

**KNOXVILLE/KNOX COUNTY METROPOLITAN PLANNING COMMISSION
 SUBDIVISION REPORT - CONCEPT/USE ON REVIEW**

▶ **FILE #:** 4-SA-16-C
 4-D-16-UR

AGENDA ITEM #: 12
AGENDA DATE: 4/14/2016

▶ **SUBDIVISION:** LAUREL RIDGE
 ▶ **APPLICANT/DEVELOPER:** IDEAL ENGINEERING SOLUTIONS
 OWNER(S): Ball Homes, LLC

TAX IDENTIFICATION: 103 108.03, 108.05, 108.06 & 108.07

[View map on KGIS](#)

JURISDICTION: County Commission District 6

STREET ADDRESS: 11137 Hardin Valley Rd

▶ **LOCATION:** Northwest side of Hardin Valley Rd., northeast of Brighton Farms Blvd.

SECTOR PLAN: Northwest County

GROWTH POLICY PLAN: Planned Growth Area

WATERSHED: Beaver Creek and Conner Creek

▶ **APPROXIMATE ACREAGE:** 69.7 acres

▶ **ZONING:** PR (Planned Residential) pending

▶ **EXISTING LAND USE:** Residence and vacant land

▶ **PROPOSED USE:** Detached Residential Subdivision

SURROUNDING LAND USE AND ZONING: North: Vacant land and residence / PR (Planned residential) and A (Agricultural)
 South: Residences / PR (Planned residential)
 East: Vacant land / A (Agricultural)
 West: Residences / RA (Low Density Residential) and A (Agricultural)

▶ **NUMBER OF LOTS:** 227

SURVEYOR/ENGINEER: Ideal Engineering Solutions, Inc

ACCESSIBILITY: Access is via Hardin Valley Rd., a minor arterial street with a 3 lane street section within an 60' right-of-way (88' required).

▶ **SUBDIVISION VARIANCES REQUIRED:**

1. Reduction of the intersection spacing along Hardin Valley Rd., between Road A and Berrywood Dr., from 400' to 93'.
2. Reduction of the horizontal curve radius on Road C at STA 17+01, from 250' to 200'.
3. Reduction of the horizontal curve radius on Road E at STA 17+35, from 250' to 125'.
4. Reduction of the horizontal curve radius on Road E at STA 20+57, from 250' to 125'.
5. Reduction of the horizontal curve radius on Road E at STA 22+27, from 250' to 125'.
6. Broken back tangent variance on Road E between STA 21+73.45 and STA 22+26.55, from 150' to 53.1'.
7. Vertical curve variance on Road A at STA 0+60, from K=25 to K=15.96 (125' to 80').

STAFF RECOMMENDATION:

- **APPROVE** variances 1-7 because the site's topography and shape restrict compliance with the Subdivision Regulations and the proposed variances will not create a traffic hazard.

APPROVE the Concept Plan subject to 15 conditions

1. Connection to sanitary sewer and meeting any other relevant requirements of the Knox County Health Department.
2. Provision of street names which are consistent with the Uniform Street Naming and Addressing System within Knox County (Ord 91-1-102).
3. Installation of sidewalks as identified on the concept plan. Sidewalks shall meet all applicable requirements of the Americans with Disabilities Act (ADA) and the Knox County Department of Engineering and Public Works, and shall be installed at the time the street improvements are installed for the subdivision. The side of the street that the sidewalks are to be located on shall be worked out with the Knox County Department of Engineering and Public Works at the design plan stage of the subdivision.
4. Revising the concept plan to provide a stub-out street connection from Road A to the two large parcels located to the east and west of this site (Tax parcels 103-10801 & 103-10804) subject to approval by the Knox County Department of Engineering and Public Works and Planning Commission Staff.
5. The intersection of Road A with Roads B and D shall be designed as a two way stop condition.
6. Design of the temporary turnaround at the end of Road E subject to approval of the Knox County Department of Engineering and Public Works.
7. Prior to obtaining a design plan approval for the subdivision, submitting a detailed grading plan to the Knox County Department of Engineering and Public Works and Planning Commission Staff that documents all proposed lots will have adequate building sites and yard areas with driveway grades not exceeding a 15% grade. Those lots that cannot comply with this condition will have to be combined with adjoining lots on any final plats submitted to the Planning Commission for approval.
8. Implementation of the intersection improvements and recommendations outlined in the Traffic Impact Study prepared by Ajax Engineering as revised on March 30, 2016. The design details and timing of the installation of the improvements shall be worked out with the Knox County Department of Engineering and Public Works during the design plan stage for the subdivision.
9. Installation of traffic calming devices as required by the Knox County Department of Engineering and Public Works.
10. All closed contours/sinkholes and the 50' setback around the feature shall be shown on the final plat. Building construction within the 50' setback may be permitted if a geotechnical study prepared by a registered engineer states that building within the 50' sinkhole buffer is acceptable and the study is approved by the Knox County Department of Engineering and Public Works. The geotechnical study must be completed and submitted to Knox County Department of Engineering and Public Works prior to submission of the final plat for any lots that do not have a building area outside of the 50' setback area. A 5' drainage easement extending outside of the uppermost closed contour is required. Building construction is not permitted within the hatched contour area of the sinkhole or the drainage easement. Engineered footings may be required for any structures within the 50' sinkhole buffer.
11. Meeting all applicable requirements of the Knox County Department of Engineering and Public Works.
12. Placing a note on the final plat that all lots will have access only to the internal street system except for the two lots for the existing home sites on Hardin Valley Rd. and Sam Lee Rd.
13. Including a line of sight easement on the final plat across Lots 57 and 58 in order to provide the needed sight distance for the curve in Road E.
14. Prior to certification of the final plat for the subdivision, establishing a property owners association that will be responsible for the maintenance of the common areas, recreational amenities and drainage system.
15. A final plat application based on this concept plan will not be accepted for review by the MPC until certification of design plan approval has been submitted to the MPC staff.

- **APPROVE the Development Plan for up to 227 detached dwelling units on individual lots, and the requested reduction of the peripheral setback from 35' to 25', subject to 2 conditions.**

1. Obtaining approval from the Knox County Commission of the rezoning of the property to PR (Planned Residential) at a density up to 4 du/ac.
2. Meeting all applicable requirements of the Knox County Zoning Ordinance.

With the conditions noted, this plan meets the requirements for approval in the PR zone and the other criteria for approval of a Use on Review.

COMMENTS:

The applicant is proposing to subdivide a 69.7 acre tract into 227 detached residential lots at a density of 3.26 du/ac. The property is located on the northwest side of Hardin Valley Rd. northeast of Brighton Farms Blvd. The proposed subdivision will be served by public streets with access out to Hardin Valley Rd. While the property fronts on a section of Sam Lee Rd. it is not at a location that would be acceptable for a second street connection. The proposed subdivision will include sidewalks on one side of all streets and will connect to the existing sidewalks located along Hardin Valley Rd.

