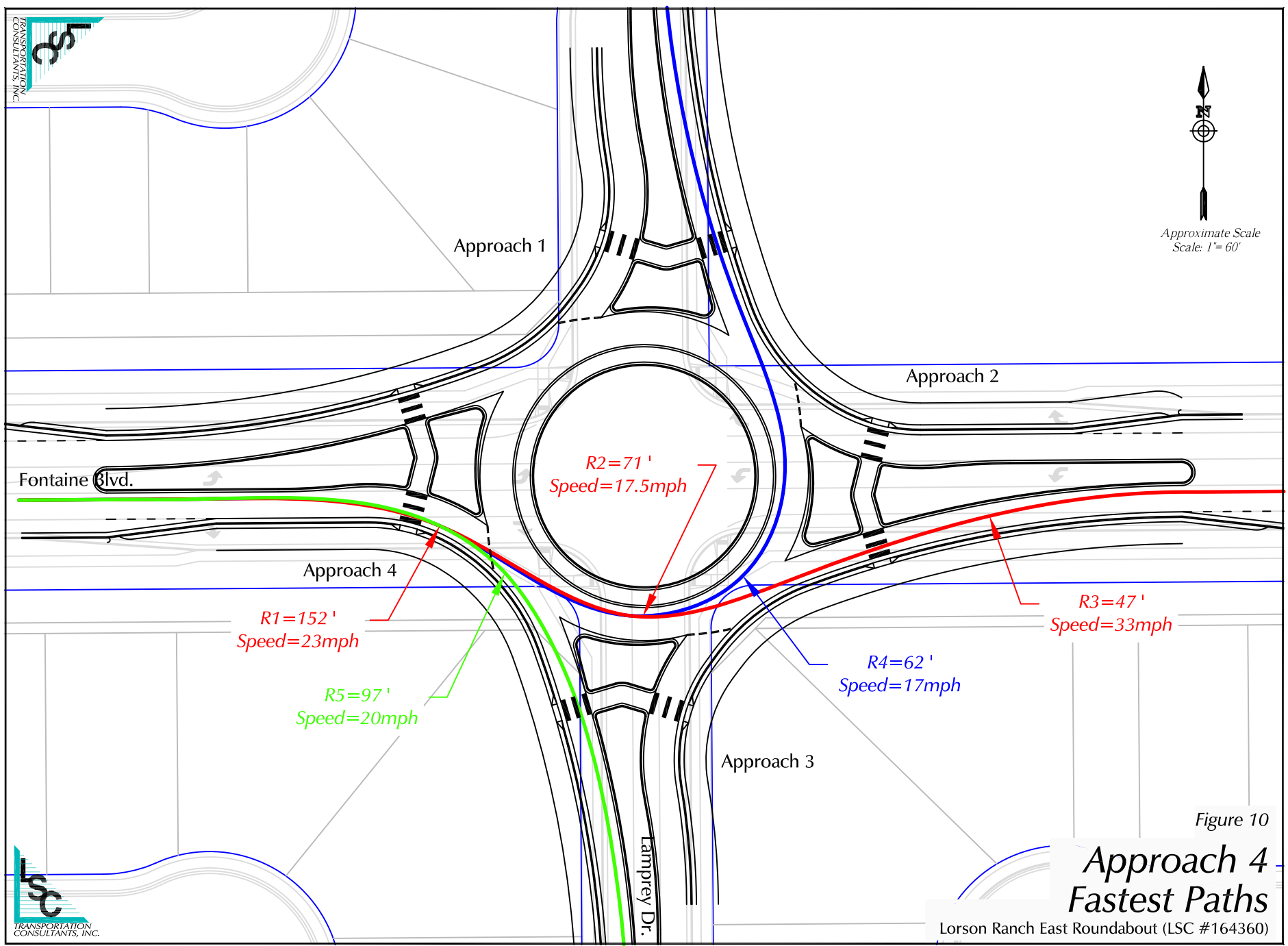
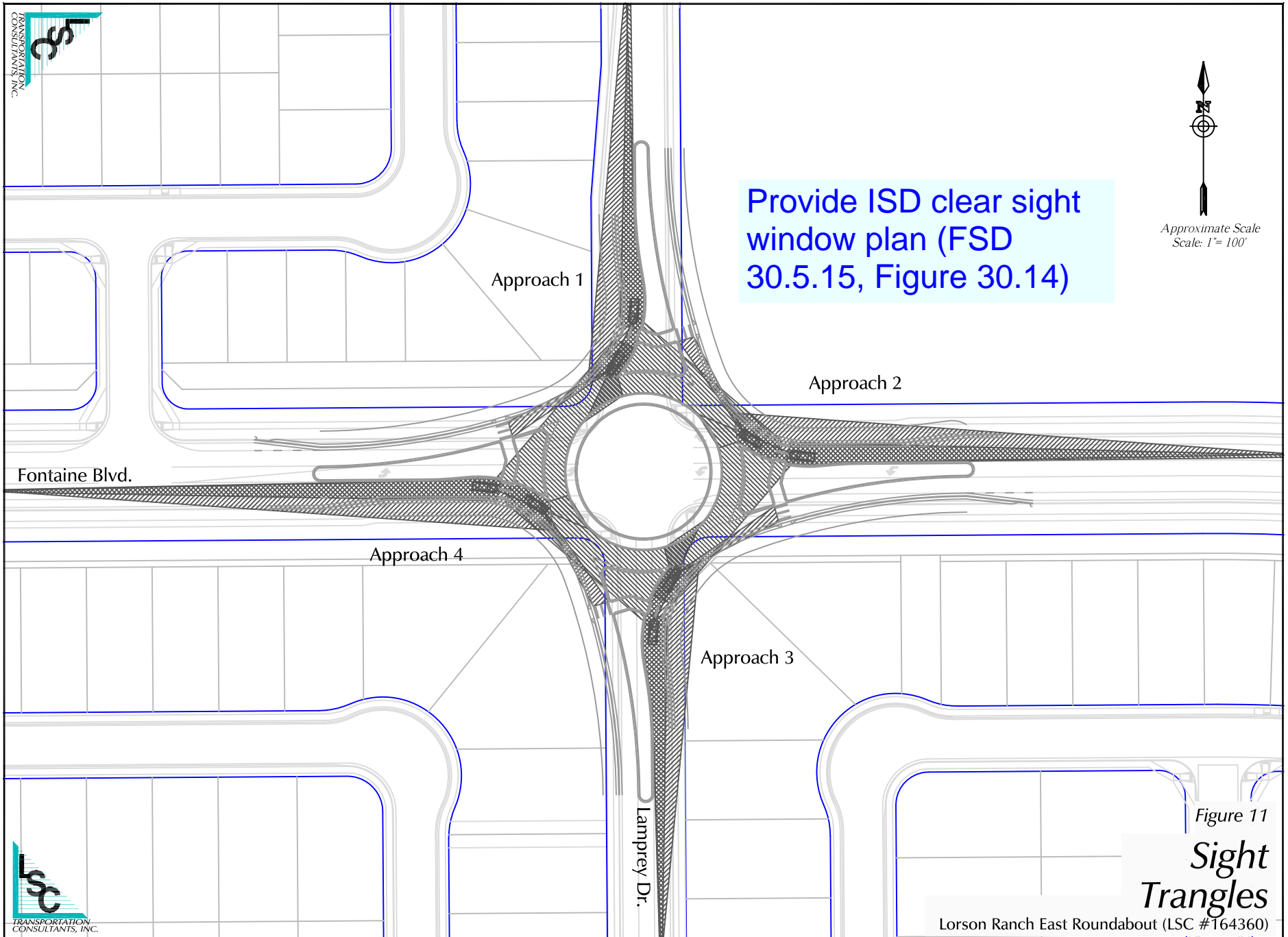


Figure 10

Approach 4 Fastest Paths

Lorson Ranch East Roundabout (LSC #164360)



Provide ISD clear sight window plan (FSD 30.5.15, Figure 30.14)

North Arrow
Approximate Scale
Scale: 1" = 100'

Fontaine Blvd.

