

NORWICH
PUBLIC SCHOOLS

ENROLLMENT DYNAMICS
&
PROJECTIONS
2009 - 2018

Prepared by

Hyung C. Chung, Ph.D., FAICP
H. C. Planning Consultants, Inc.

April 20, 2009

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Hyung C. Chung, Ph.D.
President

Mrs. Pamela W. Aubin
Superintendent
Norwich Public Schools
90 Town Street
Norwich, CT 06360-2324

April 27, 2009

Re: 10-Year School Enrollment Projections

Dear Mrs. Aubin:

We are pleased to submit our final report, *Norwich School Enrollment Dynamics & Projections, 2009-2018*, dated April 20, 2009. The report contains an eight-page summary.

I would like to thank the members of the Norwich Board of Education for their thorough review of our draft report. We are grateful, as well, to the members of your office, the Norwich public schools, Norwich city departments, the Connecticut State Department of Education, as well as the Norwich Free Academy for providing data necessary for the study. I would especially like to thank Mr. James Lawler for facilitating this study.

Sincerely,

A handwritten signature in black ink, appearing to read 'Hyung C. Chung', written in a cursive style.

Hyung C. Chung
President, HCPC, Inc.

CC:jc
Encl.

**SUMMARY REPORT
NORWICH PUBLIC SCHOOLS
10-YEAR SCHOOL ENROLLMENT PROJECTIONS
2009 - 2018**

This report presents ten-year enrollment projections for the Norwich public schools in Connecticut between 2009 and 2018. The enrollment projections include the K-8 students who attend Norwich's public schools and Norwich resident grades 9-12 students who attend Norwich Free Academy. All projections are as of October 1 for each school year.

1. Enrollment Data

We obtained enrollment data from the Norwich Public Schools (NPS) and the Connecticut State Department of Education (CSDE). The CSDE data are 'fully-graded', that is, its enrollments include all graded special education and special need students (SE/SN), whereas the NPS data are 'partially-graded', that is, the grade enrollments *exclude* special education/need students since they are un-graded and presented separately from the graded students. Therefore, the differences between 'fully-graded' and 'partially-graded' enrollments represent the number of SE/SN students. In the full report, we projected both fully-graded and partially-graded enrollments, but in this summary report we are presenting only the fully-graded enrollment projections.

2. Projection Methods

School enrollment projections were derived by applying the Share Ratio Method (SRM). Under the SRM, Norwich's future enrollments were calculated by projecting the city's share of enrollments as a percent of the statewide enrollments for each grade, and then by multiplying these percentages by the statewide enrollment projections by grade. The SRM has the advantage of being capable of showing Norwich's enrollment changes relative to statewide enrollment changes. We applied 3-, 5-, 10-, weighted 3-, and weighted 5-year growth trends which produced five different projections by grade. Of these, the 10-year trend projections produced relatively 'low' enrollments, the weighted 3-year trend produced relatively 'high' projections, and the other projections were somewhere in-between. By averaging the low and the high projections, we obtained what we call the 'middle' projections. Note that all the enrollment data included in this report are these 'middle' projections.

3. District-wide Enrollment Projections by Grade and Grade Level

Table 1 on the next page presents the ten-year enrollment projections by grade and grade level. First, we projected the number of births between 2004 and 2013 (Column 1). Note the births between 2004 and 2008 are actual births, but the births for the subsequent five years are projected. Next, the kindergarten (K) enrollments were projected (col. 2) by taking 75.9%, the average of students enrolled divided by births from five years earlier (included is any out-migration of preschool children). Once these kindergarten enrollments are projected, we can step by step project successive upper grade enrollments because kindergartners become first graders, first graders become second graders, and so forth up through the 12th grade. Using the SRM, we prepared the 10-year projections for district-wide enrollments by grade and grade level, and also by school as well.

According to the projections: (see Table 1 columns 17 through 20)

- K-5 enrollments are projected to increase by 126 students (+5%) over the first five years, but to decrease by 18 students (-1%) over the second five years;
- Grades 6-8 or middle school enrollments are projected to grow by only 9 students (+1%) over the first five years, but to then increase by 90 students (+8%) over the subsequent five years;
- However, Norwich Free Academy's enrollments are projected to decline by 162 students (-10%) over the first five years and then further by 48 students (-3%) over the second five years.

TABLE 1
TEN-YEAR ENROLLMENT PROJECTIONS BY GRADE
NORWICH PUBLIC SCHOOLS, 2009 - 2018
 <Fully-Graded Enrollments^[1] as of October 1 of Each Year>

Birth Year	Norwich Births ^[2]	School Year	PK ^[3]	Grades K-8 Enrollment												NFA Enrollment					Norwich's Share(%) of Connecticut's Enrollment				
				K	1	2	3	4	5	6	7	8	9	10	11	12	K-5	6-8	9-12	NFA	K-5	6-8	9-12	NFA	
HISTORY:																									
1993	546	1998	143	539	402	387	415	423	394	418	411	437	379	337	271	255	2560	1266	1242	5068	0.972%	0.858%	0.954%	1.269%	
1994	567	1999	180	529	385	404	399	397	422	390	433	425	374	375	300	270	2536	1248	1319	5103	0.959%	0.884%	0.945%	1.254%	
1995	546	2000	182	395	513	387	405	386	389	411	417	429	353	374	352	276	2475	1257	1355	5087	0.938%	0.880%	0.928%	0.951%	
1996	537	2001	216	439	391	523	402	411	390	412	417	422	403	373	326	319	2556	1251	1421	5228	0.974%	0.892%	0.941%	1.048%	
1997	474	2002	165	372	442	391	520	423	414	388	434	412	421	398	317	298	2562	1234	1434	5230	0.980%	0.876%	0.933%	0.897%	
1998	481	2003	148	404	375	417	403	508	428	409	410	422	453	429	338	304	2535	1241	1524	5300	0.976%	0.906%	0.940%	0.955%	
1999	476	2004	190	363	388	394	433	394	528	415	416	406	482	386	391	331	2500	1237	1570	5307	0.973%	0.911%	0.941%	0.867%	
2000	476	2005	232	373	377	383	378	425	407	518	417	414	464	454	409	349	2343	1349	1676	5368	0.919%	0.959%	0.953%	0.897%	
2001	479	2006	243	372	377	384	387	370	417	382	504	416	437	413	364	354	2307	1302	1568	5177	0.912%	0.892%	0.924%	0.912%	
2002	543	2007	242	382	389	383	397	412	369	419	388	501	447	448	337	320	2332	1308	1552	5192	0.929%	0.885%	0.934%	0.945%	
2003	500	2008	253	397	408	397	363	408	407	379	409	386	473	438	373	315	2380	1174	1599	5153	0.951%	0.925%	0.934%	0.963%	
PROJECTIONS:																									
2004	530	2009	253	414	402	413	396	369	406	406	380	407	387	463	374	342	2399	1194	1566	5160	0.965%	0.918%	0.943%	1.023%	
2005	486	2010	253	379	419	407	412	401	367	406	406	379	408	379	396	343	2385	1193	1526	5104	0.966%	0.903%	0.940%	0.945%	
2006	561	2011	253	438	384	424	405	418	400	367	407	406	380	400	324	363	2469	1180	1466	5115	1.004%	0.879%	0.948%	1.081%	
2007	535	2012	253	418	443	389	422	412	416	399	368	406	407	372	342	297	2500	1173	1418	5090	1.017%	0.855%	0.948%	1.030%	
2008	523	2013	253	408	422	449	387	429	410	416	401	366	407	399	318	313	2506	1183	1437	5125	1.018%	0.870%	0.958%	1.001%	
2009	509	2014	253	397	413	428	447	393	427	410	417	399	367	398	341	291	2506	1226	1398	5129	1.019%	0.853%	0.961%	0.977%	
2010	515	2015	253	402	402	418	426	454	392	426	411	415	400	360	341	312	2494	1253	1413	5159	1.012%	0.868%	0.969%	0.978%	
2011	524	2016	253	409	407	407	417	433	452	391	428	409	416	392	307	312	2524	1228	1428	5180	1.019%	0.866%	0.974%	0.992%	
2012	526	2017	253	410	413	412	405	423	431	451	392	426	410	408	336	281	2495	1270	1435	5199	1.004%	0.893%	0.978%	0.992%	
2013	528	2018	253	412	414	419	410	412	421	430	452	391	427	401	349	307	2488	1273	1485	5246	0.998%	0.929%	0.987%	0.993%	
1st 5-Year 2008-2013 Change			11	14	52	24	21	3	37	-8	-20	-66	-39	-55	-2		126	9	-162	-28	0.067%	-0.055%	0.024%	0.038%	
Percent Change			3%	3%	13%	7%	5%	1%	10%	-2%	-5%	-14%	-9%	-15%	-1%		5%	1%	-10%	-1%	7.0%	-5.9%	2.6%	3.9%	
2nd 5-Year 2013-2018 Change			4	-8	-30	23	-17	11	14	51	25	20	2	31	-6		-18	90	48	121	-0.020%	0.059%	0.029%	-0.008%	
Percent Change			1%	-2%	-7%	6%	-4%	3%	3%	13%	7%	5%	1%	10%	-2%		-1%	8%	3%	2%	-2.0%	6.8%	3.0%	-0.8%	
2008-2018: 10-Year Change			15	6	22	47	4	14	51	43	5	-46	-37	-24	-8		108	99	-114	93	0.047%	0.004%	0.053%	0.030%	
2008-2018: Percent Change (%)			4%	2%	5%	13%	1%	4%	14%	11%	1%	-10%	-8%	-6%	-2%		5%	8%	-7%	2%	4.9%	0.4%	5.7%	3.1%	

[1] Fully-graded K-8 enrollments count special education and special need students of all Norwich public schools which include DTZ (21 grades 7&8 students) and Hickory Street (14 grades 3-6 students) schools. Grades 9-12 enrollments count only Norwich resident students attending Norwich Free Academy (NFA) which include special education students but exclude 90 students in Norwich High School (alternative high school) and 26 grades 9-12 special education students in DTZ School.

[2] Birth data between 1998 and 2007 are the actual number of births obtained from the Connecticut Department of Public Health, the number of births in 2008 is an estimate based on the birth counts during the first eight months of 2008, and the births between 2009 and 2013 are projections.

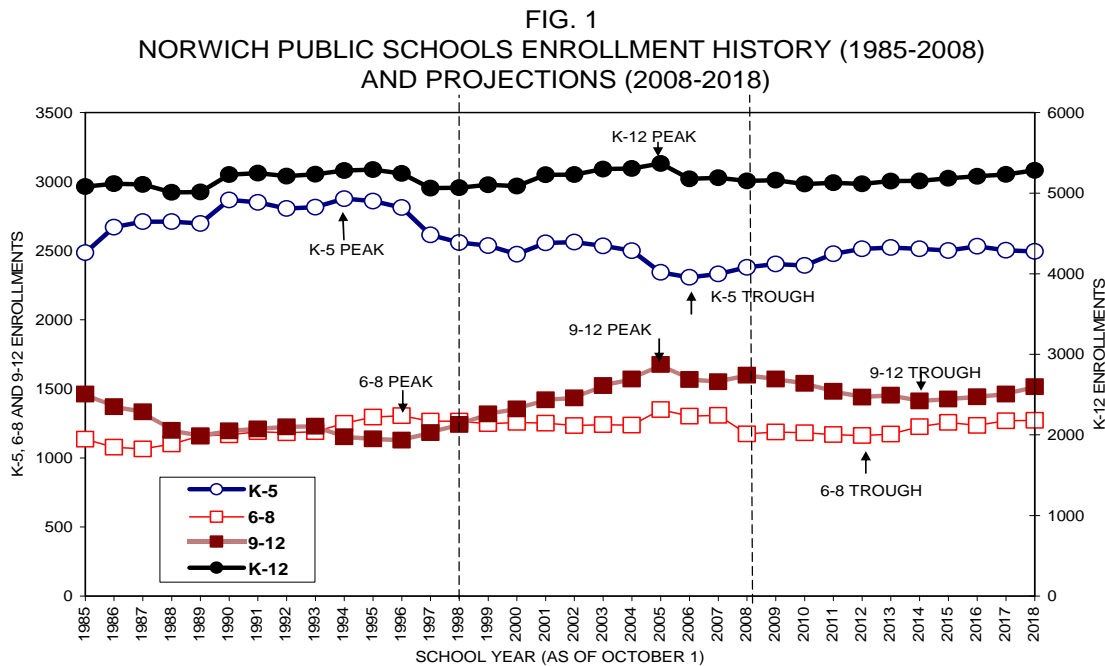
[3] Pre-Kindergarten enrollments are not projected and assumed to be the same as the 2008 figure.

Figures in italics are projections and estimates.

