

Responses to EPC June 11, 2019 Comment Letter:

Transportation / Traffic Impact Study (TIS)

1. Separate roundabout design comments. **Unresolved; response from February 25 comments not received. Chris sent responses to the comments in an email in late March. These responses are as follows:**

Here are our responses from late March (along with the Northeast RA and Southwest RA exhibits – fastest path, truck turning, geometric elements)

Northeast location:

1. *We removed the interim teardrop design that prevented u-turns from northbound to southbound.*
2. *We also removed the interim design on the departure to Approach 1.*
3. *Removing these interim conditions allowed us to increase the Phi angles to 21 degrees for WB and SB and 24 degrees for NB.*
4. *The fastest paths for the three approaches are now 27mph for WB and 24mph for NB and SB. The 27 mph for WB is just over the recommended maximum of 25mph but will be fine once the WB RT lane is added as a two lane approach can be up to 30mph. The 27mph fastest path was the primary reason we proposed the teardrop interim condition to avoid any vehicles that would conflict with the WB entry prior to the north leg being constructed. The good news is we now have a Phi angle of 21 degrees – in my opinion the 27mph fastest path would be an issue if the Phi were below 20 degrees.*

Southwest location:

1. *We did a lot of trial and error and the only way we found that we could increase the Phi angle above 16 degrees on Approach 4 would be to bring the approach into the roundabout at 135 degrees from north which would be highly impactful of the property north of the existing approach 4 and it would be much more difficult to slow vehicles down as they exit Woodmen Road. We feel the current layout that is attached is a superior design because vehicles are required to slow down to below 25mph prior to reaching the roundabout entry.*
2. *The Phi angle is 16 degrees on the NW and SW approaches, 17 degrees on the NE approach and 37 degrees on the SE approach. Section 30.5.23 Entry Angle, Phi from the Wisconsin DOT Facilities Development Manual provides the following guidance: "Phi is not discussed in detail in NCHRP 672. This angle is not a controlling design parameter but instead a gauge of sight to the left and ease of entry to the right. This affects both capacity and safety at the intersection. The typical range for the Phi angle is between 20 and 30 degrees with 25 degrees or greater being the optimal, although there are designs that operate safely and efficiently with a Phi angle as low as 16 degrees. Designers may find it difficult to attain Phi angle values in the desirable range, but provided that the fastest path speeds are relatively low, the Phi angle is not a controlling criterion."*

3. *The Phi angle and fastest path combinations are 16 degrees and 22mph for the SW approach, 37 degrees and 25mph for the SE approach (from a parking lot), 17 degrees and 22mph for the NE approach and 16 degrees and 20mph for the NW approach. The recommended fastest path is 25mph and all three approaches with a Phi of less than 20 degrees have fastest paths of between 20mph and 22mph so meet the intent of the Wisconsin DOT guidance provided above.*

The following are responses to comments from Staff/"action items" from our roundabout meeting in late March:

- Sight Triangles – **This have been included in the response memo.**
- Have these been covered:
 - Remove delineators for tear drop **DONE**
 - Signage – “return to shopping center” – U Turn **Completed by Drexel Barrell.**
- Summary from the meeting:
 - Make a few minor modifications to some of the Yield bars/sharks teeth pavement marking locations. **DONE**
 - Adjust the north leg ped crossing location/alignment on the SW roundabout as needed after shifting the Yield bar. **DONE**
 - Show sidewalk connections on the west side and north sides of the SW roundabout and ramps across the exit lane for that SW lot. **Completed by Drexel Barrell.**
 - Add some chevron signs on the SW roundabout approaches – coming in off Woodmen and on the EB approach from the N. Frontage Road. **DONE ON STRIPING PLAN Completed by Drexel Barrell.**
 - Add detail for the gore area at the right-in off Woodmen and show where the curb will begin along the outside of the entry curve. **Completed by Drexel Barrell**
 - Add detail on concrete truck aprons on the intersection approaches. **Completed by Drexel Barrell**
 - Complete the roundabout design memo/report that explains, references, and ties together all the technical exhibits, the design tables. **Will complete following agreement by staff on the final roundabout modifications discussed at the meeting and listed above.**
- 4. Provide a memorandum (referencing the Preliminary Plan TIS), to go along with the development agreement, stating the anticipated overall site ADT that will warrant each offsite improvement. Include the improvements proposed for immediate construction as “Phase 1”. **Unresolved (response is that this memo will follow).**

Please refer to attached revised Table 7b from the TIS. We will follow up with Staff to discuss. Once an agreement with staff has been reached on the table revisions, we formalize in a memo.

7. **(14) Reduction of the speed limit on Meridian Road between Woodmen Road and a location near Owl Lane (verify MUTCD requirement) is being considered by the County Engineer if this*

development proceeds. Provide signage as appropriate on the plans. Unresolved; this signage can be confirmed with the County Engineer; address on the plans. Completed by Drexel Barrell.

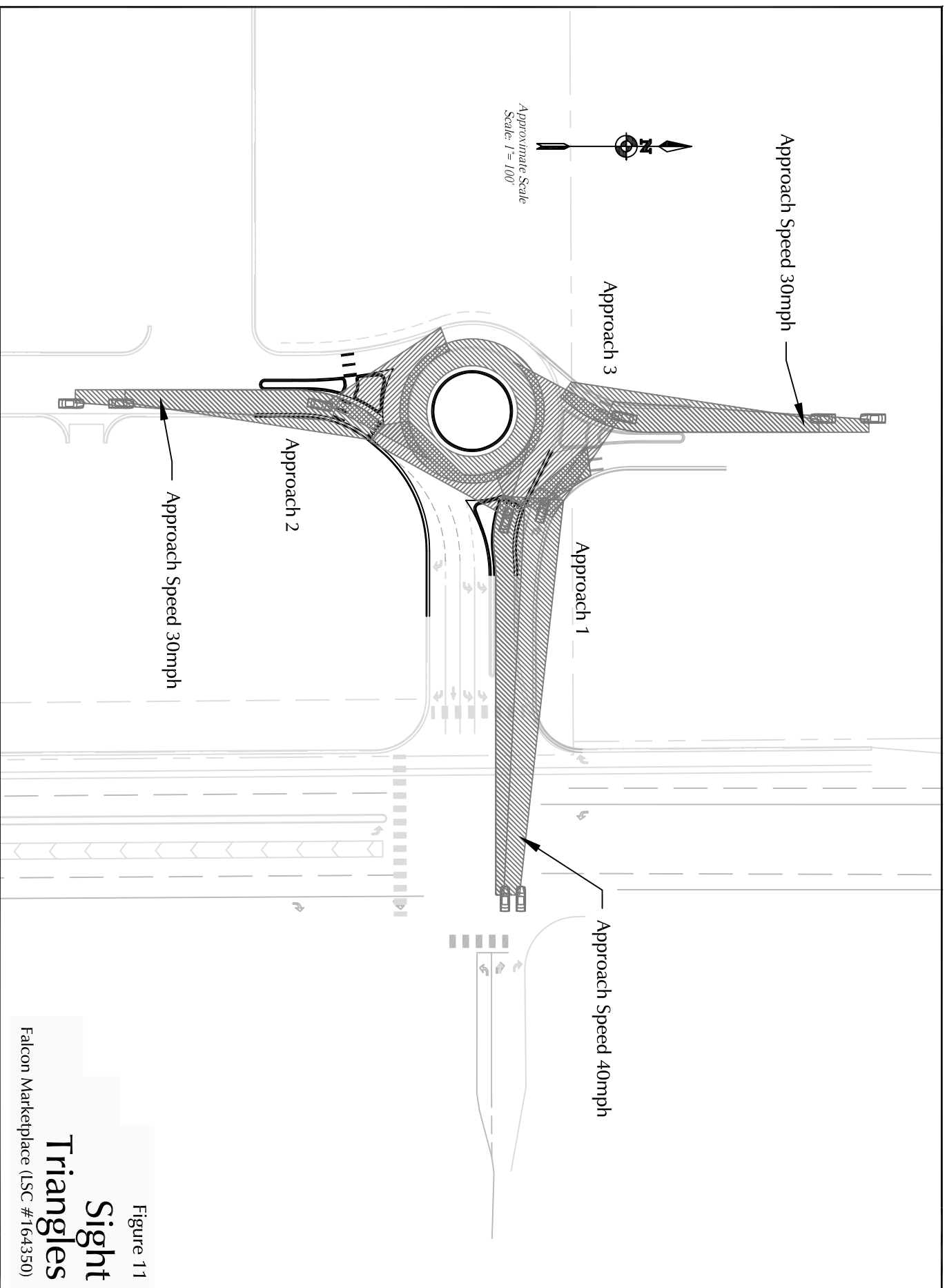


Figure 11
**Sight
Triangles**

Falcon Marketplace (LSC #164350)

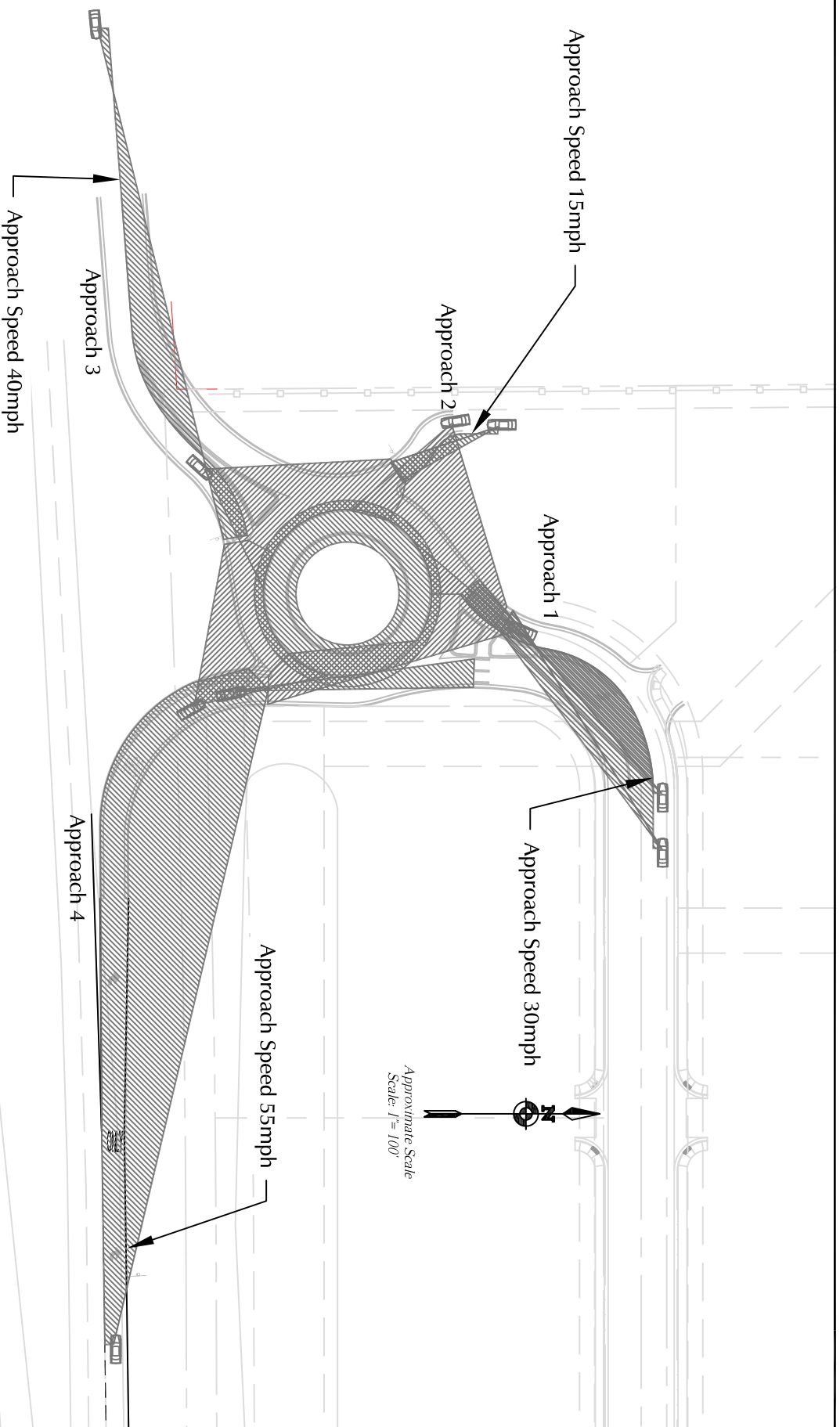


Figure 13

Sight Triangles

Falcon Marketplace (LSC #164350)

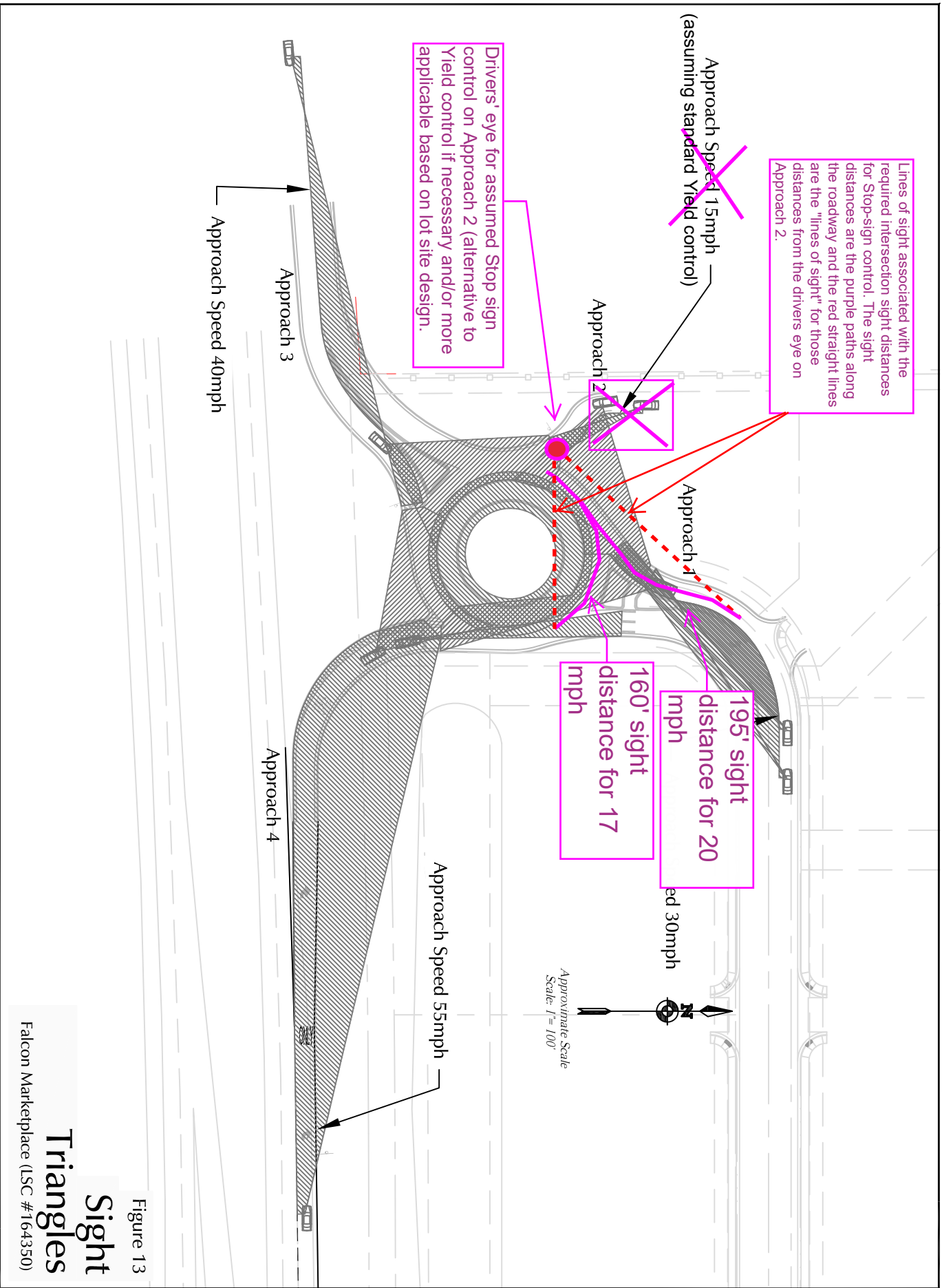


Figure 13

Sight Triangles

Falcon Marketplace (LSC #164350)