Approach 1

Approach 2

Approach 4

Approach 3

Lamprey Dr.

Figure 11
**Sight
Triangles**

Lorson Ranch East Roundabout (LSC #164360)



Future Multi-Lane Design Exhibits





Approximate Scale
Scale: 1" = 60'

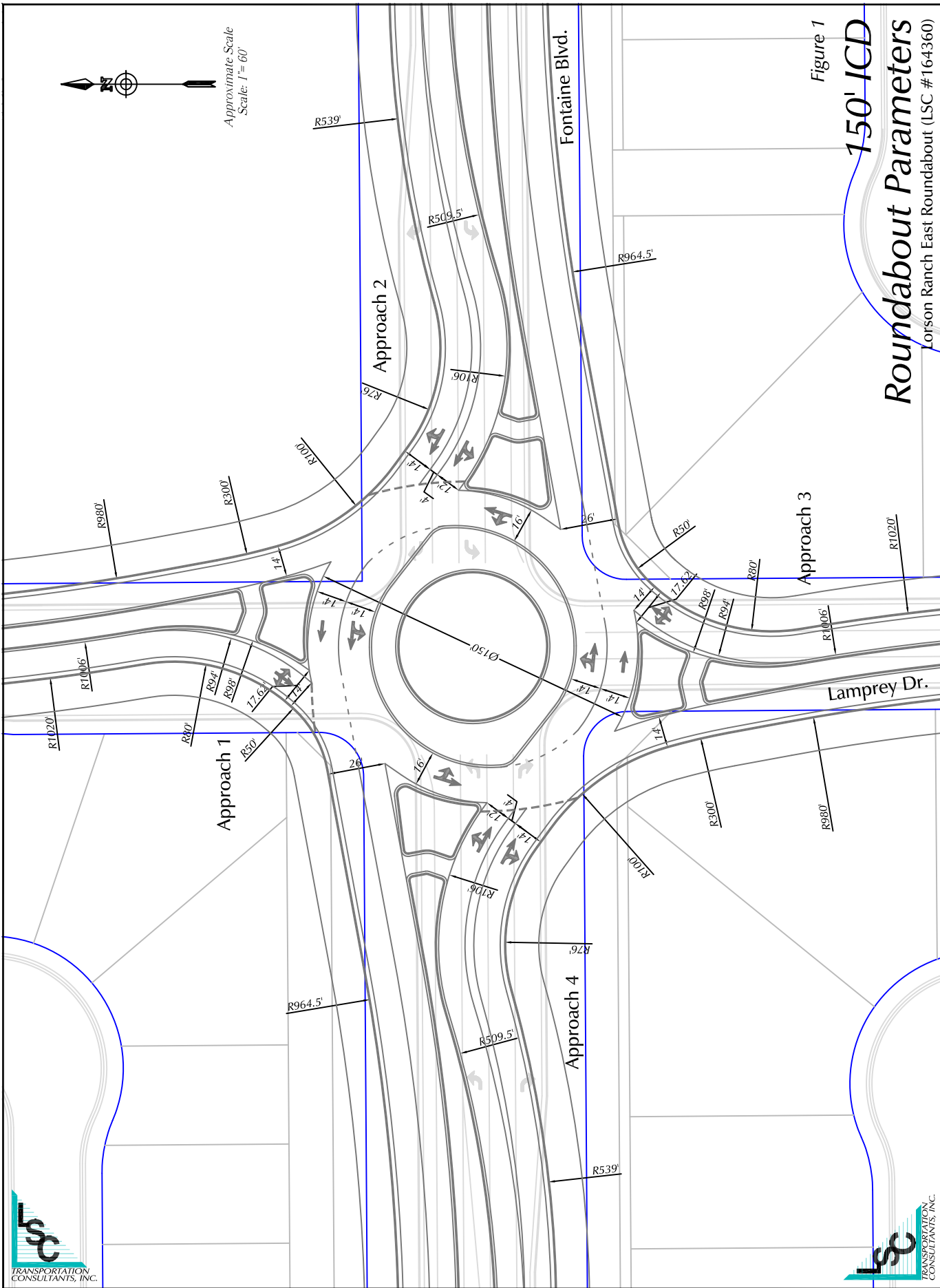
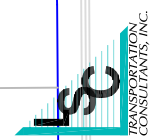


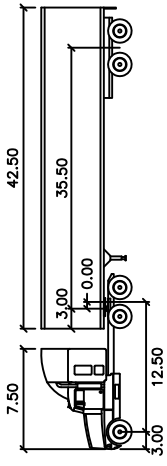
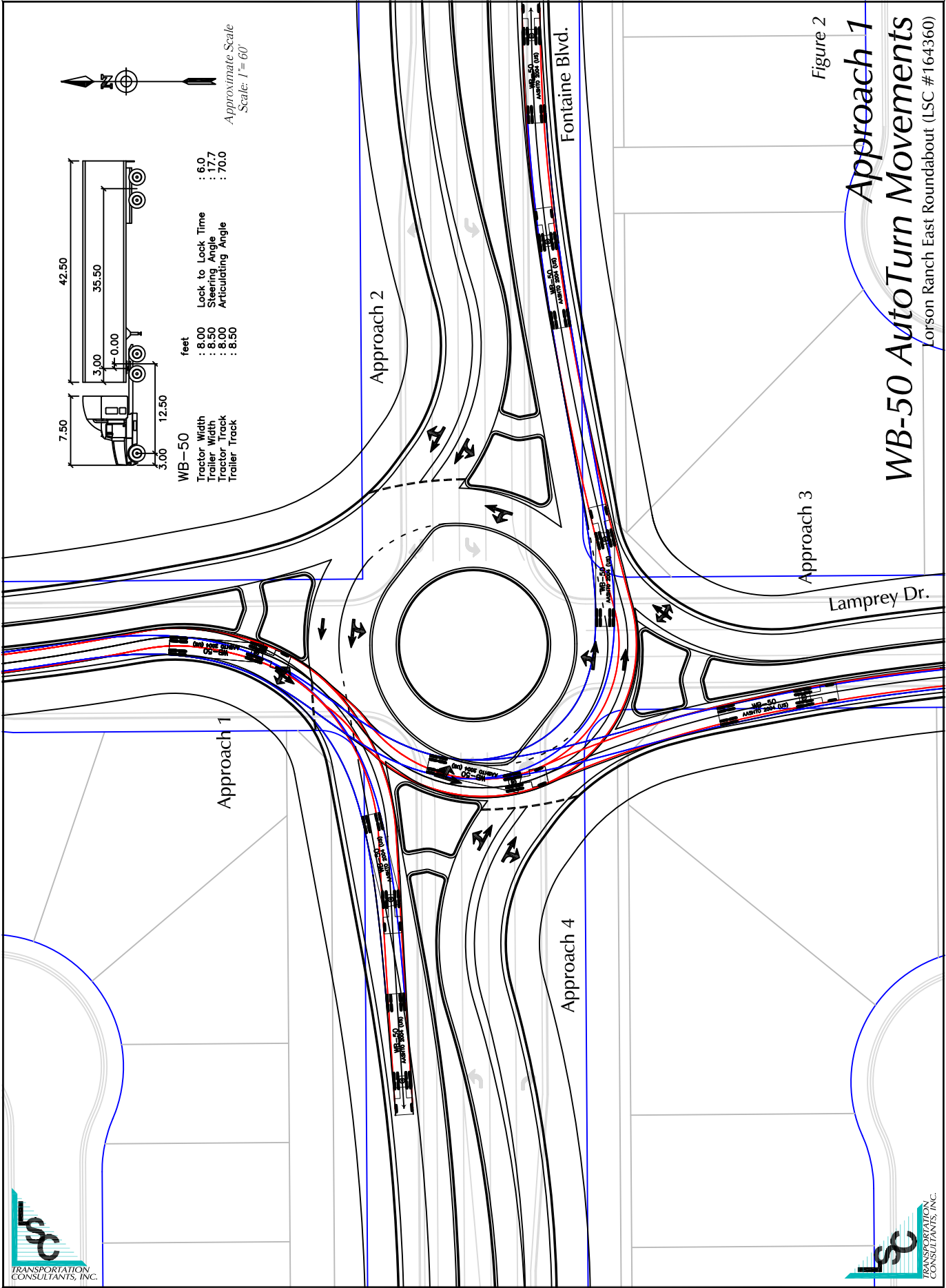
Figure 1