All in all, Norwich's K-12 enrollments are forecast to lose 28 students over the first five years but to *gain* 121 students (+2%) over the second five projection years.

Note that the first five-year K-5 projections are based on actual births while the second five-year K-5 projections are based on the 'estimated' or assumed number of births. Thus, the first five-year K-5 projections are likely to be more reliable than the second-five year projections.

Norwich's Enrollments as Shares of Connecticut Enrollments: Table 1 (last four columns) also indicates that Norwich's K-5, 6-8, and 9-12 grade enrollments constituted 0.953%, 0.925% and 0.934% of the corresponding grade groups for Connecticut's enrollments in 2008. According to the projections, Norwich's share of Connecticut's elementary school enrollment will increase slightly over the next ten years, implying that Norwich's K-5 enrollments are projected to grow faster than Connecticut's K-5 enrollments. In contrast, Norwich's share of Connecticut middle school enrollments is projected to decline almost at the same rate as Connecticut's middle school enrollments are projected to decline. Although the enrollments of Norwich high school students attending Norwich Free Academy are projected to decline over the next five years and then to gradually increase in the second five years, its share of Connecticut's high school enrollments is expected to increase slightly, implying that NFA's enrollments will decline more slowly than Connecticut's high school enrollments will.



Enrollment Peaks and Troughs: Figure 1 illustrates Norwich public schools' enrollment history and projections. The figure also indicates the enrollment peaks and troughs for grades K-5, 6-8 and 9-12. The K-5 enrollment peak occurred in 1994 (six years after the births peak in 1987) with 2,877 students, and then dropped in 2006 to a trough of 2,307 students. Afterwards, this enrollment began to grow moderately again. This pattern of peaks and valleys is repeated in the patterns of grades 6-8 and 9-12 enrollments albeit with appropriate time lags. For instance, the middle school enrollment peak occurred in 1996, two years after the K-5 peak, and the NFA high school enrollment peak took place in 2006 at 1,766 students, twelve years after the K-5 peak. Similar patterns of enrollment troughs can also be observed, although the time lags vary a little.

4. Enrollment Projections for Individual Elementary Schools

Table 2 presents the results of ten-year enrollment projections for each elementary school in Norwich.

TABLE 2
10-YEAR ENROLLMENT PROJECTIONS FOR EACH K-5 ELEMENTARY SCHOOL
NORWICH, CONNECTICUT, 2003-2018
(SRM Middle Projections)

Year	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonnoc	Total
2004	136	339	359	256	406	306	257	209	232	2500
2005	118	328	344	224	390	273	231	200	235	2343
2006	131	325	362	228	376	260	224	179	222	2307
2007	157	342	369	232	371	236	193	197	208	2305
2008	158	327	350	239	427	302	182	187	208	2380
2009	164	328	356	237	445	301	180	184	205	2399
2010	168	329	344	222	447	302	183	185	204	2385
2011	177	325	369	235	460	314	189	186	212	2469
2012	178	316	373	238	483	316	193	189	213	2500
2013	171	318	379	240	476	320	203	187	213	2506
2014	174	330	377	241	467	313	197	190	215	2506
2015	174	328	376	240	465	312	197	189	214	2494
2016	175	333	380	243	472	317	198	191	215	2524
2017	174	329	376	240	465	312	197	189	213	2495
2018	173	328	375	240	463	311	196	189	213	2488
<u>2008-2013</u>										
Number	13	-9	30	2	46	16	22	0	5	126
Percent	8.1%	-2.6%	8.5%	0.7%	10.8%	5.5%	12.3%	0.2%	2.3%	5.3%
<u>2013-2018</u>										
Number	2	9	-4	0	-13	-9	-7	2	1	-18
Percent	1.3%	2.9%	-1.1%	0.1%	-2.7%	-2.7%	-3.2%	1.1%	0.3%	-0.7%
<u>2008-2018</u>										
Number	15	1	25	2	33	8	16	2	5	108
Percent	9.5%	0.2%	7.3%	0.8%	7.8%	2.6%	8.8%	1.3%	2.6%	4.5%

Note: Totals may be one or two off due to rounding.

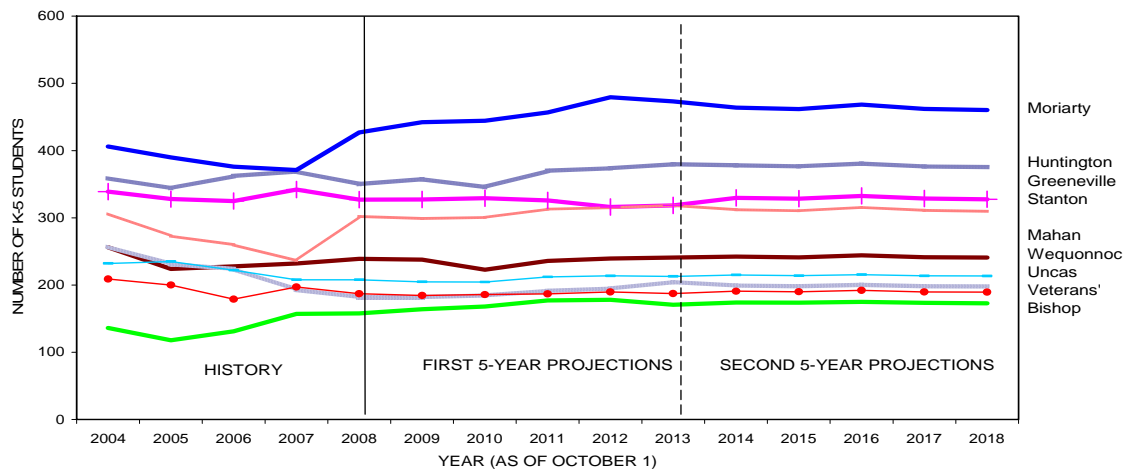
Note the following from Table 2:

- First Five Forecast Years:** All Norwich's elementary schools, except Greeneville ES, are projected to increase their enrollments: Moriarty ES will increase most by adding 46 students, followed by Huntington (30 students), Uncas (22 students), Stanton (16 students), Bishop (13 students), Wequonnoc (5 students), Moriarty (2 students), and Veterans (0 students). However, Greeneville is projected to lose 9 students. Altogether, it is projected that K-5 enrollments will increase by 126 students or by 5.3% over the next five years. These projections were based on the actual number of births in the Norwich school district, and they reflect the weighted 5-year average enrollment growth trend.

- The Second Five Forecast Years:** While the K-5 enrollments are projected to add 126 students in the first five forecast years, the enrollments are then projected to lose 18 students over the second five years. Accordingly, Norwich's elementary schools are projected either to add or to lose a few students. In short, the elementary school enrollments will be flat or plateau over the second five forecast years.

As shown in Figure 2, Moriarty will remain as the largest school in terms of enrollments, followed by Huntington, Greeneville, Stanton, Mahan, Wequonnoc, Uncas, Veterans', and Bishop. These school-by-school enrollment projections were made by assuming that each school has an ample capacity to accommodate the projected peak enrollments. Note that the second five-year projections were made based on the projected number of births (unlike the first-year projections which were based on the actual number of births). Accordingly, the second five-year projections are prone to produce larger projection errors.

FIG. 2
GRADES K-5 ENROLLMENT PROJECTIONS BY SCHOOL
NORWICH PUBLIC SCHOOLS, 2009 - 2018



5. Enrollment Projections for Middle Schools

As shown in Table 3, the enrollments for Norwich’s two middle schools are projected to add only 9 students (+0.7%) over the next five years: the larger Kelly Middle School is projected to lose 11 students while the smaller Teachers’ Memorial Middle School is projected to gain 19 students. In short, the middle schools will hardly grow between 2008 and 2013.

TABLE 3
10-YEAR ENROLLMENT PROJECTIONS OF MIDDLE SCHOOLS
NORWICH, CONNECTICUT, 2009-2018

	Kelly	Teachers'	TOTAL
2004	694	543	1237
2005	750	599	1349
2006	746	556	1302
2007	759	549	1308
2008	691	483	1174
Projections:			
2009	684	510	1194
2010	681	511	1193
2011	678	502	1180
2012	674	498	1173
2013	680	502	1183
2014	705	521	1226
2015	720	532	1253
2016	706	522	1228
2017	730	539	1270
2018	732	541	1273
<u>2008-2013</u>			
Number	-11	19	9
Percent	-1.6%	4.0%	0.7%
<u>2013-2018</u>			
Number	52	39	91
Percent	7.6%	7.7%	7.7%
<u>2013-2018</u>			
Number	41	58	99
Percent	-11	19	9

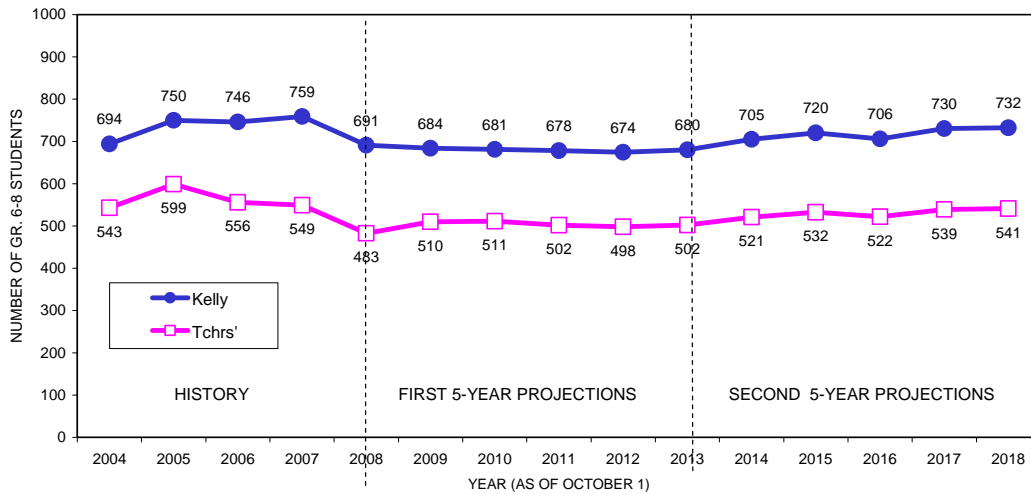
Totals may be one or two off due to rounding. * The year SRMS opened.

However, it is projected that the two Norwich middle schools will add 91 students (+7.7%) over the subsequent five years: of these, 52 students (+7.6%) will be added to Kelly MS, and the remaining 39 students (+7.7%) to Teachers’ MS. In sum, the middle schools are projected to grow very slowly over the first five years, but to grow

more rapidly during the second five forecast years. These projections also assume that the school capacities of both middle schools are sufficient in capacity to accommodate the projected enrollments.

All in all, the Kelly Middle School is projected to add 41 students (6.0%) over the next ten years while the Teachers Memorial Middle School is projected to add 58 students (12.0%). These forecasts are valid as long as the projection assumptions are not violated.

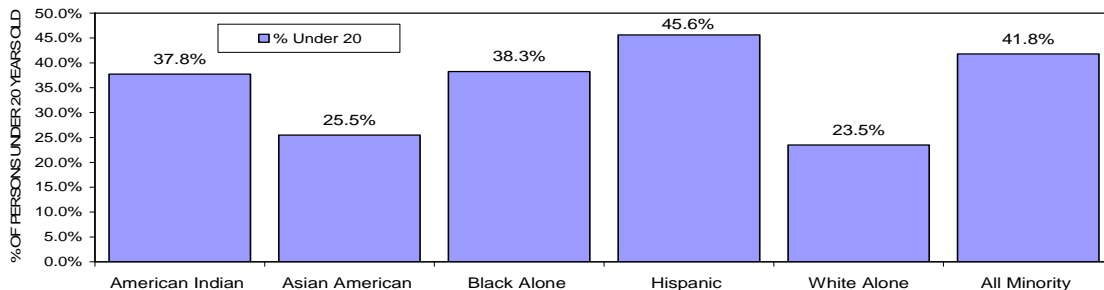
FIG. 3
GRADES 6-8 ENROLLMENT PROJECTIONS BY SCHOOL
NORWICH PUBLIC SCHOOLS, 2009-2018



6. Effects of Changing Racial/Ethnic Population Composition in Norwich

During the past ten years (1999-2008), the total minority enrollments in Norwich public schools increased from 1,203 students in 1999 to 2,132 students in 2008, growing by 77% within 10 years. In the meantime, the number of white students in Norwich decreased by 38%, losing 1,078 students. As a result, the proportion of minority students increased from 30% in 1999 to 55% in 2008 while the percent of white students dropped sharply from 70% in 1999 to 45% in 2008. The continued growth of minority students in Norwich is due to two reasons: the number of persons belonging to minority groups has been increasing, and a high percentage of this population is under 20 years old. As shown in Figure 4 below, as much as 41.8% of the minority populations, in comparison to 23.5% of the white populace, were found to be less than 20 years old in 2000. In short, individuals belonging to minority groups generate roughly two times more school children than the same number of white individuals. As a result, even though the white population may continue to leave Norwich, public school enrollment will maintain the current level of enrollment as long as minority population growth makes up one-half of the white population decline.