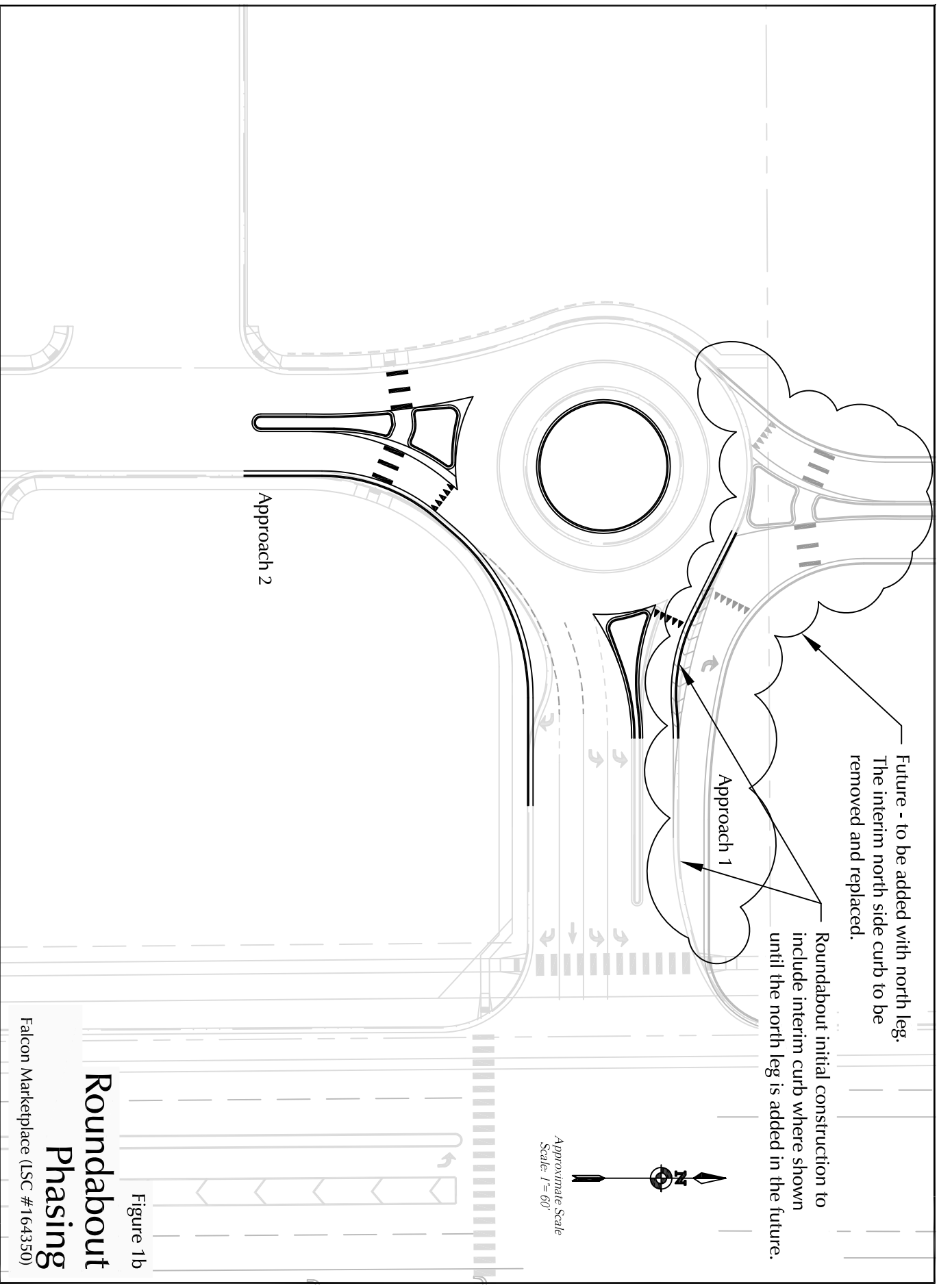
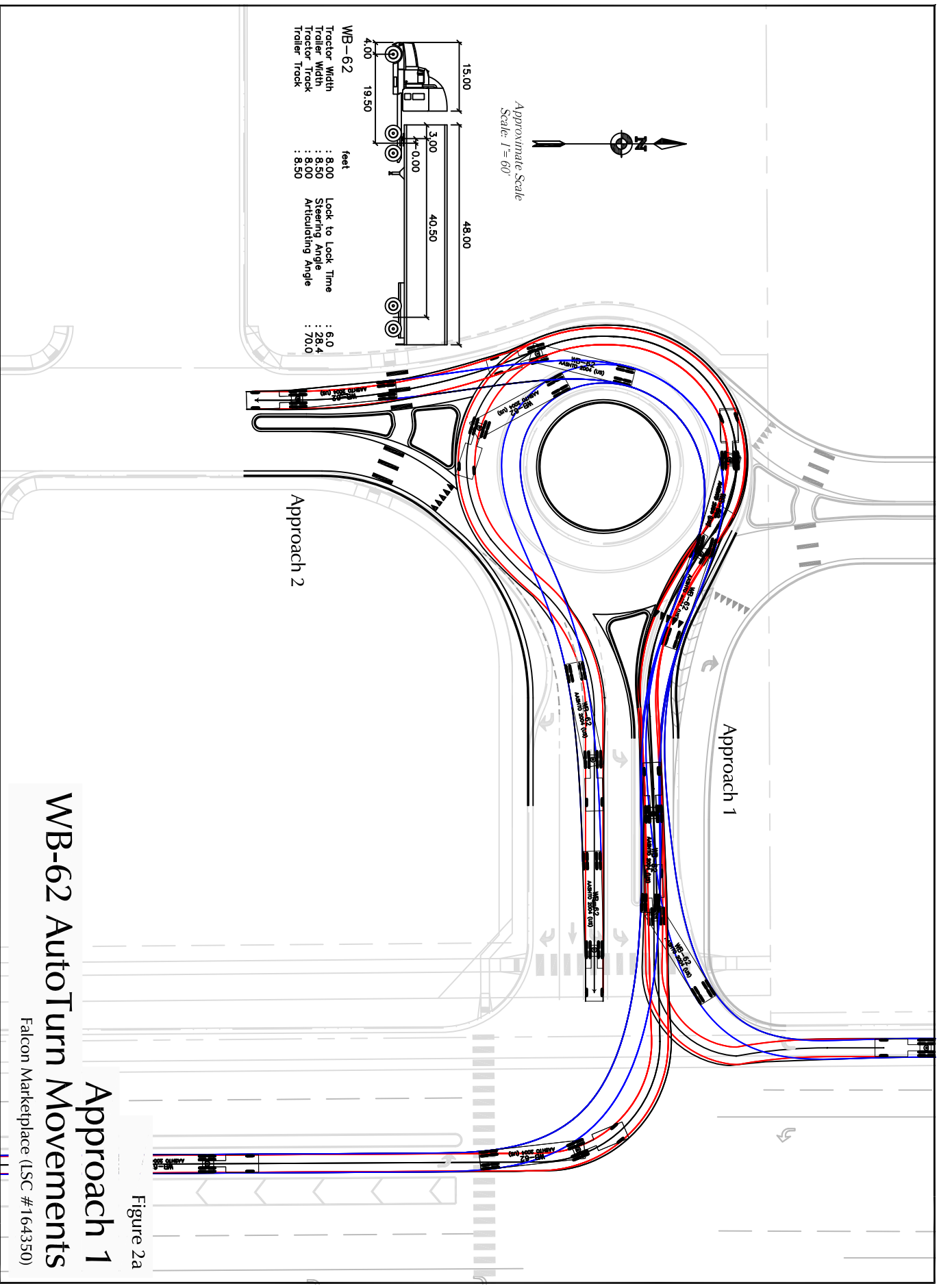


Figure 1b

Roundabout Phasing

Falcon Marketplace (LSC #164350)



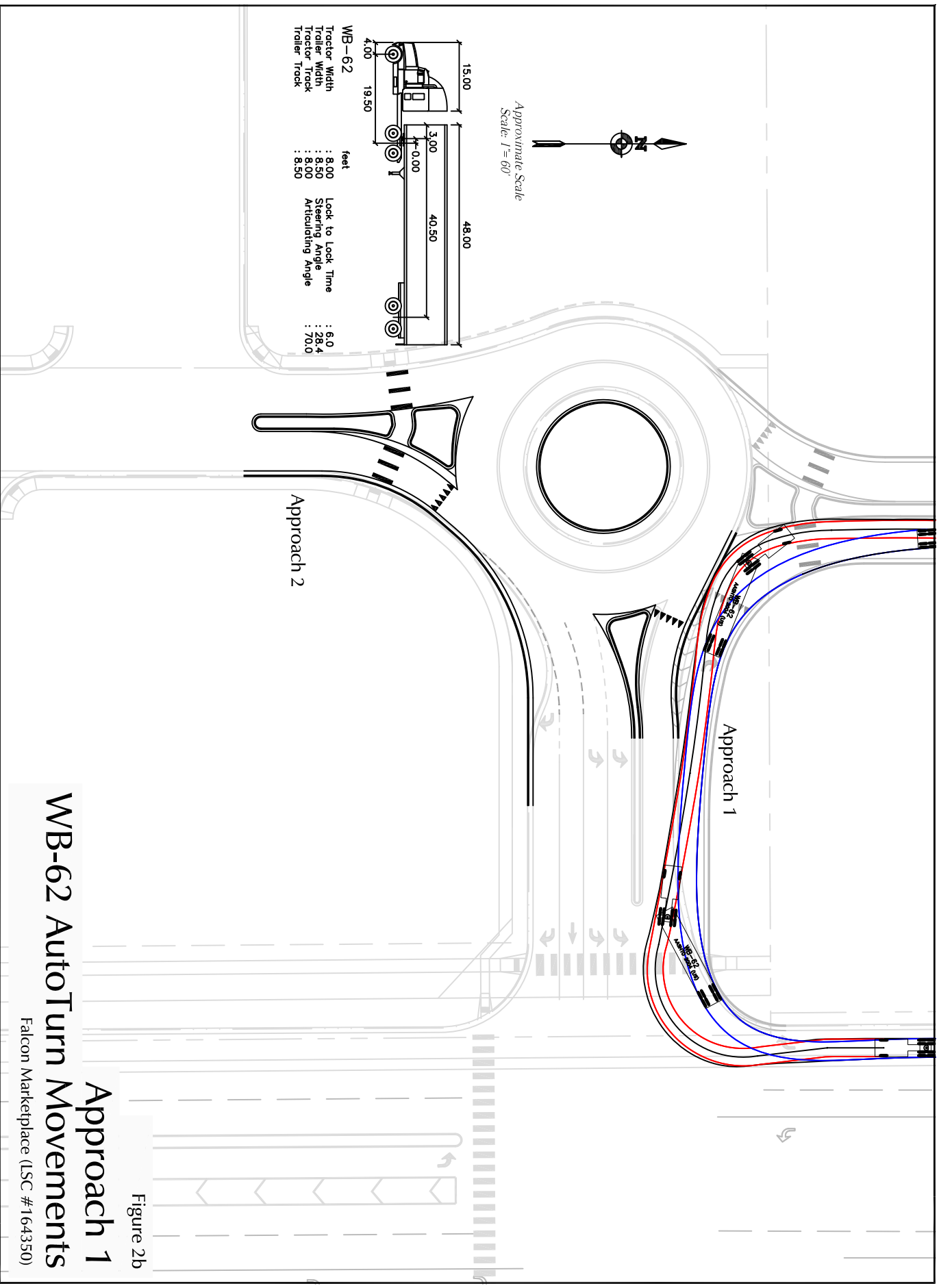


Figure 2b

Approach 1

WB-62 Auto Turn Movements

Falcon Marketplace (LSC #164350)

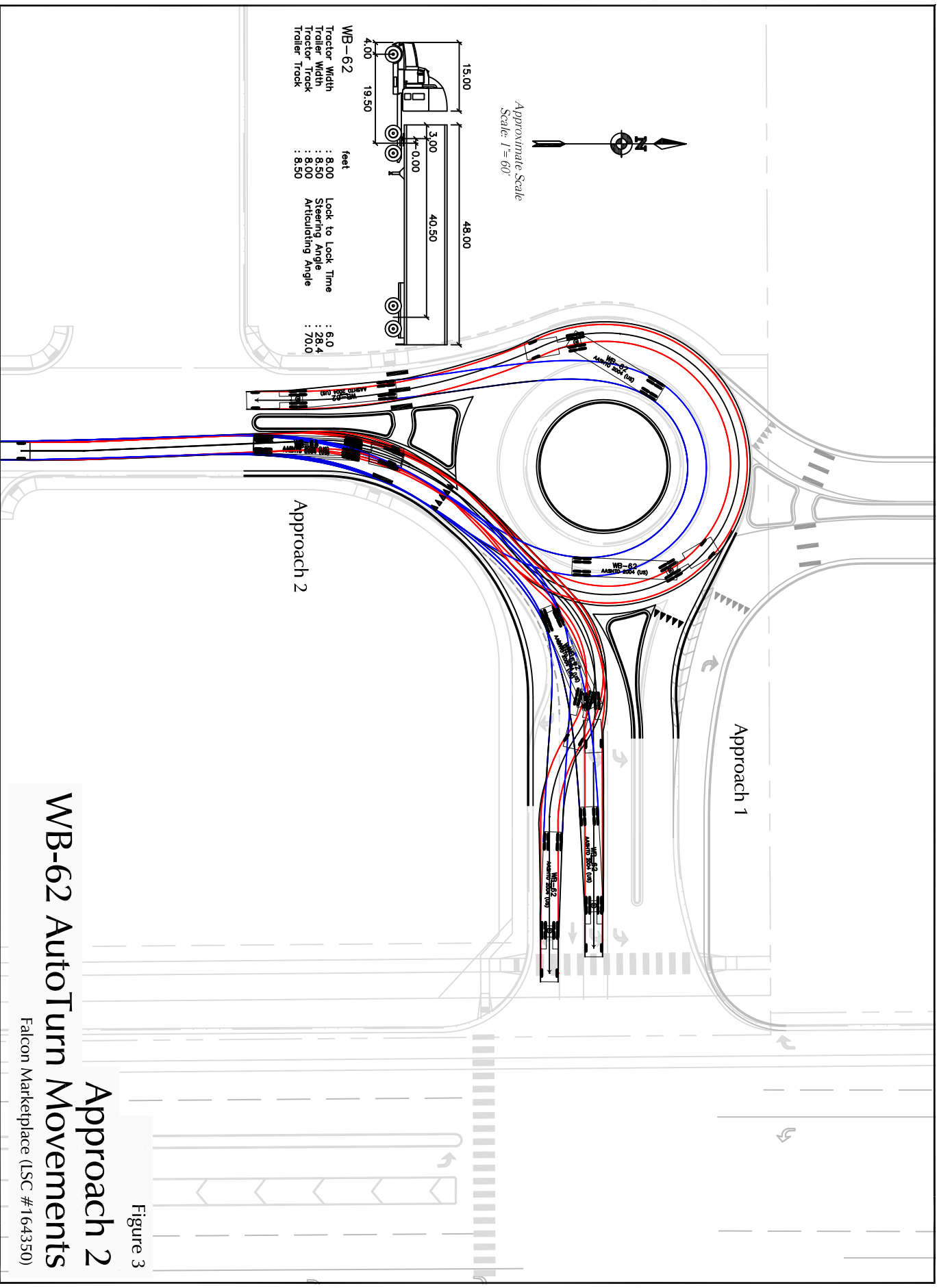


Figure 3

Approach 2 WB-62 Auto Turn Movements

Falcon Marketplace (LSC #164350)

