2660 BUCKNER LANE REZONING
TRAFFIC IMPACT STUDY
Prepared by:
RPM Transportation Consultants, LLC

EXECUTIVE SUMMARY

Project Description
The purpose of this study is to analyze the traffic impacts associated with the 2660 Buckner Lane Master Plan as well as address the initial phases of development. The property is located on the east side of Buckner Lane between Thompson’s Station Road East and Spring Station Drive in Spring Hill, Tennessee. The proposed mixed-use development will be developed in several phases, which is expected to occur over a 20-year period. The Buckner Lane Property master plan includes a mix of land uses including residential (single-family, cottage, townhome, and multifamily), retail, restaurant, office, and hotel.

The property totals approximately 781 acres. It is bounded on the west by Buckner Lane, single family homes, and two schools. The property is bounded on the east by Interstate 65, on the north by Thompson’s Station Road East, on the south by existing single-family development. The property is currently farm land and zoned agricultural.

Over the past couple of years, the City of Spring Hill has undertaken three transportation planning studies to identify and plan for future transportation improvements in the vicinity of the project site. These studies include an Interchange Access Request for I-65, a study of Buckner Lane between Thompson’s Station Road East and Duplex Road (State Route 247), and a study of Buckner Road between Buckner Lane and I-65. While these studies have not been finalized, all include assumptions for increased density and a mixture of land uses for the 2660 Buckner Lane Property.

In this study, the current operating characteristics of the adjacent roadways and intersections in the vicinity of the project site are evaluated. The expected trips generated by the proposed development are determined and distributed to the roadway network based on the development master plan, which includes phasing of the mixed-use development program and the anticipated street network through the site. The adjacent roadways and intersections are then reevaluated to determine the anticipated traffic impacts of the project. Finally, recommendations are presented,
including roadway improvements and/or traffic control improvements that are needed to accommodate the expected traffic.

**Data Collection**

In order to provide data for the traffic impact analysis, manual traffic counts were obtained for the following intersections:

- Buckner Lane & Thompson’s Station Road East
- Buckner Lane & Westchester Lane
- Buckner Lane & Buckner Road
- Buckner Lane & Twin Lakes Drive
- Buckner Lane & Spring Station Drive

The City of Spring Hill provided traffic volume data that was collected for the City’s transportation studies that are underway. The traffic data that was provided by the City was supplemented by RPM Transportation Consultants, specifically for the intersection of Buckner Lane and Westchester Lane. The existing peak hour traffic volumes show that the study area experiences heavy commuter traffic flows in the northbound direction during the AM peak hour and in the southbound direction during the PM peak hour. Additionally, the two schools located on the east side of Buckner Lane south of Buckner Road generate high volumes of AM peak hour traffic entering and exiting the schools.

**Projection of Future Traffic Volumes**

As previously mentioned, this study evaluates three scenarios of development of the master plan in order to identify the amount of traffic expected to be generated as the development builds out as well as to determine the roadway improvements necessary to accommodate the development. The three scenarios include 1) Phase 1, 2) Phases 1 and 2, and 3) full buildout, which includes Phases 1 – 5. It is assumed that Phases 1 and 2 would be constructed prior to the construction of an I-65 Interchange, and the remaining phases of development would not commence until an I-65 Interchange is constructed. Therefore, the Full Buildout scenario assumes the I-65 Interchange is in place and Buckner Road is extended to I-65 and further east to Lewisburg Pike. The Full Buildout of the property is anticipated to occur over a 20-year horizon. Table 1 presents the development program for the three scenarios. Development of the property is expected to begin on the west side of the property along Buckner Lane and expand to the east and south with the later phases.
TABLE 1: DEVELOPMENT SCENARIOS

<table>
<thead>
<tr>
<th>DEVELOPMENT SCENARIO</th>
<th>PHASE(S)</th>
<th>LAND USES &amp; SIZES*</th>
<th>HORIZON YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Single-Family (d.u.)</td>
<td>Cottage, Townhome, &amp; Multi-Family (d.u.)</td>
</tr>
<tr>
<td>Scenario 1</td>
<td>1</td>
<td>159</td>
<td>--</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>1 &amp; 2</td>
<td>342</td>
<td>1,238</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>1 – 5</td>
<td>774</td>
<td>2,152</td>
</tr>
<tr>
<td>FULL BUILDOUT</td>
<td></td>
<td>774</td>
<td>2,152</td>
</tr>
</tbody>
</table>

*Development program provided by Southeast Venture, LLC

It is important to note that the land uses and sizes in Table 1 represent the expected maximum development intensity for the master plan and rezoning request; however, market demand may result in variations in sizes.