150' ICD

Roundabout Parameters

Lorson Ranch East Roundabout (LSC #164360)





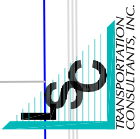
WB-50		feet	
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

Approximate Scale
Scale: 1" = 60'

Figure 2

Approach 1 WB-50 Auto Turn Movements

Lorson Ranch East Roundabout (LSC #164360)



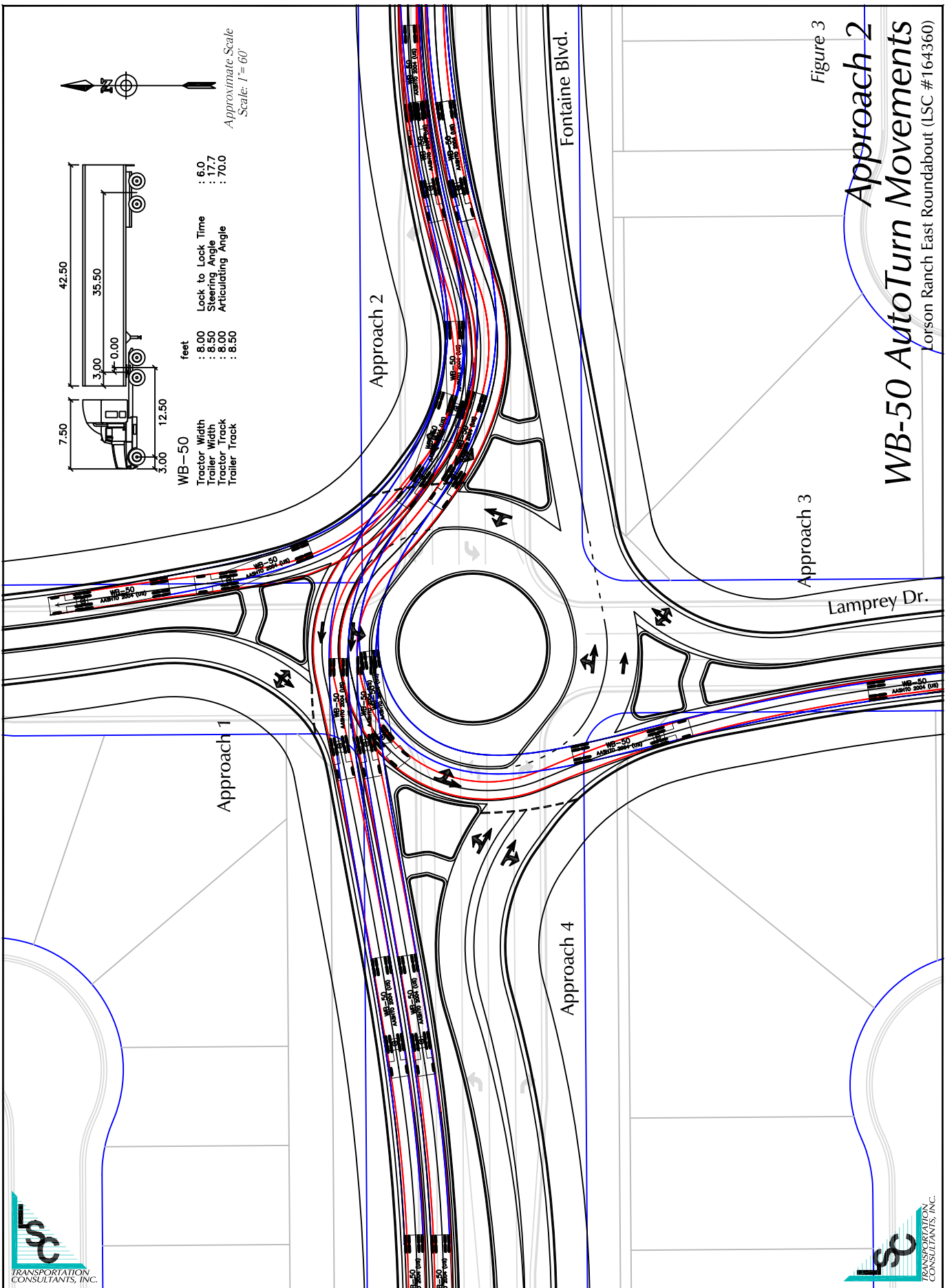
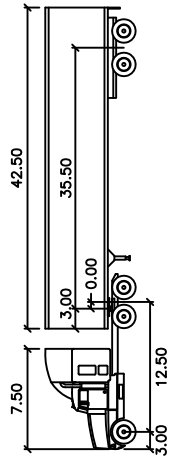
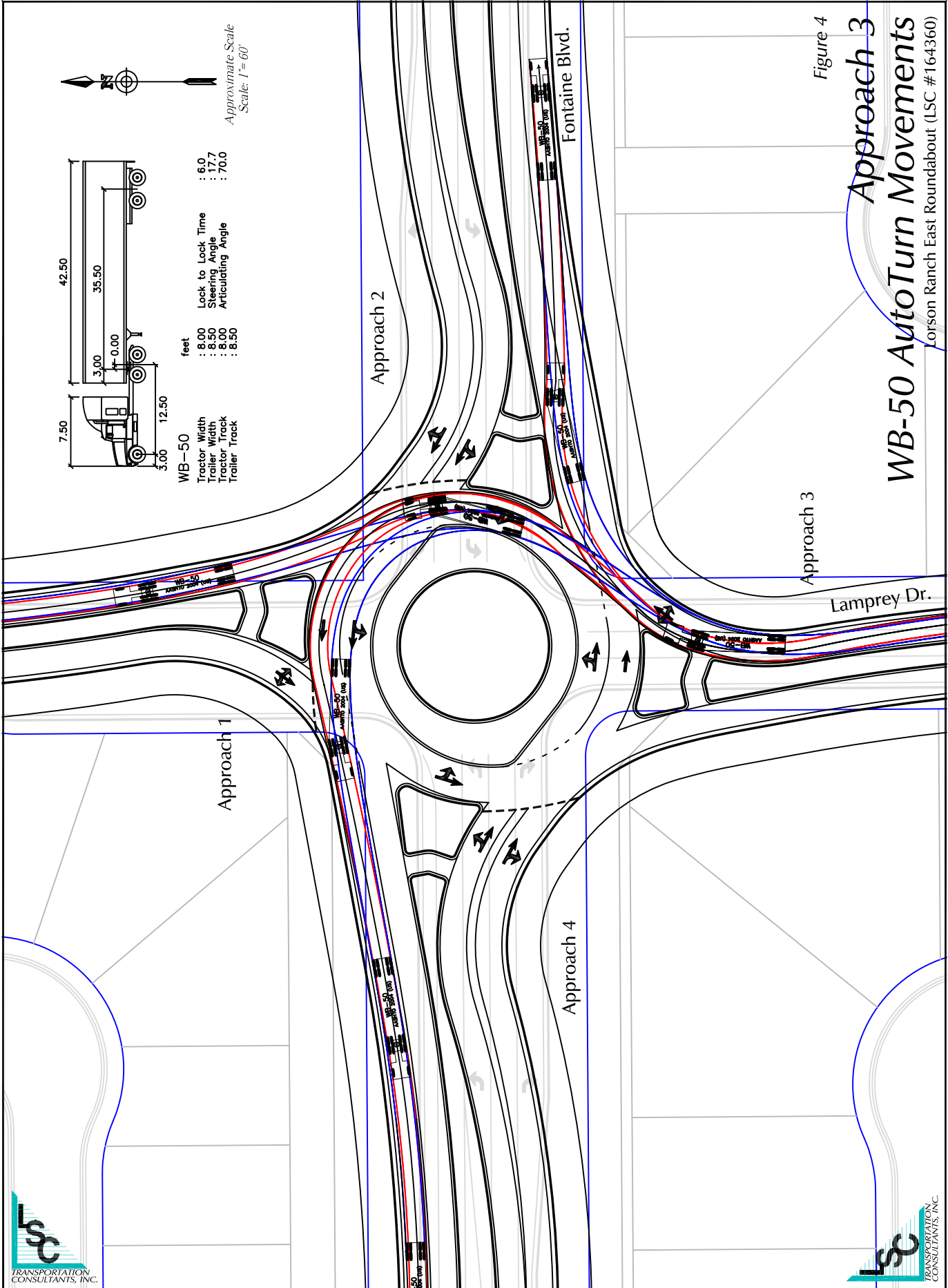


