

**TOWN OF MADISON**  
**CONNECTICUT 06443**  
**ECONOMIC DEVELOPMENT COMMISSION**

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**A REPORT ON THE IMPACT OF HOUSING  
SALES ON SCHOOL ENROLLMENTS**

**January 26, 2004**

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**INTRODUCTION**

Within the Town of Madison, the annual budget exceeds \$45 million of which two thirds is dedicated to operate the Town’s Schools. Given that the costs for education are the greatest single component of the budget the Economic Development Commission (EDC) felt that it was very important to understand how School enrollments may change resulting from the sales of homes in the Town. This information will enable the EDC to establish specific planning metrics based upon Madison data when evaluating proposals.

Over the last 4 months, the EDC subcommittee on analytical metrics, with the assistance of the School Department, the Assessor’s Office, and the First Selectman’s Office completed a study that reconciled property sales to the change in the school population. All of the property transactions between 1995 and 2003 were analyzed and compared to the annual change in school population.

**THE DATA ON PROPERTY TRANSACTIONS**

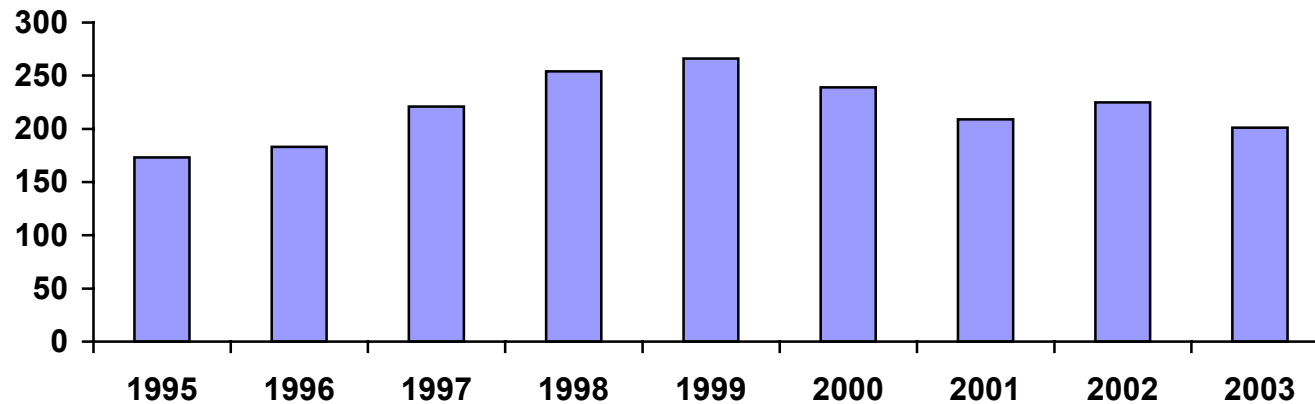
The EDC worked with the Assessor’s Office and the Town’s Database Manager to identify recent property transactions. An electronic database of information from 1995 to date is maintained in the Assessors office. Over the past nine years, there were 6,722 transactions recorded in the Town records. As the data was reviewed we realized that the majority of transactions created only a change in ownership - not necessarily a change in the property occupancy – i.e. one family moving out and another family moving in. Therefore, by understanding the intent of each transaction and a property-by-property evaluation, the database of transactions was reduced by 4,880. The following table details the adjustments made by the type of transaction.

