CITY OF PIPERTON, TENNESSEE

(County of Fayette)

URBAN GROWTH POPULATION PROJECTION REVIEW

MAY, 2001

PREPARED BY:

LAND DEVELOPMENT SOLUTIONS, LLC
1355 Lynnfield Rd., Ste. 245
Memphis, TN 38119
901.818.5388 Phone
901.818.5439 Fax

POPULATION GROWTH PROJECTIONS

One notable commonality observed among the Urban Growth Boundary Reports prepared by the applicable Fayette County municipalities is an explicit disagreement with the population projections prepared for each municipality by the University of Tennessee's Center for Business and Economic Research (CBER).

An examination of the CBER's proposed population projections for Piperton reveals the apparent use of a non-component trend extrapolation methodology. Simply stated, trend extrapolation models attempt to project future population growth by extending historical population growth trends (*based on either the actual numbers of people or the rates of growth*) into the future.

The advantages of trend extrapolation models are their relative simplicity, and utility when attempting to "mass-produce" population projections for a large number of divisions with varied characteristics. They are also appropriate in slow-growth areas, and in areas where historic census counts are the only reliable data available.

There are significant shortcomings with basic trend extrapolation models, however, when the projection period is greater than 10-years, and/or when the model is used to project future populations for smaller divisions that are part of a metropolitan dynamic. For example, the model's premise that historical growth trends will continue into the future may result in absurdly high, or low (*in the case of Fayette County*), population projections if these projections are not tempered with extenuating data based on the analyst's knowledge of local conditions. Secondly, as a non-component projection model (*non-component projection models assess the net effects of the three population components – births, deaths, and migration, rather than assessing the three components individually*), trend extrapolation models lack individual population component detail – specifically the migration component, which renders this model least appropriate in areas where rapid migration has been, is, or will be (*as is anticipated in Fayette County*) the primary component of population change.

A review of historical census data for Fayette County over the last fifty years (**Table 1**) provides considerable insight as to why CBER's projections for Fayette County and its municipalities indicate zero to slow population growth over the next twenty years.

TABLE 1. POPULATION TRENDS - Fayette County 1950 - 2000

		1950	1960	1970	1980	1990	2000*
Fayette County -	number	27,535	24,577	23,330	25,305	25,559	28,806
	% change (decade)	-	-10.7	-5.0%	8.4%	1.0%	12.7%

***Official Census Count**

SOURCE: Fayette County Chamber of Commerce; U.S. Census Bureau

As the data indicate, Fayette County's population has grown less than five percent over the last fifty years. In fact, it has taken the balance of the century for Fayette County to return to its 1950 population levels. These population trends are most likely the result of considerable out-migration, and a constant or declining natural increase (*the numerical difference between births and deaths*) due to changes in fertility rates.

Consequently, the application of trend extrapolation methodology to these data is obviously going to result in population projections significantly skewed by the county's periods of "flat-line" growth. Hence, CBER's projections for Fayette County and its municipalities simply reflect a continuation of the county's historically slow growth trends. However, CBER's projections have met with considerable resistance from county and municipal officials who argue that the dynamics of the Memphis Metropolitan Area (MMA), coupled with an increase in infrastructure investment throughout the county, are going to significantly alter historical county growth trends in future years.

CBER's population projections for the City of Piperton over the required twenty-year planning period (**TABLE 2**) are particularly unrealistic given the city's attractive locational attributes; significant planned infrastructure improvements (*S.R. 385*); and a proposed centralized wastewater treatment facility.

TABLE 2. POPULATION PROJECTIONS - City of Piperton 2000 - 2020

	2000	2005	2010	2020
City of Piperton -	644	650	656	666

SOURCE: University of Tennesse Center for Business and Economic Research

In response to CBER's incongruous population projections, city officials developed their own projections based on an analysis of "historical regional growth patterns." Additionally, the city received assistance from the University of Memphis' Regional Economic Development Center (REDC) in first assessing CBER's projections, and then in developing more plausible projections based on a methodology that combines historical growth trends in the metropolitan area with the effects of the relocation of existing population bases from the urban core to suburban/exurban areas.