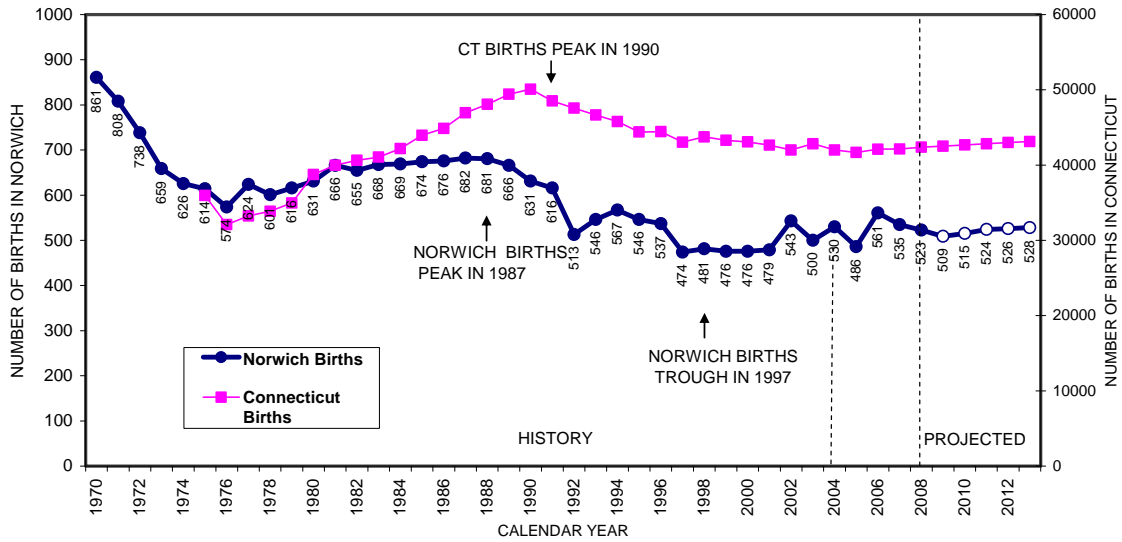
FIG. 4
PERCENT OF PERSONS UNDER 20 YEARS OLD
BY RACE/ETHNIC GROUP
NORWICH, CONNECTICUT, AS OF APRIL 1, 2000



7. Factors Influencing Public School Enrollments and Projection Assumptions

Figure 5 shows the trends of births in Norwich and Connecticut since 1970. Connecticut births peaked in 1990 and Norwich's births peaked in 1987, three years earlier than the peak in Connecticut's births. From these peak years, births in both Connecticut and Norwich began to decline, and Norwich reached the trough in 1997. Thereafter, births began to increase again, although very slowly and with considerable annual fluctuation. In general, Norwich's births trend followed the birth trend of Connecticut. Births in both areas show a very gradual increase since 2001.

**FIG. 5
BIRTH TRENDS IN CONNECTICUT AND NORWICH,
HISTORY (1970-2008) AND PROJECTIONS (2009-2013)**



**TABLE 4
FACTORS INFLUENCING NORWICH PUBLIC SCHOOL ENROLLMENTS, 1998-2008**

Year	Births (State Data) (1)	Housing Net Gain (2)	Home Sales (3)	% of K-12 in Nonpublic schools (4)	Ridgefield Unemployment Rate (5)
1998	481	-2	314	13.0%	5.0
1999	476	9	418	13.2%	4.4
2000	476	16	327	13.0%	2.9
2001	479	15	526	12.2%	3.6
2002	543	131	562	16.3%	4.7
2003	500	241*	691	16.7%	6.1
2004	530	223*	802	15.7%	5.5
2005	486	218*	777	15.5%	5.4
2006	561	136*	676	15.7%	4.9
2007	535	69	469	15.7%	5.1
2008 (est.)	523	24	348	NA	6.5
1999-2008 Change:					
3-yr. Avg.	540	76	498	15.6%	5.5
5-yr. Avg.	527	134	614	15.9%	5.5
10-yr. Avg.	511	108	560	14.7%	4.9
W. 3-yr. Avg.	533	58	443	15.7%	5.8
W. 5-yr. Avg.	529	98	533	15.7%	5.6
Assumption:					
2008-2013	510-530	80 - 100	450 - 600	15.0% - 16.0%	5.0%- 7.0%

*A major portion of the units is 2-BR condominiums.

Table 4 on the previous page presents major factors which influence public school enrollments. They are: births, housing net gains (new homes constructed minus demolition), home sales (housing turnover), percent of Norwich students attending nonpublic schools (schools other than Norwich public schools and Norwich Free Academy) and Norwich unemployment rates. Of these, births and the percent of students in nonpublic schools directly affect public school enrollments whereas housing net gains and home sales affect births and the percent of nonpublic enrollments. Unemployment rates in turn affect all the previously cited factors. Annual fluctuations in these factors produce the annual and cyclical fluctuations of school enrollments.

From Table 4, note that the housing net gains shot up from 15 housing units in 2001 to 241 units in 2003. The number then dropped to 24 units in 2008. Similarly, the home sales in Norwich increased from 526 sales in 2001 to 802 sales in 2004, but decreased to 348 sales in 2008. The percent of Norwich students in nonpublic schools had risen from 12.2% in 2001 to 16.7% in 2003, but came down to 15% in 2008. All of these factors were robust until 2005 due to favorable economic conditions in the region. Concomitantly, these gains began to dwindle as the national and regional economies began to wane due to the recent advent of economic recession, and it is almost impossible to accurately foresee future economic conditions. Therefore, in accordance with the 3-, 5-, and 10- year past trends, it is assumed that over the next five years, Norwich's unemployment rates will annually fluctuate between 5.5%-6.5%, births between 510-540, housing net gains between 80-100 units, home sales between 450 to 500 houses, and K-12 students enrolled in nonpublic schools between 16.5% to 17.0%. Note that the enrollment projections are as good as the projection assumptions are so that when any assumptions change, so do the projections. Thus, enrollment projections must be updated when any major factors influencing public school enrollment deviate significantly from the projection assumptions.

Definitions: This summary report presents only fully-graded enrollments, but the full report also presents the projections for partially-graded enrollments. Fully-graded enrollments consist of all regular and special education/special need students in Norwich public schools, including students at DTZ (grades 7 and 8) and Hickory Street schools. Grades 9-12 enrollments include the Norwich resident high school students attending NFA (both regular and special education students), but they exclude grades 9-12 enrollments in Norwich High School (an alternative high school) and special education students in DTZ School.

Projection Methodology: Three methods, the Share-Ratio Method (SRM), the Cohort Survival Method (CSM) and the Multiple Regression Method (MRM), are used for preparing the enrollment projections in this report. We obtained more or less the same projections from SRM and CSM, but MRM produced somewhat higher numbers. The CSM is widely used by school districts because it is easy to apply whereas the advantage of MRM is that it produces various statistics such as R^2 , t tests, and p-values which provide assessments of the projections' reliability.

Limitations of Projections: In general, enrollment projections for years distant from the current year tend to yield large variances from the actual future enrollments. Similarly, projections for small numbers tend to produce large percentage errors. Thus, projections by grade level will be more accurate than projections by grade. Also, school-by-school enrollment projections will be less reliable than the district-wide projections. In particular, kindergarten enrollment projections are prone to producing relatively large deviations due to the variable net migration of preschool children during the five year period preceding their entry into kindergarten programs as well as due to the changing number of Norwich kindergartners who enroll in private and parochial schools.

Full Report: This report is a summary of the full report entitled *Norwich Public Schools, Enrollment Dynamics & Projections, 2009-2018*, dated February 2, 2009.

Acknowledgment: HCPC acknowledges officials of the Norwich Public School, Norwich Free Academy, Norwich Town Clerk's office and the Connecticut State Department of Education, who provided the data needed for the study.

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This report supersedes all the draft reports that were distributed prior to its issuing date. All forecasts and projections are presented not as predictions. Projections are made based on selected past trends and a set of assumptions and offered as a guide to the school facilities planning.

1 INTRODUCTION

1.1 Introduction

In this report, we present the 10-year enrollment projections by grade K through 12 for the Norwich public school system. There are nine elementary public schools which serve grades PK-5, including special education students: Bishop, Greeneville, Samuel Huntington, Thomas W. Mahan, John M. Moriarty, John B. Stanton, Uncas, Veterans' Memorial, and Wequonnoc schools; two middle schools, Kelly and Teachers' Memorial which serve grades 6 through 8; and a high school, Norwich High School, also called Thames River Academy (TRA), which serves as an alternative high school for grades 9 through 12 students. A unique aspect of the Norwich school district is that the majority of its high school students are sent to Norwich Free Academy (NFA), an independent school serving Norwich and seven surrounding communities.* In addition, Norwich Public Schools administers two small schools serving special education students: Hickory Street School for grades 4 to 7 students with special needs, and Deborah Tenant-Zinewicz School (DTZ) for grades 7-12 special education students.

The purpose of this report is to present the enrollment projections by grade and by school. Thus, enrollments without assigned grades and enrollments which show irregular patterns of annual fluctuations are not projected. That is, we do not present projections for pre-kindergarten enrollments in regular elementary schools and special education students at Hickory School and DTZ School; we also do not do projections for Norwich's alternative high school. The Connecticut State Department of Education (CSDE) requires all school systems in Connecticut to submit by October 1 their enrollment data, and the projections presented in this report are therefore calculated as of October 1 of each school year.

* Norwich Free Academy is a privately endowed, independent, comprehensive high school which offers a private and public education to students from Norwich and from seven surrounding communities (Bozrah, Canterbury, Franklin, Lisbon, Preston, Sprague, and Voluntown) along with tuition students. The Norwich Free Academy was incorporated in 1855 by an act of the Connecticut Legislature, and it operates as an endowed educational institution. It is governed by a Board of Trustees without control from either the City of Norwich or the Norwich Public Schools. The Academy therefore describes itself as an Independent School. However, the CSDE does not list NFA in its list of non-public schools, and therefore considers it to be public school because the state of Connecticut oversees the school. NFA is a member of the Connecticut Association of Independent Schools. With a substantial endowment, the Academy can afford to charge public school tuition for a private school education.

1.2 Current Enrollment

Norwich public school enrollments as of October 1, 2008 for each school and grade are shown in Table 1.1, shown below. Table 1.1 has two panels. Panel A presents the special education and special needs (ESL and bilingual programs) students separately from the grade-by-grade enrollments. In short, graded enrollments do not include these special education/needs students. On the other hand, Panel B presents the grade enrollments including special education/needs students, that is, it does not report the latter group separately. Panel A has the advantage of tracking the size of SE/SN students separately, and Panel B has the advantage of tracking the correct enrollment size by grade. (Note that the enrollment figures shown in Panel A are obtained from the Norwich Public Schools and the figures in Panel B are from the Connecticut State Department of Education so that the enrollment totals differ one or two students.)

TABLE 1.1
NORWICH PUBLIC SCHOOL ENROLLMENT
AS OF OCTOBER 1, 2008

(A) Enrollment data presenting special education and needs students as ungraded

	PRE-												ESL/Bil Grand					
	K	K	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	Total SpEd*	Total	Total	
Bishop	15	28	38	27	22	22	21								173		173	
Greeneville	0	41	55	61	59	53	56								325		325	
Huntington	29	51	52	60	42	70	54								358	13	7 378	
Mahan	48	37	33	36	25	43	40								262	27	289	
Moriarty	0	73	70	56	69	71	64								403	12	16 431	
Stanton	76	48	47	47	41	49	61								369	20	389	
Uncas	0	43	23	32	27	26	27								178		178	
Veterans' Memorial	29	26	35	30	33	22	28								203	31	234	
Wequonnoc	19	34	41	35	30	30	31								220	5	225	
Subtotal PK-5															2491	108	23 2622	
Kelly Middle								211	228	232					671	6	677	
Teachers' Middle								159	157	137					453	18	471	
Subtotal Gr. 6-8															1124	24	0 1148	
Norwich High (TRA)												*	*	*	*		90	
DTZ										*	*	*	*	*			47	
Hickory Street (HS)				*	*	*	*	*									14	
Totals excl. NFA	216	381	394	386	350	389	386	373	397	378		*	*	*	*	3766	132	23 3921
Norwich Free Academy												473	438	373	315	1599		1599
Totals Incl. NFA	216	381	394	386	350	389	386	373	397	378	524	464	392	335	5365	132	23 5520	

Prepared by HCPC, Inc. based on the annual (Oct. 2008) Norwich public schools enrollment sheet.