The Planning Commission recommended approval of a rezoning to PR (Planned Residential) at a density of up to 4 du/ac. on March 10, 2016. The Knox County Commission will consider the rezoning request to PR (Planned Residential) at a density of up to 4 du/ac. on April 25, 2016.

Staff has recommended a condition that a stub-out street be provided to the two large parcels located to the east and west of this site (Tax parcels 103-10801 & 103-10804). While these two parcels have frontage on Hardin Valley Rd., additional access points along Hardin Valley Rd. should be avoided when alternative access connections can be provided.

The preliminary site grading plan identified a potential problem with having adequate building sites in the area of Lots 74-89. Staff has recommended a condition that the applicant provide a detailed grading plan prior to design plan approval that documents that adequate building sites are available on all proposed lots.

A Traffic Impact Study was prepared by Ajax Engineering for this development with the last revision date being March 30, 2016. The study recommends turn lane improvements on Hardin Valley Rd. at the proposed subdivision entrance.

The applicant has requested a reduction of the peripheral setback from 35' to 25' along all exterior boundaries of this subdivision. The Planning Commission can approve a peripheral setback reduction down to 15' when the subdivision adjoins specific residential zoning districts. The standard rear yard setback for the low density and general residential zoning districts is 25'.

EFFECT OF THE PROPOSAL ON THE SUBJECT PROPERTY, SURROUNDING PROPERTY AND THE COMMUNITY AS A WHOLE

1. The proposed detached residential subdivision will have minimal impact on local services since utilities are available to serve this site.
2. The proposed low density residential development is compatible with the scale and intensity of development that has occurred in this area.
- 3 The proposed detached residential subdivision at a density of 3.26 du/ac, is consistent in use and density with the requested rezoning for the property.
4. With the recommended street improvements identified in the Traffic Impact Study, traffic flow in the area should continue to function at acceptable levels.

CONFORMITY OF THE PROPOSAL TO CRITERIA ESTABLISHED BY THE KNOX COUNTY ZONING ORDINANCE

1. With the recommended conditions, the proposed subdivision is consistent with all relevant requirements of the PR zoning, as well as other criteria for approval of a use on review.
2. The development is consistent with the following general standards for uses permitted on review: The proposal is consistent with the adopted plans and policies of the General Plan and Sector Plan. The use is in harmony with the general purpose and intent of the Zoning Ordinance. The use will not significantly injure the value of adjacent property. The use will not draw additional traffic through residential areas since the development has access to a minor arterial street.

CONFORMITY OF THE PROPOSAL TO ADOPTED MPC PLANS

1. The Northwest County Sector Plan proposes low density residential uses for this site. The proposed subdivision at a density of 3.26 du/ac is consistent with the sector plan.
2. This site is located within the Planned Growth Area on the Knoxville-Knox County-Farragut Growth Policy Plan map.

ESTIMATED TRAFFIC IMPACT: 2204 (average daily vehicle trips)

Average Daily Vehicle Trips are computed using national average trip rates reported in the latest edition of "Trip Generation," published by the Institute of Transportation Engineers. Average Daily Vehicle Trips represent the total number of trips that a particular land use can be expected to generate during a 24-hour day (Monday through Friday), with a "trip" counted each time a vehicle enters or exits a proposed development.

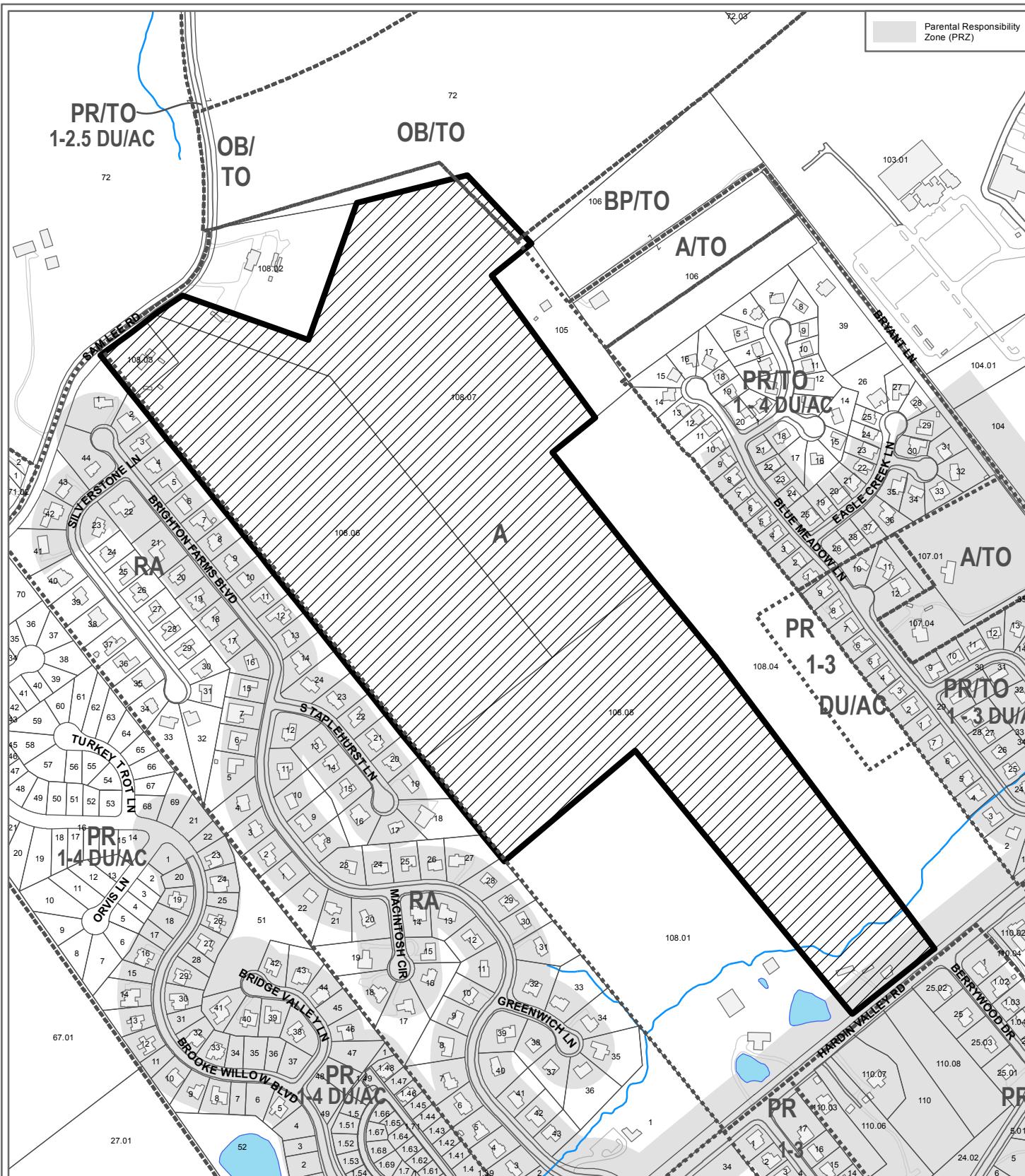
ESTIMATED STUDENT YIELD: 121 (public and private school children, ages 5-18 years)

Schools affected by this proposal: Hardin Valley Elementary, Karns Middle, and Hardin Valley Academy.