With respect to the city's locally generated population projections, officials employed an analysis methodology that closely parallels a formally accepted projection technique known as *comparative forecasting.* In comparative forecasting, the analyst attempts to predict the future growth of a community by comparing, or reconciling that community's growth patterns with the growth patterns of older, more mature communities. The assumption of the comparative forecasting model is that the subject community's growth pattern will approximate the growth patterns of communities further along in their growth cycle. Ideally, the subject community will be patterned after communities that exhibit similar socio-economic and political characteristics.

As exhibited in (**TABLE 3**), city officials patterned the future growth of Piperton after the Shelby County municipalities of Bartlett, Collierville, Germantown, and Lakeland – all suburban/exurban communities that have experienced extraordinary growth over the last thirty years.

TABLE 3. POPULATION TRENDS - Comparative Communities 1970 - 2000

		1970	1980	1990	2000*
Bartlett -	number	1,150	17,170	26,989	40,543
	% change (decade)	-	1393.0%	57.2%	50.2%
Collierville -	number	3,651	7,839	14,427	31,872
	% change (decade)	-	114.7%	84.0%	120.9%
Germantown -	number	3,474	20,459	32,893	37,348
	% change (decade)	-	488.9%	60.8%	13.54%
Lakeland -	number	-	612	1,204	6,862
	% change (decade)	-	-	96.7%	469.9%

***Official Census Count**

SOURCE: U.S. Census Buearu

Of particular note are the significant population gains exhibited by Bartlett and Lakeland over different twenty-year periods. Between 1970 and 1990, Bartlett's population grew an astounding 2,247 percent, while Lakeland, whose population of 612 in 1980 compares with Piperton's current estimate, increased by 1,021 percent between 1980 and 2000.

One simply cannot conclude, however, that the factors currently affecting the population components of births, deaths, and migration will produce the same pattern of growth in Piperton as that exhibited by the comparative communities identified in (**Table 4**). Nevertheless, given the similarities between Piperton and the identified comparative communities, including *similar socio-economic characteristics; contiguousness with high growth areas; accessibility to regional transportation infrastructure;* and *a desirable development environment*, it is reasonable to assume that Piperton will face many of the same growth pressures experienced by the comparative communities over the next twenty years.

The population projections developed by city officials are illustrated in (**Table 4**).

TABLE 4. POPULATION PROJECTIONS - City of Piperton 2000 - 2020

	2000	2005	2010	2015	2020
City of Piperton -	700	5,000	11,000	18,000	25,000

SOURCE: City of Piperton Urban Growth Report

An analysis of the city's projections indicates an ambitious prognosis in which the city's population would swell by nearly 3,500 percent over the twenty-year planning period. And while Piperton is certainly poised for significant population growth, there are several factors that will serve to temper the projected growth rates – at least in the short term.

Between 2000 and 2005, the city projects its population to grow by 4,300 or 614%. However, to date, the city has yet to construct its planned wastewater treatment facility - which restricts, considerably, the development community's ability to offer varying product types (*multi-family, zero lot line, etc.*). Moreover, while K-12 educational facilities (*Rossville Academy*) are available in the adjacent community of Rossville, the nearest public school (*Southwest Elementary*) is several miles from Piperton. Accordingly, the lack of these critical growth catalysts will restrain short-term population growth rates in Piperton, and may subsequently curtail the city's proposed projections over the breadth of the twenty-year planning period.

At any rate, the city's use of a projection methodology that approximates the commonly used comparative forecasting model to gage potential future growth rates is valid. According to W. Isard in his publication *Methods of Regional Analysis*, comparative forecasting models are most appropriate for areas on the periphery of an expanding metropolitan area, which certainly characterizes Piperton. However, as with trend extrapolation, the comparative forecasting model's premise that historical growth trends exhibited by more mature communities will be replicated by communities with similar characteristics, may result in skewed projections, especially over planning periods of greater than ten years.