In both panels, note that we included the enrollments of Norwich Free Academy (NFA serves grades 9-12 students) in the table although NFA is an independent school and therefore not under the jurisdiction of the Norwich Public Schools. Including the number of Norwich residents attending NFA in this way facilitates the enrollment projections for NFA, and assists the school authority to foresee the number of Norwich's tuition students in NFA.

As shown in Panel A, there were 2,622 PK-5 students (consisting of 2,491 graded PK-5 students, 108 Special Education and 23 ESL and bilingual program students), 1148 middle school students (including 24 SE students), and 90 alternative high school students. In addition, there were 47 special education students in DTZ and 14 students in Hickory Street School. Altogether, there were 3,921 PK-12 students attending Norwich public schools as of October 1, 2008 and an additional 1,599 Norwich resident high school students were attending NFA.

(B) Enrollment Data presenting all graded students and including special education and need students

	PRE-	K	K	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	PK-5	6-8	9-12	Total
Bishop		15	28	38	27	22	22	21								173			173
Greeneville		0	41	55	62	59	53	56								326			326
Huntington		30	63	54	62	43	72	54								378			378
Mahan		51	39	39	39	29	49	43								289			289
Moriarty		2	74	74	58	72	76	73								429			429
Stanton		87	48	47	47	45	50	65								389			389
Uncas		0	43	23	32	27	26	27								178			178
Veterans' Memorial		49	27	35	30	34	27	33								235			235
Wequonnoc		19	34	43	38	30	30	31								225			225
Subtotal PK-5		253	397	408	395	361	405	403								2622			2622
Kelly Middle									213	230	235						678		678
Teachers' Middle									163	167	142						472		472
Subtotal Gr. 6-8									376	397	377						1150		1150
Norwich High (TRA)												43	17	14	16			90	90
DTZ										12	9	8	9	5	4		21	26	47
Hickory Street (HS)				2	2	3	4	3								11	3		14
Totals by Grade		253	397	408	397	363	408	407	379	409	386	51	26	19	20	2633	1174	116	3923
Norwich Free Acad.												473	438	373	315			1599	1599
Total Incl. NFA		253	397	408	397	363	408	407	379	409	386	524	464	392	335	2633	1174	1715	5522

Prepared by HCPC, Inc. based on the October 1, 2008 enrollment data spreadsheet, which records enrollment status of each individual student attending Norwich public schools, as reported to the Connecticut State Department of Education.

Although NFA is an independent school and administratively not a part of the Norwich Public Schools, we have included NFA enrollment here for the convenience of presenting the total enrollment structure of Norwich resident students.

** Special education includes diverse programs tailored to individuals needs such as: K Special Ed, preschool handicapped, SED, Physically Challenged, and ABA program.

In Panel B, all enrollments including special education, ESL and bilingual program students are included with the graded student enrollment figures. According to this table, there were 2,633 PK-5 students, 1,174 gr. 6-8 students, and 116 gr. 9-12 students in Norwich public schools as of October 1, 2008. Altogether there were 3,923 PK-12 students in 2008. (This total is 2 students larger than the one presented in Panel A due to different data sources.) In addition, there were 1,599 Norwich high school students attending NFA.

It must be noted that there are also a sizable number of Norwich resident students who are attending nonpublic schools such as regional vocational/technical schools, public schools in other towns, and private/parochial schools throughout the region. The 2008 nonpublic school enrollment data are not available as yet, but we will analyze the nonpublic school enrollments in the next section of this report. But, there were 988 K-12 Norwich students who were attending nonpublic

schools (excluding NFA) in 2007, representing 15.7% of total number of Norwich resident students in that year.

1.3 Projection Methodology

Three different methods, the Cohort-Survival Method, the Multiple Regression Method, and the ShareRatio™ Method, were used to forecast enrollment by grade. Prior to the enrollment projections, assumptions for birth trends, level of nonpublic school enrollment, residential development, and the unemployment rate were established. Several multiple regression analyses were constructed to assure the validity of the assumptions adopted for the projections.

1.4 Projections vs. Predictions

Future school enrollments can be estimated because for the most part they are the results of events that have already taken place: for example, most of the children born five years ago will enter kindergarten classes this year, while this year's first graders will become the second graders of next year, and so forth. Moreover, when new housing units are built in a town, they will generate children year after year. There is therefore a clear causal relationship between past events and future outcomes, and the projection methods rely on this relationship: future enrollments are estimated by projecting the past trends into the future.

Unfortunately, future outcomes are not based solely on past events. Events, which have not yet taken place, will also have an impact on future outcomes. For instance, the current year's school enrollments are partially determined by current factors such as the number of new housing units being built, used home sales, economic conditions, and the number of resident students attending nonpublic schools this year. The difficulty of estimating these coincidental indicators brings a certain amount of fallibility into our calculations of how many children will enroll in school each year. Thus, we project, but we do not predict. Projections are inherently limited.

Projections are further limited by such factors as the impossibility of our knowing exactly what past and present events might have an impact on the future, the subsequent difficulty of collecting comprehensive sets of needed data, and limitations in the ability of models and theories to reveal the exact causal relationship between selected past and future events. In our attempt to overcome these difficulties, more variables affecting future enrollments are identified, more data are collected and analyzed, and more rigorous explanatory models are applied here than in any other comparable set of school enrollment projections.

1.5 Trends, Cycles, and Random Changes

Annual variations in school enrollment may be caused by three types of factors*: cyclical, trend, and random variables. Cyclical changes are those variables that are sensitive to economic or

business cycles: enrollments move up when the economy is doing well, and enrollments move down when the economy worsens. Trends are those changes that are consistent with past linear processes so that future changes may be seen as an extension of past trends. Finally, random changes are changes whose roots are so complex that they cannot be anticipated. Wars, natural calamities, or sudden influxes of immigrants may have impacts on enrollment, but we cannot foretell such events ahead of time.

In addition, seasonal variables can be observed. School enrollment can undergo considerable change from month to month, particularly in inner city schools. On the other hand, suburban school enrollments do not change significantly on a monthly basis. It must be noted again that all projections are prepared as of October 1 of each school year.

1.6 Projections of Small Numbers

Projecting small numbers is a very difficult task: for example, a variance of 5 students out of 100 students means a 5% deviation. In contrast, a variance of 5 students out of 1,000 students means a mere 0.5% deviation in projections. Namely, the random and cyclical events would have magnifying impacts on small numbers in terms of percentages. Accordingly, in general, large area projections are likely to be more accurate than small area projections.

In this report, we are trying to project a trend line; therefore, actual annual enrollment figures are likely to be different from the trend-line projections due to the effects of cyclical and random variables.

2 FACTORS INFLUENCING PUBLIC SCHOOL ENROLLMENT GROWTH

2.1 Introduction

The enrollment growth of a school district is directly related to factors such as the number of births in the district, the net migration of the population (in-migration minus out-migration), the number of new and used home sales, and the percent of resident students attending nonpublic schools. These factors are in turn related to land use and economic variables such as residential development and the unemployment rate. Accordingly, data on these factors were collected and their impacts on school enrollment growth were assessed.

2.2 Total Population Growth Trends

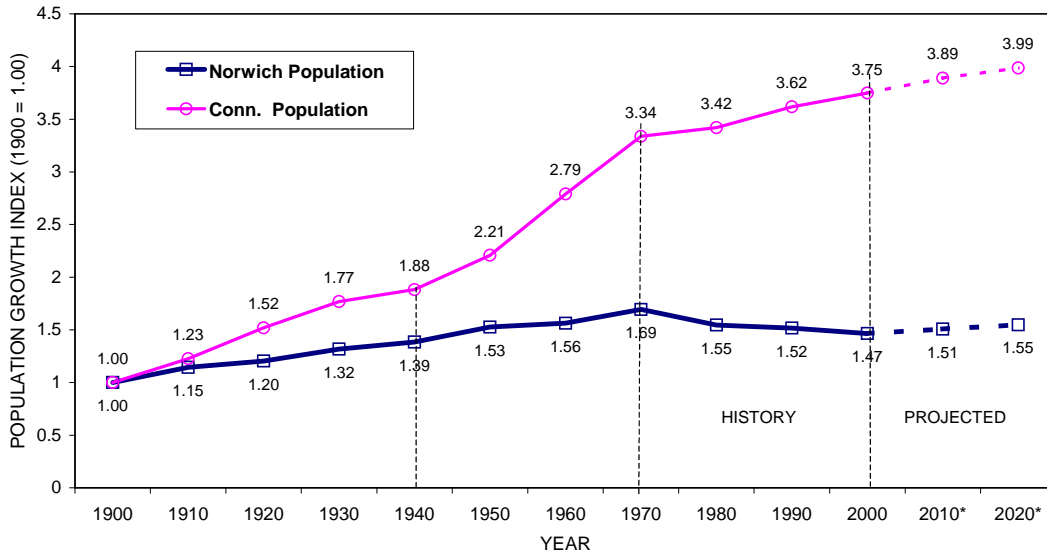
Table 2.1 and Figure 2-1 compare the population growth trends of Norwich and Connecticut since 1900. Note that Connecticut's population grew by 234% during the past seventy years between 1900 and 1970 while Norwich's population grew only by 69%. Note also that Connecticut's population continued to grow since 1970 although the rate of growth was drastically curtailed. In contrast, Norwich's population began to decline since 1970, losing 5,622 persons or decreasing by 13.5% during the 30-year period between 1970 and 2000.

TABLE 2.1
COMPARISON OF TOTAL POPULATION GROWTH TRENDS
OF NORWICH AND CONNECTICUT
1900 - 2020

Year	Norwich Populatio n	Change	Percent Change	Index (1900=1.00)	Conn. Populatio n	Change	Percent Change	Index (1900=1.00)
1900	24,637	1,589	6.9%	1.00	908,420	226,272	16.4%	1.00
1910	28,219	3,582	14.5%	1.15	1,114,756	206,336	22.7%	1.23
1920	29,685	1,466	5.2%	1.20	1,380,631	265,875	23.9%	1.52
1930	32,438	2,753	9.3%	1.32	1,606,903	226,272	16.4%	1.77
1940	34,140	1,702	5.2%	1.39	1,709,242	102,339	6.4%	1.88
1950	37,633	3,493	10.2%	1.53	2,007,280	298,038	17.4%	2.21
1960	38,506	873	2.3%	1.56	2,535,234	527,954	26.3%	2.79
1970	41,739	3,233	8.4%	1.69	3,032,217	496,983	19.6%	3.34
1980	38,074	-3,665	-8.8%	1.55	3,107,576	75,359	2.5%	3.42
1990	37,391	-683	-1.8%	1.52	3,287,116	179,540	5.8%	3.62
2000	36,117	-1,274	-3.4%	1.47	3,405,565	118,449	3.6%	3.75
2010	37,138	1,021	2.8%	1.51	3,534,086	128,521	3.8%	3.89
2020	38,130	992	2.7%	1.55	3,622,774	88,688	2.5%	3.99

Source: U. S. Censuses of Population, 2010 and 2020 projections are by Connecticut State Data Center.

FIG. 2-1
 POPULATION GROWTH TRENDS (1900-2000) AND
 PROJECTIONS (2000-2020) OF
 NORWICH AND CONNECTICUT



In Figure 2.1, the dotted lines represent the projected total population of Connecticut and Norwich prepared by the Connecticut State Data Center (CtSDC). It is assumed that the populations of Connecticut and Norwich are projected to continue its 1970-2000 growth trend. Accordingly, Norwich’s population in 2020 is projected to grow so slightly that it will only attain its 1980 population size. (See Table 1-1)

2.3 Population Growth Trends of Southeastern Connecticut Region by Town

Table 2.2 presents the population growth trends by town in the Southeastern Connecticut Region since 1980. According to Table 2.2, the populations of all three urban centers, Groton (-11.6%), New London (-10.1%) and Norwich (-3.4%) declined during the 1990's while the populations of suburban and rural towns, except three suburban towns (Ledyard, Preston and Sprague) experienced population growth. According to the Connecticut Department of Public Health's annual estimation of town populations, all the towns except Waterford increased on average by 3.2% of their populations. But, it was estimated that Norwich's population increased only by 0.9% in seven years.

Norwich's population constituted 1.225% of Connecticut's total population in 1980, but the percentage declined to 1.138% in 1990 and further to 1.061% in 2000.