- School-age population (ages 5–18) is estimated by MPC using data from a variety of sources.
- While most children will attend public schools, the estimate includes population that may be home-schooled, attend private schools at various stages of enrollment, or drop out of the public system.
- Students are assigned to schools based on current attendance zones as determined by Knox County Schools. Zone boundaries are subject to change.
- Estimates presume full build-out of the proposed development. Build-out is subject to market forces, and timing varies widely from proposal to proposal.
- Student yields from new development do not reflect a net addition of children in schools. Additions occur incrementally over the build-out period. New students may replace current population that ages through the system or moves from the attendance zone.
- School capacities are subject to change by Knox County Schools through building additions, curriculum or scheduling changes, or amendments to attendance zone boundaries.

MPC's approval or denial of this concept plan request is final, unless the action is appealed to Knox County Chancery Court. The date of the Knox County Chancery Court hearing will depend on when the appeal application is filed.

MPC's approval or denial of this use on review request is final, unless the action is appealed to the Knox County Board of Zoning Appeals. The date of the Knox County Board of Zoning Appeals hearing will depend on when the appeal application is filed.



**4-SA-16-C / 4-D-16-UR
CONCEPT PLAN/USE ON REVIEW**



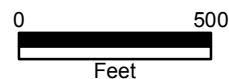
Detached Residential Subdivision in PR (Planned Residential) pending

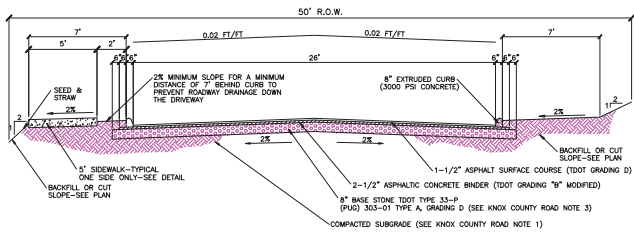
Original Print Date: 3/21/2016
Metropolitan Planning Commission * City / County Building * Knoxville, TN 37902

Revised:

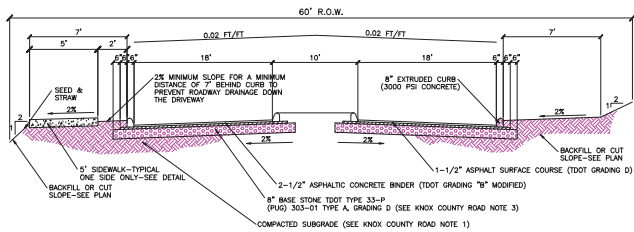
Petitioner: Ideal Engineering Solutions
Laurel Ridge

Map No: 103
Jurisdiction: County

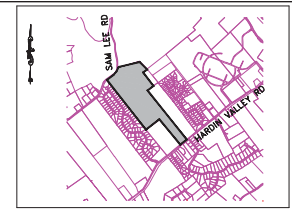




TYPICAL KNOX COUNTY ROAD CROSS SECTION
NOT TO SCALE



TYPICAL BOULEVARD ROAD CROSS SECTION STA 0+00 - 5+22
NOT TO SCALE



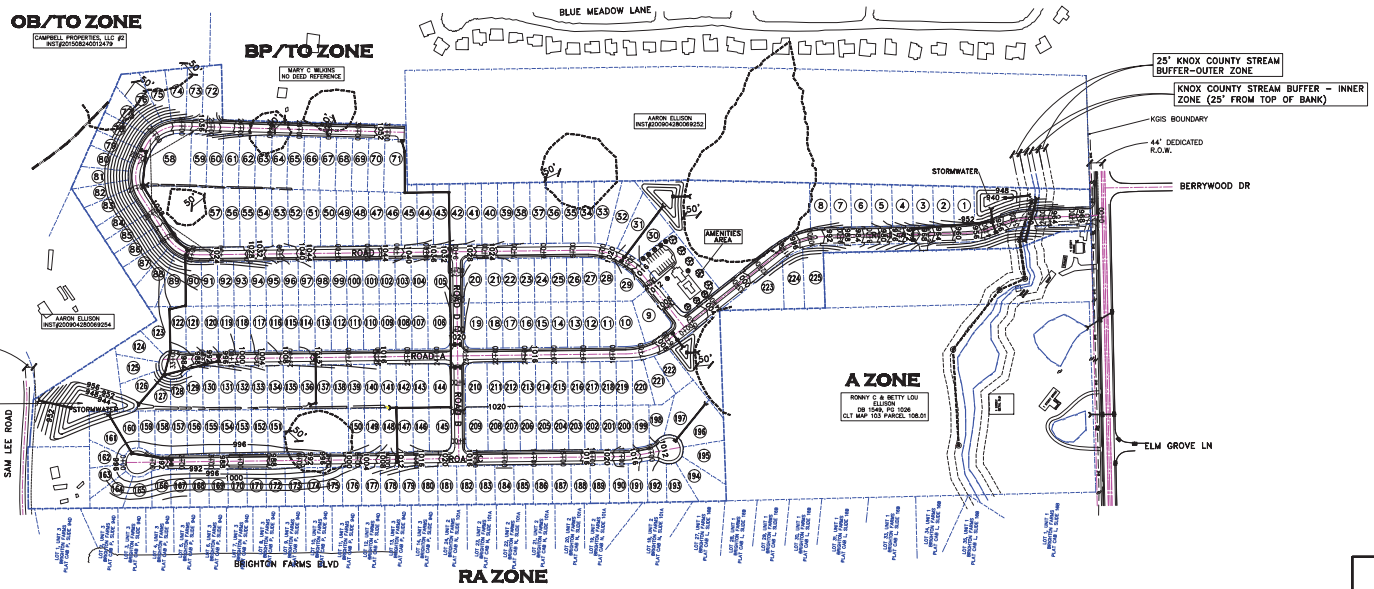
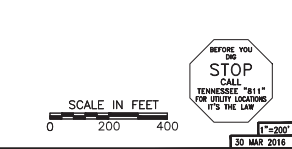
VICINITY MAP
NOT TO SCALE

- GENERAL NOTES:
- CONTRACTOR TO VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION. LOCATION OF UTILITIES IS BASED ON THE BEST AVAILABLE INFORMATION. CALL TENNESSEE "811" AT LEAST 72 HOURS PRIOR TO CONSTRUCTION ACTIVITIES FOR UTILITIES LOCATION.
 - CONTRACTOR RESPONSIBLE FOR COMPLIANCE WITH OSHA REQUIREMENTS FOR SLOPE STABILITY, SHORING, AND SLOPE CONTROL DURING CONSTRUCTION.
 - BACK FILL MUST BE PLACED AND COMPACTED TO 95% OF STANDARD PROCTOR PRIOR TO UTILITY INSTALLATION.
 - CONTRACTOR IS RESPONSIBLE FOR VERIFYING GRADES AND ALIGNMENTS PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES OR INCONSISTENCIES TO IDEAL ENGINEERING SOLUTIONS, INC. AT 755-3575.
 - TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
 - THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE PROVISIONS OF THE MANUAL OF ACCOUNT PRACTICE IN CONSTRUCTION ISSUED BY THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC.
 - DEMOLITION OF EXISTING STRUCTURES AND MAINTENANCE OF EXISTING UTILITIES TO BE PERMITTED AND COORDINATED WITH KNOX COUNTY.