Under the direction of Luchy Burrell, REDC was asked to review the population projections previously prepared by CBER and City of Piperton officials, and subsequently generate their own population projections incorporating their own methodology.

REDC utilized a population projection technique incorporating a methodology based on *ratio trend analysis*. Essentially, the ratio trend model assumes that the relationship of a minor civil division (*Fayette County*) to a larger geographic entity (*MMA*) will continue into the future. This methodology is also known as a *step-down technique*, in which a percentage of the larger geographic entity's total population is allocated, or stepped-down to smaller civil divisions. Step-down techniques may have more than one "step," as the level of analysis is applied to smaller civil divisions.

Ratio trend analysis takes advantage of the fact that population projections for larger geographical areas tend to be more reliable than those for smaller areas, largely because of the availability of more detailed component data for larger geographical areas. As a result, large-scale projections tend to serve as a constraint on potential population levels for aggregations of smaller geographic entities. For example, the MMA has exhibited fairly stable growth over the last twenty years, averaging roughly ten percent population growth per decade. Population projections based on the extrapolation of this fairly stable population base provides a projection count that cannot be exceeded by the aggregate of the smaller geographical entities. Consequently, if projections for the MMA suggest a population growth of 100,000 every ten years throughout the projection period, then we can conclude that the aggregate population-count of all smaller divisions that are a part of the MMA cannot exceed 100,000. The challenge then becomes distributing or "allocating" the 100,000 population-count among the smaller divisions that comprise the MMA.

Population trends and projections for the MMA and the five counties (*Crittenton County, Arkansas; Desoto County, Mississippi;* and *Fayette, Shelby and Tipton Counties in Tennessee*) that comprise the MMA are illustrated in (**Table 5**). Moreover, each county's share of the MMA population is provided for comparative analysis.

TABLE 5. POPULATION TRENDS/PROJECTIONS - MMA 1980 - 2020

					Projections	
		1980	**1990**	**2000***	**2010**	**2020**
MMA	number	938,777	1,007,306	1,135,614	*1,216,800*	*1,366,700*
	% share	100.0%	100.0%	100.0%	*100.0%*	*100.0%*
Shelby Co.	number	**777,113**	**826,330**	**897,472**		
	% share	**82.7%**	**82.0%**	**79.0%**		
De Soto Co.	number	53,930	67,910	107,199		
	% share	5.7%	6.7%	9.4%		
Tipton Co.	number	32,930	37,568	51,270		
	% share	3.5%	3.7%	4.5%		
Crittenden Co.	number	49,499	49,939	50,866		
	% share	5.3%	5.0%	4.5%		
Fayette Co.	number	**25,305**	**25,559**	**28,806**		
	% share	**2.7%**	**2.5%**	**2.5%**		

***Official Census Count**

SOURCE: City of Piperton Urban Growth Report; U.S. Census Buearu

A review of the data in (**Table 5**) reveals several pertinent trends that may be incorporated into a trend ratio analysis. First, the data suggests that Shelby County's share of the MMA population base will continue to decline over the planning period. Secondly, De Soto and Tipton Counties' share of the MMA population is increasing, and should continue to do so over the planning period. Lastly, trend ratio analysis would suggest that population growth in Crittenden County and Fayette County is static, and will remain constant, or decline, over the planning period.

However, as with the trend extrapolation and comparative forecasting projection models discussed earlier in this report, trend ratio analysis, as a population projection technique, is flawed in that historic trends may not equate to future trends, and the length of the historical period used for determining the ratios will influence future growth rates.

In the case of Fayette County, for example, trend ratio analysis applied to the data contained in (**Table 5**) could not account for the fact that between July 1, 1997 and July, 1998, Fayette County was the third fastest-growing county in the state according to the U.S. Census Bureau. Moreover, a recent University of Memphis study indicated that between 1992 and 1997 nearly 3,000 people migrated from Shelby County to Fayette County. Taken together, this data suggests that Fayette County may be on the verge of experiencing significant growth over the next twenty years.

