

SEAL PROPERTY SUBDIVISION
Transportation Impact Analysis
Hardin Valley Road
Knoxville, TN

**A Transportation Impact Analysis for the Seal Property
Subdivision**

Submitted to

Knoxville-Knox County Planning

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FMA Project No. 592.006

Submitted By:



8-SC-20-C
8-E-20-UR
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Executive Summary

Ball Homes, LLC is proposing a residential development (i.e. Seal Property Subdivision) with single-family housing located in Knox County. The project is located south of the intersection of Hickory Creek Road at Hardin Valley Road / E Gallaher Ferry Road, east of Creekside Manor Lane, and west of Marietta Church Road. The full buildout of the development will consist of 265 single family lots. Construction is proposed to take place this year and this study assumes full build out for the development will occur in 2023.

The main driveway connection is located at the proposed roundabout at the intersection of Hickory Creek Road at Hardin Valley Road / E Gallaher Ferry Road. The main driveway connection will have a 10 foot wide curbed median, a roadway width of 18 feet and total width of 46 feet. A second driveway connection is proposed along Hardin Valley Road 770 feet east of the proposed roundabout.

In order to maintain or provide an acceptable level-of-service for each of the intersections studied, some recommendations are presented.

Hickory Creek Road at Hardin Valley Road

The background and full buildout traffic conditions at the proposed roundabout intersection will operate at a LOS A during both the AM and PM peak hours. The addition of the driveway to the proposed roundabout at Hickory Creek Road, Hardin Valley Road and E Gallaher Ferry Road will only cause a minor increase in delay to the intersection; therefore there are no recommended improvements.

Hardin Valley Road at Muddy Creek Lane

As a part of the Seal Property Subdivision the driveway connection (Road "A") will tie into the existing intersection of Hardin Valley Road at Muddy Creek Lane. The full buildout traffic conditions for the eastbound and westbound left turning movements operate at a LOS A during both the AM and PM peak hours, the northbound approach (Road "A") operates at a LOS B during both the AM and PM peak hours and the southbound approach (Muddy Creek Lane) will operate at a LOS C during both the AM and PM peak hours after the completion of the Seal Property Subdivision.

After the completion of the Seal Property Subdivision neither an eastbound right turn lane nor a westbound left turn lane are warranted at the intersection of Hardin Valley Road at Muddy Creek Lane / driveway connection (Road "A").