- PROPERTY NOTES:
- TOTAL AREA = 89.74 ACRES
 - CLT AND PARCEL: 105-10805.103-10805.103-10808 AND 105-10807
 - EXISTING ZONING: A (PER 4.0 50/ACRES PROPOSED)
 - PROPOSED NUMBER OF LOTS: 226 WITH AMENITIES AREA
 - 10' DRAINAGE AND UTILITY EASEMENT UNDER EXISTING ROAD FRONTAGE LOT LINES, 5' EACH SIDE OF ALL INTERIOR LOT LINES, EXCEPT UNDER PROPOSED TIE-ROD LINES.
 - ALL LOTS TO HAVE VEHICULAR ACCESS TO INTERNAL STREETS ONLY.
 - TRAFFIC CALMING AS REQUIRED BY KNOX COUNTY ENGINEERING AND PUBLIC WORKS
 - ALL DRAINAGE GRADES MUST BE LESS THAN 1% AND ACCOMMODATE SIDEWALK AT NO MORE THAN 2% CROSS SLOPE.

- SETBACKS:
- | | |
|--------|--------|
| FRONT: | 20 FT. |
| SIDE: | 6 FT. |
| REAR: | 25 FT. |
- UTILITIES:
- | | |
|--------------|-----------------------------|
| WATER: | WEST KNOX UTILITY DISTRICT |
| SEWER: | WEST KNOX UTILITY DISTRICT |
| ELECTRIC: | LENOIR CITY UTILITIES BOARD |
| SOLID WASTE: | PRIVATE HAULER |
| TELEPHONE: | AT&T |

- VARIANCES REQUESTED:
- ROAD C STA 17+41 REDUCTION OF HORIZONTAL RADIUS FROM 200' TO 200'
 - ROAD E STA 17+45 REDUCTION OF HORIZONTAL RADIUS FROM 200' TO 125'
 - ROAD D STA 20+57 REDUCTION OF HORIZONTAL RADIUS FROM 200' TO 125'
 - ROAD E STA 22+27 REDUCTION OF HORIZONTAL RADIUS FROM 200' TO 125'
 - ROAD A STA 0+00 HORIZONTAL SEPARATOR BETWEEN ROAD A AND BERRYWOOD DRIVE FROM 400 FT.



STREAM DETERMINATION REQUIRED FOR DRAINAGE DETENTION IN THIS AREA

30' DEDICATED R.O.W.

SAM LEE ROAD

AMENITIES AREA

ROAD A

ROAD B

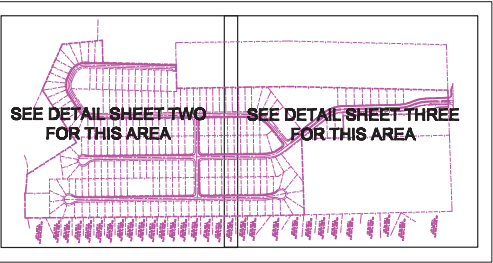
ROAD C

ROAD D

ROAD E

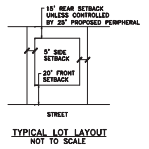
ROAD F

ROAD G



SEE DETAIL SHEET TWO FOR THIS AREA
SEE DETAIL SHEET THREE FOR THIS AREA

4-SA-16-C / 4-D-16-UR
Revised: 3/30/2016



TYPICAL LOT LAYOUT
NOT TO SCALE

SHEET INDEX:

SHEET ONE	OVERALL SITE CONCEPT PLAN 1"=200'
SHEET TWO	CONCEPT PLAN 1"=100'
SHEET THREE	CONCEPT PLAN 1"=100'
SHEET FOUR	ROAD PROFILE A
SHEET FIVE	ROAD PROFILE A (continued) AND ROAD PROFILES B & D
SHEET SIX	ROAD PROFILE C
SHEET SEVEN	ROAD PROFILE E

CERTIFICATION OF CONCEPT PLAN
I HEREBY CERTIFY THAT I AM AN ENGINEER, LICENSED UNDER THE LAWS OF THE STATE OF TENNESSEE. I FURTHER CERTIFY THESE PLANS AND ACCOMPANYING DRAWINGS, DOCUMENTS AND STATEMENTS CONFORM TO ALL APPLICABLE PROVISIONS OF THE KNOXVILLE-KNOX COUNTY SUBDIVISION REGULATIONS EXCEPT AS HAS BEEN ITEMIZED AND DESCRIBED IN A REPORT FILED WITH THE METROPOLITAN PLANNING COMMISSION.

D. Campbell TN PE 22540



NOTE:
CONTRACTOR IS RESPONSIBLE FOR ALL TRENCH SAFETY
Contractor shall shore and brace all open cut trenches as required by State and Federal Laws and Local Ordinances to conform with recommendations set forth in ACC Manual of Accident Prevention in Construction to protect life, property, or works to avoid unnecessary safe cuts in unstable material.