REDC's population projections for Fayette County (*utilizing trend ratio analysis*) for the twenty-year planning period are illustrated in (**Table 6**). Also included, are county population projections prepared by local county officials, for which no methodology was provided.

TABLE 6. POPULATION PROJECTIONS - Fayette County 2000 - 2020

		2000	2010	2020
Fayette Co.	REDC	31,258	33,894	38,069
	County Officials	37,974	69,033	100,000

SOURCE: City of Piperton Urban Growth Report

Clearly, the significant disparity between the two projections reflects divergence between the analysts' assumptions and analysis techniques. While REDC's projections were developed under the assumption that the county's share of the MMA would continue through the planning period, the county officials' projections appear to be based on subjective assumptions without the support of technical analysis. Interestingly, the county officials' projection for the year 2000 of 37,974 is nearly 10,000 greater than the actual U.S. Census figure issued after the publication of the City of Piperton's Urban Growth Report.

In attempting to arrive at a credible forecast for Fayette County, which should fall somewhere in between REDC's projections and the county officials' projections, it is necessary to re-review the historical trends and projections for the MMA prepared by the U.S. Census Bureau.

As discussed earlier in this report, the reliability of population projections is greatest at larger geographical scales, due to the stability and predictability of the three population components (*births, deaths,* and *migration*). At regional and national levels, population growth is primarily a function of births and deaths – the migration component is negligible and data regarding this component is readily available and maintained by the U.S. Census Bureau. Conversely, at the local level migration changes population more quickly than births and deaths, and information pertaining to migration levels is difficult to obtain.

Indeed, census data for the MMA indicate that for the twenty-year period between 1980 and 2000 the MMA 's population increased by 196,837 – over 85 percent of which resulted from natural increase (*difference between births and deaths*). Thus one can conclude that the majority of the MMA's growth has emanated from natural increase, and it is assumed that this trend will continue into the foreseeable future. The ramification of this growth trend is that population projections for the MMA should enjoy a high degree of accuracy due to the minimal impact of the migration component, and the fact that death birth rates in industrialized nations tend to be stable over time.

Accordingly, with regard to Fayette County's and the City of Piperton's projected share of the MMA's future population growth, we find from a review of the U.S. Census Bureau's projections through 2020 (**Table 5**) that the MMA's population is projected to increase by 231,086 (*81,186 between 2000 – 2010* and *149,900 between 2010 – 2020*) through the planning period. Given the high degree of confidence in the U.S. Bureau' projections for the MMA, and recalling from trend ratio analysis that the aggregate of the smaller divisions will be constrained by the projected population for the larger geographical entity, we are left with an allocation exercise in which the projected total population increase for the MMA of 231,086 is distributed among the smaller divisions, beginning with the counties, and ultimately to the municipalities.

Assessing REDC's and the county officials' Fayette County projections from the context of the above reasoning results in the determination that REDC's projected figure of 38,069 (*through 2020*) is probably too low, while the county officials' projected figure of 100,000 (*through 2020*) is unrealistically high.

Further analysis of this opinion is provided in (**Table 7**). Utilizing trend ratio analysis, REDC's population projections for Fayette County through the planning period are based on an extrapolation of the county's historical distribution share of between 2.5 and 2.7 percent, resulting in 2.8 percent share projection for the years 2010 and 2020. However, given Fayette County's propensity to experience significant growth over the next two decades as a result of growth catalysts discussed throughout this report, one must assume that Fayette County's share of the MMA's total population will exceed its projected distribution share of 2.8 percent by 2020.

