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# Addendum to comprehensive plan density analysis : prepared by the Center for Economic Development Research, College of Business Administration, University of South Florida

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# **Addendum to Comprehensive Plan Density Analysis**

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## *Preface*

*The Tampa Bay Builders Association (TBBA) commissioned the Center for Economic Development Research (CEDR) to conduct the applied economic research reported herein. In July 2005, CEDR published a research report, which was also commissioned by the TBBA, titled “Comprehensive Plan Density Analysis.” The July 2005 report compared the density of residential dwellings specified in the County’s 1994 Comprehensive Plan to actual units built and projected units to be built within Hillsborough County’s urban service area. The report covered rezoning cases initiated between 1997 and 2004.*

*This report compares the findings from CEDR’s July 2005 study with information that the Hillsborough County City-County Planning Commission provided to the TBBA and CEDR on August 31, 2005. The information provided was from a report titled, “Effective Density Used in Population Projection – Unincorp., County and Plant City by Census Tract and Flue Category,” dated October 2004.*

*CEDR, a unit of the University of South Florida’s (USF) College of Business Administration (COBA), initiates and conducts innovative research on economic development. The Center’s education programs are designed to cultivate excellence in regional development. Our information system serves to enhance economic development efforts at USF, COBA, and throughout the Tampa Bay area and the state of Florida.*

*We thank Ms. Lorraine Duffy and James Hosler of the Hillsborough County City-County Planning Commission for their cooperation and assistance in extracting data from public records for this research.*

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## Executive Summary

In this research we re-categorizes the results reported in our earlier report, titled “Comprehensive Plan Density Analysis” dated July 2005 and compare the re-categorized results with data provided by the Hillsborough County City-County Planning Commission (The Planning Commission). As in our earlier report, this comparison relates to Hillsborough County’s 1994 Comprehensive Plan, rezoning cases, actual and projected residential land use densities in the urban service area of unincorporated Hillsborough County.

Because The Planning Commission’s data is categorized differently from our data, we resorted our data to match their data categories. The Planning Commission categorized its data by 17 different Comprehensive Plan land use designations, while we used categories based on units per acre density. It was not possible to reclassify The Planning Commission’s data into the original 10 CEDR categories, because the data provided to us did not contain details by land plot.

Our findings are based on the comparison of two metrics:

1. CEDR’s projected percent of acres that are built-out residential compared to The Planning Commission’s percent of acres that are built-out residential, i.e. the number of residential acres divided by the total acres that included residential and non-residential.
2. CEDR’s projected units built-out per acre and The Planning Commission’s units built-out per acre, i.e. residential units divided by total acres.

CEDR’s projected percent of acres that are built-out residential differs from The Planning Commission’s percent of acres that are built-out residential, but it is not readily apparent how significant the differences are. However, in 11 out of 17 Categories we find a positive difference, which indicates that CEDR’s Projected % Residential acres is greater than The Planning Commission’s data for that Category. Category RES-4 has the smallest percentage difference, + 0.49%.

Furthermore, a comparison of CEDR’s projected units built-out per acre and The Planning Commission’s units built-out per acre shows that there are six categories for which the values are statistically equivalent, while for the other 10 categories that we were able to test, the values are not statistically equivalent. We also note that for Categories NMU-4, RES-4, RES-6, and SMU-6, which comprise 50.9% of the total land in the study, the difference between CEDR’s projected units built-out per acre and The Planning Commission’s units built-out per acre was more than 1 unit per acre in each category.

## **I. Introduction.**

In this research we re-categorizes the results reported in our earlier report, titled “Comprehensive Plan Density Analysis” dated July 2005 and compare the re-categorized results with data provided by the Hillsborough County City-County Planning Commission (The Planning Commission). As in our earlier report, this comparison relates to Hillsborough County’s 1994 Comprehensive Plan, rezoning cases, actual and projected residential land use densities in the urban service area of unincorporated Hillsborough County.