OSHA RULES SHALL BE ADOPTED BY

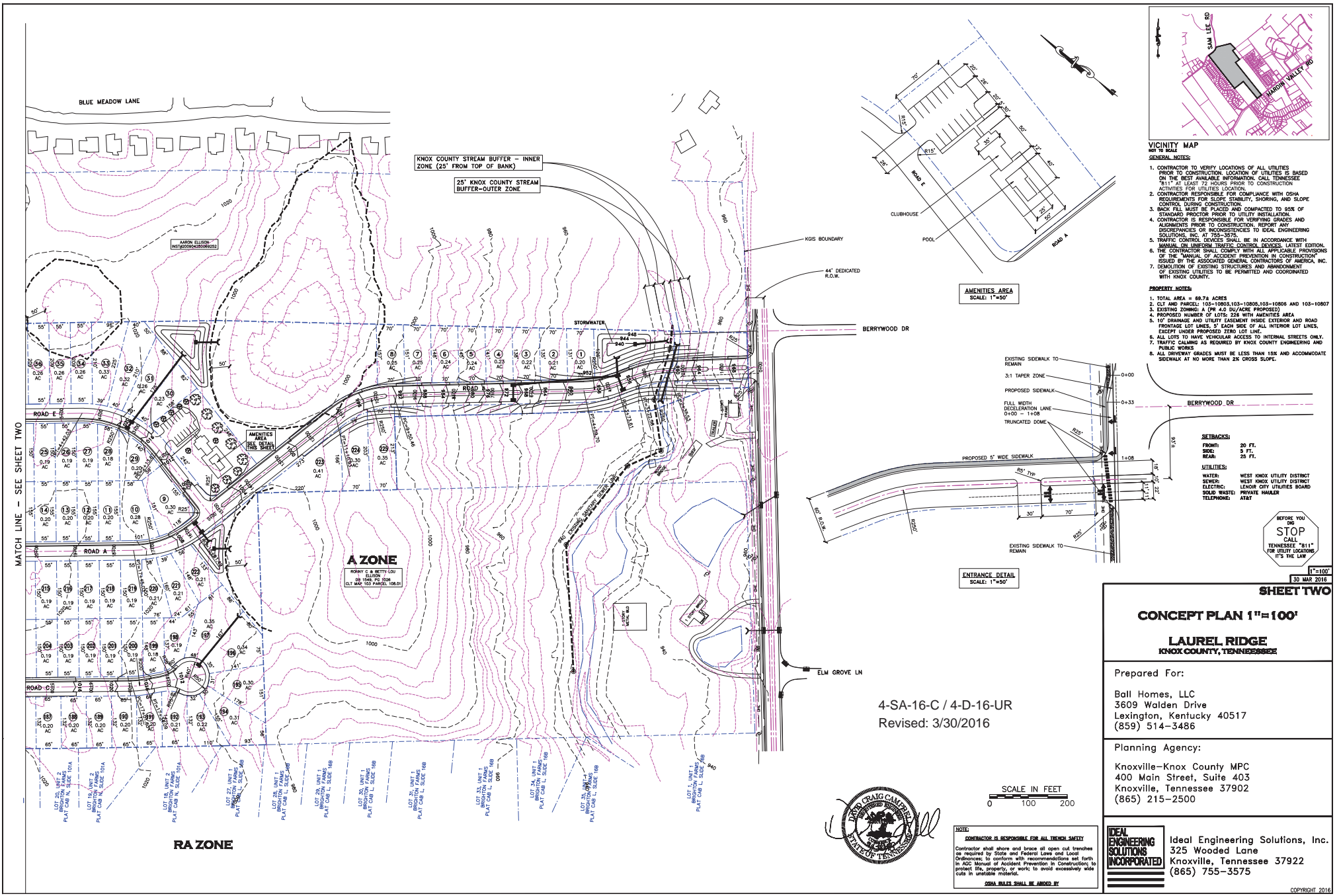
SHEET ONE

OVERALL SITE CONCEPT PLAN
1"=200'
LAUREL RIDGE
KNOX COUNTY, TENNESSEE

Prepared For:
Ball Homes, LLC
3609 Walden Drive
Lexington, Kentucky 40517
(859) 514-3486

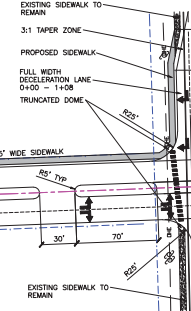
Planning Agency:
Knoxville-Knox County MPC
400 Main Street, Suite 403
Knoxville, Tennessee 37902
(865) 215-2500

IDEAL ENGINEERING SOLUTIONS INCORPORATED
Ideal Engineering Solutions, Inc.
325 Wooded Lane
Knoxville, Tennessee 37922
(865) 755-3575



- VICINITY MAP**
NOT TO SCALE
- GENERAL NOTES:**
- CONTRACTOR TO VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION. LOCATION OF UTILITIES IS BASED ON THE BEST AVAILABLE INFORMATION. CALL TENNESSEE "811" AT LEAST 72 HOURS PRIOR TO CONSTRUCTION ACTIVITIES FOR UTILITIES LOCATION.
 - CONTRACTOR RESPONSIBLE FOR COMPLIANCE WITH OSHA REQUIREMENTS FOR SLOPE STABILITY, SHORING, AND SLOPE CONTROL DURING CONSTRUCTION.
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 - DEMOLITION OF EXISTING STRUCTURES AND ABANDONMENT OF EXISTING UTILITIES TO BE PERMITTED AND COORDINATED WITH KNOX COUNTY.

- PROPERTY NOTES:**
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 - EXISTING ZONING: A (PER A-0 SUBCARE PROPOSED)
 - PROPOSED NUMBER OF LOTS: 226 WITH AMENITIES AREA
 - 10' DRAINAGE AND UTILITY EASEMENT INSIDE EXTERIOR AND ROAD FRONTAGE LOT LINES, 5' EACH SIDE OF ALL INTERIOR LOT LINES, EXCEPT UNDER PROPOSED TIE-ROD LINES
 - ALL LOTS TO HAVE VEHICULAR ACCESS TO INTERNAL STREETS ONLY
 - TRAFFIC CALMING AS REQUIRED BY KNOX COUNTY ENGINEERING AND PUBLIC WORKS
 - ALL DRIVEWAY GRADES MUST BE LESS THAN 15% AND ACCOMMODATE SIDEWALK AT NO MORE THAN 2% CROSS SLOPE.



- SETBACKS:**
- FRONT: 20 FT.
 - SIDE: 5 FT.
 - REAR: 25 FT.
- UTILITIES:**
- WATER: WEST KNOX UTILITY DISTRICT
 - SEWER: WEST KNOX UTILITY DISTRICT
 - ELECTRIC: LENOR CITY UTILITIES BOARD
 - SOLID WASTE: PRIVATE HAULER
 - AVAIL



4-SA-16-C / 4-D-16-UR
Revised: 3/30/2016



NOTE:
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Contractor shall shore and brace all open cut trenches as required by State and Federal Laws and Local Ordinances to conform with recommendations set forth in ACC Manual of Accident Prevention in Construction to protect life, property, or works to avoid unnecessary wide cuts in unstable material.
OSHA RULES SHALL BE ADOPTED BY

SHEET TWO

CONCEPT PLAN 1"=100'