A traffic generation process was used to estimate the amount of traffic expected to be generated by the proposed project for the three development scenarios. Factors for the trip generation were taken from ITE’s Trip Generation, Ninth Edition. The proposed 2660 Buckner Lane property rezoning will allow for a mix of land uses at relatively high density. Based on information provided by Southeast Venture, LLC, Phase 1 is expected to include single-family residential lots and commercial retail and restaurant land uses. The total of Phases 1 and 2 is expected to include single-family and multi-family residential units as well as commercial retail and restaurant land uses. The Full Buildout of the master plan is expected to include single-family and multi-family units, commercial retail and restaurant land uses, office land uses, and hotel land uses.

Data presented in the ITE publication, Trip Generation Handbook, show that developments containing multiple land uses will commonly have internal trips. A process was used to estimate the number of internal trips that can be expected between land uses for the three development scenarios. Given the development’s size, it is important to note that the internal trips may still occur as vehicular trips between land uses within the development along the internal street network, and the intention of the internal capture rate is to account for traffic generated by the development that will not be external traffic on the existing street network.

Studies have shown that most new retail and restaurant developments generate relatively little “new” traffic. The traffic volumes entering and exiting new retail sites
are usually either captured ("pass-by") trips from the adjacent street or diverted trips from streets serving other destinations. This traffic will be on the roadway system and will be passing by the site even if the proposed development is not constructed. Data presented in the Trip Generation Handbook was utilized to estimate pass-by traffic expected for the retail and restaurant uses.

Conservatively, no reductions were applied for walking, biking, or transit. Though given the close proximity to existing residential developments and two schools as well as the network of sidewalks, greenways and bikeways planned as part of the development, some external trips are expected to be accomplished by walking and biking.

Table 2 presents the daily, AM, and PM peak hour trip generation for each of the three scenarios of the proposed development. As shown, Scenario 1 of the 2660 Buckner Lane mixed-use development can be expected to generate approximately 11,557 new vehicle trips per day. The AM and PM peak hour trip generations for Scenario 1 will equal approximately 600 and 888 new trips, respectively. These trips represent the new traffic that will be generated by Scenario 1. As shown in Table 2, Scenario 2 of the development can be expected to generate approximately 31,731 new vehicle trips per day. The AM and PM peak hour trip generations for Scenario 2 will equal approximately 1,849 and 2,004 new trips, respectively. These trips represent the new traffic that will be generated by the buildout of Phases 1 and 2. Scenario 3, which includes the full buildout of the development master plan, is expected to generate approximately 68,719 new vehicle trips per day. The AM and PM peak hour trip generations for the full buildout of the 2660 Buckner Lane mixed-use development will equal approximately 5,315 and 6,902 new trips, respectively.
### TABLE 2: DEVELOPMENT TRIP GENERATION