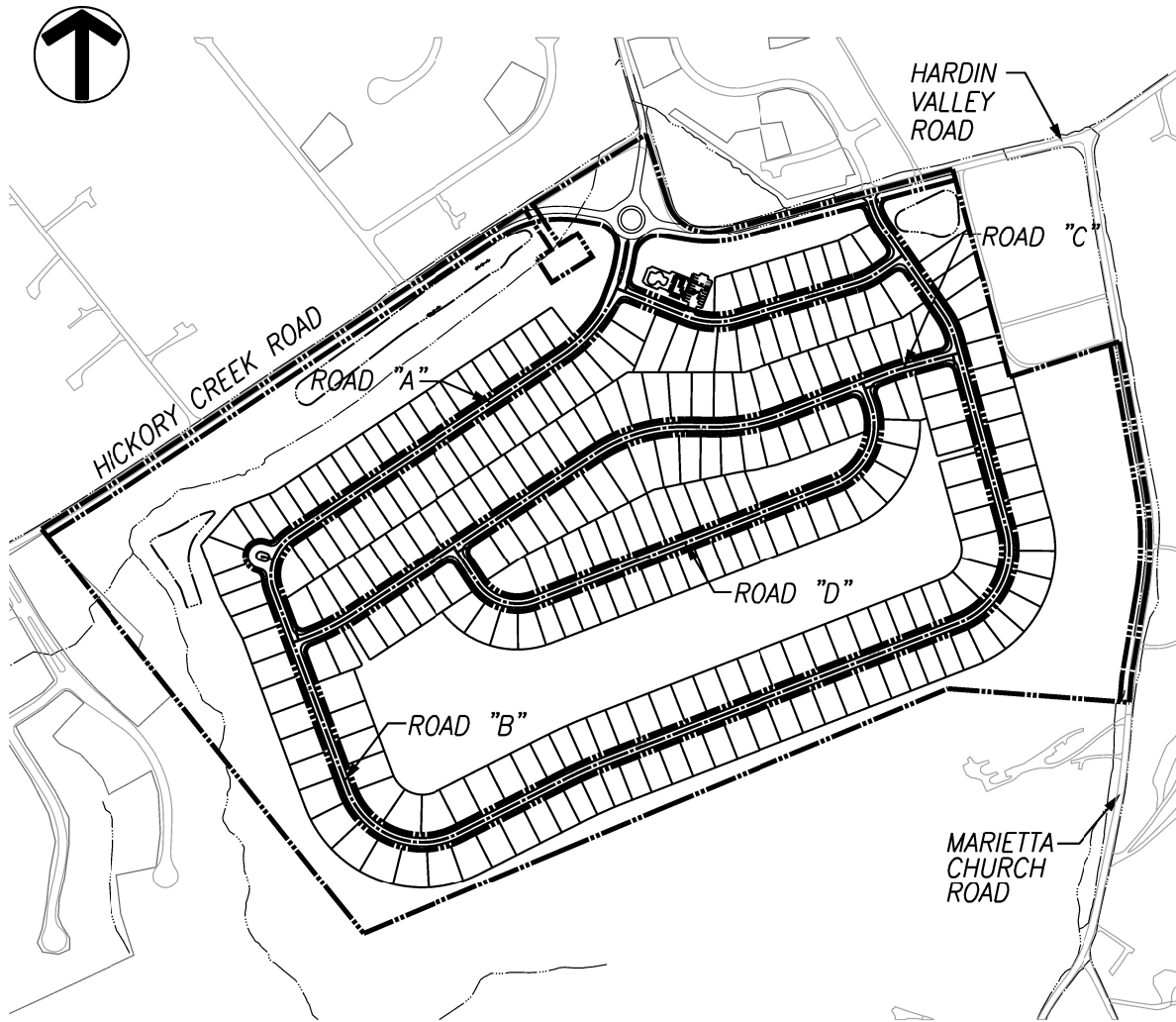


Figure 2: Site Plan

4 Trip Generation and Trip Distribution

The Seal Property Subdivision proposes 265 single family lots. Single-Family Detached Housing or Land Use 210 was used to calculate site trips for the subdivision using the fitted curve equations from the *Trip Generation, 10th Edition*, published by the Institute of Transportation Engineers. The land use worksheets are included in Attachment 5.

The total trips generated by the full buildout of the Seal Property Subdivision was estimated to be 2,549 daily trips. The estimated trips are 193 trips during the AM peak hour and 259 trips during the PM peak hour. A trip generation summary is shown in Table 4-1.

**Table 4-1
Seal Property Subdivision
Trip Generation Summary**

Land Use	Density	Daily Trips	AM Peak Hour		PM Peak Hour	
			Enter	Exit	Enter	Exit
Single-Family Detached Housing (LUC 210)	265 Lots	2549	48	145	163	96

The existing distribution of traffic at the intersection of Hickory Creek Road at Hardin Valley Road / E Gallaher Ferry Road is 60% eastbound, 25% northbound and 15% southbound during the AM peak hour and 35% eastbound, 60% northbound and 5% southbound during the PM peak hour.

The directional distribution of the traffic generated by the Seal Property Subdivision was determined using the existing traffic volumes along Hardin Valley Road in combination with the concept plan layout. FMA assumed that 85% of traffic would enter/exit from Hardin Valley Road, 10% of traffic would enter/exit from Hickory Creek Road and 5% of traffic would enter/exit from E Gallaher Ferry Road.

The subdivision traffic will enter / exit using both the roundabout and the intersection of Hardin Valley Road at the driveway connection (Road "A"). FMA assumed that 25% of the proposed site traffic would enter from the intersection Hardin Valley Road at the driveway connection (Road "A") and 75% of the proposed site traffic would enter via the roundabout. FMA assumed that 50% of the proposed site traffic would exit from the intersection of Hardin Valley Road at the driveway connection (Road "A") and 50% of the proposed site traffic would exit via the roundabout.

6 Turn Lane Warrant Analysis

The intersection of Hardin Valley Road at the driveway connection (Road "A") was evaluated to determine if a right turn lane or a left turn lane are warranted. The Knox County Department of Engineering and Public Works handbook, "Access Control and Driveway Design Policy," was used to analyze the information. Neither an eastbound right turn lane nor a westbound left turn lane on Hardin Valley Road is warranted. The turn lane warrant worksheets and analysis are included in Attachment 9.

7 Conclusions and Recommendations

7.1 Hickory Creek Road @ Hardin Valley Road

The existing conditions at the two-way stop controlled intersection of Hickory Creek Road at Hardin Valley Road / E Gallaher Ferry Road and the background and full conditions at the proposed roundabout were analyzed using the Highway Capacity Software (HCS7).

The existing traffic conditions for the eastbound approach (Hickory Creek Road) operate at a LOS B during the AM peak hour and a LOS A during the PM Peak hour and the northbound left turn (Hardin Valley Road) operates at a LOS A during both the AM and PM peak hours.