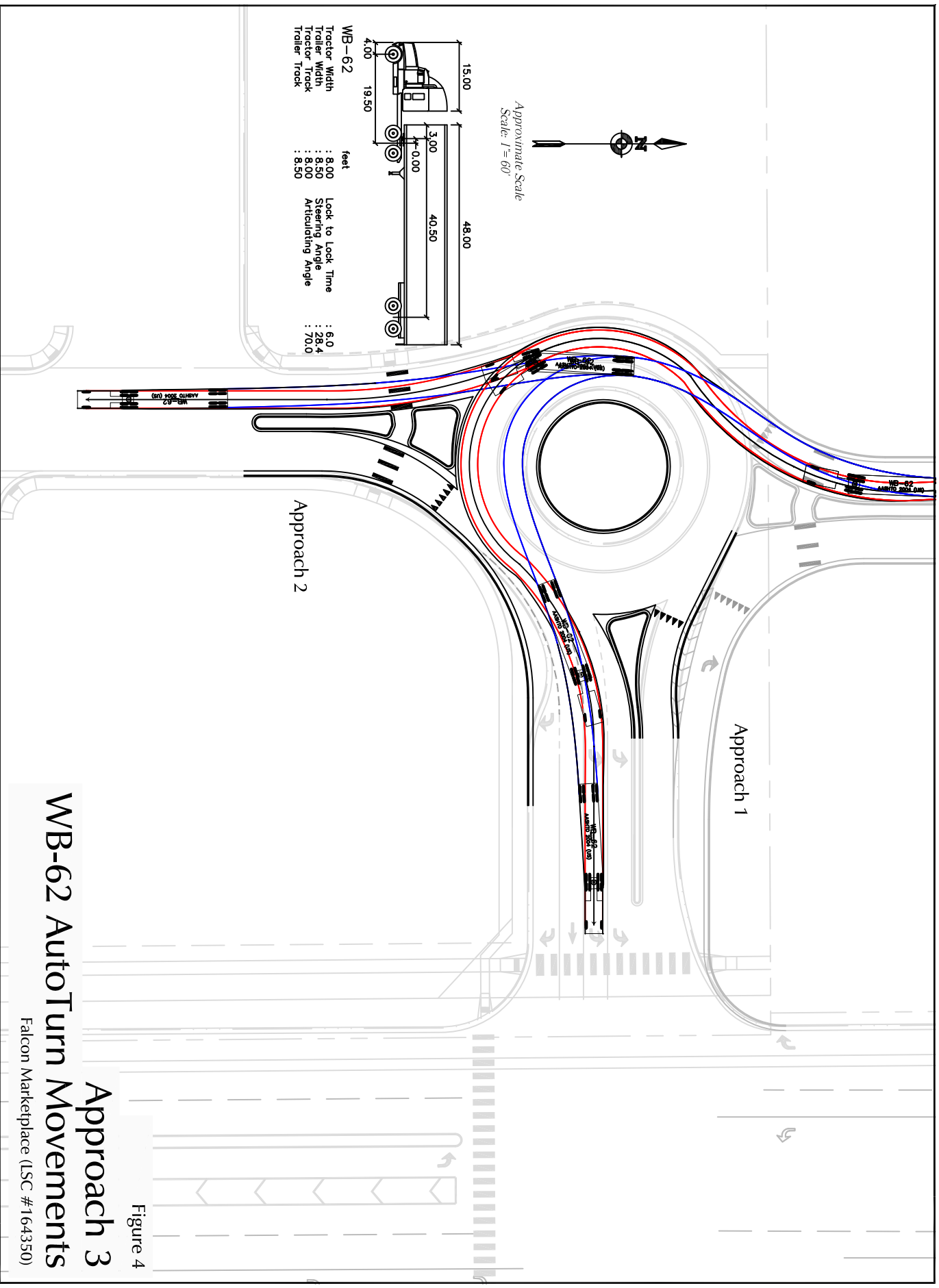


Figure 4

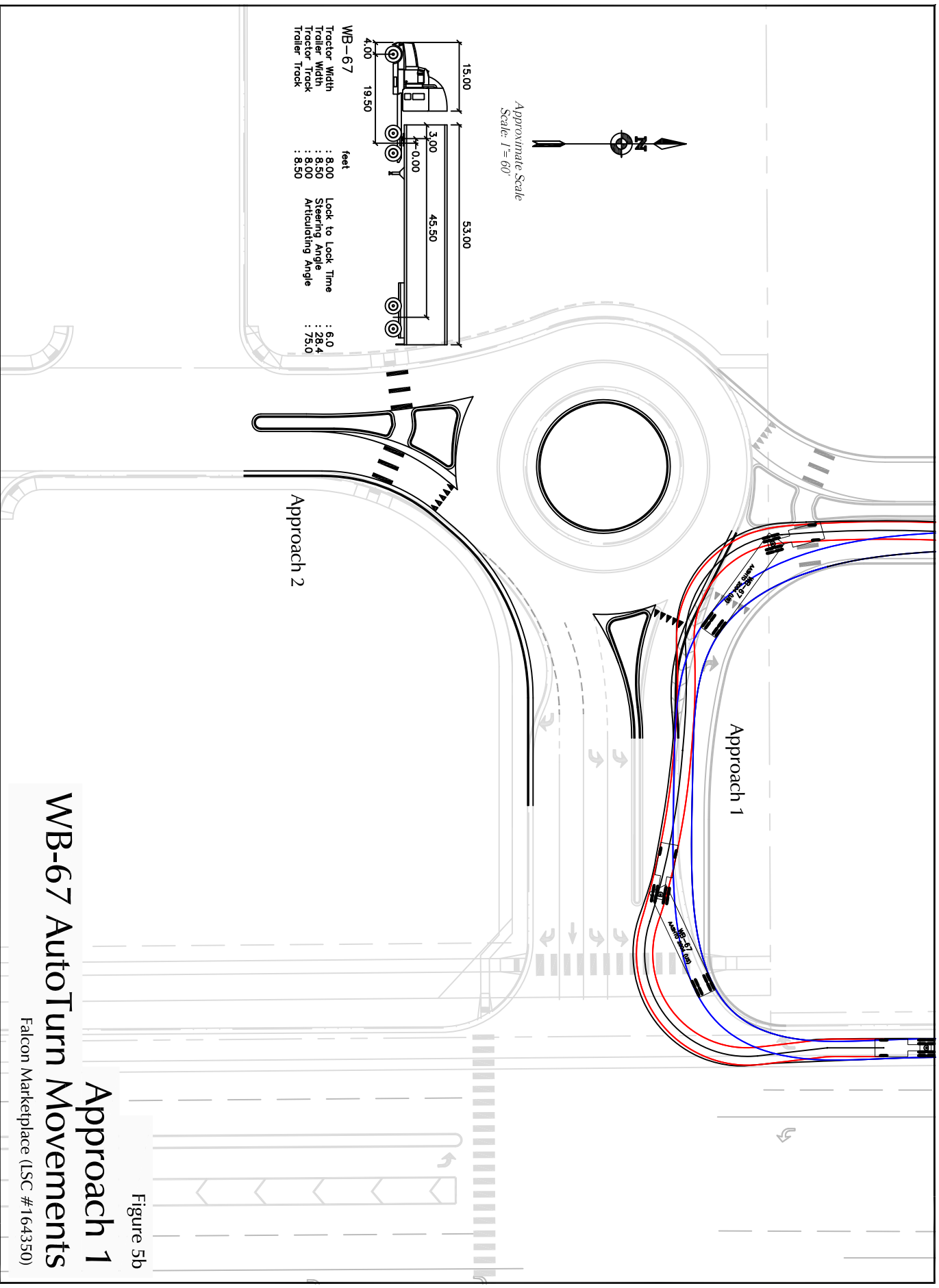


Figure 5b

Approach 1

WB-67 Auto Turn Movements

Falcon Marketplace (LSC #164350)

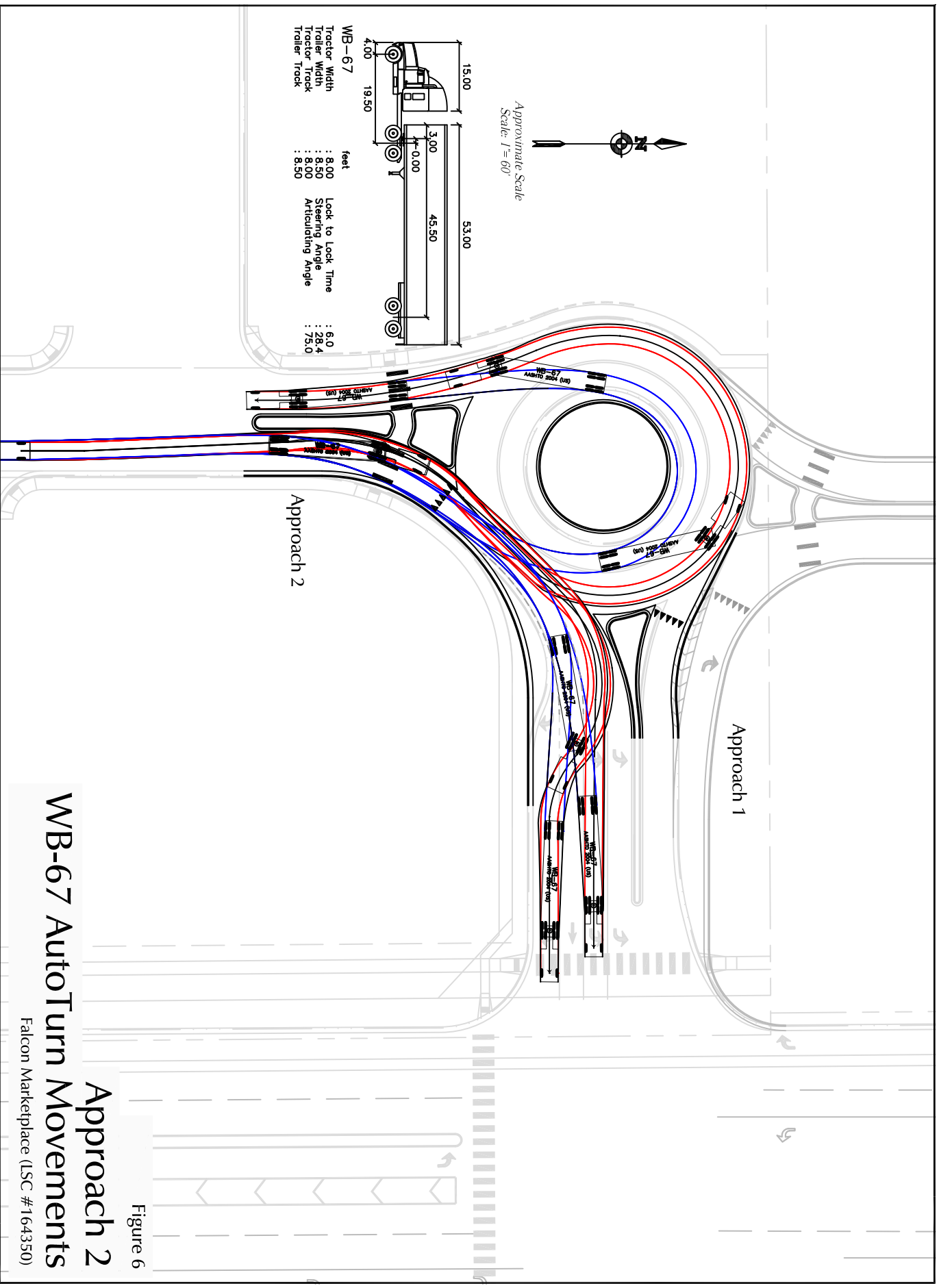


Figure 6

Approach 2

WB-67 Auto Turn Movements

Falcon Marketplace (LSC #164350)