Figure 3

WB-50 AutoTurn Movements

Approach 2

Lorson Ranch East Roundabout (LSC #164360)



WB-50		feet	
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

Approximate Scale
Scale: 1" = 60'

Figure 4

WB-50 AutoTurn Movements

Approach 3

Lorson Ranch East Roundabout (LSC #164360)

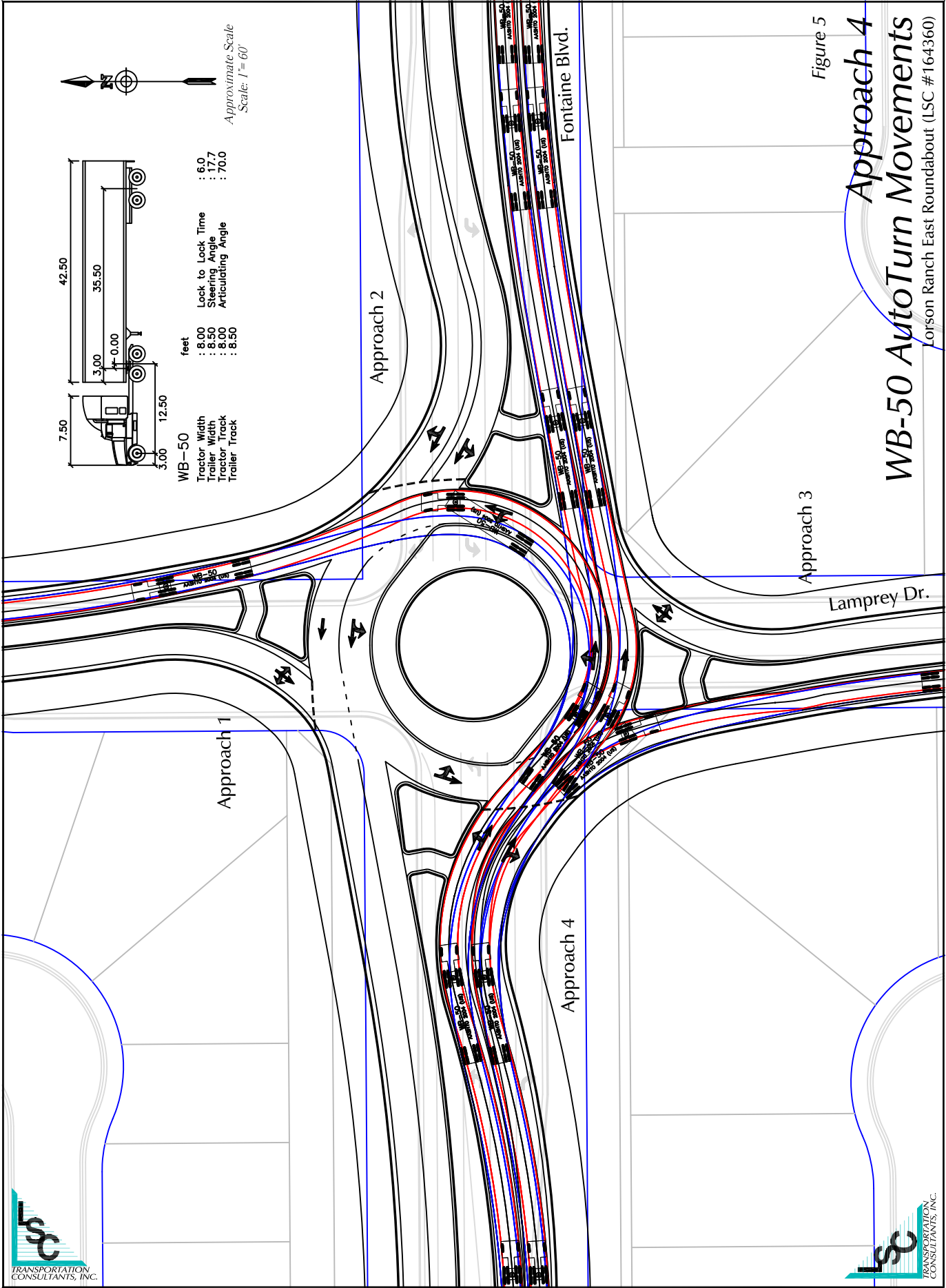
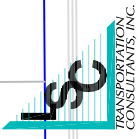