TABLE 2.2
POPULATION GROWTH TRENDS OF SOUTHEASTERN CONNECTICUT REGION BY TOWN
1980-2007

Area Name	4/1/80 Census Population	4/1/90 Census Population	4/1/2000 Census Population	7/1/2007 Estimated* Population	% Change 1980 to 1990	% Change 1990 to 2000	% Change 2000 to 2007	2000 Town Pop. as % of CT Pop.
<u>Urban:</u>								
Groton	41,062	45,144	39,925	42,324	9.9%	-11.6%	6.0%	1.172%
New London	28,842	28,540	25,671	25,923	-1.0%	-10.1%	1.0%	0.754%
Norwich	38,074	37,391	36,117	36,432*	-1.8%	-3.4%	0.9%	1.061%
Urban Total	107,978	111,075	101,713	104,679	2.9%	-8.4%	2.9%	2.987%
<u>Suburban:</u>								
Colchester	7,761	10,980	14,551	15,495	41.5%	32.5%	6.5%	0.427%
East Lyme	13,870	15,340	18,118	18,690	10.6%	18.1%	3.2%	0.532%
Griswold	8,967	10,384	10,807	11,390	15.8%	4.1%	5.4%	0.317%
Ledyard	13,735	14,913	14,687	15,097	8.6%	-1.5%	2.8%	0.431%
Lisbon	3,279	3,790	4,069	4,205	15.6%	7.4%	3.3%	0.119%
Montville	16,455	16,673	18,546	19,744	1.3%	11.2%	6.5%	0.545%
Preston	4,644	006	4,688	4,902	7.8%	-6.4%	4.6%	0.138%
Sprague	2,996	3,008	2,971	2,981	0.4%	-1.2%	0.3%	0.087%
Stonington	16,220	16,919	17,906	18,343	4.3%	5.8%	2.4%	0.526%
Waterford	17,843	17,930	19,152	18,775	0.5%	6.8%	-2.0%	0.562%
Suburban Total	105,770	114,943	125,495	129,622	8.7%	9.2%	3.3%	3.685%
<u>Rural:</u>								
Bozrah	2,135	2,297	2,357	2,444	7.6%	2.6%	3.7%	0.069%
Franklin	1,592	1,810	1,835	1,891	13.7%	1.4%	3.1%	0.054%
North Stonington	4,219	4,884	4,991	5,212	15.8%	2.2%	4.4%	0.147%
Salem	2,335	3,310	3,858	4,102	41.8%	16.6%	6.3%	0.113%
Voluntown	1,637	2,113	2,528	2,612	29.1%	19.6%	3.3%	0.074%
Rural Total	11,918	14,414	15,569	16,261	20.9%	8.0%	4.4%	0.457%
SEC Region	225,666	240,432	242,777	250,562	6.5%	1.0%	3.2%	7.129%
Connecticut	3,107,576	3,287,116	3,405,565	3,502,309	5.8%	3.6%	2.8%	100.000%
Norwich's Pop. As % of CT's Pop.	1.225%	1.138%	1.061%	1.061%	--	--	--	--

Source: Censuses by the U. S. Census Bureau and estimates by the Connecticut Department of Public Health.

*36,578 estimates by the U. S. Census Bureau

2.4 Projected Population of Norwich

Population and school enrollment growth are closely related, and we would like to know the projected populations of Norwich over the next ten years. There are two sources which provide the population projections by town: one is the population projections prepared in 1995 by the Connecticut Office of Policy Management (OPM) and the other is the population projections in 2007 by the Connecticut State Data Center (CtSDC).

As shown in Table 2.3, OPM projected that Norwich's total population would grow to 39,550 persons in 2020, adding 2,700 persons (+9.5%) between 2000 and 2020. However, in comparison, CtSDC projected the population size of 38,130 persons in 2020, adding 992 persons (+2.7%) over the next twenty years since 2000. It is not possible at this time to determine which projection is more likely, but both projections show relatively small population growth.

TABLE 2.3
COMPARISON OF NORWICH POPULATION PROJECTIONS FROM TWO SOURCES
1980 – 2020

	1980 Census	1990 Census	2000 Census	2010 Proj.	2020 Proj.	2000 -2020 Change
1995 OPM Proj.*	38,074	37,391	36,117	36,850	39,550	
10-Yr. Pop. Change		-683	-1,274	733	2,700	3,433
% Change		-1.8%	-3.4%	2.0%	7.3%	9.5%
2007 CtSDC Proj.**	38,074	37,391	36,117	37,138	38,130	
10-Yr. Pop. Change		-683	-1,274	1,021	992	2,013
% Change		-1.8%	-3.4%	2.8%	2.7%	5.6%
Variances = CtSDC projections – OPM projections						
Difference	--	--	--	288	-1,708	-1,420

* Projections by *Connecticut Population Projections, Series 95.1*, September 1995, Connecticut Office of Policy and Management

** Projections by Connecticut State Data Center (CtSDC). Total population consisting of household population and populations in group quarters.

the OPM projected a population of 35,030 persons for the year 2000, but turned out to be 2.9% (1,057 persons) smaller than the actual 2000 census population.

2.5 Residentially-Zoned Vacant Land in Norwich

The amount of residentially zoned vacant land area remaining in a town is an important indicator of the potential size of housing units and the population which could be added to a given town.

Normally, the city planning department conducts a Buildout Analysis, which estimates the total number of residential units to be built when all the available residentially-zoned vacant land is fully developed. Such a study is not available for Norwich. However, according to the Norwich land use data prepared by the Southeastern Connecticut Council of Government planners, 6,049 acres or 33% of Norwich's total land (18,000 acres) was residentially developed as of 2005, and 5,490 acres or 31% of Norwich's total land area was still remaining as vacant land in the same year.* Although we do not know at this time how much of this vacant land is zoned for residential

development, we may assume that Norwich could still accommodate a fairly large additional population within the vacant land if there is a market demand for more housing in the future.

TABLE 2.4
NORWICH LAND USE IN ACRES, 2005

	Acreage	Percent
Total Acres	18,000	100%
Low and Very Low Density Residential	2,540	14%
Medium and High Density Residential	3,509	19%
Industrial, Intensive	470	3%
Industrial, Extractive	4	0%
Commercial	858	5%
Institutional	894	5%
Mixed Urban Use	21	0%
Transportation, Communication and Utility (TCU)	1,812	10%
Total Developed Land	10,108	56%
Total Open Space (w/cemeteries)	1,565	9%
Active Recreation	233	1%
Agriculture (incl. Agricultural Reserves)	604	3%
Total Designated Open Space	2,402	13%
Undeveloped	5,490	31%

Source: 2007 Regional Plan of Conservation and Development, Southeastern Connecticut Council of Government.

2.6 Birth Trends

Annual birth data are very important for determining the future number of kindergarten pupils and projecting enrollments for upper grades. Past data on births up to 2007 are available from the Connecticut Department of Public Health. Birth data for 2008 is an estimate based on the births reported to the Norwich Town Clerk's office.

In 1970, there were 861 children born in Norwich, but the number dwindled to 574 births in 1976. Similarly, the number of births in Connecticut also declined and reached a trough in 1976 (see Fig. 2-2 on the next page). These declines in births in both Connecticut and Norwich are consistent with the very slow growth of populations in the state and Norwich since 1970. However, the number of births in Connecticut increased rapidly and reached its peak in 1990. This rapid growth of births during the 14-year period between 1976 and 1990 in Connecticut was due to the aging of the baby boomer generations so that the number of childbearing-age women aged between 15 and 49 years old rapidly grew and reached its maximum in 1990. This phenomenon is evident in most towns in Connecticut and in the nation as well.

* It is most likely that not all vacant areas as of 2005 are residentially zoned. In addition, much of these lands could be deemed residentially un-developable due to the location's steep slope, various soil conditions, and other public and private land uses.

This birth growth pattern is also observed in Norwich so that its births also peaked in 1987, two years earlier than the state. However, we can observe that *the magnitude of growth of births between 1996 and 1988 was very small* compared to the growth in the state: it increased from 574 births in 1976 to 682 births in 1988, an addition of 108 births in 11 years or a growth of 18.7%. In comparison, Connecticut's births increased by 18,004 births or by 56.1%. The most population growth in this period took place in suburban towns while the population of old inner cities declined due to the exodus of many residents to suburban/rural towns. After the births peaked, both Connecticut and Norwich experienced a decline in the number of births. The number of births in Connecticut decreased from 50,098 peak-year births in 1990 to 41,691 births in 2005, a loss of 8,047 births (or reduction by 16.0%) within 15 years. Similarly, the number of births in Norwich declined from 682 births in 1987 peak to 474 births in 1997, a loss of 208 births (-30.6%) within a span of 10 years. However, since its second birth trough in 1997, Norwich has been witnessing a gradual growth: Norwich's births increased from 474 births in 1997 to 561 births in 2006. This unexpected growth of births in Norwich may be due to an increase in the city's minority population because the fertility rates among the minority population are known to be greater than the one for the white population.

FIG. 2-2
TRENDS IN LIVE BIRTHS, NORWICH AND CONNECTICUT
1970-2008

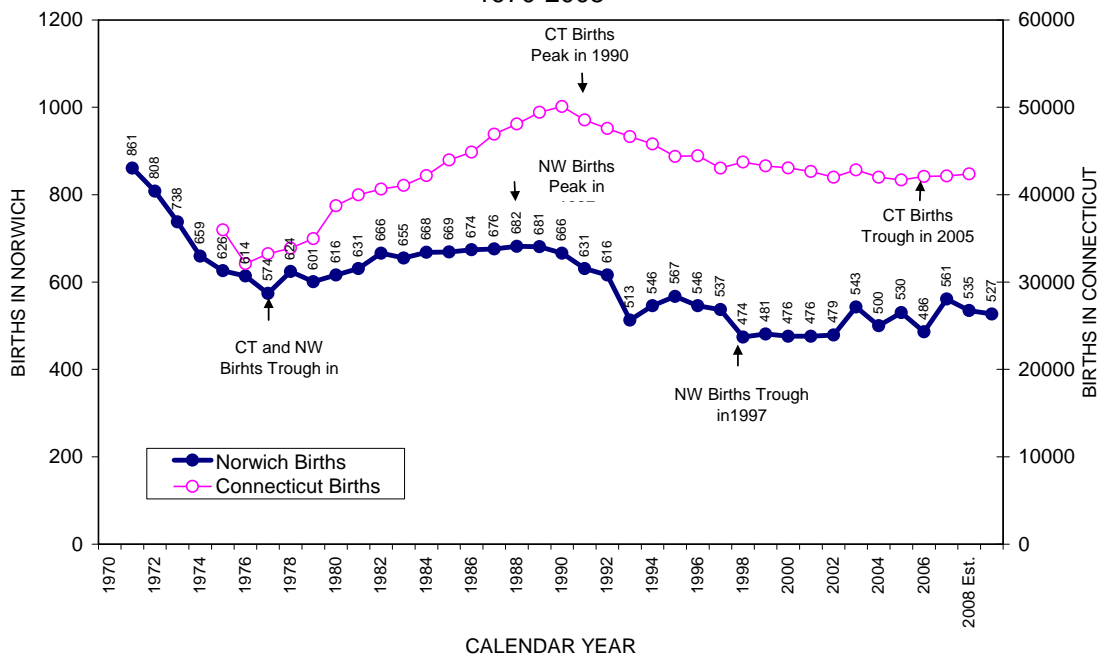


TABLE 2.5
BIRTHS TO NORWICH RESIDENTS
1975-2008

Year	Births to Norwich Residents, State Data (1)	Live Births to Connecticut Residents (2)	Norwich's Births as % of (3)	Connecticut Unemployment Rate (Not Seas. adj.) (4)	Norwich Unemployment Rate (Not Seas. adj.) (5)
1975	614	35,971	1.71%	9.1	9.3
1976	574	32,094	1.79%	9.5	10.0
1977	624	33,245	1.88%	7.0	7.8
1978	601	33,878	1.77%	5.2	7.4
1979	616	34,962	1.76%	5.1	7.2
1980	631	38,750	1.63%	5.9	8.2
1981	666	39,999	1.67%	6.2	7.0
1982	655	40,632	1.61%	6.9	6.9
1983	668	41,056	1.63%	6.0	4.6
1984	669	42,184	1.59%	4.6	4.3
1985	674	43,968	1.53%	4.9	5.0
1986	676	44,881	1.51%	3.8	4.1
1987	682	46,941	1.45%	3.3	3.5
1988	681	48,080	1.42%	3.0	3.2
1989	666	49,418	1.35%	3.7	3.8
1990	631	50,098	1.26%	5.1	6.8
1991	616	48,542	1.27%	6.7	8.4
1992	513	47,574	1.08%	7.5	8.3
1993	546	46,658	1.17%	6.2	6.8
1994	567	45,795	1.24%	5.6	6.0
1995	546	44,387	1.23%	5.5	6.3
1996	537	44,455	1.21%	5.7	7.3
1997	474	43,048	1.10%	5.1	6.9
1998	481	43,741	1.10%	3.8	5.0
1999	476	43,292	1.10%	3.2	4.4
2000	476	43,075	1.11%	2.3	2.9
2001	479	42,659	1.12%	3.4	3.6
2002	543	41,996	1.29%	4.4	4.7
2003	500	42,826	1.17%	5.5	6.1
2004	530	42,005	1.26%	4.9	5.5
2005	486	41,691	1.17%	4.9	5.4
2006	561	42,100	1.33%	4.3	4.9
2007	535	42,140	1.27%	4.6	5.1
2008 (est.)	523	42,370	1.23%	6.5(Oct.)	6.9(Oct.)
<u>1998-2007:</u>					
3-yr. Ave.	527	41,977	1.26%	4.6	5.1
5-yr. Ave.	522	42,152	1.24%	4.8	5.4
10-yr. Ave.	507	42,553	1.19%	4.1	4.8
W. 3-yr. Ave.	536	42,052	1.27%	4.6	5.1
W. 5-yr. Ave.	529	42,067	1.26%	4.7	5.2

Sources: Column (1): Connecticut Department of Public Health. Column (2): Connecticut State Department of Education. (3) and (4): Connecticut Department of Labor. *Data from the Norwich Town Clerk's Office.