***Table 1: Housing transaction adjustments to derive true sales of homes between different families.***

|  | Transactions<br>Removed | No. Home<br>Transactions |
|--|-------------------------|--------------------------|
| <b><i>All Residential Zoned Property Transactions Since 1/1/95</i></b> |                         | <b>6,722</b>             |
| Less Warranty Deed Transactions  | (2,905)                 | 3,817                    |
| Less Transactions with a Sales Price Less than \$50,000                | (302)                   | 3,515                    |
| Less Transactions with the Same Previous and After Address             | (1,460)                 | 2,055                    |
| Less Transactions with the Same Name                                   | (20)                    | 2,035                    |
| Removal of Condos  | (193)                   | 1,842                    |
| <b><i>Adjustments for Missing Data Points:</i></b>                     |                         |                          |
| Missing Data - October `01 thru Feb `02                                | 46                      | 1,888                    |
| Missing Data - August `03 thru Dec. `03                                | 83                      | 1,971                    |
| <b><u>Total "True" Housing Sales</u></b>                               |                         | <b><u>1,971</u></b>      |

The 1,842 transactions identified as true home sales were then categorized by year. Between October 2001 and February 2002 the data was missing, and the data collected in 2003 was only through July. To remain comparable, these missing data points were estimated based on monthly trend analysis. The adjustments (detailed in Table 6 at the end of this report) added another 129 sales. The total therefore increased to 1,971 sales. As the following chart shows, between 170 and 270 homes per year actually change in Madison.

**Chart 1. House Sales By Year**



**THE DATA ON SCHOOL POPULATION CHANGE**

The EDC worked with the School Department and the Town’s Database Manager to identify the change in school population. To assess the impact of housing sales, we first attempted to reconcile by property address the change in school enrollment. This became an impossible undertaking, as several years of data did not exist by individual for the 9 years evaluated. Additionally, for the information maintained, the databases did not contain common data points that could be accurately reconciled. Therefore, as an alternative, the enrollment data for each school class, over this time frame, was tracked.

Specifically, the enrollment for the 3<sup>rd</sup> grade in 1999 was compared to the 4<sup>th</sup> grade in 2000 and the 5<sup>th</sup> grade in 2001 and so forth. The whole school system, except for kindergarten, to eliminate additions from births, was assembled. The following assumptions therefore generated the change in enrollment statistics over time:

1. Fluctuation in kindergarten enrollment on an annual basis is too volatile to include in a mean growth figure.
2. A change factor is established by measuring the change of enrollment of a group of children as they move through the system, i.e., first graders in 1993 = 215; when they become second graders in 1994 there are 205 remaining resulting in a change factor of 10 students.
3. For the purposes of this analysis, it was assumed that this change factor may be attributed to residential movement (real estate transactions). Movement from public to private schools historically has been a constant and absorbed in a 10-year growth as a steady factor.
4. Real Estate sales contribute to more than the change factor described in 3. But for this purpose, what is needed is that change which either decreases or increases the overall population. This factor is captured in the “change factor”.

The numbers generated by this analysis identified a total of 562 students that entered into the Madison school system between 1995 and 2003. The largest change year was 113 in 2000 and the smallest was 28 in 1995. The following table details the “change factor” by year.

***Table 2. Change Factor in School Population by Year***

| <b>Year</b>        | <b>School<br/>Pop<br/>Change</b> |
|--------------------|----------------------------------|
| 1995               | 28                               |
| 1996               | 80                               |
| 1997               | 65                               |
| 1998               | 76                               |
| 1999               | 53                               |
| 2000               | 113                              |
| 2001               | 42                               |
| 2002               | 43                               |
| 2003               | 62                               |
| <b>Grand Total</b> | <b>562</b>                       |

**RECONCILING HOUSING CHANGE TO SCHOOL ENROLLMENT CHANGE**

The core question is if there is a correlation between the true change in property ownership and the change in the school population. By dividing the annual change factor in student enrollment by the number of “true housing sales,” we can derive the average change in students per household for each of the years since 1995.