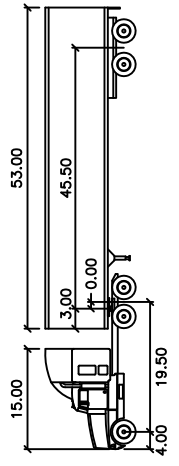
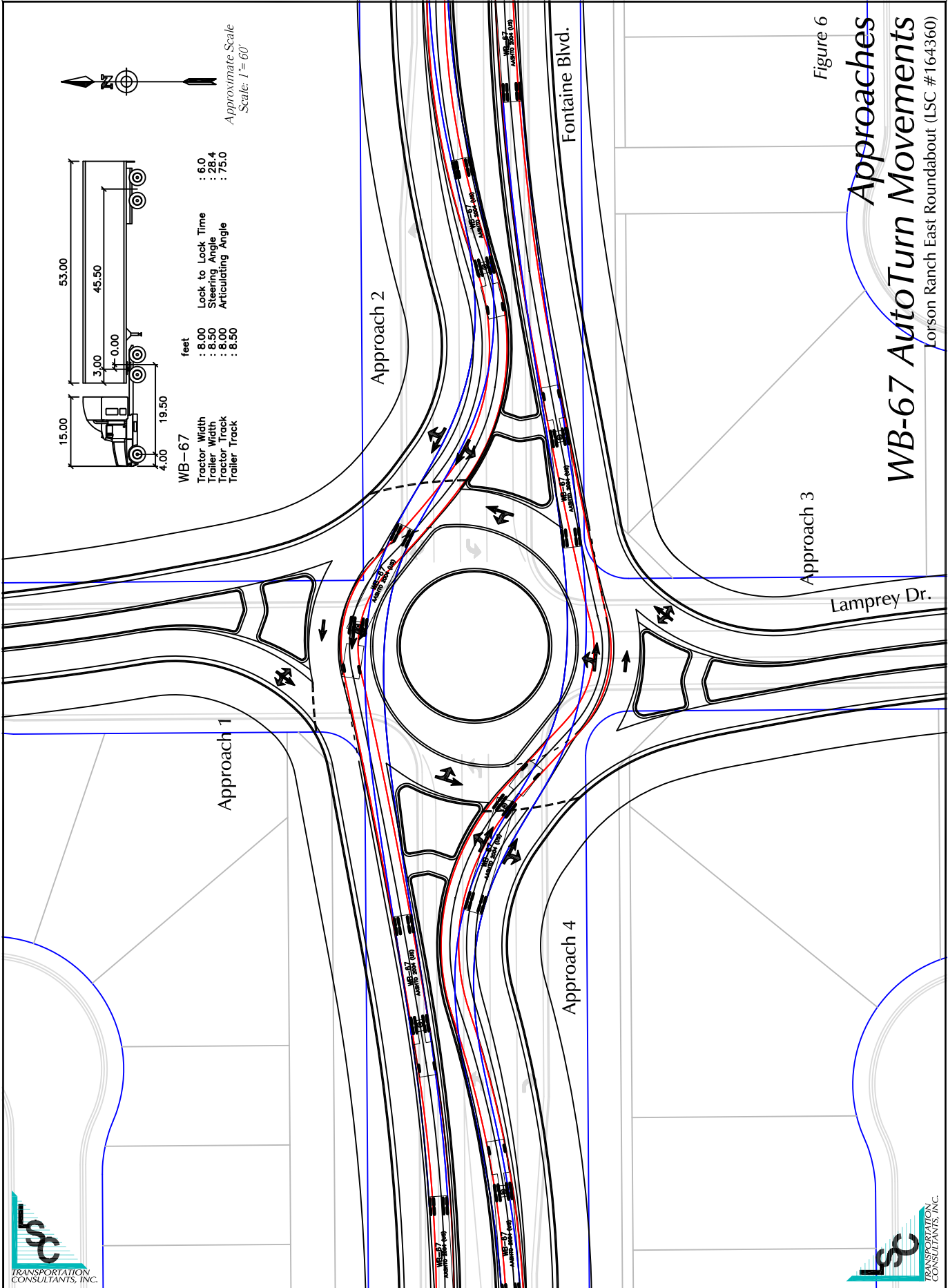
Figure 5

WB-50 AutoTurn Movements

Approach 4

Lorson Ranch East Roundabout (LSC #164360)





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

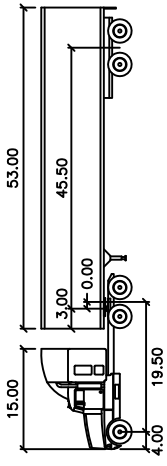
Approximate Scale
Scale: 1" = 60'

Figure 6

Approaches

WB-67 AutoTurn Movements

Lorson Ranch East Roundabout (LSC #164360)



WB-67		feet	
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Tractor Track	: 4.00	Steering Angle	: 28.4
Trailer Width	: 19.50	Articulating Angle	: 75.0
Trailer Track	: 3.00		

Approximate Scale
Scale: 1" = 60'