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>SIZE</th>
<th>GENERATED TRAFFIC</th>
<th>DAILY</th>
<th>AM PEAK</th>
<th>PM PEAK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>TRAFFIC</td>
<td>Enter</td>
<td>Exit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Enter</td>
<td>Exit</td>
<td>Enter</td>
</tr>
<tr>
<td><strong>SCENARIO 1 – PHASE 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail (LUC 820)</td>
<td>252,866 s.f.</td>
<td>7,912</td>
<td>156</td>
<td>89</td>
<td>350</td>
</tr>
<tr>
<td>Restaurant (LUC 932)</td>
<td>28,096 s.f.</td>
<td>2,277</td>
<td>135</td>
<td>121</td>
<td>80</td>
</tr>
<tr>
<td>Residential Single-Family (LUC 210)</td>
<td>159 d.u.</td>
<td>1,368</td>
<td>27</td>
<td>72</td>
<td>34</td>
</tr>
<tr>
<td><strong>SCENARIO 1 SUBTOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SCENARIO 1 TOTAL</strong></td>
<td></td>
<td></td>
<td>11,557</td>
<td>318</td>
<td>282</td>
</tr>
<tr>
<td><strong>SCENARIO 2 – PHASES 1 &amp; 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail (LUC 820)</td>
<td>676,296 s.f.</td>
<td>15,997</td>
<td>278</td>
<td>161</td>
<td>648</td>
</tr>
<tr>
<td>Restaurant (LUC 932)</td>
<td>75,141 s.f.</td>
<td>6,497</td>
<td>333</td>
<td>331</td>
<td>202</td>
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<tr>
<td>Residential Single-Family (LUC 210)</td>
<td>342 d.u.</td>
<td>2,767</td>
<td>58</td>
<td>160</td>
<td>91</td>
</tr>
<tr>
<td>Residential Multifamily (LUC 220 &amp; 230)</td>
<td>1,238 d.u.</td>
<td>6,470</td>
<td>110</td>
<td>418</td>
<td>214</td>
</tr>
<tr>
<td><strong>SCENARIO 2 SUBTOTAL</strong></td>
<td></td>
<td></td>
<td>31,731</td>
<td>779</td>
<td>1,070</td>
</tr>
<tr>
<td><strong>SCENARIO 2 TOTAL</strong></td>
<td></td>
<td></td>
<td>31,731</td>
<td>1,849</td>
<td>2,004</td>
</tr>
<tr>
<td><strong>SCENARIO 3 – FULL BUIDLOUT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Office (LUC 710)</td>
<td>3,902,250 s.f.</td>
<td>18,073</td>
<td>2,697</td>
<td>135</td>
<td>688</td>
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<tr>
<td>Retail (LUC 820)</td>
<td>1,153,676 s.f.</td>
<td>21,221</td>
<td>253</td>
<td>148</td>
<td>741</td>
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<tr>
<td>Restaurant (LUC 932)</td>
<td>128,186 s.f.</td>
<td>10,390</td>
<td>393</td>
<td>378</td>
<td>284</td>
</tr>
<tr>
<td>Residential Single-Family (LUC 210)</td>
<td>774 d.u.</td>
<td>5,866</td>
<td>130</td>
<td>313</td>
<td>193</td>
</tr>
<tr>
<td>Residential Multifamily (LUC 220 &amp; 230)</td>
<td>2,152 d.u.</td>
<td>10,443</td>
<td>170</td>
<td>576</td>
<td>316</td>
</tr>
<tr>
<td>Hotel (LUC 310)</td>
<td>400 rooms</td>
<td>2,726</td>
<td>120</td>
<td>2</td>
<td>51</td>
</tr>
<tr>
<td><strong>SCENARIO 3 SUBTOTAL</strong></td>
<td></td>
<td></td>
<td>68,719</td>
<td>3,763</td>
<td>1,552</td>
</tr>
<tr>
<td><strong>SCENARIO 3 TOTAL</strong></td>
<td></td>
<td></td>
<td>68,719</td>
<td>5,315</td>
<td>6,902</td>
</tr>
</tbody>
</table>

Note: Calculations above represent only new traffic generated by the project site. Internal and pass-by trips are not included in the numbers above.

Source: *Trip Generation, Ninth Edition*

Directional distributions of traffic generated by the property were developed for each land use for the three scenarios. As previously mentioned, it is assumed that a Buckner Road will be extended to Lewisburg Pike to the east and will include an interchange with I-65 prior to Full Buildout of the development. However, an interchange is not assumed to be in place for the initial phases of development. For Scenario 1 (Phase 1)
and Scenario 2 (Phase 1 and Phase 2), the directional distributions generally reflect the existing travel patterns developed from the existing peak hour traffic volumes. The master plan of the development includes an extensive and connected internal street network, which is assumed to be constructed as adjacent phases are developed in order to provide access and circulation for the development phases. The directional distributions were used to assign the AM and PM peak hour traffic generations to the street network. Capacity analyses were conducted for the study intersections for Scenario 1 and Scenario 2 to determine the projected operations of the intersections during the AM and PM peak hours as well as to identify necessary transportation infrastructure improvements for each respective scenario. Capacity analyses were not conducted for Scenario 3 (Full Buildout) due to the unknown regional shift in traffic that will occur with the construction of a new interchange. Those capacity analyses will be included in the City’s transportation planning studies, which have a broader scope, using information and data presented in this traffic impact study.