TABLE 7. POPULATION TRENDS/PROJECTIONS - MMA/Fayette Co. 1980 - 2020

					Projections	
		1980	**1990**	**2000***	**2010**	**2020**
MMA	number	938,777	1,007,306	1,135,614	*1,216,800*	*1,366,700*
	% share	100.0%	100.0%	100.0%	*100.0%*	*100.0%*
Fayette Co. - REDC	number	25,305	25,559	28,806	*33,894*	*38,069*
	% share	2.7%	2.5%	**2.5%**	***2.8%***	***2.8%***
Fayette Co. - County Officials	number	25,305	25,559	28,806	*69,033*	*100,000*
	% share	2.7%	2.5%	**2.5%**	***5.7%***	***7.3%***

***Official Census Count**

SOURCE: City of Piperton Urban Growth Report; U.S. Census Buearu

On the other hand, the county officials' contention that Fayette County's distribution share will increase to 5.7 percent in 2010, and 7.3 percent in 2020 is not consistent with the growth patterns exhibited by other rapidly developing divisions within the MMA.

In order for Fayette County to realize this rate of growth over the planning period, it would have to capture over 30 percent of the MMA's projected population increase of 231,086 – 17 percent by 2010, and 13 percent by 2020. This scenario appears unlikely.

A more realistic, yet optimistic, approach is to assume that Fayette County's growth rate will approach the growth rates experienced by De Soto County between 1980 and 2000. Both counties share similar attractive locational attributes – their primary differences being related to the timing and availability of infrastructure (*schools* and *sanitary sewer*). Moreover, De Soto County's growth during this period has been unprecedented within the MMA (*historically*), which acknowledges Fayette County officials' contention that the county's historically low growth rate is subject to a dramatic turn around over the next twenty years.

The proposed alternative projections for Fayette County are provided in (**Table 8**). These projections, which combine the comparative forecasting and trend ratio analysis identified previously in this report, assume that Fayette County's distribution share "rate of growth" will increase by 25 percent by 2010, and by 50 percent by 2020. Additional assumptions are that Shelby County's distribution share will decline slightly; De Soto County's distribution share will moderate, as it absorbs inventory and experiences a maturing of its growth cycle; Tipton County's distribution share will continue to increase; and Crittenden County's distribution share will remain constant.

TABLE 8. ALTERNATIVE PROJECTIONS - Fayette Co. 1980 - 2020

					Projections	
		1980	**1990**	**2000***	**2010**	**2020**
MMA	number	938,777	1,007,306	1,135,614	*1,216,800*	*1,366,700*
	% share	100.0%	100.0%	100.0%	*100.0%*	*100.0%*
Fayette Co. -	number	25,305	25,559	28,806	*38,580*	*65,000*
	% share	2.7%	2.5%	2.5%	***3.2%***	***4.8%***

***Official Census Count**

SOURCE: Land Development Solutions, LLC, 2001

Population projections prepared by REDC for the City of Piperton are based on a continuation of the trend ratio analysis model used for developing their projections for Fayette County. Additionally, REDC incorporated assumptions regarding recently proposed land development projects.

Upon generating population projections for the county (*see **Table 6***), REDC allocated, or "stepped-down" the projection counts to the county's six census divisions based on each division's historical distribution share (**Table 9**).

TABLE 9. POPULATION TRENDS - Census Divisions 1970 - 1990

(Share of the total county population)

		1970	1980	1990
Braden	% share	11.4%	11.6%	12.1%
Fayette Corners	% share	5.9%	4.8%	3.8%
Moscow-LaGrange	% share	17.8%	14.6%	13.5%
Oakland	% share	16.9%	20.3%	23.2%
Rossville	% share	15.7%	14.8%	14.6%
Somerville	% share	32.2%	34.0%	32.8%
Fayette County		100.0%	100.0%	100.0%

SOURCE: City of Piperton Urban Growth Report

The subsequent projections for each census division are illustrated in (**Table 10**). These projections represent simple extrapolations of each census district's historical distribution share over the planning period.