2.7 Population and Birth Projections

The number of births in a town is not only affected by the total town population but **more** importantly as noted earlier, by the age-sex composition of population. In order to assess the future trends in Norwich births, we have reviewed the projected number of childbearing age females in Norwich, aged between 14 to 49 years old. As shown in Table 2.6, the number of females aged 15-44 years increased by 4.8% between 1980 and 1990, and the number of births increased until 1987 and then declined to 631 births in 1990, the same number of births registered in 1980 (see Table 2.3). In the subsequent decade between 1990 and 2000, the number of childbearing age females decreased by 4.0% while the number of births decreased from 631 births in 1990 to 476 births in 2000, a decline of 24.6% in a decade. The projections by CtSDC shown in Table 2.6 indicate small percentage declines in the number of 15-49 year-old females between 2000 and 2020. We can therefore surmise that the number of births in Norwich will also decline, albeit in very small numbers in the short-term future. However, the growth of the minority population in the future may bring a moderate growth of births in Norwich.

TABLE 2.6
NUMBER OF CHILDBEARING AGE FEMALES
NORWICH, CONNECTICUT, 1980-2020

	Age (in years)							15-49 Total
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
1980 Census	1,647	1,873	1,582	1,272	1,057	816	847	9,094
1990 Census	1,078	1,529	1,880	1,625	1,359	1,149	913	9,533
2000 Census	1,121	1,254	1,232	1,284	1,478	1,464	1,321	9,154
2010 Proj.*	1,142	1,201	1,256	1,454	1,249	1,204	1,406	8,912
2020 Proj.*	1,114	1,125	1,266	1,393	1,284	1,369	1,208	9,533
% Change:								
1980-1990	-34.5%	-18.4%	18.8%	27.8%	28.6%	40.8%	7.8%	4.8%
1990-2000	4.0%	-18.0%	-34.5%	-21.0%	8.8%	27.4%	44.7%	-4.0%
2000-2010	6.4%	-9.6%	12.1%	1.4%	-16.8%	-2.2%	8.4%	-0.5%
2010-2020	-4.3%	5.9%	-9.1%	11.7%	1.5%	-15.9%	-1.8%	-2.1%

* Populations projected by the Connecticut State Data Center.

In order to prepare 10-year public school enrollment projections, it is necessary to forecast the number of children that will be born in Norwich over the next five years, between 2009 and 2013. For this reason, we have conducted a statistical analysis of birth trends in Norwich as shown below:

$$[2.1] \quad \text{BNW}(T) = 0.01 \text{BCT}(T) + \text{COALES}(-2) \quad [1990-2007]$$

$$\quad \quad \quad (42.79) \quad \quad (2.89)$$

$$\overline{R}^2 = 0.613 \quad \text{SEE} = 29.27 \quad \text{D.W.} = 1.95 \quad \text{MDV} = 527.6$$

In equation 2.1, BNW(T) = the number of births to Norwich residents in a given year T; BCT(T) = the number of births in Connecticut in a given year T; and COALES(-2) = the condominium sales which took place two years prior to T. The figures in parentheses in the second row are t-ratios; R²

(R bar squared) = the adjusted coefficient of determination; SEE = Standard Error of Estimates; D.W. = Durbin Watson statistics; and MDV = the median value of the dependent variable.*

As illustrated in Figure 2.2 and 2.3, Norwich's births sharply declined from 861 births in 1970 to 574 births in 1976, a decline of 287 births (-33.3%) within a period of six years. From the 1976 trough, the number of births in Norwich slowly increased and attained the level of 682 births in 1987, adding 108 births within eleven years. Note that Norwich reached its peak for births three years ahead of the Connecticut whose births peaked in 1990. From then on, Norwich's births gradually declined until 1997 and then began to increase again slightly with considerable annual fluctuations. Equation 2.1 indicates that Norwich's birth trend is positively correlated to the growth trends of births in Connecticut, but also to the condominiums (multi-family units) sold ten years ago. Note that according to the family-cycle model (see page 2-24), the enrollment impact of housing construction and home sales are normally felt many years after the housing units were built in a town.

Using equation 2.1**, Norwich's births during the 2003-2007 period were calculated. *Equation 2.1 projects that Norwich's births will fluctuate between 510 to 530 births per year over the next five years.*

* For a further explanation of the statistics (R², SEE, etc.), see Appendix 2-A on page 2-22.

** Alternately, we derived the following equation for the years 1991 to 2008, including the estimated 530 births in the year 2008. Note that variable COSALES in Equation 2.1 is replaced with NETGAIN, the number of annual housing net gains. However, the R² value is reduced to 0.427 with a still large SEE value of 29.82 births.

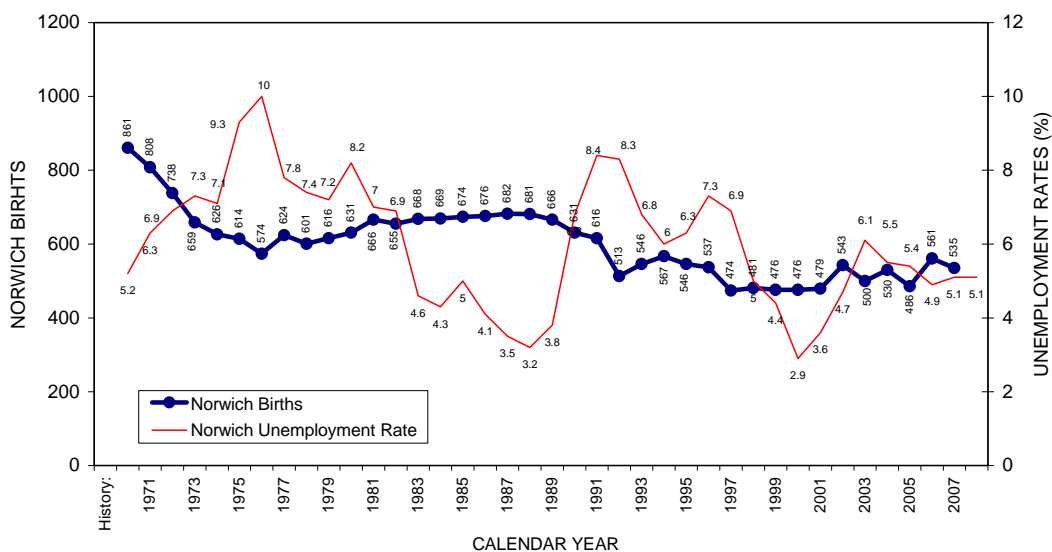
$$[2.1A] \quad \text{BNW}(T) = .011556 \text{ BCT}(T) + 0.200658 \text{ NETGAIN}(-1) \quad [1991-2008]$$

(54.99)
(2.51)

$\overline{R^2} = 0.4272$
SEE = 29.82
D.W. = 1.89
MDV = 521.2

Births and Unemployment Rate: For many Connecticut towns, the number of births in an area is inversely related to the area's economic condition as measured by the unemployment rate. That is, the number of births in an area increases when the unemployment rate falls, and the number of births decreases when the unemployment rate rises. As shown in Fig. 2-3 above, this inverse relationship between births and unemployment rate was also evident in Norwich but it has shown a statistically very weak relationship.

FIG. 2-3 TRENDS OF BIRTHS TO NORWICH RESIDENTS AND NORWICH UNEMPLOYMENT RATES



2.8 Norwich Resident Pupils Attending Nonpublic Schools

Norwich's public school enrollment is affected by the number of students who reside in Norwich but attend nonpublic schools (private/parochial schools, vocational-technical schools, charter schools, and also public schools in other towns). However, it must be noted that the Norwich resident high school students who are attending Norwich Free Academy (NFA) are *excluded* from the grades 9-12 enrollments of nonpublic schools in this report because NFA was treated as though it is a part of Norwich public schools for projection purposes. Obviously, when a large proportion of Norwich resident students attend nonpublic schools, fewer students attend public schools, and vice versa.

Tables 2-7 and 2-8 on the following pages present the number and percent of Norwich resident students attending public and nonpublic schools by grade and grade level between 1998 and 2008. They were also illustrated in Figures 2-4 through 2-6.