Conclusions and Recommendations
The 2660 Buckner Lane Property is located at the northeastern corner of the City of Spring Hill, Tennessee. The applicant is seeking rezoning in order to develop the property as a Gateway Planned zoning district that will allow the highest intensity of development within the Spring Hill community with a variety of land uses, which is consistent with the City’s Spring Hill Rising 2040 Plan. This traffic impact study evaluates the proposed development and resulting traffic generation at Phase 1, Phase 2, and Full-buildout. The analyses presented in this study were utilized to determine the transportation improvements necessary to accommodate the traffic generated by Phase 1 and Phase 2 of the development prior to the construction of the anticipated I-65 interchange and Buckner Road Extension. The following specific transportation improvements are recommended in order to accommodate the existing and development traffic at Phase 1 and Phase 2:

PHASE 1

Buckner Lane
• Realign Buckner Lane between Thompson’s Station Road East and Buckner Road. A major goal of this realignment is to improve the existing sight distance restriction along Buckner Lane south of Thompson’s Station Road East, which is currently restricted due to vertical curvature. The design of Buckner Lane should consider realigning the street to the east of the hilltop at the northwest corner of the property, so that adequate sight distance can be provided.
• Widen Buckner Lane between Thompson’s Station Road East and Buckner Road to provide a minimum of two travel lanes in each direction with a center two-
way left-turn lane or landscaped median to accommodate left turn lanes where needed.

- The Buckner Lane improvements should include bike lanes and sidewalks on both sides.

**Intersection of Buckner Lane and Thompson’s Station Road East**

- Widen Thompson’s Station Road East in order to provide a westbound left turn lane.
- Widen Thompson’s Station Road East in order to provide an eastbound right turn lane with channelization to an added lane on Buckner Lane in the southbound direction.
- Install traffic signal control with permissive/protected left turn signal phasing for Thompson’s Station Road East.
- Bicycle treatments and pedestrian facilities should be considered in the design of the intersection geometry and traffic signal.

**Intersection of Buckner Lane and Westchester Lane/Residential Loop**

- Extend Westchester Lane to intersect with the realigned Buckner Lane, and reconstruct the Westchester Lane approach to include a separate eastbound left turn lane and a shared through/right turn lane.
- Align the proposed new residential street with Westchester Lane. The design of the new residential street should include a separate westbound left turn lane and a shared through/right turn lane at the intersection.
- Stop-control should be provided for the eastbound and westbound approaches of Westchester Lane and the new residential street.

**Intersection of Buckner Lane and Buckner Road**

- Construct a southbound left turn lane on Buckner Lane.
- The outside southbound through lane should be signed and pavement marked as a right turn lane at this intersection.
- Construct a northbound left turn lane on Buckner Lane.
- Construct a second northbound through lane on Buckner Lane.
- Extend Buckner Road east of Buckner Lane to provide access to the Phase 1 parcels and internal street network.
- At a minimum, the westbound approach of Buckner Road Extension should include one left turn lane, one through lane, and one right turn lane.
- Install traffic signal control with protected/permissive left turn signal phasing for the northbound and southbound approaches of Buckner Lane.
- Bicycle treatments and pedestrian facilities should be considered in the design of the intersection geometry and traffic signal.
These transportation network improvements are recommended to be constructed in order to accommodate Phase 1 of the master plan; however, it may be appropriate to construct the improvements in more discreet phases depending on the order that parcels within Phase 1 come online. These improvements will provide acceptable traffic operations through the completion of Phase 1.