## **II. Information Sources.**

Information sources used in our July 2005 research project involved a review of 780 rezoning cases for land in unincorporated Hillsborough County. The land covered by these cases totaled 37,416 acres designated for 181,785 residential units as defined by each rezoning case’s Comprehensive Plan designated residential rate multiplied by the number of acres. The review was limited to 1997-2004 rezoning cases that encompassed 10 or more acres in the urban service area, and originally designated Residential in the Comprehensive Plan. The sources for the rezoning information are:

- TBBA database of rezoning cases (paper and electronic).
- Rezoning Commission Agenda files (electronic) – Provided by Ed Scilex, Senior Zoning Technician, Hillsborough County Planning & Growth Management.
- Re-zoning case files (paper) – provided by Vernon Hampton, Office Assistant – File Clerk, Hillsborough County Planning & Growth Management.
- Hillsborough County GIS maps (paper & on-line) to include the 1994 Comprehensive Plan map.
- Integrated Realty Information System (IRIS – IMAP) maps and property database.

The information source for the data provided by The Planning Commission is a 2-page document titled, “Effective Density Used in Population Projection – Unincorp. County and Plant City by Census Tract and Flue Category,” dated October 2004. Included in the document is a section titled “Unincorp County Effective Density Method,” which contains an algorithm relating to a computer query. For 17 categories, the algorithm indicates 1) the percent of acres that would be developed residentially, and 2) the average observed residential density that was actually developed.

## **III. Scope.**

We compare our July 2005 research findings of projected residential build-out densities to the data provided by The Planning Commission. Because The Planning Commission’s data is categorized differently from our data, we resorted our data to match their data categories. The Planning Commission categorized its data by 17 different Comprehensive Plan land use designations, while we used categories based on units per acre density. It was not possible to reclassify The Planning Commission’s data into the original 10 CEDR categories, because the data provided to us did not contain details by land plot.

The CEDR data contains rezoning cases that were approved between January 1, 1997 – September 30, 2004 and involved residential units on parcels of land equal to or greater than 10 acres. The Planning Commission’s data contains two metrics that show: (1) % of acres in Hillsborough County that are used for residential purposes, and (2) rate / number of units built-out per acre. Their information, which was provided to us, does not include specific land plot details, such as actual plot size in acres or the number of units built-out on these plots.

We compare the following metrics from the original CEDR report to The Planning Commission’s metrics:

- Percent of acres that are built-out residential, i.e. the number of residential acres divided by the total acres that included residential and non-residential.
- The built-out rate per acre, i.e. residential units divided by total acres.

#### **IV. Method.**

Initially, we combined the original CEDR data files, which were sorted by year, into one merged data file. Unnecessary data columns were deleted. Irrelevant rezoning cases, such as withdraw or denied, were eliminated. What remained became the new consolidated work file. This new file was then sorted by Comprehensive Plan rate and categorized like the original study into one of three groups:

- Residential – Done, or
- Residential – Partial Built-out or Not Developed, or
- Non-Residential –for example, schools, towers, excavations, commercial or retail structures, correctional facilities, hospitals, farm worker housing, and mobile home parks.

As in the original study, because all years (especially 2003 and 2004) have missing data and there exists a large number of Partial Built-out and Not Developed land we (1) estimated the migration of Partial Built-out or Not Developed land to Non-Residential use, and (2) projected future actual built-out from Partial Built-out or Not Developed.

We expand the Comprehensive Plan categories in the original CEDR study from 10 to 17 in order to match The Planning Commission’s categories. **Table 1**, on the next page, shows how the original 10 categories were expanded. Table 1’s columns are:

- Column A. Lists CEDR’s original study categories that arrayed the data by planned density (units per acre - .2 through 35). All land use categories with like density rates were combined.
- Column B. Indicates the categories used by The Planning Commission that arrayed the data by planned use and density category. For example, CEDR’s original study categories .2 and .4 are combined into The Planning Commission’s AE category, and CEDR’s original study category 20 is separated into The Planning Commission’s OC-20, RES-20, and UMU-20 categories.
- Column C. Defines the abbreviations used in Columns A and B.