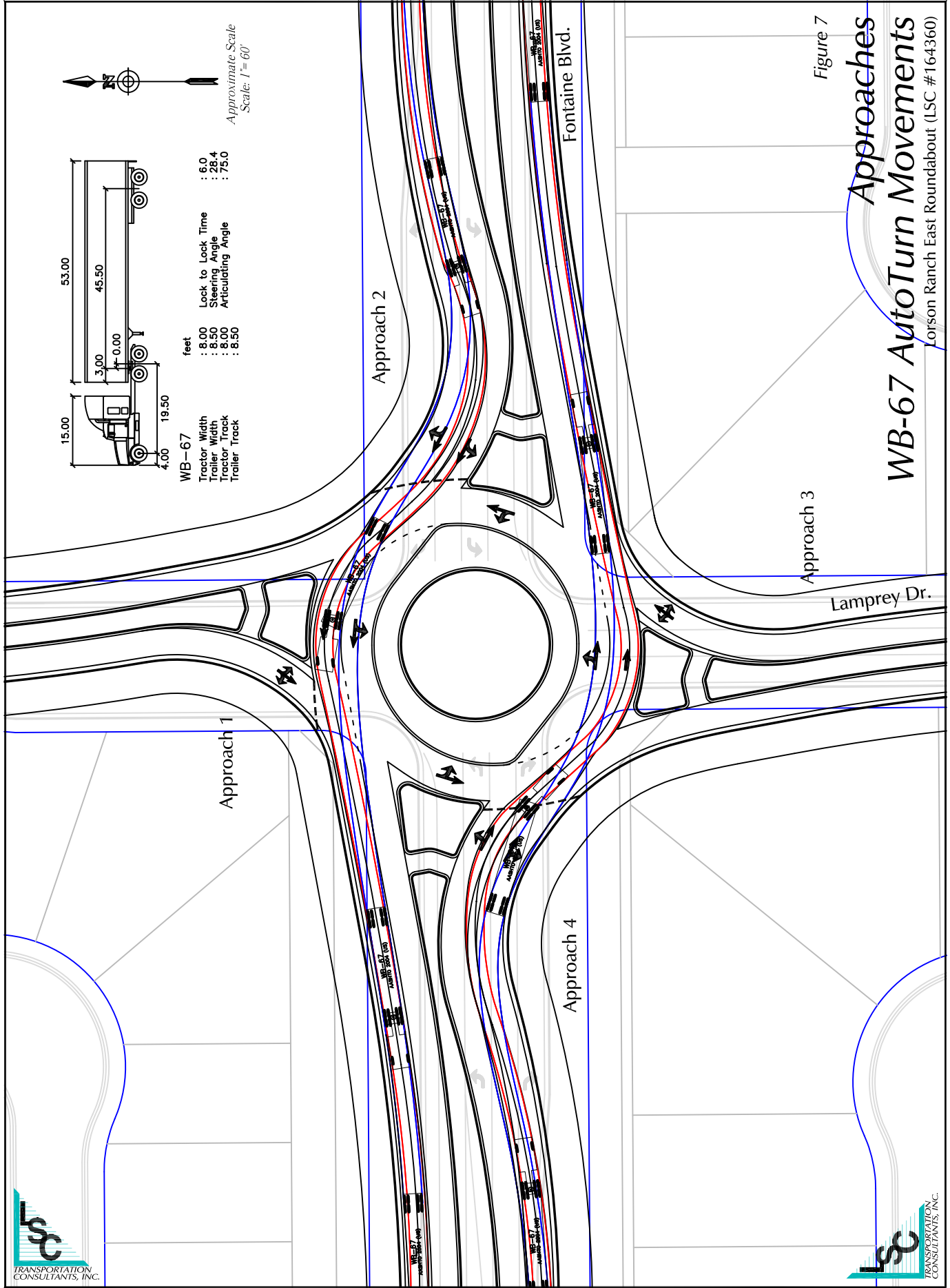


Figure 7

Approaches

WB-67 AutoTurn Movements

Lorson Ranch East Roundabout (LSC #164360)

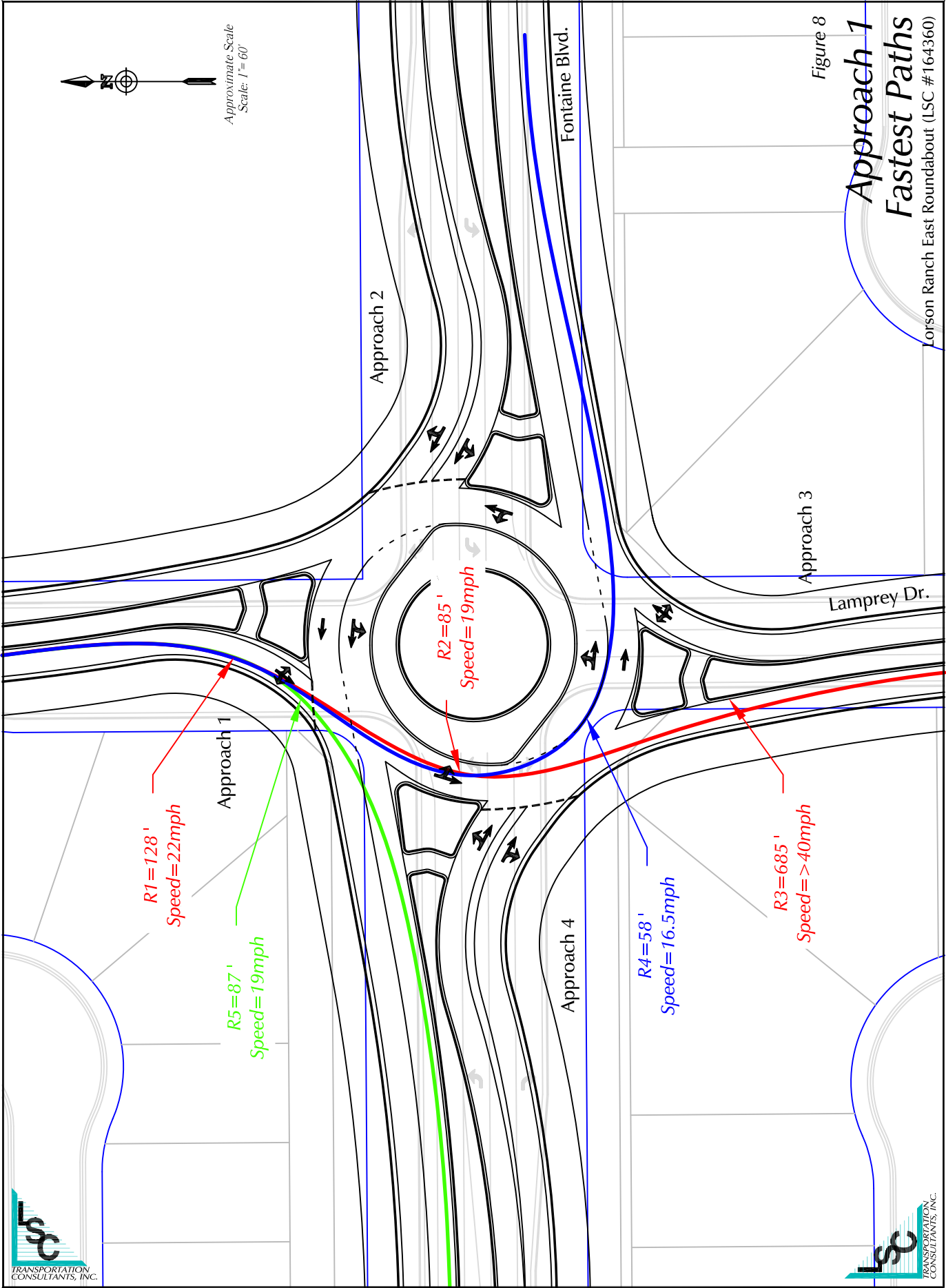
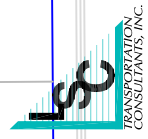


Figure 8

Approach 1 Fastest Paths

Lorson Ranch East Roundabout (LSC #164360)