**PHASE 2**

In addition to the transportation improvements that are identified for Phase 1, the following improvements are recommended to be constructed by the development if not previously constructed by other parties prior to the completion of Phase 2 of the development program (as analyzed in this TIS or a development plan of similar density):

**Buckner Lane**
- Buckner Lane should be widened between Buckner Road and Duplex Road per the City’s *Buckner Lane Study*, which recommends providing two travel lanes in each direction and a center two-way left-turn lane or raised median with turn lanes at intersections.

**Buckner Road**
- Buckner Road should be widened between Buckner Lane and Columbia Pike per the City’s *Buckner Road Study*, which recommends providing two travel lanes in each direction and left turn lanes at intersections where deemed appropriate.
- Buckner Road should be extended east of Buckner Lane to provide access to the Phase 2 parcels and internal street network.

**Intersection of Buckner Lane and Westchester Lane/Residential Loop**
- Install traffic signal control when a traffic study indicates signal warrants are met per the MUTCD.
- The eastbound approach of Westchester Lane and the westbound approach of Residential Loop should include one left turn lane and one shared through/right turn lane.
- The northbound approach of Buckner Lane should include one left turn lane, one through lane, and one shared through/right turn lane.
- The southbound approach of Buckner Lane should include one left turn lane, two through lanes, and one right turn lane.
Intersection of Buckner Lane and Buckner Road/Buckner Road Extension
- All four approaches to the intersection should include one left turn lane, two through lanes, and one right turn lane.

Intersection of Buckner Lane and Twin Lakes Drive
- Install traffic signal control when a traffic study indicates signal warrants are met per the MUTCD.

Intersection of Buckner Lane and Spring Station Drive
- Install traffic signal control when a traffic study indicates signal warrants are met per the MUTCD.

Intersection of Buckner Lane and Road C
- The eastbound and westbound approaches of Road C should include one shared lane for all turning movements.
- The northbound and southbound approaches of Buckner Lane should include one left turn lane, one through lane, and one shared through/right turn lane.

Intersection of Buckner Road Extension and Road D
- Install all-way stop-control as interim traffic control prior to completion of Buckner Road Extension.
- The northbound and southbound approaches of Road D should include one shared lane for all turning movements.
- The eastbound and westbound approaches of Buckner Road Extension should include one shared through/left turn lane and one shared through/right turn lane.

Intersection of Buckner Road Extension and Road E
- Install all-way stop-control as interim traffic control prior to completion of Buckner Road Extension.
- The northbound approach of Road E should include one shared through/left turn lane.
- The southbound approach of Road E should include one shared through/right turn lane.
- The eastbound approach of Buckner Road Extension should include one left turn lane and one right turn lane.

These recommended transportation network improvements should be constructed before completion of development Scenario 2, which includes Phases 1 and 2 (as analyzed in this TIS or a development plan of similar density). However, it may be
appropriate to construct the improvements in more discreet phases depending on the order that parcels within Phase 2 come online. No further development should be permitted beyond Phase 2 until an interchange at I-65 is constructed that provides direct access to the property. As the property develops, parcel-specific traffic studies may be needed or required at the City’s discretion to identify phasing of the recommended improvements within each development phase. It is anticipated that travel patterns in the study area will change with the construction of the development, planned roadway and intersection improvements in the vicinity of the project site, as well as the construction of a new I-65 interchange near the project site. Therefore, these parcel-specific traffic studies should be conducted to confirm the conclusions of this analysis and to more specifically define the design details of the roadway improvements, such as turn lane storage lengths and traffic control within the study area.

In summary, the traffic that is expected to be generated by the allowable development for the proposed 2660 Buckner Lane rezoning can be accommodated with significant and extensive roadway improvements in the study area paired with a well-connected internal street network. The recommended improvements associated with the proposed development are generally consistent with the City’s plans to improve Buckner Lane and Buckner Road as well as its plan to pursue approval and construction of a new I-65 interchange between Thompson’s Station Road East and Duplex Road. All roadway and intersection improvements associated with construction of development on the 2660 Buckner Lane property should be coordinated with the City of Spring Hill.