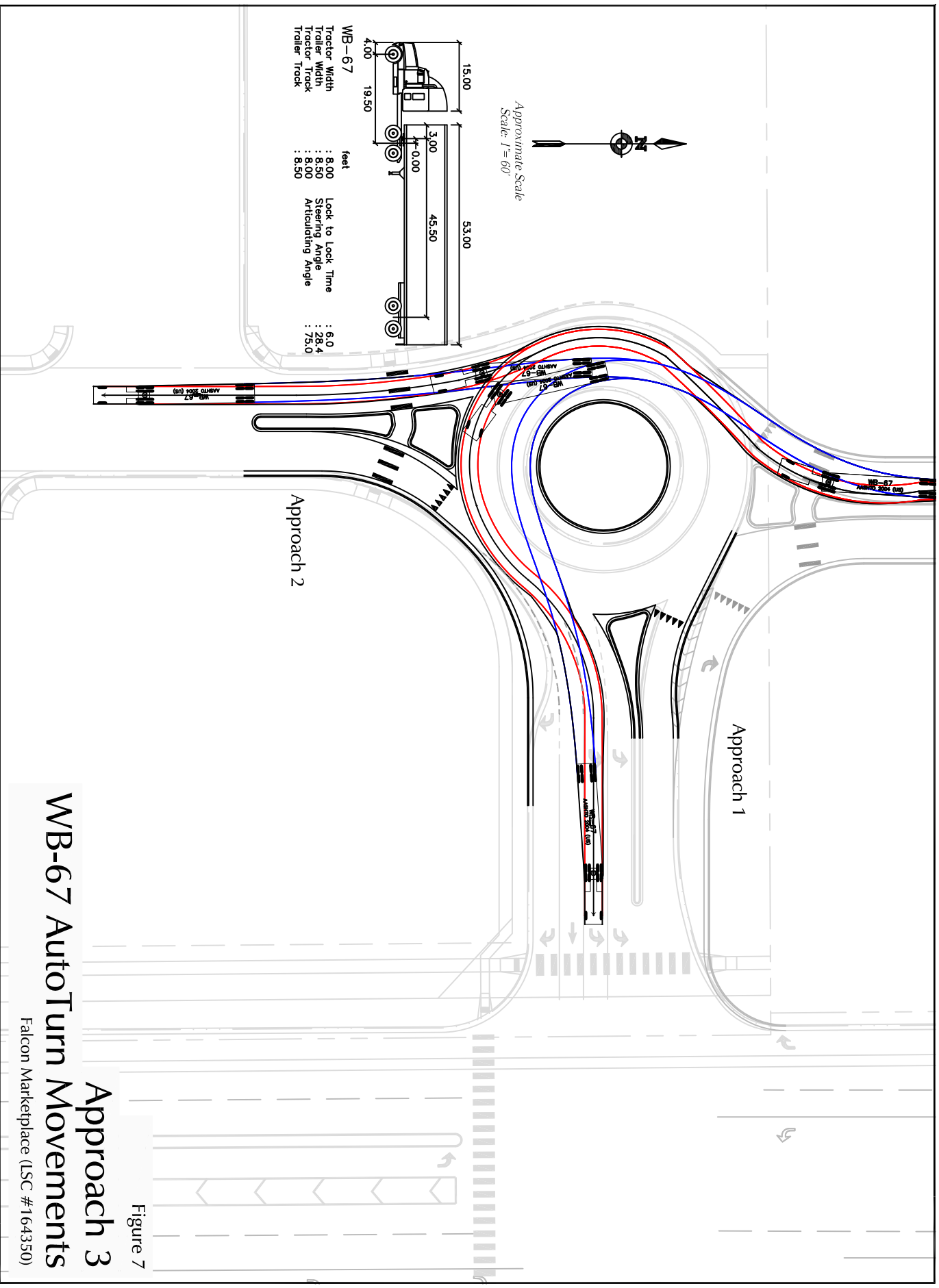


Figure 7

WB-67 Auto Turn Movements

Falcon Marketplace (LSC #164350)

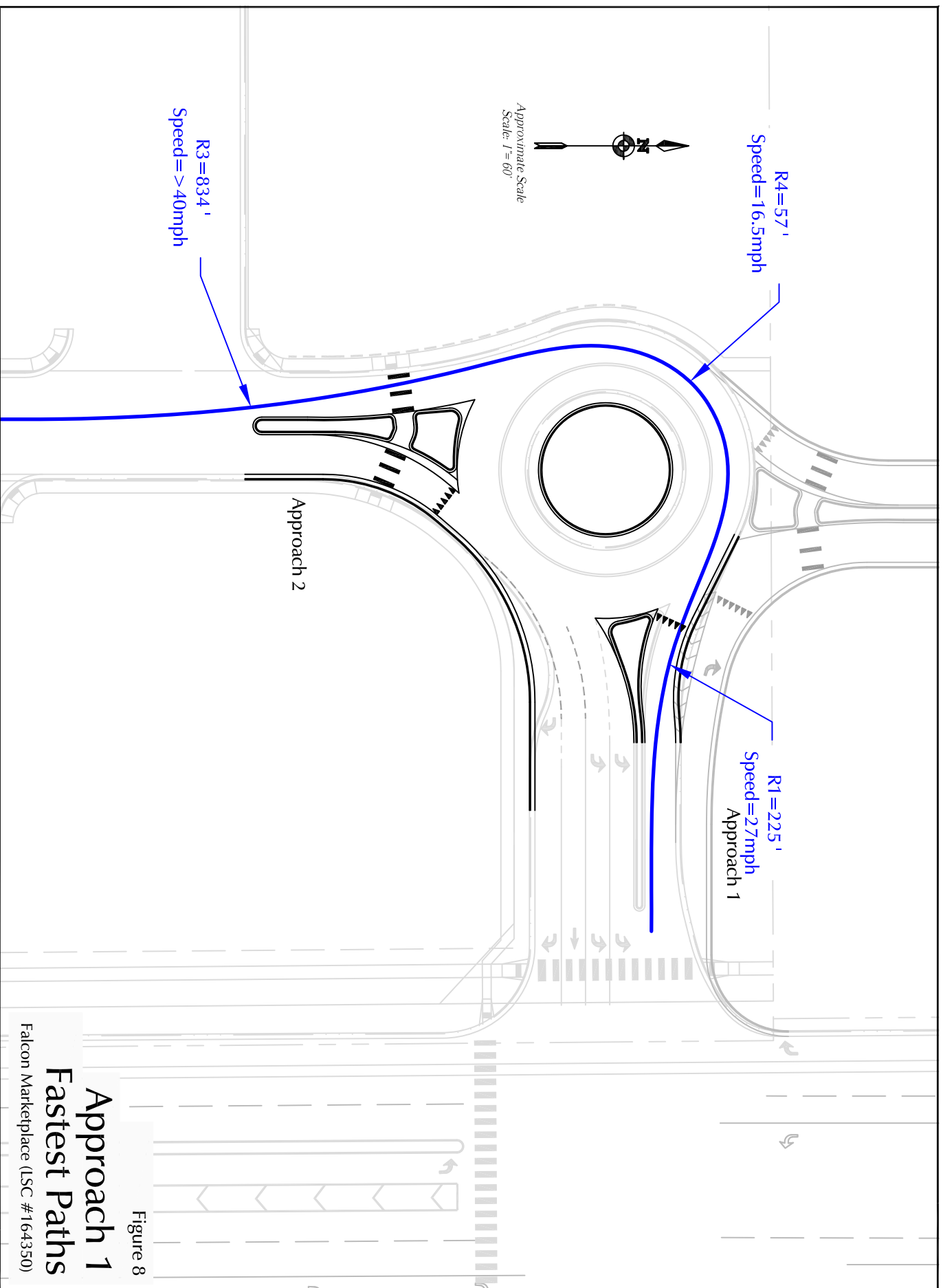


Figure 8

Approach 1 Fastest Paths

Falcon Marketplace (LSC #164350)

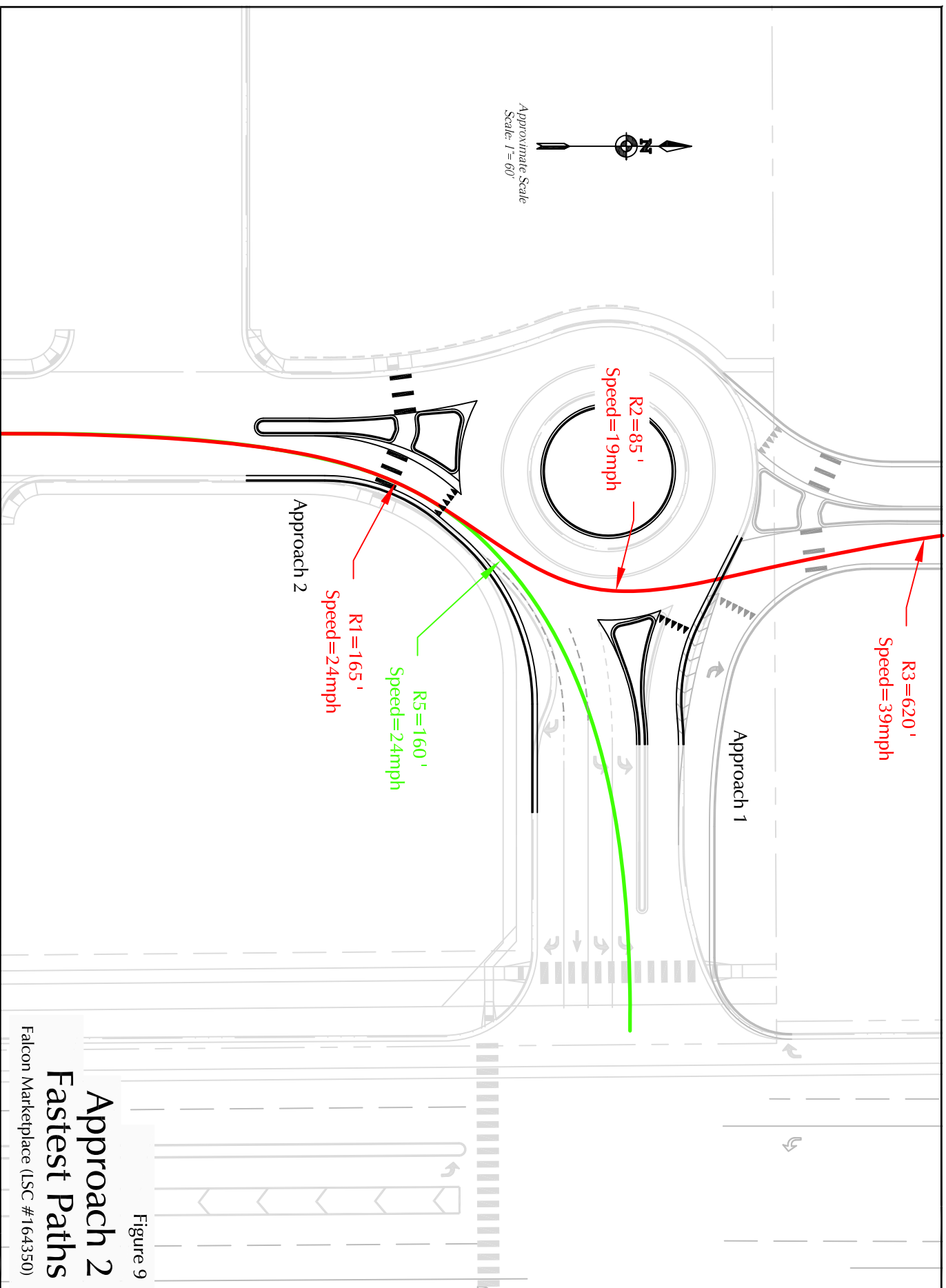
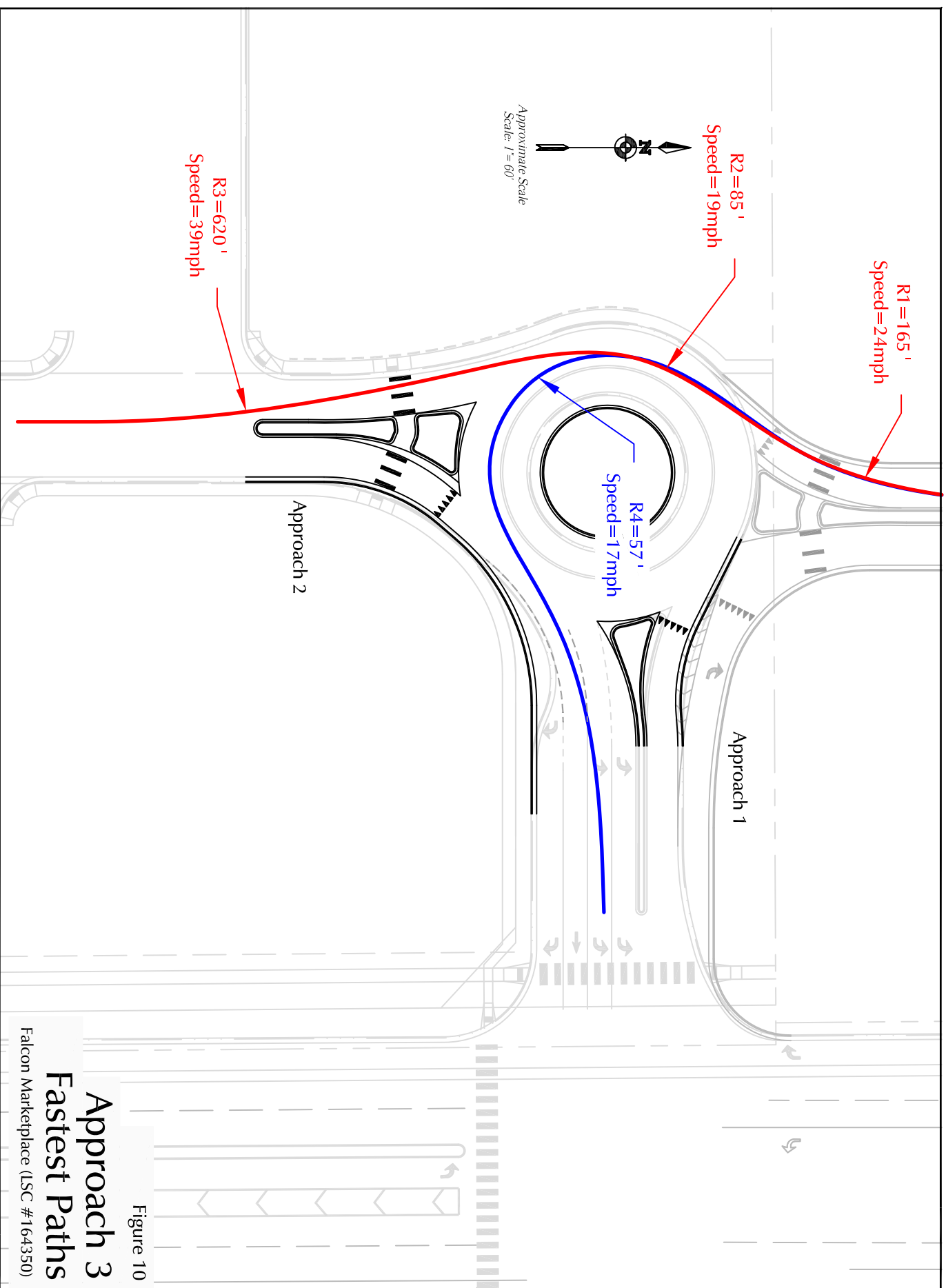
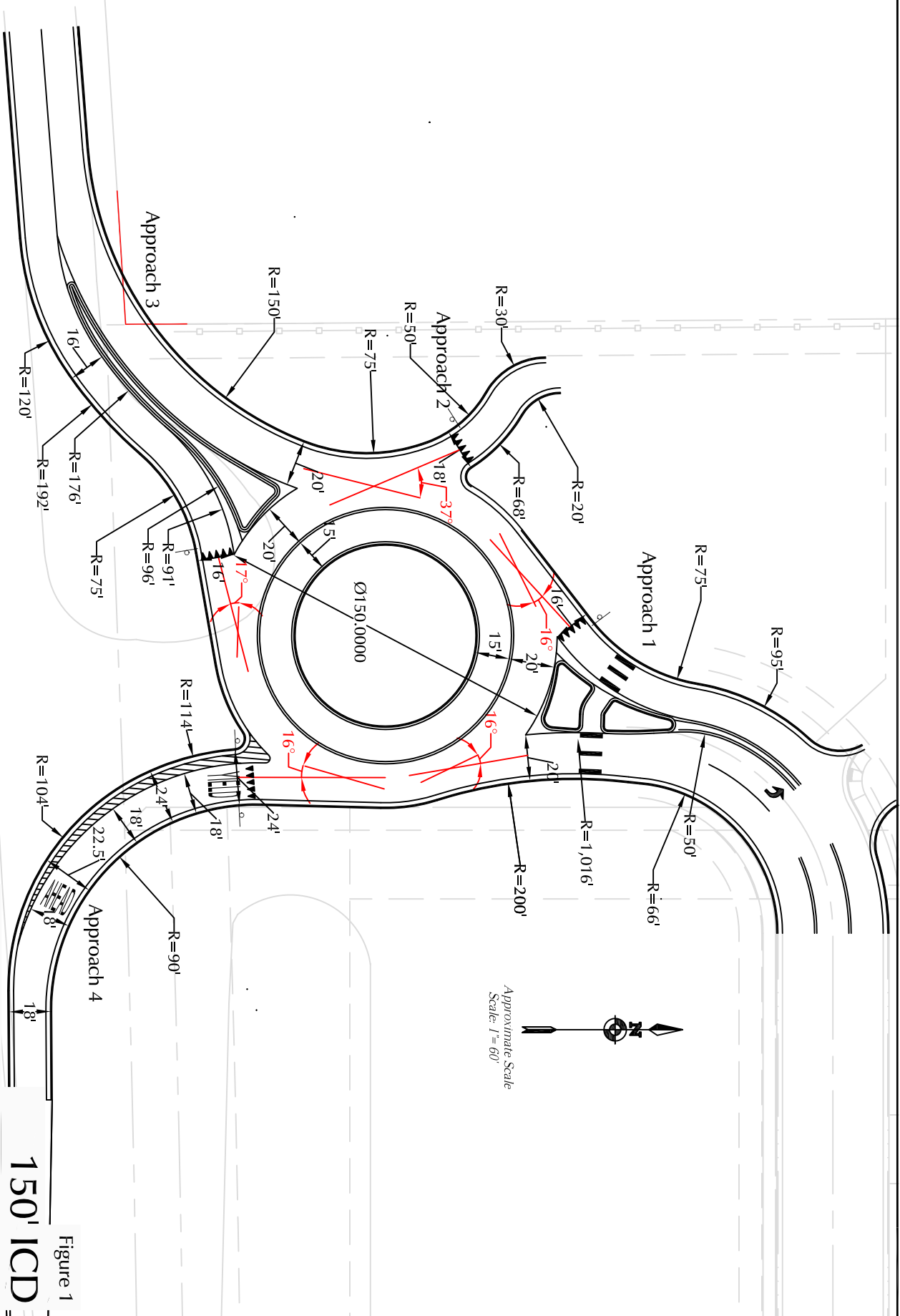