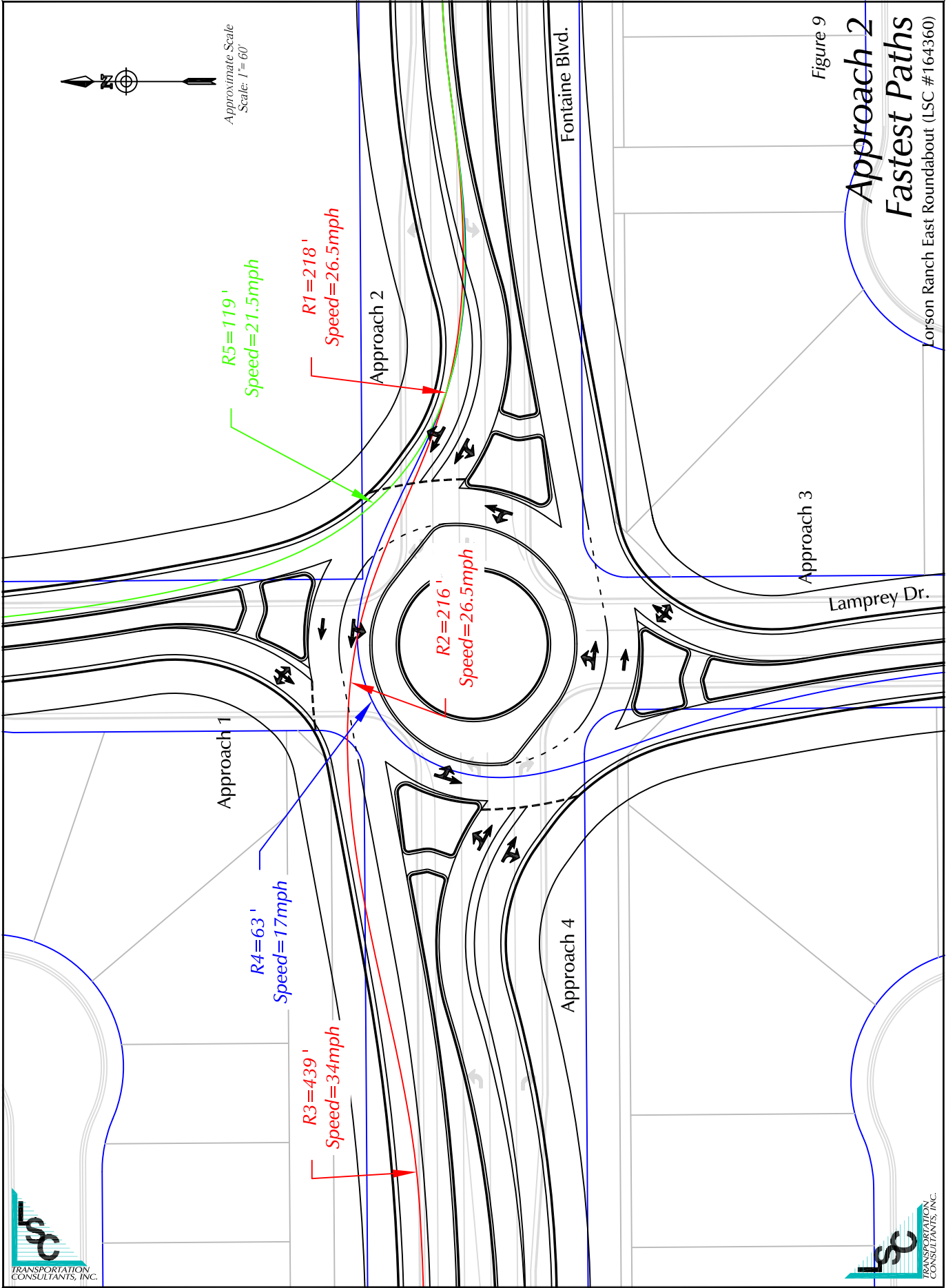
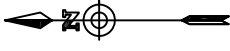


Figure 9

Approach 2 Fastest Paths

Lorison Ranch East Roundabout (LSC #164360)



Approximate Scale
Scale: 1" = 60'

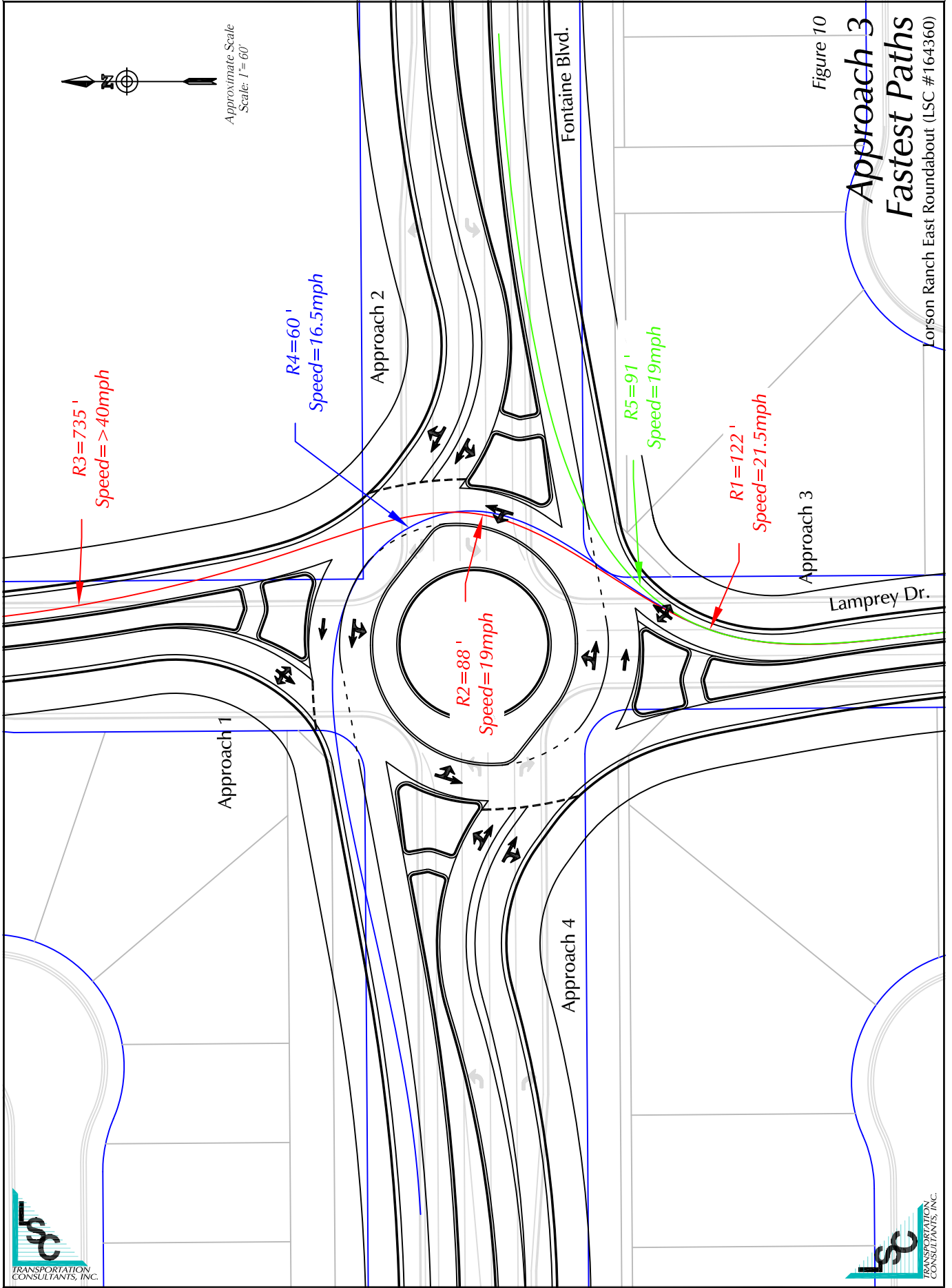
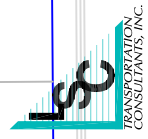
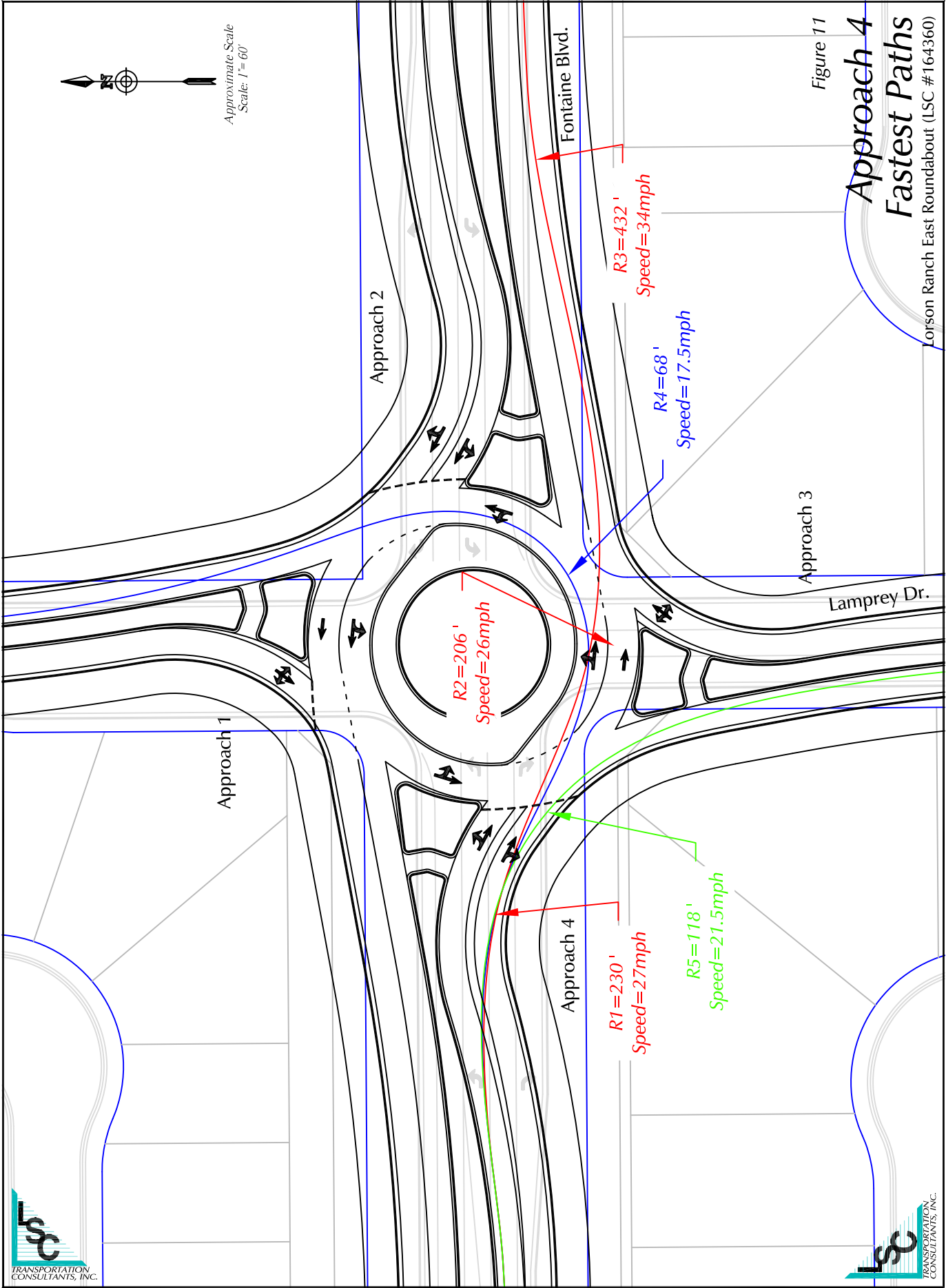