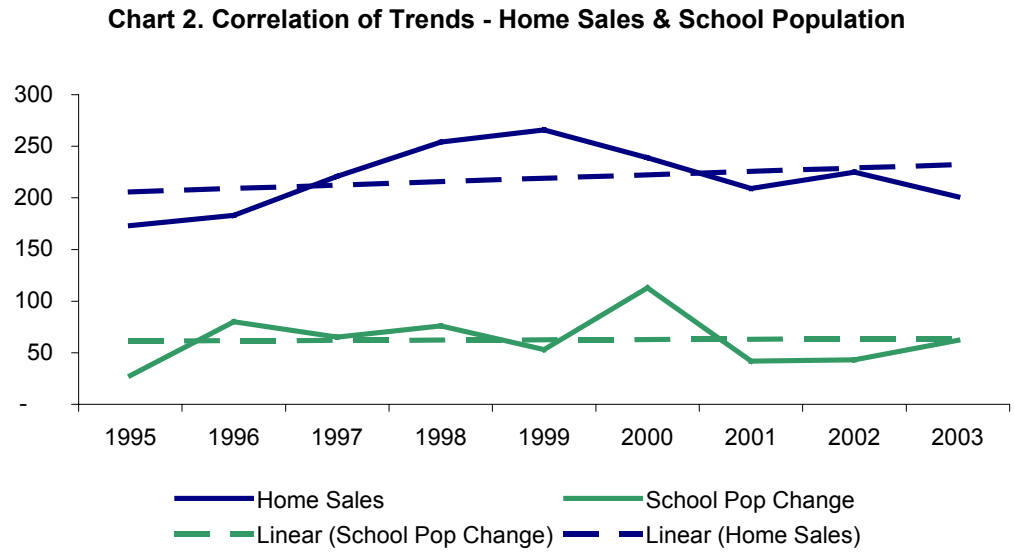
Table 3 provides the number of home sales per year, the school population change and the number of students per household. The numbers range from a low of 0.20 students per household to a high of 0.47 students per household. The State of Connecticut also maintains this statistic. The average for the State is 0.535 students per household. In no year in the nine evaluated did the Madison average exceed the State average.

***Table 3. Change in Student Population per Home Sale***

| <b>Year</b>        | <b>Home Sales</b> | <b>School Pop Change</b> | <b>Students per Hshold</b> |
|--------------------|-------------------|--------------------------|----------------------------|
| 1995               | 173               | 28                       | 0.16                       |
| 1996               | 183               | 80                       | 0.44                       |
| 1997               | 221               | 65                       | 0.29                       |
| 1998               | 254               | 76                       | 0.30                       |
| 1999               | 266               | 53                       | 0.20                       |
| 2000               | 239               | 113                      | 0.47                       |
| 2001               | 209               | 42                       | 0.20                       |
| 2002               | 225               | 43                       | 0.19                       |
| 2003               | 201               | 62                       | 0.31                       |
| <b>Grand Total</b> | <b>1,971</b>      | <b>562</b>               | <b>0.29</b>                |