Figure 9

Approach 2 Fastest Paths

Falcon Marketplace (LSC #164350)





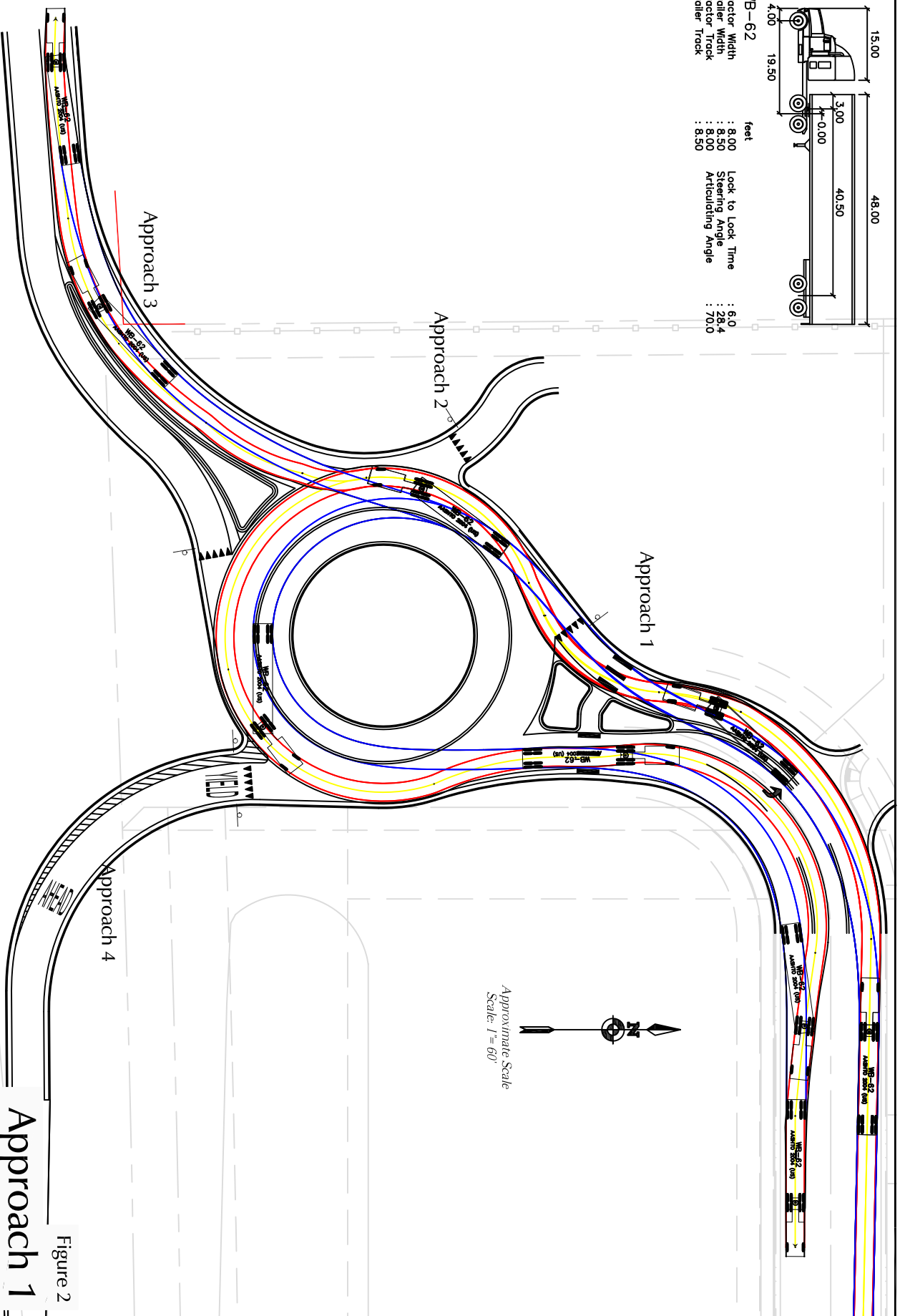
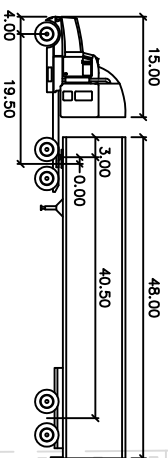
Roundabout Parameters

Falcon Marketplace (LSC #164350)

150' ICD

Figure 1

WB-62		feet	
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Tractor Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		



WB-62 (Design Vehicle) Auto Turn Movements

Falcon Marketplace (LSC #164350)

Figure 2

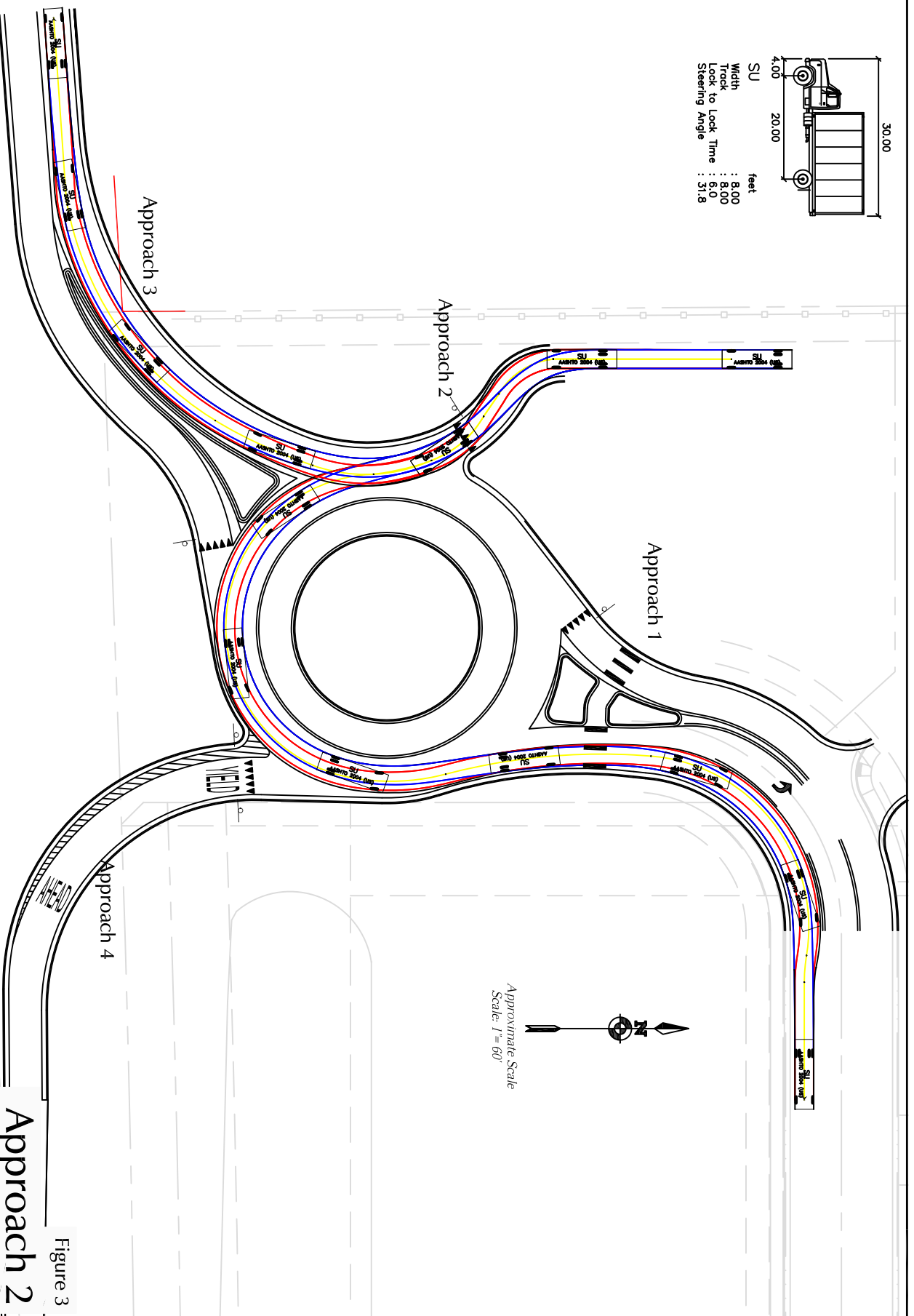
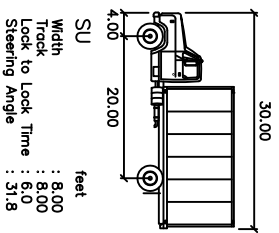
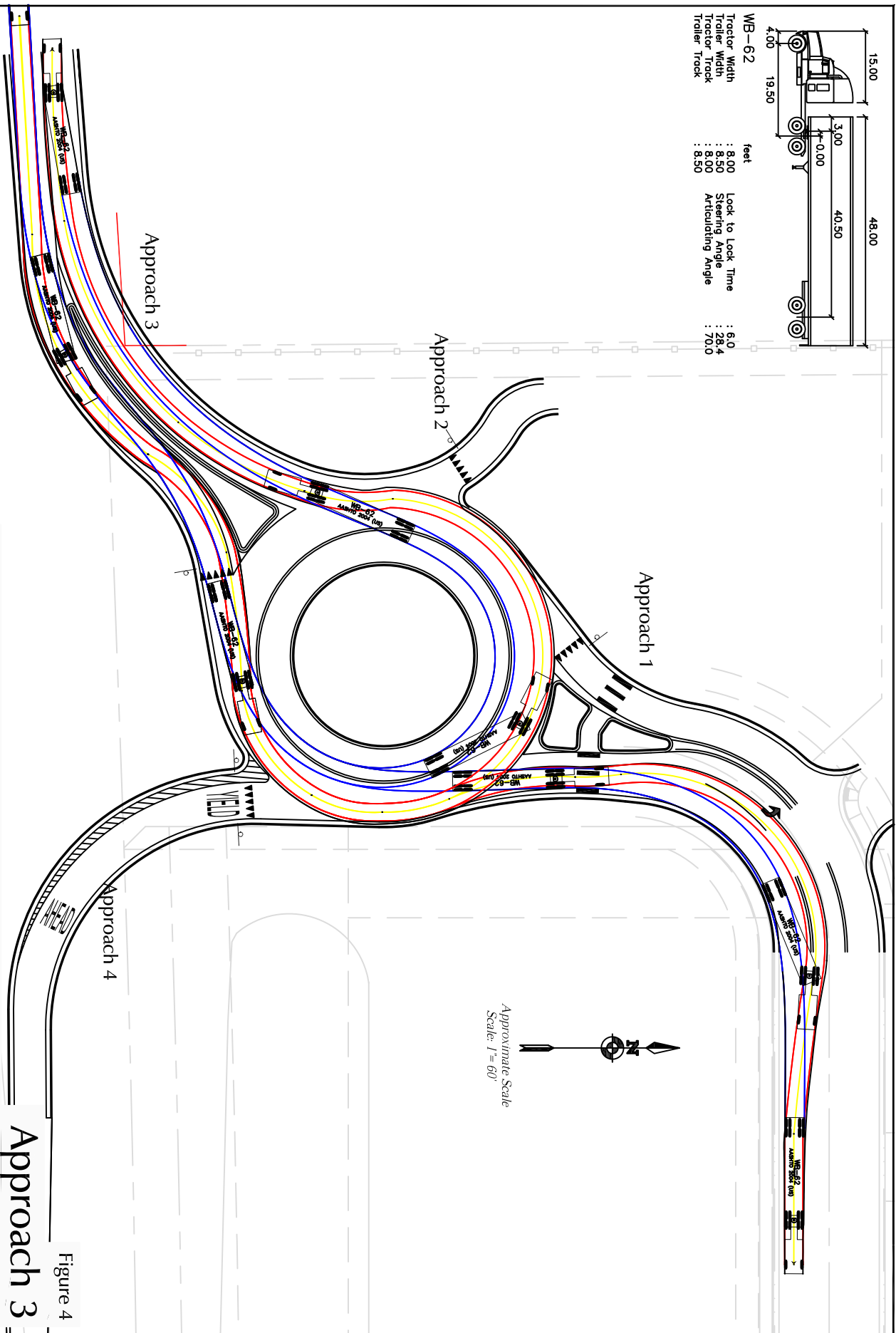
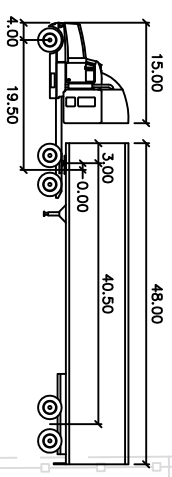


Figure 3

Approach 2 SU Auto Turn Movements

Falcon Marketplace (LSC #164350)