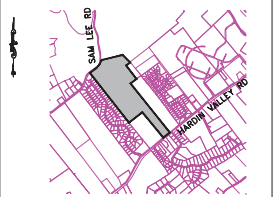
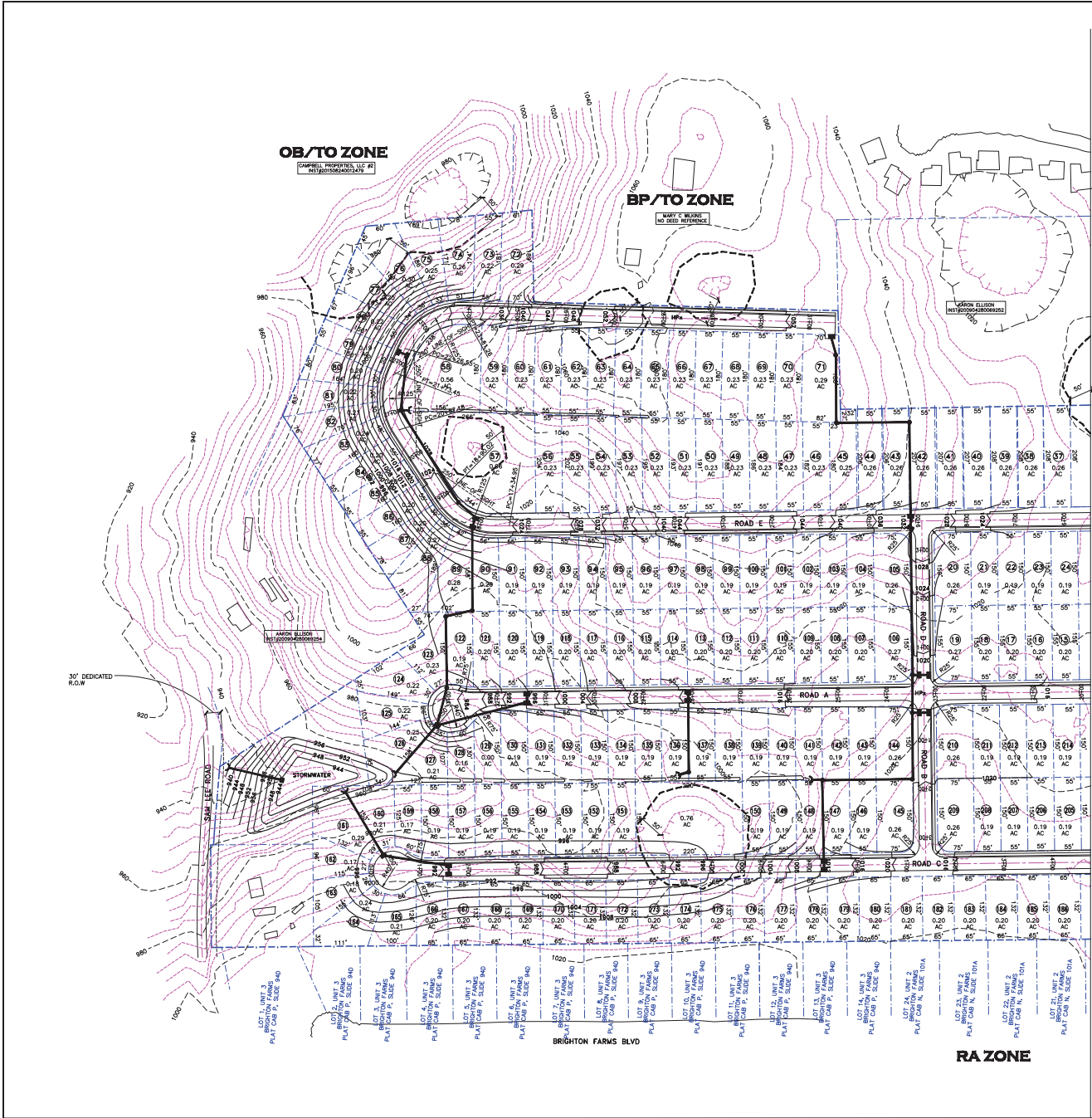
LAUREL RIDGE
KNOX COUNTY, TENNESSEE

Prepared For:
Ball Homes, LLC
3609 Walden Drive
Lexington, Kentucky 40517
(859) 514-3486

Planning Agency:
Knoxville-Knox County MPC
400 Main Street, Suite 403
Knoxville, Tennessee 37902
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IDEAL ENGINEERING SOLUTIONS INCORPORATED
Ideal Engineering Solutions, Inc.
325 Wooded Lane
Knoxville, Tennessee 37922
(865) 755-3575

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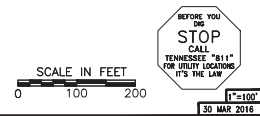


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 - BACK FILL MUST BE PLACED AND COMPACTED TO SIX (6) STANDARD PROCTOR PRIOR TO UTILITY INSTALLATION. CONTRACTOR IS RESPONSIBLE FOR VERIFYING GRADES AND ALIGNMENTS PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES OR INCONSISTENCIES TO IDEAL ENGINEERING SOLUTIONS, INC. AT 755-3575.
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 - 10' DRAINAGE AND UTILITY EASEMENT PROVISION IN CONSTRUCTION FRONTAGE LOT LINES, 5' EACH SIDE OF ALL INTERIOR LOT LINES. EXCEPT LOTS PROPOSED TIE-TO LOT LINES.
 - ALL LOTS TO HAVE VEHICULAR ACCESS TO INTERNAL STREETS ONLY.
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- SETBACKS:**
- FRONT: 20 FT.
 - SIDE: 10 FT.
 - REAR: 25 FT.
- UTILITIES:**
- WATER: WEST KNOX UTILITY DISTRICT
 - SEWER: WEST KNOX UTILITY DISTRICT
 - ELECTRIC: KNOX COUNTY UTILITIES BOARD
 - SOIL: PRIVATE HANDLER
 - TELEPHONE: AT&T

4-SA-16-C / 4-D-16-UR
 Revised: 3/30/2016



SHEET THREE

CONCEPT PLAN 1"=100'

LAUREL RIDGE
 KNOX COUNTY, TENNESSEE

Prepared For:

Ball Homes, LLC
 3609 Walden Drive
 Lexington, Kentucky 40517
 (859) 514-3486

Planning Agency:

Knoxville-Knox County MPC
 400 Main Street, Suite 403
 Knoxville, Tennessee 37902
 (865) 215-2500