Table 1. ZONING CATEGORIES

<b><u>A</u></b>	<b><u>B</u></b>	<b><u>C</u></b>
<b><u>Original Study Categories</u></b>	<b><u>The Planning Commission Categories</u></b>	<b><u>Category Definition</u></b>
.2 (included AE- .2 and AR- .2)	AE (included AE- .2 and AE- .4)	Agricultural Estate - .2 (1 unit per 5 acres / - .4 (1 unit per 2.5 Acres)
.4 (included AE- .4)		
	AM	Agricultural Mining (1 unit per 20 acres)
	AR (includes AR-.2	Agricultural Rural (1 unit per 5 acres)
1 (included AM/R-1, RES-1)	RES-1	Residential-1 (1 unit per acre)
2 (included RES-2, RESP-2	RES-2	Residential-2 (2 units per acre)
	RESP-2	Residential Planned (2 units per acre)
4 (included NMU-4, RES-4)	NMU-4	Neighborhood Mixed Use-4 (4 units per acre)
	RES-4	Residential-4 (4 units per acre)
6 (included RES-6, SMU-6)	RES-6	Residential-6 (6 units per acre)
	SMU-6	Suburban Mixed Use-6 (6 units per acre)
9 (included RES-9	RES-9	Residential-9 (9 units per acre)
12 (included CMU-12, RES-12)	CMU-12	Community Mixed Use-12 (12 units per acre)
	RES-12	Residential-12 (12 units per acre)
20 (included OC-20, RES-20, UMU-20)	OC-20	Office Commercial-20 (20 units per acre)
	RES-20	Residential-20 (20 units per acre)
	UMU-20	Urban Mixed Use-20 (20 units per acre)
35 (included UMU-35)	UMU-35	Urban Mixed Use-35 (35 units per acre)

We created a new master worksheet that contains the following data fields:

- Status (Non-residential, Done, Partial - Not Developed)
- Case Nr. (Rezoning Case number)
- Development Name
- Acres
- 1994 Comprehensive Plan (Category)
- 1994 Comprehensive Plan Rate (0, 1, 2, 4, ...35)

- Calculated Comprehensive Plan Units (Acres x Rate)
- Actual Units
- Calculated Units per Acres Rate (Actual units / acres)
- Acres Projected Migration (10% move from Residential Partial – Not Developed to Non-residential)
- Calculated Projected units (Comprehensive Plan Units x actual build-out rate for that category)
- Calculated Projected units per Acre (Projected units / Acres)

We then (1) calculated the migration of acres to Non-Residential and (2) projected residential built-out units as follows:

1. *Calculated migration of planned Residential land to Non-Residential use.* The number of acres for each case in category Residential – Partial Built-out or Not Developed was reduced by 10% and the same amount was then added to Non-Residential acres. For example, in category RES-6 Partial or Not Developed, 10% of the actual 1,524 acres is 152. This 152 is then subtracted from the 1,524 equaling 1,372 (1,524 – 152) and added to the RES-6 Non-Residential category equaling 848 acres (696 + 152).
2. *Project actual built-out units of Residential – Partial Built-out or Not Developed cases.* This projection is based on the computed all year's average from the original CEDR Study for each Residential-Done category density rating factor's actual built-out unit percent. Like in the original study we assume at least a 10% migration of the Not Done / Not Developed land to the Non-Residential category. The projected future development of the remaining land is calculated by multiplying the average completion percentage for the applicable residential unit per acre rate by the projected total available capacity units. For example, in category RES-6 actual done unit built-out was 51.21% of the planned capacity. The projected capacity equals the projected acres (adjusted down by 10% from actual) multiplied by the planned units per acre (1,372 x 6 = 8,232). This projected capacity is then multiplied by the build-out rate of 51.21% to obtain the projected built-out units of 4,216 (8,232 x .5121 = 4,216).

These projections are a key in both the original study and this add-on analysis. To be consistent we applied the same migration factor and projected built-out rate used in the original CEDR study to this add-on analysis.

## **V. Findings.**

Our findings are based on the comparison of two metrics:

1. CEDR's projected percent of acres that are built-out residential compared to The Planning Commission's percent of acres that are built-out residential, i.e. the number of residential acres divided by the total acres that included residential and non-residential. We show this comparison in Table 2.

2. CEDR’s projected units built-out per acre and The Planning Commission’s units built-out per acre, i.e. residential units divided by total acres. We show this comparison in Table 3.