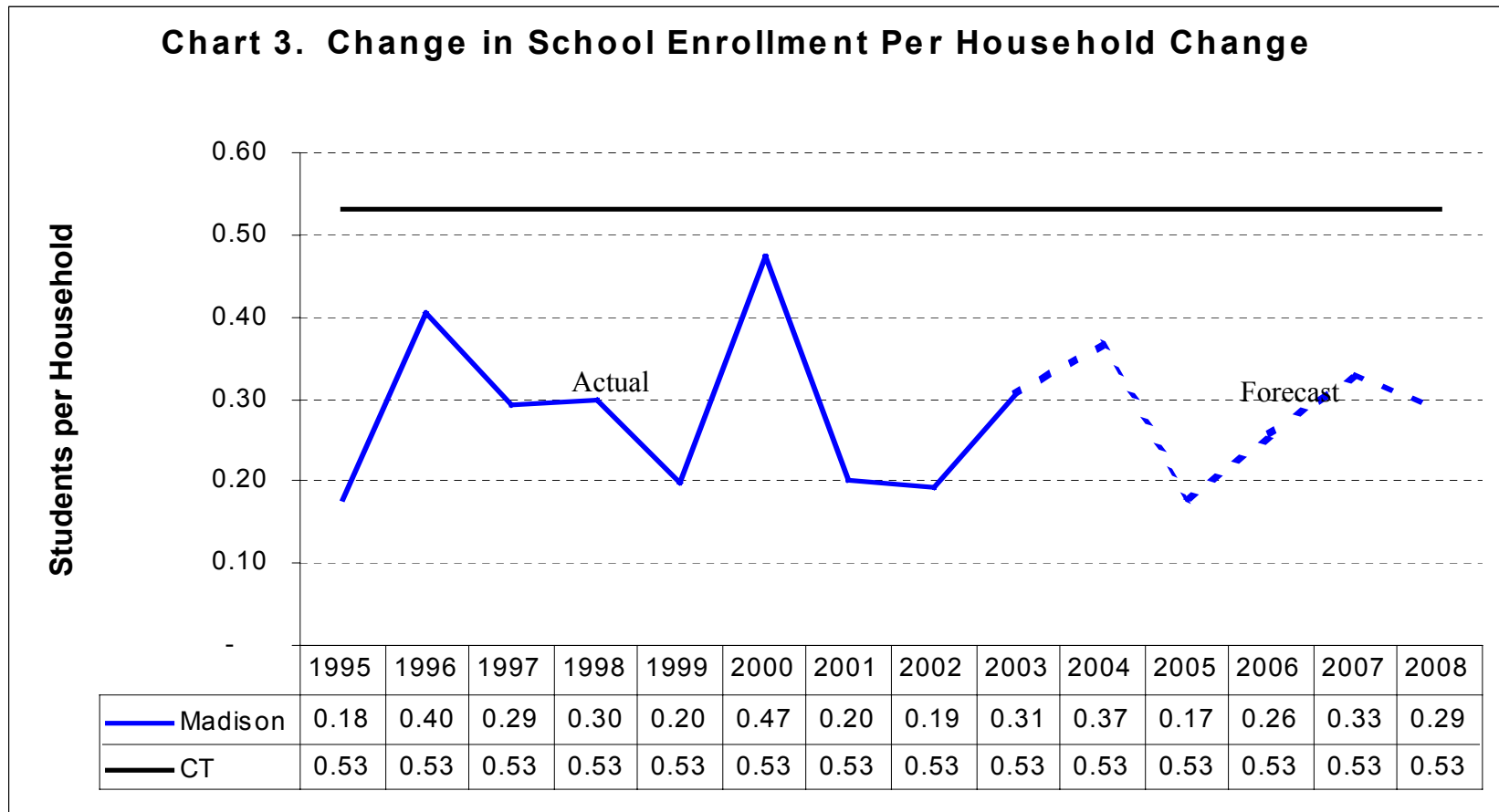
To test the validity of our analysis, we correlated the trend lines for each set of data and used several statistical data methods to determine the level of confidence in the correlation. Specifically a covariance analysis was used to statistically assess the quality of the correlation.

The covariance analysis plots the trend lines for each set of data and tracks the consistency of statistical change between the data sets. The covariance can be a negative number indicating no correlation of the data sets or a positive number. The higher the positive number, the stronger is the correlation of the data sets. The Covariance between these data sets is 233 indicating a strong correlation. The following chart illustrates that the trend line for each data set and indicates a trend that yields a high positive covariance.



Given the reasonably strong correlation in the data assembled we feel confident in forecasting this trend. The following chart illustrates that the trend in the enrollment per household is increasing. The average for the 9 historical years is 0.29 students per household – just over half the State of Connecticut Average. It is worthwhile to note that in none of the 9 years reviewed, has the Madison change in students per household exceeded the State Average of .535 students per household.

To estimate the next few years, we forecasted the students per household based on a five-year trending. The five-year trending was selected to reflect the cyclical trends in the historical data rather than diminishing the forecast by basing it on the full nine years of data. The trend line, illustrated in Chart 3, indicates that over the next few years the students per household in Madison will increase to 0.38, fall and then grow again to 0.34.