WB-62		feet	
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Tractor Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

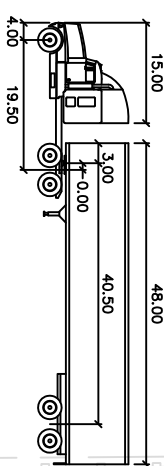


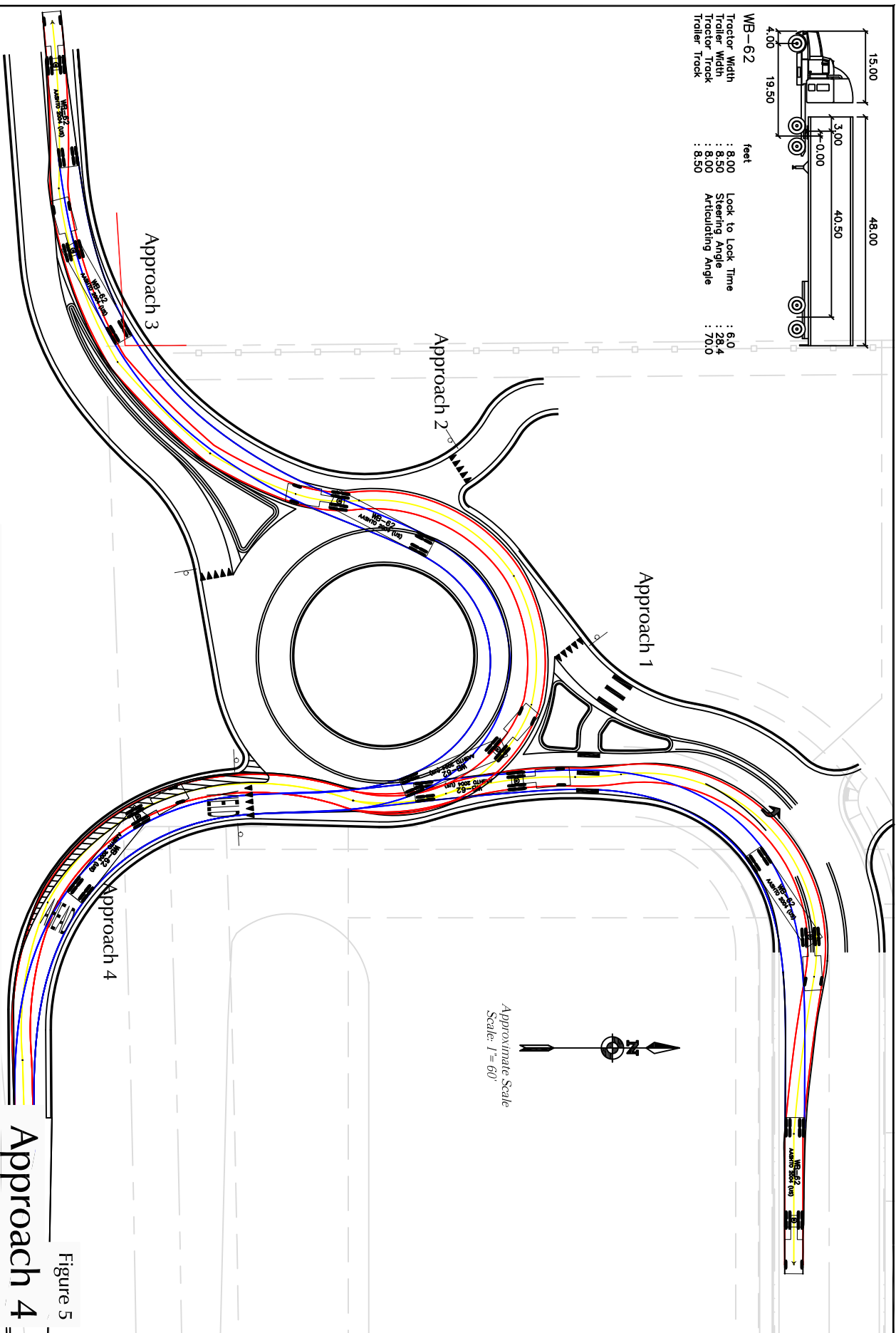
Approximate Scale
Scale: 1" = 60'

WB-62 (Design Vehicle) Auto Turn Movements

Falcon Marketplace (LSC #164350)

Figure 4

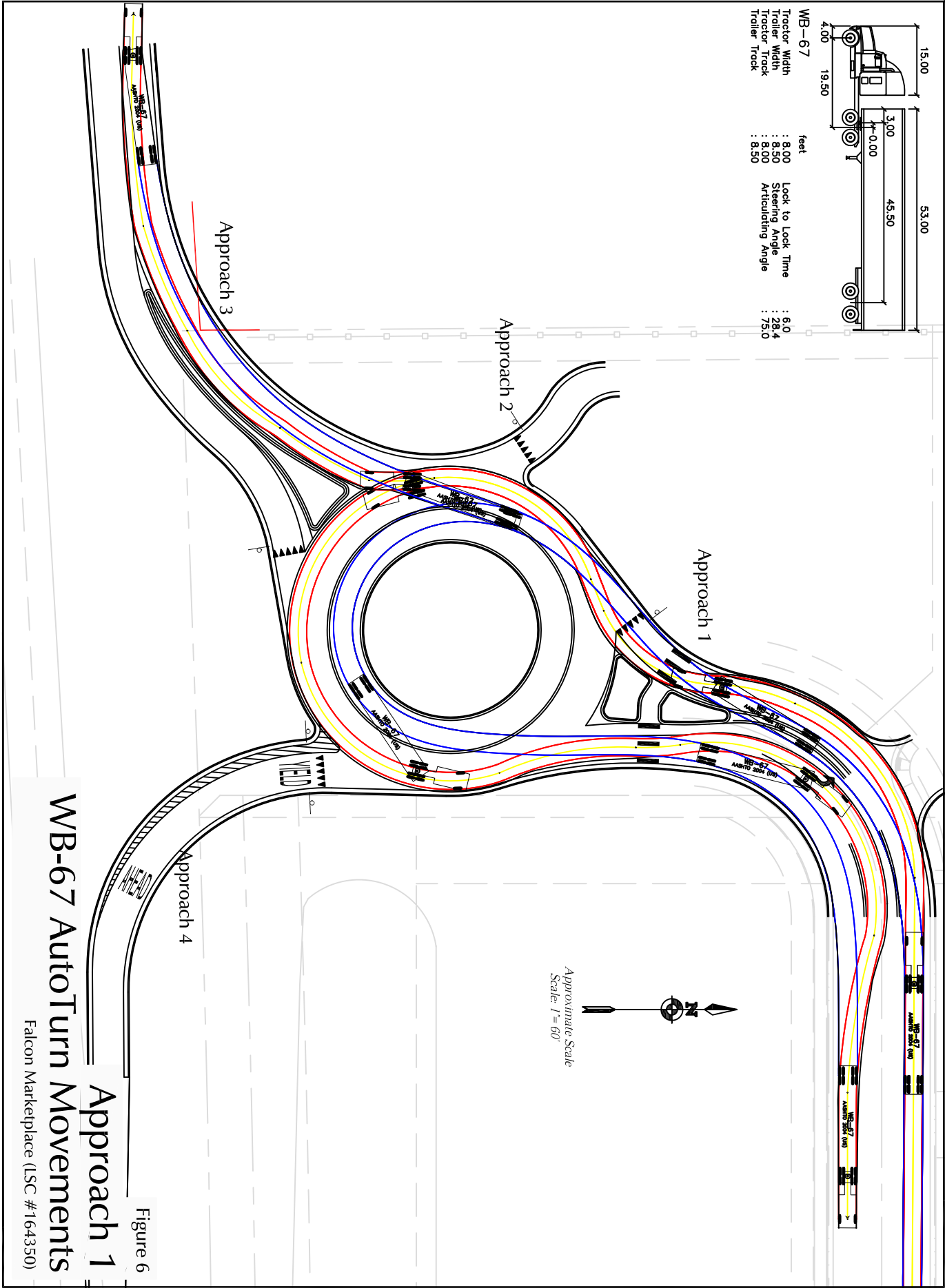
			
WB-62			
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Tractor Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 70.0
Tractor Track	: 8.50		



WB-62 (Design Vehicle) Auto Turn Movements

Falcon Marketplace (LSC #164350)

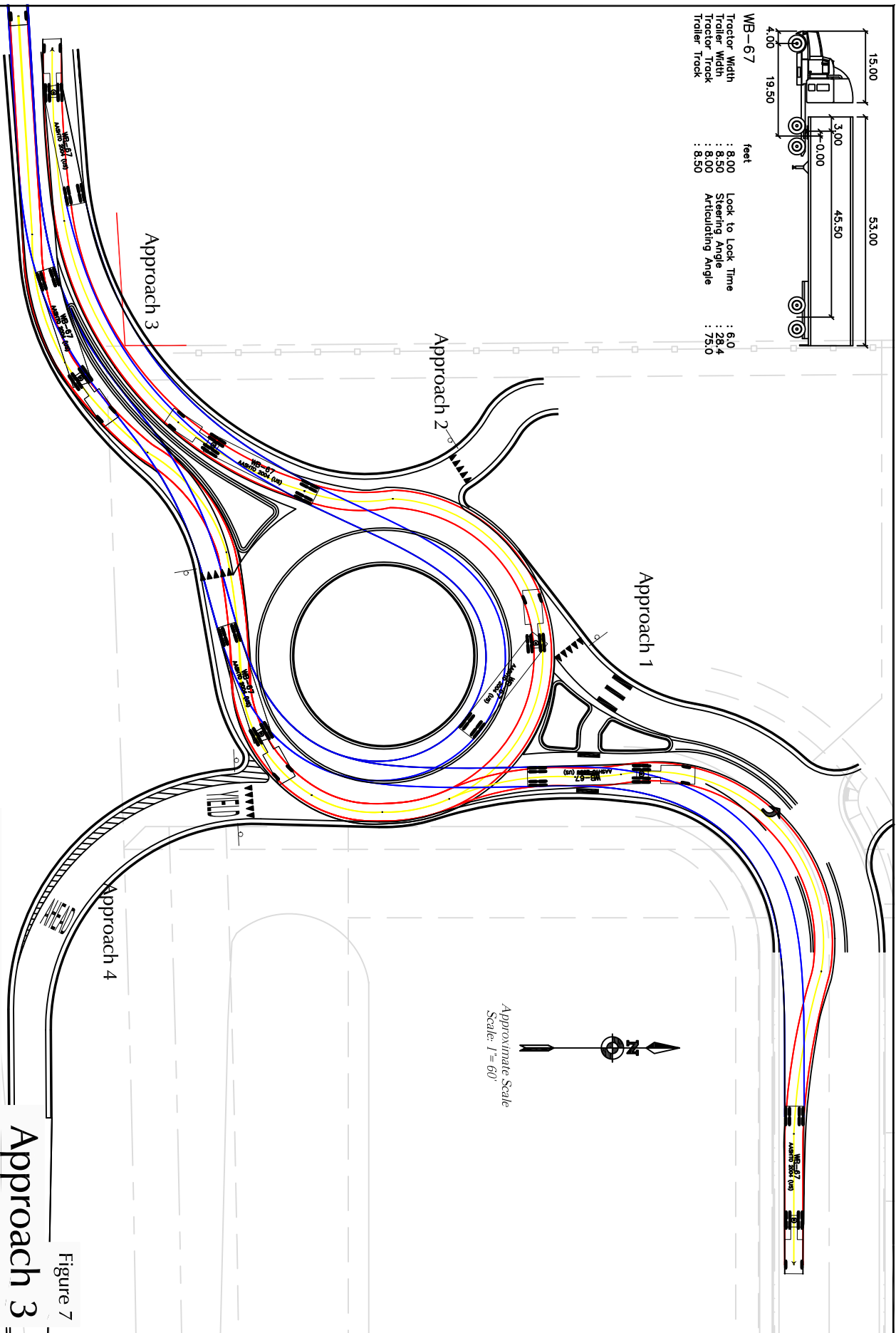
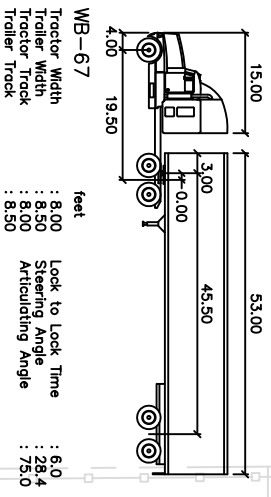
Figure 5



WB-67 Auto Turn Movements

Approach 1

Falcon Marketplace (LSC #164350)



Approximate Scale
Scale: 1" = 60'

WB-67 Auto Turn Movements
Approach 3

Falcon Marketplace (LSC #164350)

WB-67			
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Tractor Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 75.0
Trailer Track	: 8.50		

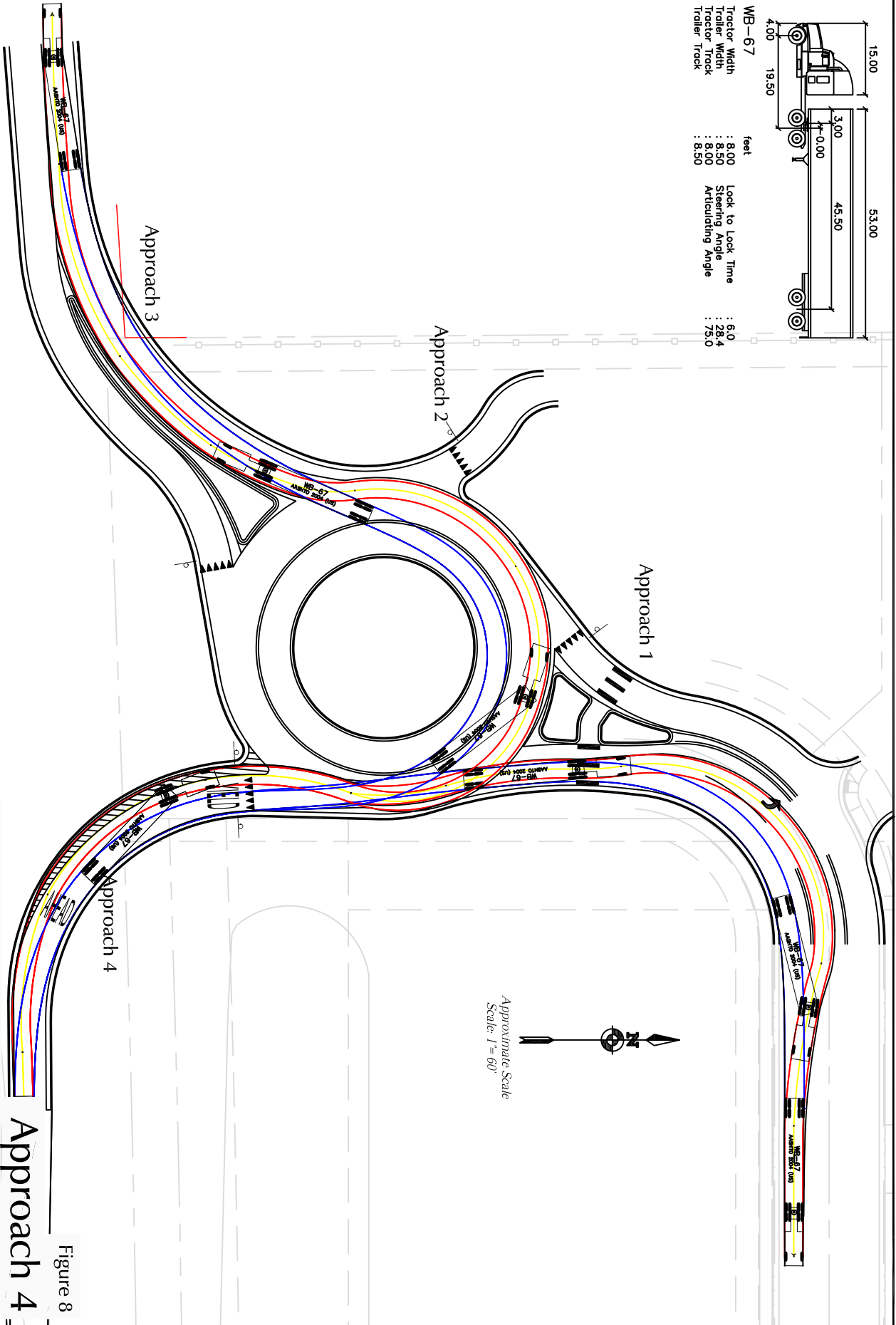
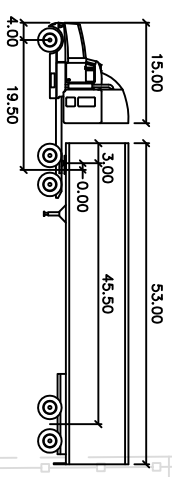