**Table 2**, below, summarizes our findings when comparing the percent of projected residential acres from the re-categorized CEDR data to The Planning Commission’s data. Table 2’s columns are:

- Column A. Category is the County’s Comprehensive Plan density rating categories.
- Column B. Sample Size is the number of rezoning cases examined in the original CEDR study and used as the basis for estimating Projected Units/Acre.
- Column C. Projected % Residential CEDR is the total acres of Residential–Done and Residential-Partial or Not Developed divided by the total acreage including Non-Residential acres, by Category, from the original CEDR study.
- Column D. % Residential PC is The Planning Commission’s (PC) data.
- Column E. Diff. compares the two sets of data. The comparison indicates the raw percentage value difference between the CEDR Study and the PC result (Column C minus Column D).
- Column F. % Diff. shows the percent difference. It is the raw percentage value difference (Column E) divided by CEDR’s Project % Acres Residential (Column C).

Table 2. Percent Acres Residential Comparison.

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>
<u>Category</u>	<u>Sample Size</u>	<u>Projected % Residential CEDR</u>	<u>% Residential PC</u>	<u>Diff.</u>	<u>% Diff.</u>
AE	9	15.08%	50.00%	-34.92	-231.47%
AM	3	100.00%	10.00%	90.00	90.00%
AR	19	73.09%	20.00%	53.09	72.64%
RES -1	94	58.47%	90.00%	-31.53	-53.93%
RES - 2	33	79.48%	70.00%	9.48	11.93%
RESP - 2	11	62.01%	25.00%	37.01	59.68%
NMU - 4	8	71.16%	20.00%	51.16	71.89%
<b>RES - 4</b>	<b>188</b>	<b>72.49%</b>	<b>72.00%</b>	<b>0.49</b>	<b>0.67%</b>
<b>RES - 6</b>	<b>58</b>	<b>74.60%</b>	<b>72.00%</b>	<b>2.60</b>	<b>3.49%</b>
<b>SMU - 6</b>	<b>45</b>	<b>84.39%</b>	<b>88.00%</b>	<b>-3.61</b>	<b>-4.28%</b>
RES - 9	20	58.13%	64.00%	-5.87	-10.11%
CMU - 12	37	35.94%	27.50%	8.44	23.47%
RES -12	8	52.38%	68.00%	-15.62	-29.81%
OC - 20	26	31.55%	17.00%	14.55	46.12%
<b>RES - 20</b>	<b>7</b>	<b>74.06%</b>	<b>70.00%</b>	<b>4.06</b>	<b>5.48%</b>
UMU - 20	24	67.62%	19.50%	48.12	71.16%
UMU - 35	1	0.00%	30.00%	-30.00	N/A

From Table 2, we find that:

- A positive difference in Column E indicates that CEDR's Projected % Residential acres is greater than The Planning Commission's data for that Category. In 11 out of 17 Categories we find a positive difference. Category RES-4 has the smallest percentage difference, + 0.49%.
- In six out of the 16 Categories that we compared, the percentage differences, (Column F) between CEDR's Projected % Acres Residential and The Planning Commission's data are within +/-12%. These six Categories, which are highlighted in Table 2, are RES-2, RES-4, RES-6, SMU-6, RES-9, and RES-20. Four of the six Categories are within +/-6%. They are RES-4, RES-6, SMU-6, and RES-20. We cannot compare Category UMU-35 because the sample size is 1 and it is Non-Residential.

**Table 3**, on the next page, summarizes our findings when comparing projected units built-out per acre from the re-categorized CEDR data to The Planning Commission's data. Table 3's columns are:

- Column A. Category is the County's Comprehensive Plan density rating categories.
- Column B. Sample Size is the number of rezoning cases examined in the original CEDR study and used as the basis for estimating Projected Units/Acre.
- Column C. Projected Units/Acre CEDR is the projected number of residential units to be built-out divided by the total acreage for that category. We show this number based on the original CEDR study
- Column D. Units / Acre PC is The Planning Commission's (PC) data.
- Column E. Diff. compares the two sets of data. The comparison indicates the units per acre difference between the CEDR Study and the PC result (Column C minus Column D).
- Column F. % Diff. shows the percent difference. It is the units per acre difference (Column E) divided by Projected Units / Acre CEDR (Column C).
- Column G. 2 Std Dev shows the measurement of 2 standard deviations about Projected Units/Acre CEDR (Column C). The standard deviation is a measure of volatility. For a normal distribution there is about a 95% probability that the true measure of Units per Acre is within +/- 2 standard deviations of CEDR's sample estimate of Projected Units / Acre.
- Column F. 95% Confid. Test indicates if The Planning Commission's Units / Acre PC number (Column D) falls within +/- 2 standard deviations of the CEDR's sample estimate. If it is within +/- 2 standard deviations, we *Accept* the proposition that CEDR's estimate of Projected Units / Acre (Column C) is statistically equivalent to The Planning Commission's Units / Acre. Otherwise, we *Reject* the equivalency proposition.