TABLE 2.7
 NORWICH RESIDENT PUPILS ATTENDING PUBLIC AND NONPUBLIC SCHOOLS BY GRADE
 1998-2007

	PK	K	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
1998 NORWICH PUBLIC S.	143	539	402	387	415	423	394	418	411	437	39	12	10	4
NW FREE ACADEMY											379	337	271	255
NONPUB	42	58	53	68	55	57	47	53	41	14	20	26	16	0
VOC-TECH											79	84	54	45
NON-LOCAL TOTAL	42	58	53	68	55	57	47	53	41	14	99	110	70	45
TOTAL	185	597	455	455	470	480	441	471	452	451	517	459	351	304
% NONPUB*	22.7%	9.7%	11.6%	14.9%	11.7%	11.9%	10.7%	11.3%	9.1%	3.1%	19.1%	24.0%	19.9%	14.8%
1999 NORWICH PUBLIC S.	180	529	385	404	399	397	422	390	433	425	36	18	9	11
NW FREE ACADEMY											374	375	300	270
NONPUB	37	54	52	43	64	54	51	45	44	44	20	9	13	28
VOC-TECH											83	68	62	53
NON-LOCAL TOTAL	37	54	52	43	64	54	51	45	44	44	103	77	75	81
TOTAL	217	583	437	447	463	451	473	435	477	469	513	470	384	362
% NONPUB*	17.1%	9.3%	11.9%	9.6%	13.8%	12.0%	10.8%	10.3%	9.2%	9.4%	20.1%	16.4%	19.5%	22.4%
2000 NORWICH PUBLIC S.	182	395	513	387	405	386	389	411	417	429	51	19	10	6
NW FREE ACADEMY											353	374	352	276
NONPUB	37	51	49	43	40	54	51	56	44	39	18	18	9	19
VOC-TECH											90	76	58	61
NON-LOCAL TOTAL	37	51	49	43	40	54	51	56	44	39	108	94	67	80
TOTAL	219	446	562	430	445	440	440	467	461	468	512	487	429	362
% NON-LOCAL	16.9%	11.4%	8.7%	10.0%	9.0%	12.3%	11.6%	12.0%	9.5%	8.3%	21.1%	19.3%	15.6%	22.1%
2001 NORWICH PUBLIC S.	216	439	391	523	402	411	390	412	417	422	64	32	16	9
NW FREE ACADEMY											403	373	326	319
NONPUB	33	50	42	47	40	33	54	51	59	48	12	22	14	6
VOC-TECH											80	78	61	47
NON-LOCAL TOTAL	33	50	42	47	40	33	54	51	59	48	92	100	75	53
TOTAL	249	489	433	570	442	444	444	463	476	470	559	505	417	381
% NON-LOCAL	13.3%	10.2%	9.7%	8.2%	9.0%	7.4%	12.2%	11.0%	12.4%	10.2%	16.5%	19.8%	18.0%	13.9%
2002 NORWICH PUBLIC S.	165	369	442	390	520	422	418	391	436	414	46	30	22	26
NW FREE ACADEMY											421	398	317	298
NON-LOCAL PUBLIC	16	22	25	31	26	27	30	26	27	29	18	9	21	7
VOC-TECH											71	77	67	46
PRIVATE/PAROCIAL	37	60	44	37	41	38	35	60	48	60	20	11	21	13
NON-LOCAL TOTAL	53	82	69	68	67	65	65	86	75	89	109	97	109	66
TOTAL	218	451	511	458	587	487	483	477	511	503	576	525	448	390
% NON-LOCAL	24.3%	18.2%	13.5%	14.8%	11.4%	13.3%	13.5%	18.0%	14.7%	17.7%	18.9%	18.5%	24.3%	16.9%
2003 NORWICH PUBLIC S.	148	404	375	417	401	508	427	410	410	421	21	30	16	23
NW FREE ACADEMY											453	429	338	304
NON-LOCAL PUBLIC	19	23	29	26	32	28	28	33	30	29	7	19	8	14
VOC-TECH											99	58	63	52
PRIVATELY	52	55	57	47	37	46	41	44	57	51	19	20	12	19
NON-LOCAL TOTAL	71	78	86	73	69	74	69	77	87	80	125	97	83	85
TOTAL	219	482	461	490	470	582	496	487	497	501	599	556	437	412
% NON-LOCAL	32.4%	16.2%	18.7%	14.9%	14.7%	12.7%	13.9%	15.8%	17.5%	16.0%	20.9%	17.4%	19.0%	20.6%
2004 NORWICH PUBLIC S.	190	363	388	393	433	392	528	415	417	406	25	29	35	37
NW FREE ACADEMY											462	386	391	331
NON-LOCAL PUBLIC	18	21	33	27	24	33	24	27	30	24	11	9	17	10
VOC-TECH											54	77	48	51
PRIVATELY	35	64	40	49	48	36	41	46	46	59	26	15	14	11
NON-LOCAL TOTAL	53	85	73	76	72	69	65	73	76	83	91	101	79	72
TOTAL	243	448	461	469	505	461	593	488	493	489	578	516	505	440
% NON-LOCAL	21.8%	19.0%	15.8%	16.2%	14.3%	15.0%	11.0%	15.0%	15.4%	17.0%	15.7%	19.6%	15.6%	16.4%
2005 NORWICH PUBLIC S.	232	373	377	383	377	425	406	518	417	414	4	7	15	24
NW FREE ACADEMY											464	454	409	349
NON-LOCAL PUBLIC	17	18	29	34	30	25	32	26	27	31	9	10	7	20
VOC-TECH											59	49	60	36
PRIVATELY	43	50	51	43	42	45	40	56	40	45	13	28	21	19
NON-LOCAL TOTAL	60	68	80	77	72	70	72	82	67	76	81	87	88	75
TOTAL	292	441	457	460	449	495	478	600	113	490	549	548	512	448
% NON-LOCAL	20.5%	15.4%	17.5%	16.7%	16.0%	14.1%	15.1%	13.7%	59.3%	15.5%	14.8%	15.9%	17.2%	16.7%
2006 NORWICH PUBLIC S.	243	372	377	384	387	370	417	382	504	416	24	26	27	32
NW FREE ACADEMY											437	413	364	354
NON-LOCAL PUBLIC	29	24	28	30	32	29	27	34	27	28	14	11	15	29
VOC-TECH											55	44	48	49
PRIVATELY	33	51	42	47	33	45	42	38	54	40	15	14	24	19
NON-LOCAL TOTAL	62	75	70	77	65	74	69	72	81	68	84	69	87	97
TOTAL	305	447	447	461	452	444	486	454	585	484	545	508	478	483
% NON-LOCAL	20.3%	16.8%	15.7%	16.7%	14.4%	16.7%	14.2%	15.9%	13.8%	14.0%	15.4%	13.6%	18.2%	20.1%
2007 NORWICH PUBLIC S.	242	382	389	383	397	412	369	419	388	501	29	16	28	26
NW FREE ACADEMY											447	448	337	320
NON-LOCAL PUBLIC	32	29	33	26	30	32	28	26	34	29	7	19	8	37
VOC-TECH											52	56	46	43
PRIVATELY	54	51	41	41	44	30	43	36	40	53	24	12	15	23
NON-LOCAL TOTAL	32	80	74	67	74	62	71	62	74	82	83	87	69	103
TOTAL	274	462	463	450	471	474	440	481	462	583	559	551	434	449
% NON-LOCAL	11.7%	17.3%	16.0%	14.9%	15.7%	13.1%	16.1%	12.9%	16.0%	14.1%	14.8%	15.8%	15.9%	22.9%

* Nonpublic includes private/parochial school students.

Source: Prepared by HCPC, Inc. based on the data obtained from the Connecticut State Department of Education (CSDE).

The number of public school enrollments provided by the CSDE may slightly differ from corresponding figures shown in Table 2.7.

TABLE 2.8
 NORWICH RESIDENT PUPILS ATTENDING PUBLIC AND NONPUBLIC SCHOOLS BY GRADE LEVEL
 1998-2007

	K-5		6-8		9-12		K-12			
1998	NW PUBLIC SCHOOLS	2560 88.3%	1266 92.1%	65 4.0%	3891 65.9%	NW FREE ACADEMY	0 0.0%	0 0.0%	1242 21.0%	
	NONPUB	338 11.7%	108 7.9%	62 3.8%	508 8.6%	VOC-TECH	0 0.0%	0 0.0%	262 4.4%	
	NON-LOCAL TOTAL	338 11.7%	108 7.9%	324 19.9%	770 13.0%	TOTAL	2898 100.0%	1374 100.0%	1631 100.0%	
1999	PUBLIC	2536 88.9%	1248 90.4%	74 4.3%	3858 64.7%	NW FREE ACADEMY	0 0.0%	0 0.0%	1319 22.1%	
	NONPUB	318 11.1%	133 9.6%	70 4.0%	521 8.7%	VOC-TECH	0 0.0%	0 0.0%	266 4.5%	
	NON-LOCAL TOTAL	318 11.1%	133 9.6%	336 19.4%	787 13.2%	TOTAL	2854 100.0%	1381 100.0%	1729 100.0%	
2000	PUBLIC	2475 89.6%	1257 90.0%	86 4.8%	3818 64.2%	NW FREE ACADEMY	0 0.0%	0 0.0%	1355 22.8%	
	NONPUB	288 10.4%	139 10.0%	64 3.6%	491 8.3%	VOC-TECH	0 0.0%	0 0.0%	285 4.8%	
	NON-LOCAL TOTAL	288 10.4%	139 10.0%	349 19.5%	776 13.0%	TOTAL	2763 100.0%	1396 100.0%	1790 100.0%	
2001	PUBLIC	2556 90.6%	1251 88.8%	121 6.5%	3928 64.5%	NW FREE ACADEMY	0 0.0%	0 0.0%	1421 23.3%	
	NONPUB	266 9.4%	158 11.2%	54 2.9%	478 7.8%	VOC-TECH	0 0.0%	0 0.0%	266 4.4%	
	NON-LOCAL TOTAL	266 9.4%	158 11.2%	320 17.2%	744 12.2%	TOTAL	2822 100.0%	1409 100.0%	1862 100.0%	
2002	LOCAL PUBLIC	2561 86.0%	1241 83.2%	124 6.4%	3926 61.3%	NW FREE ACADEMY	0 0.0%	0 0.0%	1434 22.4%	
	NON-LOCAL PUBLIC	161 5.4%	82 5.5%	55 2.8%	298 4.7%	VOC-TECH	0 0.0%	0 0.0%	261 4.1%	
	PRIVATE/PAROCHIAL	255 8.6%	168 11.3%	65 3.4%	488 7.6%	NON-LOCAL TOTAL	416 14.0%	250 16.8%	1047 16.3%	
	TOTAL	2977 100.0%	1491 100.0%	1939 100.0%	6407 100.0%	2003	LOCAL PUBLIC	2532 84.9%	1241 83.6%	90 4.5%
	NW FREE ACADEMY	0 0.0%	0 0.0%	1524 76.0%	1524 23.6%	NON-LOCAL PUBLIC	166 5.6%	92 6.2%	48 2.4%	
	NON-LOCAL PUBLIC	166 5.6%	92 6.2%	48 2.4%	306 4.7%	VOC-TECH	0 0.0%	0 0.0%	272 4.2%	
	VOC-TECH	0 0.0%	0 0.0%	272 13.6%	272 4.2%	PRIVATE/PAROCHIAL	283 9.5%	152 10.2%	70 3.5%	
	PRIVATE/PAROCHIAL	283 9.5%	152 10.2%	70 3.5%	505 7.8%	NON-LOCAL TOTAL	449 15.1%	244 16.4%	390 19.5%	
	NON-LOCAL TOTAL	449 15.1%	244 16.4%	390 19.5%	1083 16.7%	TOTAL	2981 100.0%	1485 100.0%	2004 100.0%	
2004	LOCAL PUBLIC	2497 85.0%	1238 84.2%	126 6.2%	3861 59.9%	NW FREE ACADEMY	0 0.0%	0 0.0%	1570 24.4%	
	NW FREE ACADEMY	0 0.0%	0 0.0%	1570 77.0%	1570 24.4%	NON-LOCAL PUBLIC	162 5.5%	81 5.5%	47 2.3%	
	NON-LOCAL PUBLIC	162 5.5%	81 5.5%	47 2.3%	290 4.5%	VOC-TECH	0 0.0%	0 0.0%	230 3.6%	
	VOC-TECH	0 0.0%	0 0.0%	230 11.3%	230 3.6%	PRIVATE/PAROCHIAL	278 9.5%	151 10.3%	66 3.2%	
	PRIVATE/PAROCHIAL	278 9.5%	151 10.3%	66 3.2%	495 7.7%	NON-LOCAL TOTAL	440 15.0%	232 15.8%	343 16.8%	
	NON-LOCAL TOTAL	440 15.0%	232 15.8%	343 16.8%	1015 15.7%	TOTAL	2937 100.0%	1470 100.0%	2039 100.0%	
2005	LOCAL PUBLIC	2341 84.2%	1349 85.7%	50 2.4%	3740 58.3%	NW FREE ACADEMY	0 0.0%	0 0.0%	1676 26.1%	
	NW FREE ACADEMY	0 0.0%	0 0.0%	1676 81.5%	1676 26.1%	NON-LOCAL PUBLIC	168 6.0%	84 5.3%	46 2.2%	
	NON-LOCAL PUBLIC	168 6.0%	84 5.3%	46 2.2%	298 4.6%	VOC-TECH	0 0.0%	0 0.0%	204 3.2%	
	VOC-TECH	0 0.0%	0 0.0%	204 9.9%	204 3.2%	PRIVATE/PAROCHIAL	271 9.7%	141 9.4%	81 3.9%	
	PRIVATE/PAROCHIAL	271 9.7%	141 9.4%	81 3.9%	493 7.7%	NON-LOCAL TOTAL	439 15.8%	225 12.8%	331 16.1%	
	NON-LOCAL TOTAL	439 15.8%	225 12.8%	331 16.1%	995 15.5%	TOTAL	2780 100.0%	1574 100.0%	2057 100.0%	
2006	LOCAL PUBLIC	2307 84.3%	1302 85.5%	109 5.4%	3718 59.3%	NW FREE ACADEMY	0 0.0%	0 0.0%	1568 25.0%	
	NW FREE ACADEMY	0 0.0%	0 0.0%	1568 77.9%	1568 25.0%	NON-LOCAL PUBLIC	170 6.2%	89 5.8%	69 3.4%	
	NON-LOCAL PUBLIC	170 6.2%	89 5.8%	69 3.4%	328 5.2%	VOC-TECH	0 0.0%	0 0.0%	196 3.1%	
	VOC-TECH	0 0.0%	0 0.0%	196 9.7%	196 3.1%	PRIVATE/PAROCHIAL	260 9.5%	132 8.7%	72 3.6%	
	PRIVATE/PAROCHIAL	260 9.5%	132 8.7%	72 3.6%	464 7.4%	NON-LOCAL TOTAL	430 15.7%	221 14.5%	337 16.7%	
	NON-LOCAL TOTAL	430 15.7%	221 14.5%	337 16.7%	988 15.7%	TOTAL	2737 100.0%	1523 100.0%	2014 100.0%	
2007	LOCAL PUBLIC	2332 84.5%	1308 85.7%	99 5.0%	3739 59.5%	NW FREE ACADEMY	0 0.0%	0 0.0%	1552 24.7%	
	NW FREE ACADEMY	0 0.0%	0 0.0%	1552 77.9%	1552 24.7%	NON-LOCAL PUBLIC	178 6.4%	89 5.8%	71 3.6%	
	NON-LOCAL PUBLIC	178 6.4%	89 5.8%	71 3.6%	338 5.4%	VOC-TECH	0 0.0%	0 0.0%	197 3.1%	
	VOC-TECH	0 0.0%	0 0.0%	197 9.9%	197 3.1%	PRIVATE/PAROCHIAL	250 9.1%	129 8.5%	74 3.7%	
	PRIVATE/PAROCHIAL	250 9.1%	129 8.5%	74 3.7%	453 7.2%	NON-LOCAL TOTAL	428 15.5%	218 14.3%	342 17.2%	
	NON-LOCAL TOTAL	428 15.5%	218 14.3%	342 17.2%	988 15.7%	TOTAL	2760 100.0%	1526 100.0%	1993 100.0%	