Figure 10

Approach 3 Fastest Paths

Lorison Ranch East Roundabout (LSC #164360)



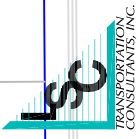


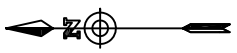
Approximate Scale
Scale: 1" = 60'

Figure 11

Approach 4 Fastest Paths

Lorison Ranch East Roundabout (LSC #164360)





Approximate Scale
Scale: 1" = 100'

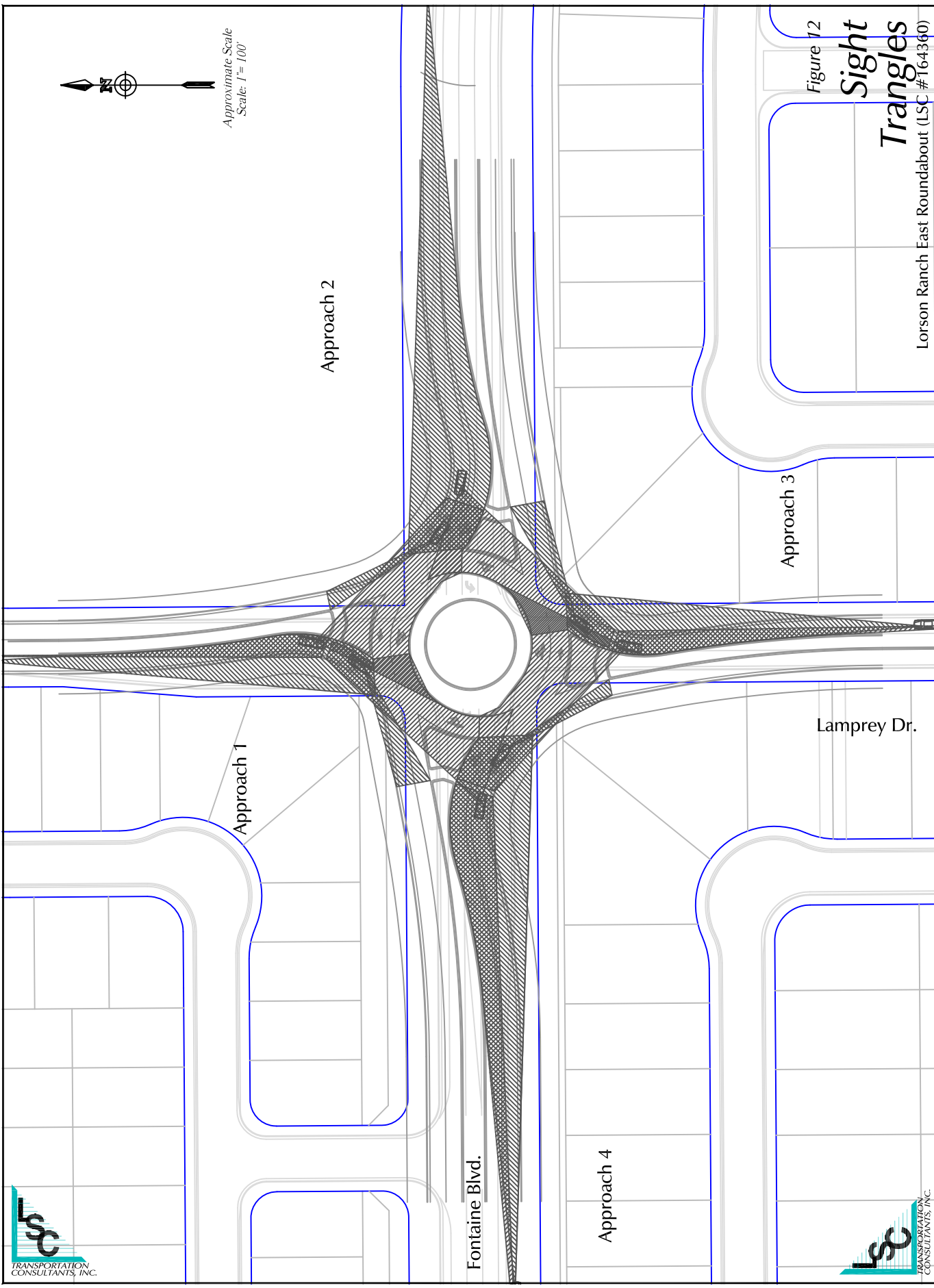


Figure 12

Sight Triangles

Lorson Ranch East Roundabout (LSC #164360)