NOTE:
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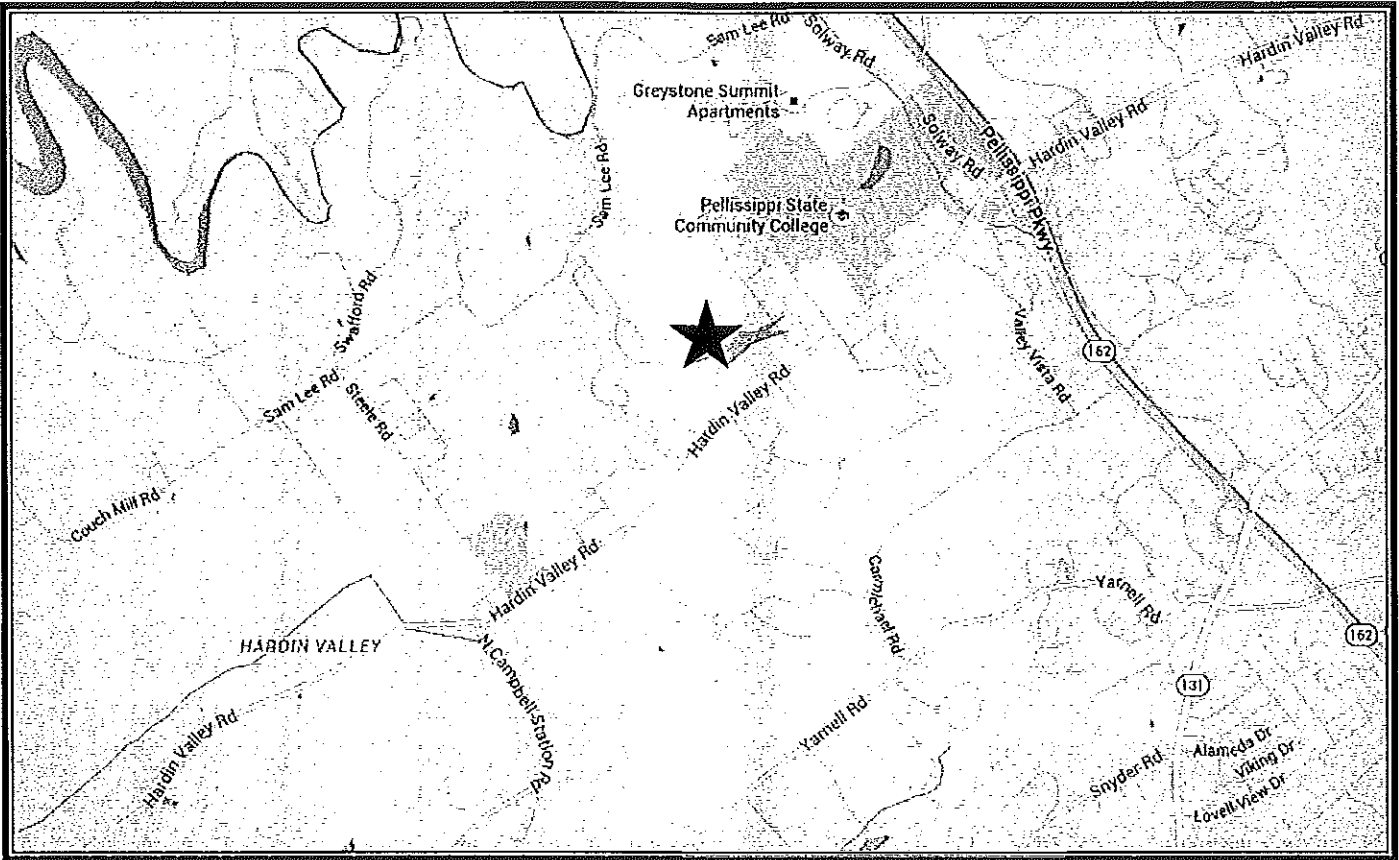
SOIL VALUES SHALL BE ADOPTED BY

IDEAL ENGINEERING SOLUTIONS INCORPORATED

Ideal Engineering Solutions, Inc.
 325 Wooded Lane
 Knoxville, Tennessee 37922
 (865) 755-3575

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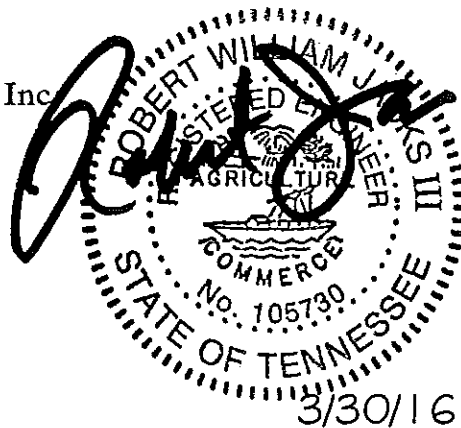


TRAFFIC IMPACT STUDY
LAUREL RIDGE
KNOX COUNTY, TENNESSEE

-Prepared For-

Ideal Engineering Solutions, Inc
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CONCLUSIONS AND RECOMMENDATIONS

The following is an overview of recommendations to minimize the traffic impacts of the development with the surrounding road system while achieving an acceptable level of traffic flow, safety, and construction cost.

- 1) **Hardin Valley Road at Laurel Ridge Road "A"**: From the capacity calculations, it has been shown (Table 3) that the northeast-bound left turns into the development at the entrance should operate very well during the AM and PM peak periods once the development is complete. The level of service for exiting vehicles out of the development will operate at a reduced level especially in the AM peak hour. For the AM peak period, southbound left-turning exiting vehicles are shown to operate at LOS E and southbound right-turning vehicles are projected to operate at LOS D. These lower levels of service are directly related to the large amount of thru vehicles on Hardin Valley Road in the peak periods that conflict with these exiting turning movements. During peak periods, queues should be expected to form at this southbound exiting approach and drivers will experience large delays.

It is expected that these projected lower levels of service for exiting vehicles out of the subdivision could potentially operate at a greater level of service than reflected in this analysis. As stated previously, the existence and influence of the traffic signal on Hardin Valley Road to the northeast of the proposed site currently allows gaps in traffic and this should continue into the future conditions. This traffic signal influence is reflected in the creation of vehicle platoons with gaps in between due to the signal phase changes at the upstream traffic signal.

- 1a) From the capacity calculations, separate southbound left and right turn lanes are required at the main driveway intersection for exiting vehicles out of the development at Hardin Valley Road. The LOS E that was reported for exiting left turns during the AM peak hour is based on separate left and right lanes. This allows separation of left turning vehicles and right turning vehicles for greater efficiencies and reduced queues. It should be noted, however, that even with separate turn lanes, the development will still potentially experience fairly large delays and queues during peak periods for left turning exiting vehicles

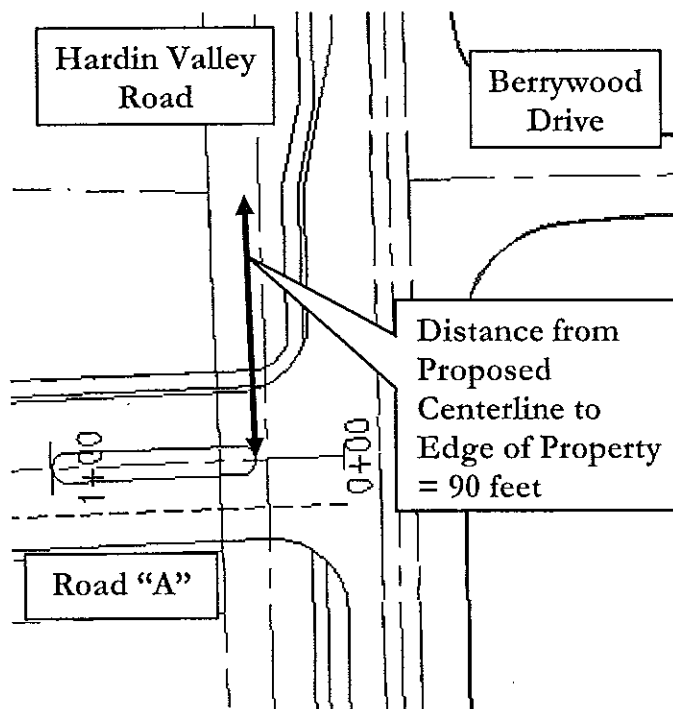
especially in the AM peak periods. Separating these two movements into separate lanes will allow an increase in the level of service for southbound exiting right turn movements.