Figure 8

WB-67 Auto Turn Movements

Falcon Marketplace (LSC #164350)

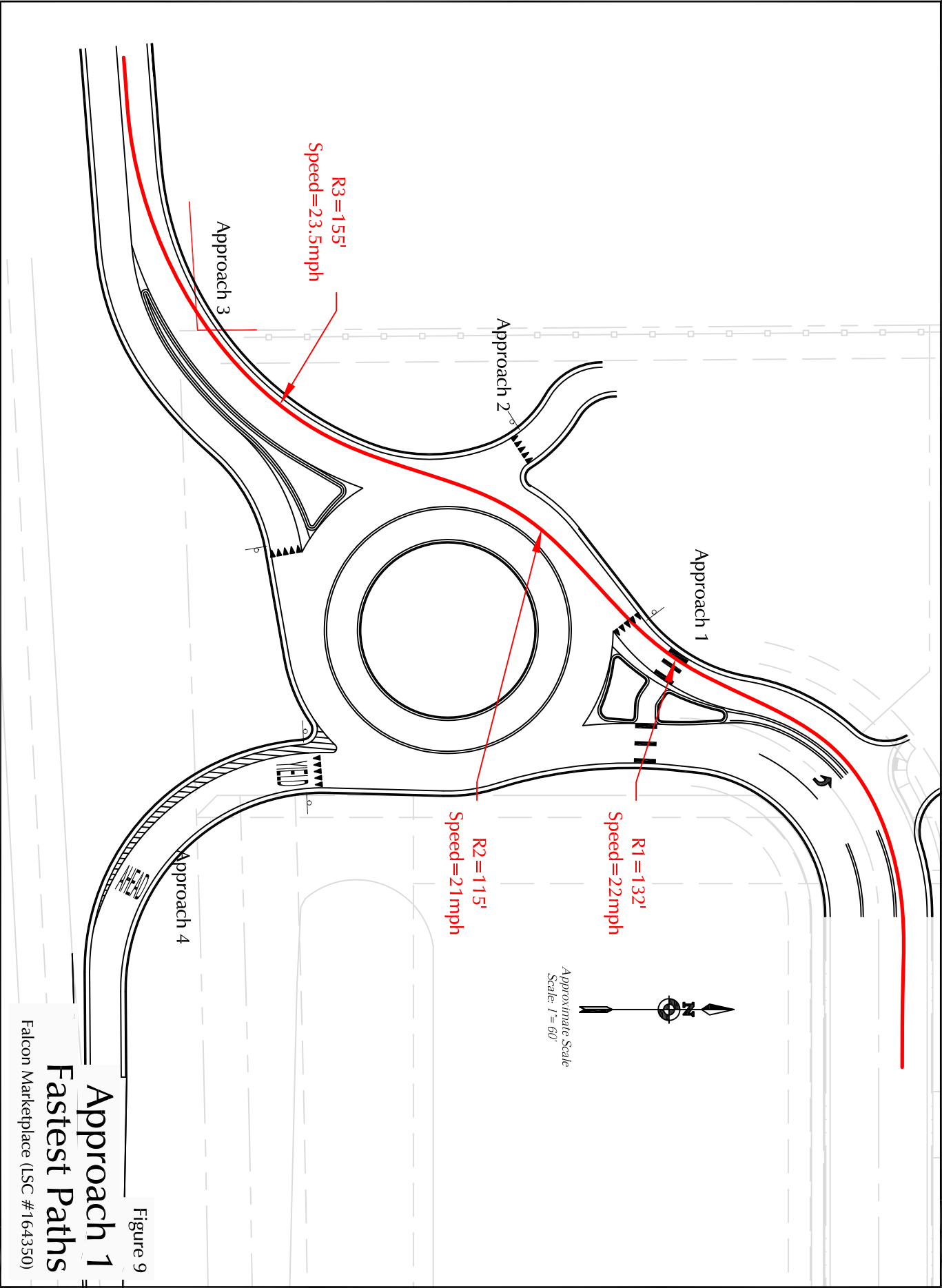


Figure 9

Approach 1 Fastest Paths

Falcon Marketplace (LSC #164350)

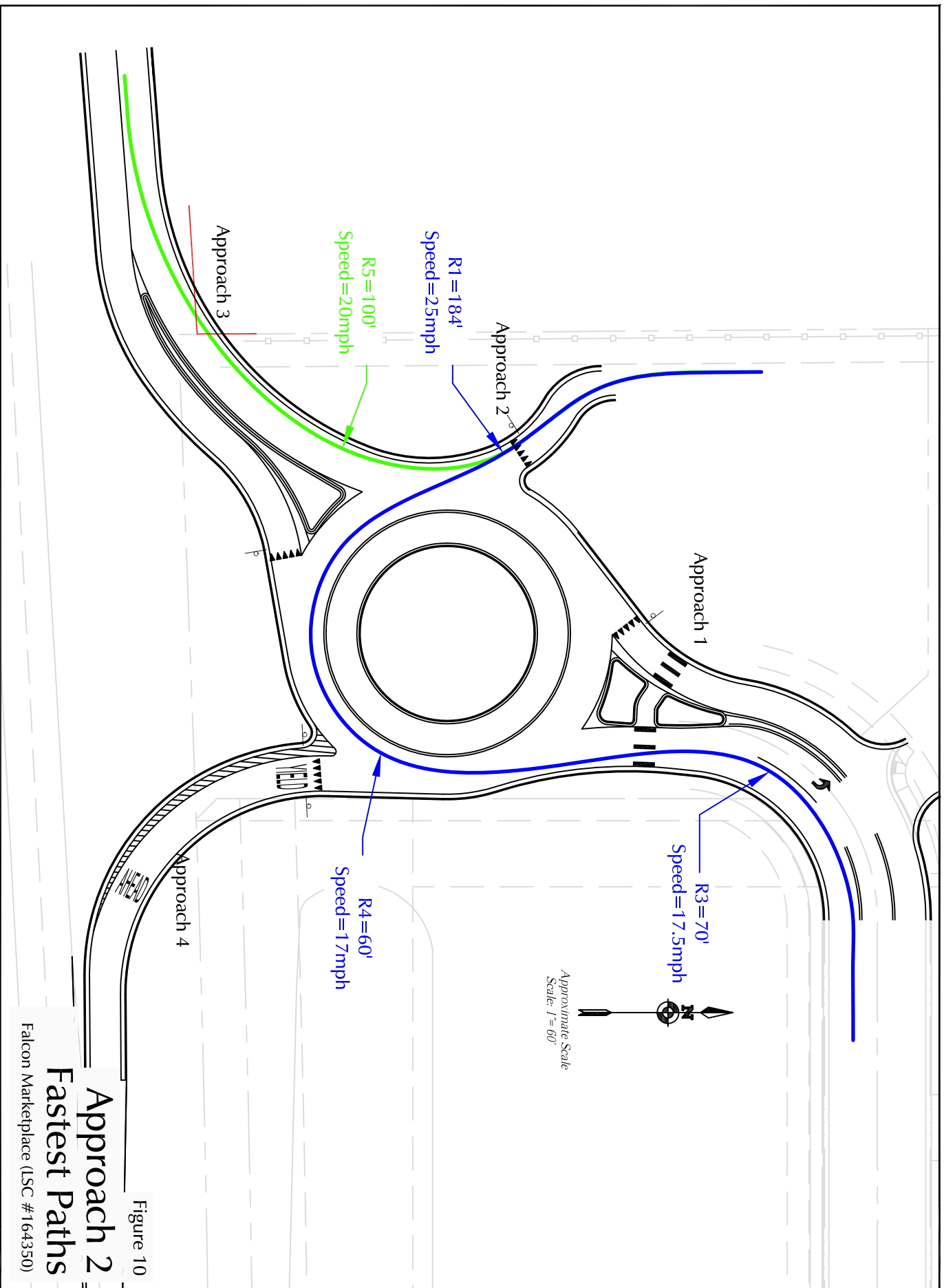


Figure 10

Approach 2 Fastest Paths

Falcon Marketplace (LSC #164350)

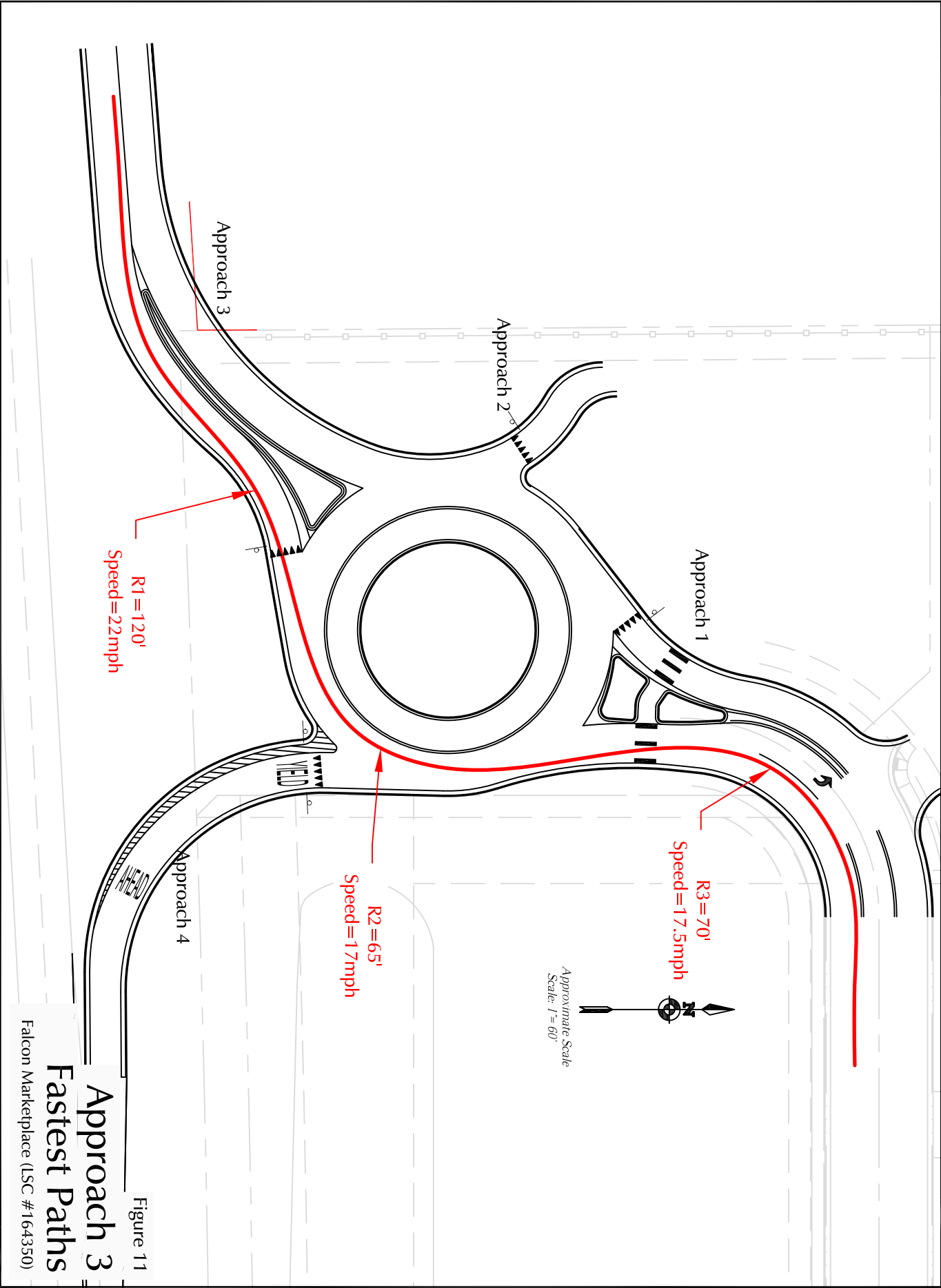


Figure 11

Approach 3 Fastest Paths

Falcon Marketplace (LSC #164350)