Table 3. Projected Units per Acre Comparison.

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>F</u>
<u>Category</u>	<u>Sample Size</u>	<u>Projected Units/Acre CEDR</u>	<u>Units/Acre PC</u>	<u>Diff.</u>	<u>% Diff.</u>	<u>2 Std Dev</u>	<u>95% Confid. Test</u>
AE	9	0.06	0.40	-0.34	-532.70%	0.359	Reject
AM	3	0.66	0.05	0.61	92.38%	0.000	Reject
AR	19	0.10	0.20	-0.10	-94.66%	0.149	Reject
RES -1	94	0.38	0.82	-0.44	-113.81%	0.787	Reject
RES - 2	33	1.31	1.72	-0.41	-30.81%	1.959	Accept
RESP - 2	11	1.12	2.00	-0.88	-79.03%	2.671	Accept
NMU - 4	8	1.85	3.18	-1.33	-71.54%	5.502	Accept
RES - 4	188	1.95	3.18	-1.23	-63.10%	2.883	Reject
RES - 6	58	2.47	5.47	-3.00	-121.61%	4.605	Reject
SMU - 6	45	2.48	4.24	-1.76	-71.14%	3.402	Reject
RES - 9	20	6.04	4.36	1.68	27.78%	10.329	Accept
CMU - 12	37	1.39	5.88	-4.49	-322.86%	6.565	Accept
RES -12	8	1.74	9.59	-7.85	-452.15%	3.606	Reject
<b>OC - 20</b>	<b>26</b>	<b>3.90</b>	<b>4.23</b>	<b>-0.33</b>	<b>-8.46%</b>	<b>12.965</b>	<b>Accept</b>
RES - 20	7	5.45	12.00	-6.55	-120.19%	7.133	Reject
UMU - 20	24	4.92	11.50	-6.58	-133.82%	11.782	Reject
UMU - 35	1	0.00	35.00	-35.00	N/A	0.000	N/A

From Table 3, we find that:

- A negative difference in Column E indicates that Projected Units / Acre CEDR is less than The Planning Commission's data for that Category. In 15 of the 17 Categories we find a negative difference. Only for AM and RES-9 was the CEDR estimate for Projected Units / Acre greater than Units / Acre PC. We also note that for Categories NMU-4, RES-4, RES-6, and SMU-6, which comprise 50.9% of the total land in the study, the difference (Column E) was more than - 1 unit per acre in each category.
- In all categories except OC-20 the percent difference (Column F) exceeds + or - 27%. Among the largest differences are RES-12 with -452.15% difference and CMU-12 with -322.86% difference. We do not compare UMU-35 because the sample size is 1 and it is Non-Residential.
- We tested sixteen of the categories for statistical equivalence of Projected Units/Acre CEDR with Units / Acre PC. We treat the PC data as point estimates, because we do not have information about the volatility of the observations used by the PC to generate their units per acre values. In Column F, we indicate whether we *Accept* or *Reject* the statistical equivalence proposition. We find six Categories, which are highlighted in Table 3, for which we accept statistical equivalence between Projected Units / Acre CEDR and Units / Acre PC. For the other 10 Categories, we reject statistical equivalence.

## **VI. Conclusion.**

CEDR's projected percent of acres that are built-out residential differs from The Planning Commission's percent of acres that are built-out residential, but it is not readily apparent how significant the differences are. However, in 11 out of 17 Categories we find a positive difference, which indicates that CEDR's Projected % Residential acres is greater than The Planning Commission's data for that Category. Category RES-4 has the smallest percentage difference, + 0.49%.

Furthermore, a comparison of CEDR's projected units built-out per acre and The Planning Commission's units built-out per acre shows that there are six categories for which the values are statistically equivalent, while for the other 10 categories that we were able to test, the values are not statistically equivalent. We also note that for Categories NMU-4, RES-4, RES-6, and SMU-6, which comprise 50.9% of the total land in the study, the difference between CEDR's projected units built-out per acre and The Planning Commission's units built-out per acre was more than 1 unit per acre in each category.