The background and full buildout traffic conditions at the proposed roundabout intersection will operate at a LOS A during both the AM and PM peak hours.

The unsignalized intersection capacity analyses shows a 95% queue length at the full buildout of approximately two car lengths for the eastbound approach during the AM peak hour and two car lengths for the westbound approach during the PM peak hour; therefore the existing storage at the intersection is adequate and no change is necessary.

Hickory Creek Road is classified as a Minor Arterial per the Major Road Plan. The minimum intersection spacing required on an arterial is 400 feet per the "Knoxville-Knox County Subdivision Regulations" as amended through February 13, 2020. The proposed driveway connection is located approximately 915 feet east of the intersection of Hickory Creek Road at Covered Bridge Boulevard. This driveway connection exceeds the typical minimum separation on a Minor Arterial; therefore, no change is necessary.

7.2 Hardin Valley Road at Muddy Creek Lane

The existing, background and full buildout conditions at the unsignalized intersection of Hardin Valley Road at Muddy Creek Lane were analyzed using the Highway Capacity Software (HCS7).

The existing traffic conditions for the eastbound left turn movement (Hardin Valley Road) currently operate at a LOS A during both the AM and PM peak hours and the southbound approach (Muddy Creek Lane) operates at a LOS B during both the AM and PM peak hours.

The background traffic conditions for the eastbound left turn movement (Hardin Valley Road) currently operate at a LOS A during both the AM and PM peak hours and the southbound approach (Muddy Creek Lane) operates at a LOS B during both the AM and PM peak hours.

As a part of the Seal Property Subdivision the driveway connection (Road "A") will tie into the existing intersection of Hardin Valley Road at Muddy Creek Lane. The full buildout traffic conditions for the eastbound and westbound left turning movements operate at a LOS A during both the AM and PM peak hours, the northbound approach (Road "A") operates at a LOS B during both the AM and PM peak hours and the southbound approach (Muddy Creek Lane) will operate at a LOS C during both the AM and PM peak hours after the completion of the Seal Property Subdivision.

The standard practice for a residential subdivision with 150 or more lots is to require at least two access points to provide alternative access opportunities in the event that one access is blocked by a fallen tree, crash, or other. The Seal Property Subdivision has one proposed driveway entrance/exit at the Hickory Creek Road, Hardin Valley road and E Gallaher Ferry Road roundabout and a second driveway connection onto Hardin Valley Road. The two access points in combination with the subdivision layout should provide adequate accessibility.

After the completion of the Seal Property Subdivision neither an eastbound right turn lane nor a westbound left turn lane are warranted at the intersection of Hardin Valley Road at Muddy Creek Lane / driveway connection (Road "A").

The minimum required sight distance for a road with a posted speed limit of 45 mph is 450 feet in each direction in accordance with the "Knoxville-Knox County Subdivision Regulations" amended through February 13, 2020. FMA measured the sight distance at the existing intersection of Hardin Valley Road at Muddy Creek Lane in July 2020. At 15 feet from the edge of pavement the sight distance is greater than 600 feet eastbound and 580 feet westbound.

Hardin Valley Road is classified as a Minor Arterial per the Major Road Plan. The minimum intersection spacing required on an arterial is 400 feet per the “Knoxville-Knox County Subdivision Regulations” as amended through February 13, 2020. The proposed driveway connection (Road “A”) is located approximately 770 feet east of the proposed roundabout and 705 feet west of the intersection with Marietta Church Road. This driveway connection exceeds the typical minimum separation on a Minor Arterial; therefore, no change is necessary.

7.3 Subdivision Roads

Road “A”, Road “B”, Road “C” and Road “D” will have a width of 26 feet in accordance with the “Knoxville-Knox County Subdivision Regulations” amended through February 13, 2020.

The minimum required sight distance for the internal subdivision Road “A”, Road “B”, Road “C” and Road “D” will be 250 feet in each direction in accordance with the “Knoxville-Knox County Subdivision Regulations” as amended through February 13, 2020. The sight triangles for the intersections of the internal subdivision roads are provided in Attachment 10.

Sight triangles are used to provide adequate sight distance for a stopped driver on the minor approach to enter or cross the major roadway. Any object (i.e. buildings, hedges, trees, walls, fences, etc.) within the sight triangle that would obstruct the driver’s view of an approaching vehicle should be removed or modified. FMA recommends any necessary landscaping that may be involved to maintain the clear sight triangles and comply with Knox County Engineering and Public Works requirements.

Any required sight distance easements for the internal subdivision intersections of Road “A”, Road “B”, Road “C”, and Road “D” should be coordinated with Knox County Engineering and Public Works and included on the final design drawings prior to construction of the subdivision.