TABLE 10. POPULATION PROJECTIONS - Census Divisions 2000 - 2020

	2000	2010	2020
Braden	3,681	4,096	4,601
Fayette Corners	1,151	1,281	1,439
Moscow-LaGrange	4,225	4,582	5,146
Oakland	7,258	7,870	8,840
Rossville	4,559	4,944	5,553
Somerville	10,256	11,121	12,491
Fayette County	31,258	33,894	38,069

SOURCE: City of Piperton Urban Growth Report

Again, however, as with REDC's projections for the county, the projection counts for the census divisions are based on the maintenance of each division's historical distribution share into the future, and cannot anticipate abrupt changes in the migration population component. Consequently, the projections do not reflect the potential for dramatic growth brought about by substantial in-migration, such as occurred in De Soto County where more than 15,000 people migrated to between 1992 and 1997 according to a recent report by REDC.

REDC generated four projection scenarios for the City of Piperton (**Table 11**).

TABLE 11. POPULATION PROJECTIONS - City of Piperton 2000 - 2020

	2000	2010	2020
Scenario 1	644	656	668
Scenario 2	700	5,747	10,794
Scenario 3	700	10,794	15,841
Scenario 4	700	10,794	20,888
Average of Scenarios 2&3	700	8,270	13,317

SOURCE: City of Piperton Urban Growth Report

The first scenario includes CBER's initially prepared population projections. Scenarios two through four are based on a questionable methodology in which a household size factor (*2.5 persons per household*) was applied to the sum total of dwelling units that are a part of several conceptual development projects/proposals at various stages in the planning process that may or may not be developed. The concluded twenty-year forecast for Piperton, as presented by REDC in (**Table 11**), is the average of Scenarios 2 and 3, or 13,317.

In an effort to reconcile Piperton's future population growth with that of the county's (as projected in **Table 8**), and to gain some sense as to the validity of REDC's projections, alternative projections for Piperton are offered in (**Table 12**). These projections are based on the following assumptions:

- The majority of growth in Fayette County through out the planning period will occur in the western part of the county – specifically in the communities of Galloway, Hickory With, Oakland, and Piperton, two of which have wastewater treatment facilities (*Galloway* and *Oakland*). This premise is based on a locational analysis of the MMA, which clearly indicates that the fastest growing communities outside of Shelby County lie on, or near, Shelby County's border – *Atoka* and *Munford* in Tipton County, and *Horn Lake, Southaven,* and *Olive Branch* in De Soto County. The growth in these communities over the last ten years has been impressive. Atoka was the fastest growing community in Tennessee during the 1990s according to the U.S. Census Bureau, while the border communities of Horn Lake, Southaven, and Olive Branch comprised more than 60 percent of De Soto County's population by 2000.

- The growth rate of MMA continues to average ten percent per decade through out the planning period.
- State tax reform that is competitive with adjoining states (*i.e. Mississippi* and *Arkansas*).
- Builder and consumer demand for property in Fayette County will remain strong.
- The distribution shares for the census divisions of Fayette Corners, Moscow-La Grange, and Somerville will continue to decline, as a percentage share, through out the planning period. Conversely, the distribution shares for the census divisions of Braden, Oakland, and Rossville will increase, as a percentage share, through out the planning period.
- The census divisions of Braden, Oakland, and Rossville will capture 85 percent of the population growth through out the planning period.
- Oakland will continue to be the fastest growing community in Fayette County through 2010.
- The City of Piperton will have constructed a centralized wastewater treatment facility by 2005.
- State Route 385 is constructed through Piperton by 2010.
- The City of Piperton's Household size increases from 2.5 to 3.0 throughout the planning period.
- Fayette County's median age of 38.1 according to the 2000 Census will decrease through out the planning period as significant migration into the county alters the county's age structure, resulting in an increasing childbearing cohort.
- The City of Piperton's conservation based regulatory system will temper unrestrained growth and result in relatively low development densities.
- Fayette County takes a proactive stance with regard to reinforcing it public school infrastructure
- The housing market remains vibrant through out the planning period.

TABLE 12. ALTERNATIVE PROJECTIONS - City of Piperton 2000 - 2020

	2000	2010	2020
City of Piperton -	589	2,800	10,500

SOURCE: Land Development Solutions, LLC, 2001