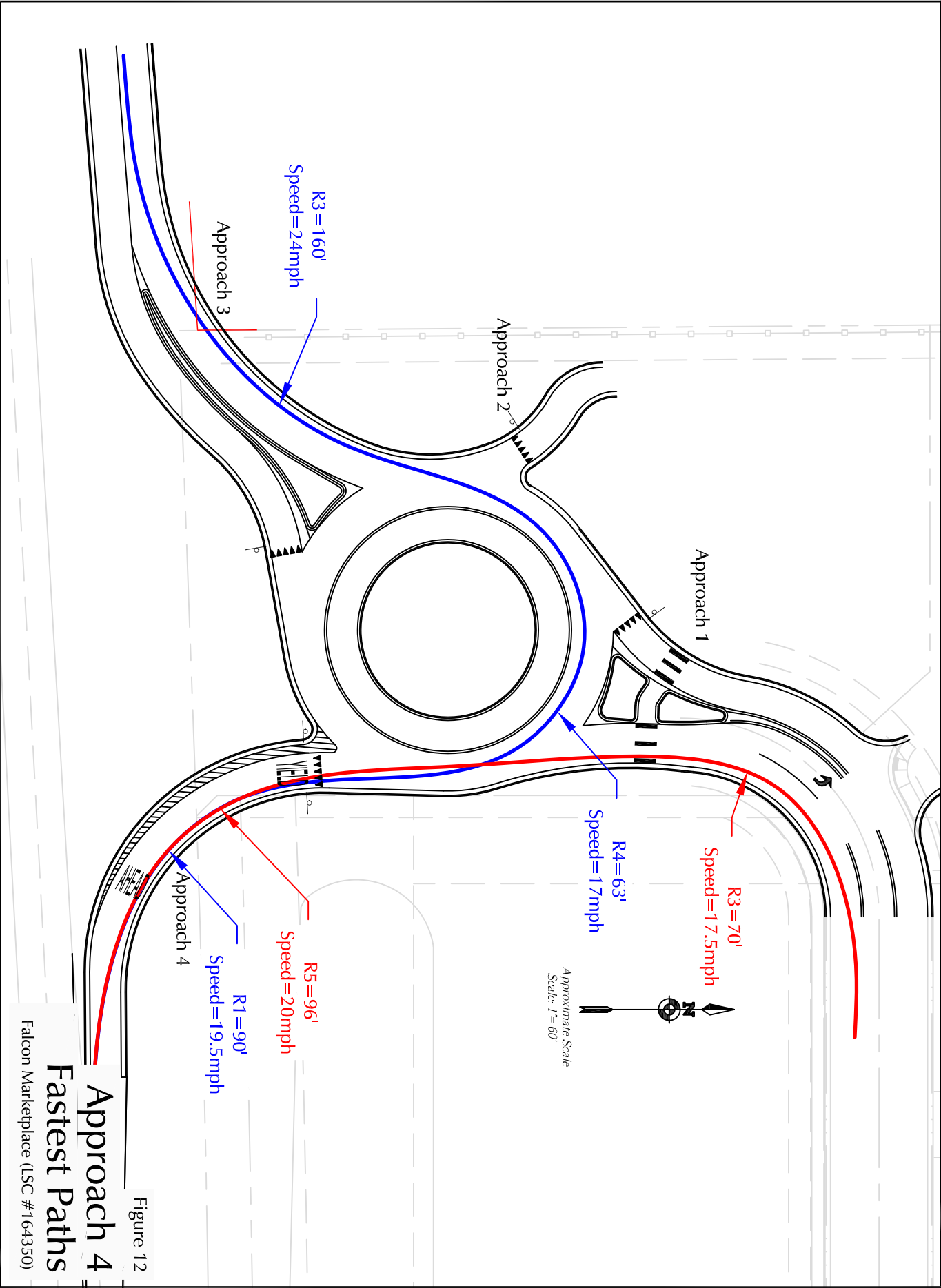


Figure 12

Approach 4 Fastest Paths

Falcon Marketplace (LSC #164350)

Table 7b - Updated Falcon Marketplace Roadway Improvements With Proposed Right-In Access to Woodmen Road					
Item #	Improvement	Timing	MORE DETAILED TIMING	ADT that will warrant/TRIGGER the Improvement	Responsibility
Countywide Road Impact Fee Program Fees and Taxes					
1	Woodmen Road Metropolitan District fees and taxes to be paid in lieu of Countywide Road Impact Fee Program fees and taxes. Woodmen Road has already been completed, but this project is joining the district.	District fees payable at platting	WITH PLAT & EACH BUILDING PERMIT	BASED ON WOODMEN ROAD DISTRICT REQUIREMENTS	Falcon Marketplace
Meridian/Eastonville and Meridian Right-In/Right-Out Intersections					
2	Signalization of Meridian Road/Eastonville Road intersection.	Design and installation with the development of Falcon Marketplace once allowed by El Paso County.	PHASE 1	TRIGGER FOR INSTALL IS ONCE WARRANTS ARE MET - HOWEVER, IF NOT ALLOWED TO INSTALL W/PHASE 1, EPC WILL REQUIRE ESCROW FOR FULL AMOUNT W PHASE 1	Falcon Marketplace
3	Reconstruction of the Meridian center median south of Eastonville Road to achieve major street left-turn sight distance for the option of northbound/southbound protected/permissive left-turn signal phasing with interim single left-turn lanes northbound and southbound and to accommodate future northbound dual left-turn lanes if needed in the future. This lane should be 425 feet long plus a 200-foot taper. The taper would be back-to-back with the southbound dual left-turn taper.	Design and installation with the development of Falcon Marketplace.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
4	Southbound right-turn deceleration lane on Meridian Road approaching Eastonville Road. This lane should be 235 feet long plus a 200-foot taper.	Design and installation with the development of Falcon Marketplace.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
5	Design and construction of continuous southbound right-turn lanes and shoulder/bike lane on Meridian Road from Eastonville Road south to the proposed right-in/right-out and from the right-in/right-out south to Woodmen Road. (Note: Also please refer to related item #16 below.)	Design and installation with the development of Falcon Marketplace.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
6	Widening of Eastonville Road east of Meridian Road to add a westbound through lane and add width as feasible between the westbound left-turn lane and the westbound through lane due to the proposed dual left-turn lanes on the west side of the intersection. This added width would allow for through lane alignment (with an acceptable offset across the intersection).	Design and installation with the development of Falcon Marketplace. Extent of this off-site improvement may be limited by available right-of-way and/or other existing constraints.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
7	Design and construction of the proposed extension of Eastonville Road between Meridian and the proposed roundabout.	Design and installation with the development of Falcon Marketplace.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
On-Site Improvements					
8	Design and construction of the public street connection through the site (Falcon Market Place).	Design and installation with the development of Falcon Marketplace.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
9	Design and construction of the proposed roundabout on-site west of the Meridian/Eastonville intersection. This would include a "stub" to the north for the anticipated future street connection north to Bent Grass Meadows Drive.	Design and installation with the development of Falcon Marketplace.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
10	Design and construction of the proposed roundabout on-site at the east terminus of the Woodmen Frontage Road.	Design and installation with the development of Falcon Marketplace.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
Woodmen/Meridian Intersection					
11	Extend existing westbound right-turn acceleration lane on Woodmen Road at Meridian Road to provide a continuous right-turn lane between Meridian Road and the proposed right-in-only access.	Design and installation with the development of Falcon Marketplace.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
12	Lengthening of Woodmen eastbound dual left-turn lanes . Lengthening of eastbound left-turn lanes and potential further future lengthening to provide a 240-foot lane transition taper, 290 feet of deceleration distance plus sufficient vehicle stacking distance. CURRENT lane length: 500 feet of dual left-turn lane and 425-foot taper. Of this taper, 215 feet is full-width "dec'd" distance. Remaining 20 feet of the required 235-foot decel distance occurs in the first 20 feet of the 500-foot dual left-turn lanes. The remainder of the dual left-turn lanes is stacking distance - 480 feet. SHORT TERM: Based on the short-term analysis, the existing lane provides sufficient stacking distance. LONG TERM: This lane will likely need to be extended to provide a total of 840 feet of dual left storage distance plus 235 feet of deceleration length plus a 200-foot taper.	Future extension of existing dual left-turn lanes once traffic queues regularly extend beyond the 480-foot stacking distance.	PAYMENT WITH DEVELOPMENT PLAN FOR EACH INDIVIDUAL LOT; WITH REGARDS TO THE TIMING OF THE IMPROVEMENT: "once traffic queues regularly extend beyond the 480-foot stacking distance." This is estimated to be approximately 65 PM peak hour eastbound left turns above the estimated short term total volume from Figure 16a of the TIS. Note: Short term total volumes assume the Meridian extension to Highway 24 to be open.	PAYMENT OF PRO RATA SHARE WITH EACH LOT DEVELOPMENT PLAN; The estimated "trigger" of 65 PM peak hour eastbound left turns above the estimated short term total volume (from Figure 16a of the TIS) approximately translates to an additional 957 directional ADT for residential trips (based on the ITE single family trip ratio). This estimated threshold may be reached with a combination of Falcon Marketplace trips and background trips. Falcon Marketplace daily trip to afternoon peak hour trip ratio is about 23:1 but would need to be adjusted for passby trips.	Falcon Marketplace will pay its pro-rata share by (based on total traffic volumes) of the cost of the improvements. The payment amount will be determined on an individual-lot basis in the form of an escrow amount payable at the time of site development plan for each individual lot.
13	Meridian northbound dual left-turn lanes: Lengthening of northbound left-turn lanes and potential further future lengthening to provide a 200-foot lane transition taper, 235 feet of deceleration distance plus sufficient vehicle stacking distance. CURRENT lane configuration: 315 feet of dual left-turn lane length, 145 feet of single left-turn lane length and a 150-foot lane transition taper from the through lane to the single left-turn lane. This provides a 150-foot taper, 235 feet of deceleration distance, and 225 feet of dual left stacking. SHORT TERM: The 315-foot dual left-turn lanes would accommodate the projected short-term queues. The deceleration distance (235 feet) plus a 200-foot taper will need to be provided south of the end of the existing 315-foot dual left stacking lanes. For the deceleration distance, 235 feet of at least single-lane width for deceleration length would flare to the north to connect to the existing dual lane width to the north. South of the deceleration portion of the lane, a standard 200-foot taper will need to be added in the median. These modifications will involve median reconstruction and restriping south of the existing dual left-turn lanes. This would result in a 200-foot taper, 235-foot deceleration distance, and 315 feet of dual left-turn stacking.	With the development of Falcon Marketplace, extend the northbound left-turn lane as described in the column to the left and as shown in Figure 25.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Short Term - Falcon Marketplace
14	Meridian northbound dual left-turn lanes. LONG TERM: Potentially, additional growth in the Falcon Area and east along Falcon Highway will add left-turning traffic demand. Long-term analysis indicates the potential future need for 400 feet of stacking distance plus the 235 feet of deceleration distance and the 200-foot taper.	Future (if necessary -- Add additional lane length beyond #13 to provide additional stacking if/when needed (as shown in Figure 26).			By other future developments impacting this turn lane. Potential for fee program credit for improvements completed as this is a regional intersection.
Golden Sage Intersections					
15	Directional wayfinding sign(s) on eastbound Woodmen Road upstream of Golden Sage - notifying/reminding eastbound motorists of the option to enter Falcon Marketplace via the Woodmen Frontage Road.	Design and installation with the development of Falcon Marketplace.	PHASE 1	PLANNED TO BE COMPLETED WITH PHASE 1	Falcon Marketplace
16	Lengthening of the current eastbound single left-turn deceleration lane on Woodmen approaching Golden Sage Road to provide a 240-foot transition taper (20:1 taper ratio), 290 feet of deceleration distance plus sufficient vehicle stacking distance. CURRENT: 175-foot taper plus a 465-foot left-turn lane which translates to a 175-foot taper, 290-foot deceleration distance, and 175 feet of stacking distance. SHORT TERM: Adequate stacking is available in the current turn lane - calculated queue length 141 feet. LONG TERM: Lengthen single left-turn lane and/or future implementation of dual left-turn lanes (if capacity needs dictate) to maintain 290 feet of deceleration length, a 240-foot lane taper (20:1 taper ratio) plus provide sufficient vehicle stacking length - model indicates 471 feet of dual left stacking distance based on morning peak-hour projected volumes. If a dual left is implemented in the future, consideration will need to be given to the configuration on Golden Sage and at the Golden Sage/Woodmen Frontage Road intersection to receive the dual left-turn movement.	Short Term: The existing lane is adequate based on the short-term analysis. Long Term: Future with additional development served by the north frontage road - extension of existing single left-turn lane and potentially widening in the median to provide dual left-turn lanes to provide additional vehicle stacking distance as described in the column to the left.	PAYMENT WITH DEVELOPMENT PLAN FOR EACH INDIVIDUAL LOT; WITH REGARDS TO THE TIMING OF THE IMPROVEMENT: AS NEEDED TO MAINTAIN ADEQUATE LEVEL OF SERVICE AND VEHICLE STACKING DISTANCE." This is estimated to be when the eastbound left turn turning volume reaches approximately 200 vehicles per hour during the PM peak. This translates to about 40 vehicles per hour over the estimated short term total volume from Figure 16a of the TIS. Note: Short term total volumes assume the Meridian extension to Highway 24 to be open.	PAYMENT OF PRO RATA SHARE WITH EACH LOT DEVELOPMENT PLAN; The estimated "trigger" of 40 PM peak hour eastbound left turns above the estimated short term total volume (from Figure 16a of the TIS) approximately translates to and additional 589 directional ADT for residential trips making this turning movement (based on the ITE single family trip ratio). This estimated threshold may be reached with a combination of Falcon Marketplace trips and background trips. Falcon Marketplace daily trip to afternoon peak hour trip ratio is about 23:1 but would need to be adjusted for passby trips.	Falcon Marketplace will pay its pro-rata share by (based on total traffic volumes) of the cost of the improvements. The payment amount will be determined on an individual-lot basis in the form of an escrow amount payable at the time of site development plan for each individual lot.
17	Southbound exclusive right-turn lane on Golden Sage Road approaching Woodmen Road (a continuous right-turn lane within the 150 feet between the Woodmen Frontage Road and Woodmen Road).	If/when needed to maintain acceptable level of service/traffic operations and/or to control vehicle queues.	PAYMENT WITH DEVELOPMENT PLAN FOR EACH INDIVIDUAL LOT; WITH REGARDS TO THE TIMING OF THE IMPROVEMENT: AS NEEDED TO MAINTAIN ADEQUATE LEVEL OF SERVICE AND VEHICLE STACKING DISTANCE." A preliminary trigger could be a southbound right turn volume of about 150-175 vehicles per hour. This translates to about 5 to 30 vehicles per hour over the projected short term volume from Figure 16a of the TIS. This may be conservative due to the westbound right turn acceleration lane on Woodmen Road. Additional study may indicate a higher threshold based on empirical data collection and analysis.	PAYMENT OF PRO RATA SHARE WITH EACH LOT DEVELOPMENT PLAN; The estimated "trigger" of 5-30 AM peak hour southbound right turns above the estimated short term total volume (from Figure 16a of the TIS) approximately translates to an additional 85-510 directional ADT for residential trips making this turning movement (based on the ITE single family trip ratio). This estimated threshold may be reached with a combination of Falcon Marketplace trips and background trips. Falcon Marketplace daily trip to afternoon peak hour trip ratio is about 45:1 but would need to be adjusted for passby trips.	Falcon Marketplace will pay its pro-rata share by (based on total traffic volumes) of the cost of the improvements. The payment amount will be determined on an individual-lot basis in the form of an escrow amount payable at the time of site development plan for each individual lot.
18	Signalization of Golden Sage Road/Woodmen Frontage Road or reconstruction as a modern roundabout; Future additional laneage may be necessary at this intersection to accommodate vehicle queues and for traffic operations.	If/when needed to maintain acceptable level of service/traffic operations and/or to control vehicle queues.	PAYMENT WITH DEVELOPMENT PLAN FOR EACH INDIVIDUAL LOT; WITH REGARDS TO THE TIMING OF THE IMPROVEMENT: AS NEEDED TO MAINTAIN ADEQUATE LEVEL OF SERVICE AND VEHICLE STACKING DISTANCE."	PAYMENT OF PRO RATA SHARE WITH EACH LOT DEVELOPMENT PLAN;	Falcon Marketplace will pay its pro-rata share by (based on total traffic volumes) of the cost of the improvements. The payment amount will be determined on an individual-lot basis in the form of an escrow amount payable at the time of site development plan for each individual lot.
Source: LSC Transportation Consultants, Inc. REV. (7-19-19)					

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