- 1b) An analysis was undertaken to examine the potential queue length for southbound left turn vehicles based on the projected volumes. The computer software Synchro includes SimTraffic. Synchro performs the macroscopic calculations for intersections and SimTraffic performs micro-simulation and animation of vehicular traffic. Both software programs estimate 95th percentile queue lengths. The 95th percentile queue is a traditional measurement used when estimating queue distances. For this proposed intersection, the queue results were derived from Synchro since SimTraffic is not able to accurately model intersections with center two-way left turn lanes and their effects on gap acceptance.

Based on the software results in Synchro with the projected volumes, the 95th percentile queue distance was calculated to be 57 feet during the AM peak and 22 feet during the PM peak. However, to account for the variability of the traffic growth in the area, it is recommended that the left turn lane exiting at the entrance be designed and constructed with at least 200 feet of left turn storage. This would allow for approximately 10 vehicles to queue during peak times.

- 1c) Based on a speed of 50 mph on Hardin Valley Road (average observed speed was 51 mph), the recommended intersection sight distance requirement is 590 feet. While not surveyed in the field, from visual observation this distance is more than available for vehicles exiting Hardin Valley Road from the new proposed main driveway. The site designer should insure that these sight distance lengths are met and they should be labeled on the plans. The overall required sight distance should be measured at the intersection at a minimum of 14.5 feet off of the edge of the traveled way as shown in TDOT Standard Drawing RD01-SD-1.

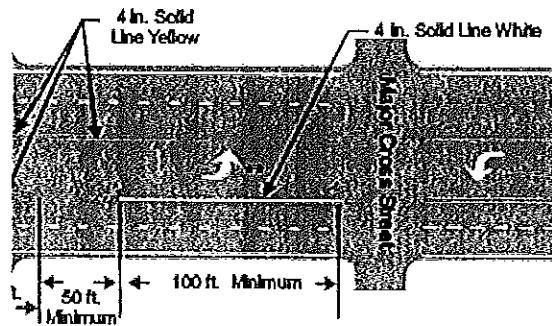
- 1d) As described previously in Evaluation of Turn Lane Thresholds based on the traffic volumes and operating speeds on Hardin Valley Road, it is recommended that a separate southwest-bound right turn lane be designed and constructed at the entrance. Typically the length of a right turn lane would be determined by calculating the stopping sight distance based on the observed operating speed. For an observed speed of 50 mph, this turn lane would need to be at least 425 feet in length. However, as seen in the figure on this page, the amount of available roadway frontage property for this development is nowhere near approaching this distance without encroaching on the adjacent property to the north and east. A right turn lane should be constructed with a maximum appropriate length as appropriate within the right-of-way that the property lines can allow. The current revised plan shows a right turn lane entering the development with a distance of 120 feet (including taper). While this design distance is not close to 425 feet (based on the observed speed),



due to the site constraints, this distance will at least be somewhat beneficial for removing right turning vehicles from the thru traffic. For this westbound approach at the new intersection, the new right turn lane should be marked with the appropriate right turn pavement marking symbols. Refer to TDOT Roadway Design Guidelines for appropriate taper lengths and pavement markings.

- e) It is recommended that the main entrance approach at the intersection with Hardin Valley Road be designed and constructed with a 24" white top bar and with a Stop Sign (R1-1). To accommodate pedestrians on the north side of Hardin Valley Road, the entrance should be designed appropriately with curb cuts and crosswalks markings.

- 1f) The center of Hardin Valley Road should be re-stripped to accommodate the new intersection with the new left turning movements into the development. The existing pavement marking for the continuous center turn lane should be converted into a



pavement marking scheme that delineates an exclusive left turn lane into the subdivision. To accommodate the future left turns into the development from Hardin Valley Road, the exclusive left turn should be marked to delineate a storage length of 100 feet minimum. The gap opening in the pavement marking for the left turns should be 50 feet minimum.

- 1g) Intersection sight distance at the new proposed main entrance at Hardin Valley Road must not be impacted by new signage, future landscaping or existing vegetation.
- 1h) The centerline of the proposed left turn of Road "A" exiting from the Laurel Ridge subdivision has been re-designed (as shown in Figure 2a) to intersect Hardin Valley Road approximately 110 feet from the centerline of the exiting lane out of Berrywood Drive. The narrowness of the project's property does confine the locations available for intersecting Road "A" into Hardin Valley Road. Additionally, the sale of the property is contingent on saving the existing home at Hardin Valley Road which would preclude shifting the entrance further away that as currently designed. The proximity of Road "A" and Berrywood Drive does provide the possibility for exiting left turning vehicles from each intersecting street to potentially interfere with each others' movements. This is particularly possible if the drivers utilize the existing continuous two-way center turn lane as a refuge in completing their turns onto Hardin Valley Road. However, the revised design distance in between the exiting lane of Road "A" and the exiting lane of

Berrywood Drive should be adequate for maintaining enough separation to avoid these conflicting turning movements. For a driver utilizing the center turn lane as a temporary refuge for completing their left turn, nearly 60 feet of two-way center turn lane storage would be left available if a turning radius of 25 feet for left turning exiting vehicles is assumed.

- 2) **Laurel Ridge Internal Drives and Sight Distance:** The current layout plans show 5 new roadways being constructed within the development labeled Road “A” thru Road “E” as shown on Figure 2a. Road “A” will be the connecting road to Hardin Valley Road.
- 2a) A Stop Sign (R1-1) should be installed at the Road “B” approach at the intersection of Road “C”. A Stop Sign should also be installed at the Road “D” approach at the intersection of Road “E”. Stop Signs (R1-1) should be installed at all of the approaches at the 4-way intersection of Road “A” at Road “B” and “D”. Finally, a Stop Sign (R1-1) should be installed at the Road “E” approach at the intersection of Road “A”.
- 2b) **Sight distance at all of the new internal “T” and four-way intersections must not be impacted by new signage, or future landscaping.** For an assumed posted 25 mph speed for the internal development streets, the recommended stopping sight distance is approximately 155 feet for level conditions and the intersection sight distance requirement is 275 feet. The road layout designer should insure that these sight distance lengths are met, maximized, and they should be labeled on the plans.
- 2d) **All road grade and intersection elements internally and externally should be designed to AASHTO, TDOT, and Knox County Engineering specifications and guidelines to ensure proper operation.**
- 2e) **Possible traffic calming measures might be needed for this development.** The current road alignments within the development are straight and have been designed to maximize the lots on the property within a fairly narrow land parcel. The narrowness of the land parcel hinders the potential to design curvature in the

horizontal road alignment that could discourage excessive vehicular speeds. If excessive speeds and conflicts are observed once the new subdivision is developed, the developer should work with the Knox County Engineering Department to investigate traffic calming/speed reduction strategies. As currently exists within the adjacent existing subdivision on Hardin Valley Road, Brighton Farms, speed humps could be employed to lower speeds through the subdivision.

Ultimately, the traffic calming measures inside the project for the proposed roads will need to be coordinated with the Knox County Engineering and Public Works during the detailed design phase.