**CONCLUSIONS**

In summary, our statistical findings are that Madison's true change in property ownership is between 170 and 270 units per year. The change in the school population is between 31 and 113 students. On average, the students per household in Madison are 0.29 with a high of 0.47 and a low of 0.18 between 1995 and 2003. As the statistical data and the charts illustrate, the State of Connecticut average is 0.535 students per household. There has not been one year over the past nine where the Madison number has exceeded the current state average of 0.535 students per household.

We believe that the EDC can apply the change in student enrollment statistics to economic forecasting models for potential development projects. To be conservative, it is the Commission's recommendation to use 0.38 students per household as a conservative number of students added to the school system for each true housing sale (one family to another) in the years ahead. This statistic – 0.38 - is 0.01 above the highest forecast number of students per household that the trend line forecasts over the next three to five years.

*The Economic Development Commission would like to thank Ms. Lisa Rollins (Madison Resident), Ms. Helen Burland (Selectman's Office), Ms. Pat Hedwall (Assessor), and Mr. Art Sickle (Manager of Technology) for their extensive support in completing this analysis. Ms. Melanie Clark and Mr. David Kadamus as EDC Commissioners provided the guidance and oversight in this project.*

**Table 4. Madison Schools Enrollment By Grade**

|              | <b>93-94</b> | <b>94-95</b> | <b>95-96</b> | <b>96-97</b> | <b>97-98</b> | <b>98-99</b> | <b>99-00</b> | <b>2000-01</b> | <b>2001-02</b> | <b>2002-03</b> | <b>2003-04</b> |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|----------------|----------------|----------------|
| k            | 193          | 213          | 248          | 202          | 237          | 273          | 263          | 257            | 249            | 270            | 235            |
| 1st          | 215          | 223          | 243          | 277          | 236          | 257          | 295          | 304            | 285            | 279            | 290            |
| 2nd          | 204          | 205          | 230          | 257          | 301          | 249          | 274          | 289            | 316            | 292            | 281            |
| 3rd          | 225          | 216          | 219          | 236          | 265          | 302          | 263          | 275            | 294            | 327            | 295            |
| 4th          | 197          | 224          | 226          | 231          | 248          | 264          | 325          | 276            | 294            | 303            | 327            |
| 5th          | 226          | 199          | 234          | 232          | 238          | 266          | 269          | 334            | 280            | 304            | 299            |
| 6th          | 224          | 237          | 211          | 244          | 246          | 251          | 284          | 273            | 336            | 290            | 307            |
| 7th          | 222          | 229          | 237          | 207          | 254          | 242          | 243          | 285            | 274            | 337            | 294            |
| 8th          | 219          | 220          | 242          | 239          | 213          | 251          | 255          | 244            | 295            | 278            | 341            |
| 9th          | 218          | 220          | 214          | 237          | 228          | 217          | 262          | 257            | 231            | 285            | 285            |
| 10th         | 221          | 209          | 226          | 222          | 234          | 229          | 224          | 249            | 244            | 224            | 272            |
| 11th         | 211          | 212          | 208          | 227          | 209          | 222          | 226          | 224            | 241            | 239            | 229            |
| 12th         | 170          | 209          | 197          | 194          | 215          | 212          | 216          | 215            | 220            | 243            | 241            |
| <b>Total</b> | <b>2745</b>  | <b>2816</b>  | <b>2935</b>  | <b>3005</b>  | <b>3124</b>  | <b>3235</b>  | <b>3399</b>  | <b>3482</b>    | <b>3559</b>    | <b>3671</b>    | <b>3696</b>    |

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**Table 5. Madison Schools Change in Enrollment By Grade**

|              | <b>94-95</b> | <b>95-96</b> | <b>96-97</b> | <b>97-98</b> | <b>98-99</b> | <b>99-00</b> | <b>2000-01</b> | <b>2001-02</b> | <b>2002-03</b> | <b>2003-04</b> |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|----------------|----------------|----------------|
| 1st          | 30           | 30           | 29           | 34           | 20           | 22           | 41             | 28             | 30             | 20             |
| 2nd          | -10          | 7            | 14           | 24           | 13           | 17           | -6             | 12             | 7              | 2              |
| 3rd          | 12           | 14           | 6            | 8            | 1            | 14           | 1              | 5              | 11             | 3              |
| 4th          | -1           | 10           | 12           | 12           | -1           | 23           | 13             | 19             | 9              | 0              |
| 5th          | 2            | 10           | 6            | 7            | 18           | 5            | 9              | 4              | 10             | -4             |
| 6th          | 11           | 12           | 10           | 14           | 13           | 18           | 4              | 2              | 10             | 3              |
| 7th          | 5            | 0            | -4           | 10           | -4           | -8           | 1              | 1              | 1              | 4              |
| 8th          | -2           | 13           | 2            | 6            | -3           | 13           | 1              | 10             | 4              | 4              |
| 9th          | 1            | -6           | -5           | -11          | 4            | 11           | 2              | -13            | -10            | 7              |
| 10th         | -9           | 6            | 8            | -3           | 1            | 7            | -13            | -13            | -7             | -13            |
| 11th         | -9           | -1           | 1            | -13          | -12          | -3           | 0              | -8             | -5             | 5              |
| 12th         | -2           | -15          | -14          | -12          | 3            | -6           | -11            | -4             | 2              | 2              |
| <b>Total</b> | <b>28</b>    | <b>80</b>    | <b>65</b>    | <b>76</b>    | <b>53</b>    | <b>113</b>   | <b>42</b>      | <b>43</b>      | <b>62</b>      | <b>33</b>      |

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**Table 6. Madison "True" Housing Sales by Month and Year**

| <b>Month</b> | <b>1995</b> | <b>1996</b> | <b>1997</b> | <b>1998</b> | <b>1999</b> | <b>2000</b> | <b>2001</b> | <b>2002</b> | <b>2003</b> | <b>Total</b> |
|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| January      | 6           | 7           | 10          | 10          | 17          | 8           | 23          | 5           | 11          | 97           |
| February     | 6           | 10          | 12          | 7           | 11          | 4           | 6           | 9           | 5           | 70           |
| March        | 11          | 10          | 19          | 14          | 15          | 17          | 14          | 13          | 18          | 131          |
| April        | 9           | 15          | 18          | 18          | 25          | 14          | 20          | 21          | 12          | 152          |
| May          | 31          | 19          | 18          | 31          | 31          | 14          | 19          | 27          | 16          | 206          |
| June         | 22          | 26          | 32          | 40          | 26          | 29          | 27          | 23          | 21          | 246          |
| July         | 15          | 25          | 19          | 26          | 31          | 32          | 25          | 37          | 35          | 245          |
| August       | 15          | 23          | 24          | 35          | 40          | 24          | 30          | 27          | 22          | 240          |
| September    | 17          | 19          | 21          | 16          | 19          | 21          | 13          | 19          | 19          | 164          |
| October      | 18          | 7           | 17          | 18          | 20          | 33          | 11          | 14          | 16          | 153          |
| November     | 12          | 14          | 16          | 14          | 18          | 19          | 12          | 19          | 13          | 138          |
| December     | 11          | 8           | 15          | 25          | 13          | 24          | 10          | 10          | 14          | 129          |
| <b>Total</b> | <b>173</b>  | <b>183</b>  | <b>221</b>  | <b>254</b>  | <b>266</b>  | <b>239</b>  | <b>209</b>  | <b>225</b>  | <b>201</b>  | <b>1,971</b> |

*Note - Missing data (red values) estimated based upon statistical monthly trends*