FIG. 2-4
NUMBER AND PERCENT OF NORWICH RESIDENT STUDENTS
ATTENDING K-5 NONPUBLIC SCHOOLS, 1998-2007

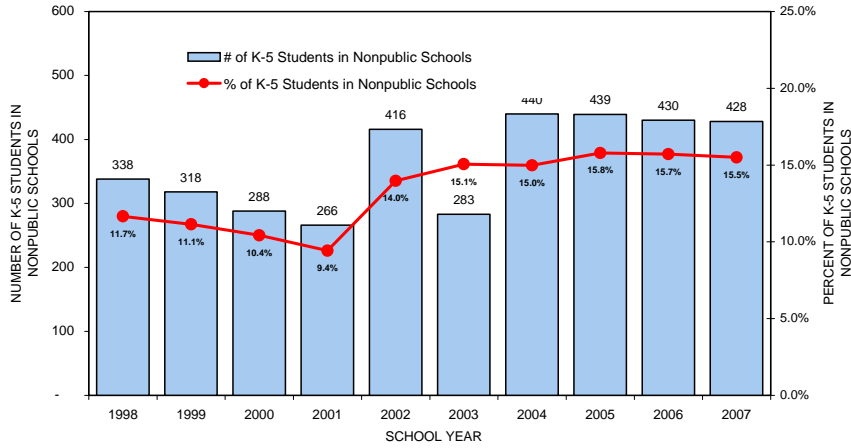


FIG. 2-5
NUMBER AND PERCENT OF NORWICH'S GRADES 6-8 STUDENTS
ATTENDING NONPUBLIC SCHOOLS, 1998 - 2007

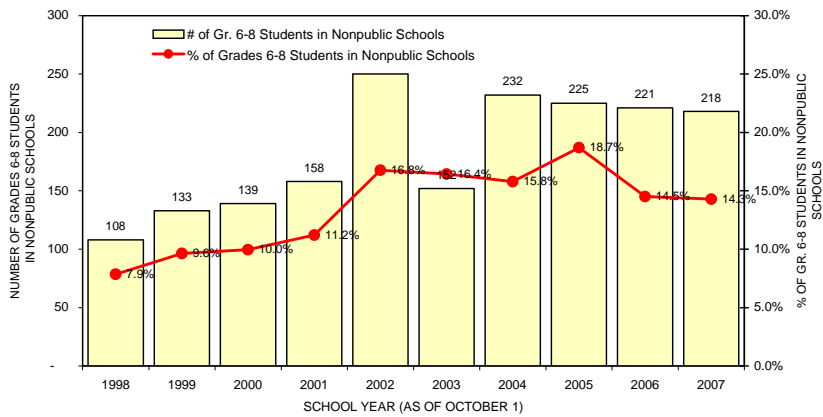
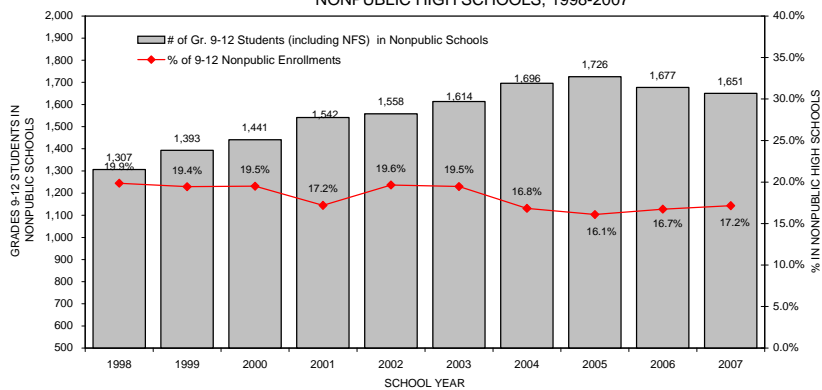


FIG. 2-6
NORWICH RESIDENTS ATTENDING
NONPUBLIC HIGH SCHOOLS, 1998-2007



From the review of nonpublic school enrollment growth trends shown in Tables 2.7 and 2.8 as well as Figures 2-4, 2-5, and 2-6 on the previous pages, several important observations can be made:

- In 2007, 15.5% of K-5 students, 14.3% of Grades 6-8 students, and 17.2% of Grades 9-12 students in Norwich attended nonpublic schools, including public schools in other towns, private/parochial, and vocational-technical schools, but excluding students in NFA. Note that the percentage of high school students attending nonpublic schools is slightly greater than that of the middle and elementary schools in Norwich.
- In 2007, there were a total of 6,279 K-12 students (not counting PK) in Norwich, consisting of 3,739 students (59.5% of total K-12 students) in Norwich public schools, 1,552 students (24.7%) in Norwich Free Academy, 338 students (5.4%) in public schools other than Norwich public schools, 197 students (3.1%) in vocational-technical schools, and 453 students (7.2%) in private/parochial schools. These numbers imply that when the proportion of nonpublic school students among total resident students increases by one percent of the total resident students, the K-12 *public* school enrollment in Norwich will commensurably decrease by 1% of 6,279 K-12 students, or by 63 students, all other factors being equal.
- In Connecticut, most school districts show that the percentage of residents attending nonpublic schools appears to be inversely affected by economic conditions. In other words, a low percentage of residents attend nonpublic school when the unemployment rate is high, and vice versa. Such a relationship was evident in Norwich for elementary and middle schools but not in high school when we conducted statistical analyses. That is, the percentages of Norwich students attending nonpublic elementary and middle schools were significantly affected by the fluctuating unemployment rates. However, the inverse relationship between the percent of Norwich students attending nonpublic high schools (NP912) and Norwich's overall unemployment rates (UNW) is not evident or statistically significant.

[2.2]
$$\text{NPK5} = -0.7548 \text{ UNW}(-4) + 0.5187\text{T} \qquad [1998 - 2007]$$

$$\qquad \qquad \qquad (-4.02) \qquad \qquad (16.82)$$

$$R^2 = 0.842 \qquad \text{SEE} = 0.98 \qquad \text{DW} = 1.99 \qquad \text{MDV} = 13.37$$

[2.3]
$$\text{NP68} = -1.3556 \text{ UNW}(-3) + 0.61698 \text{ T} \qquad [1990 - 2001]$$

$$\qquad \qquad \qquad (-3.90) \qquad \qquad (10.98)$$

$$R^2 = 0.767 \qquad \text{SEE} = 1.74 \qquad \text{DW} = 2.58 \qquad \text{MDV}=13.52$$

In the above equations, the terms NPK5 and NP68 represent the percent of Norwich residents attending nonpublic schools in grades K-5 and 6-8, respectively; UNW(-4) and UNW(-3) denote Norwich's unemployment rates in four and three years prior to T.

Equation 2.2 tells us that a one-percent increase in Norwich's unemployment rate decreases the proportion of Norwich's resident middle school students attending nonpublic middle schools by approximately 0.7548 percent. In short, when Norwich's unemployment increases by one percent, Norwich's nonpublic middle school enrollment decreases roughly by 21 students ($0.7548\%/100 \times 2,760$) and Norwich's public elementary schools gain the same number of students. Similarly, the Norwich middle schools may gain 21 students when unemployment increases by one percent. It is clear that changes in the overall economic condition in Connecticut have a moderate impact on the elementary and middle school enrollments but no significant impact on the high school enrollments in Norwich.

- The number of Norwich's K-12 students attending nonpublic schools increased from 770 students in 1998 to 988 students in 2008. At the same time, the percent of Norwich students in nonpublic schools increased from 13.0% in 1998 to 15.7% in 2008. By grade level, the percent of Norwich's students attending nonpublic elementary schools fluctuated within a range between 11.7% (in 1998) and 15.8% (in 2005); the percent of nonpublic middle schools fluctuated within a range of 7.9% (in 1998) and 18.7% (in 2005), and the percent of nonpublic high school ranged between 16.1% (in 2005) and 19.9% (in 1998).

It is generally believed that the school quality perceived by parents of students would have a considerable impact on the parents' decisions to send their children to public or private schools. For example, in addition to the economic conditions, the quality of school facilities, overcrowding, and quality of teachers would influence the parents' decisions on the choice of schools.

2.9 Residential Development in Norwich

New residential development is likely to increase public school enrollment, as it attracts new people to a town, including families with school-age children. Therefore, many communities watch residential growth trends very closely, particularly with respect to their potential impact on public school enrollment growth. Table 2.9 on page 2-17 presents the number of new dwelling units built in Norwich since 1975.

Table 2.9 (columns 1) and Fig. 2-9 below show that new dwelling units construction fluctuated considerably from year to year. Very high construction activities were found in the latter half of 1980s, a real estate boom period. It was reported that as many as 371 new homes were built in 1987. Of these, 124 units were single-family units and the remaining 247 units were multiple-family units. As the economic recession set in at the beginning of 1990s, residential construction activities in Norwich have dwindled to a very low level, sinking to a mere 25 new housing units in 1991. Throughout the 1990s, Norwich built on average 25.5 units per year for eleven years due to the closing of a shipbuilding yard in Groton. However, with the improving employment conditions brought by the introduction and expansion of two large casinos in the area, the new home construction activities were once again at high levels: 247 new units were built in 2003, 223 units in 2004, and 218 units in 2005. But recently, the level of new home construction has once again rapidly shrunk to an estimated 24 units in 2008 due to a nationwide financial turmoil and uncertain economic future.

FIG. 2-9
ANNUAL NEW HOME CONSTRUCTION AND NET GAIN
NORWICH, CT 1975-2008

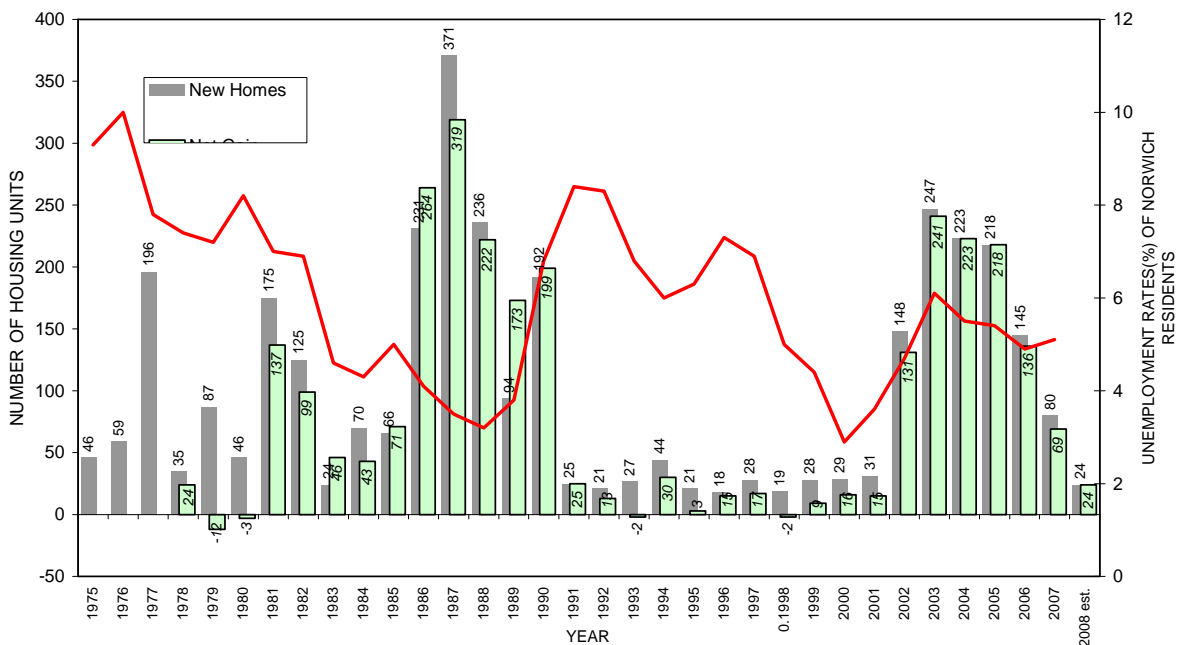


TABLE 2.9
NEW DWELLING UNITS BUILT
NORWICH, CONNECTICUT 1985-2008

Calendar Year	New Construction Jan.-Dec.	# of Single Family Units	# of Multi-Family Units	Net Gain	Total Housing Units	K-12 Public School Enrollment Excluding Proj. Choice	Public School K-12 Children Per Unit*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1985	66	58	0	71	15,779	5337	0.338
1986	231	229	2	264	16,043	5382	0.335
1987	371	124	247	319	16,362	5345	0.327
1988	236	156	80	222	16,584	5249	0.317
1989	94	43	51	173	16,757	5236	0.312
1990	192	38	144	199	16,956	5432	0.320
1991	25	21	4	25	16,497	5502	0.334
1992	21	21	0	13	16,510	5463	0.331
1993	27	27	0	-2	16,508	5524	0.335
1994	44	29	15	30	16,538	5471	0.331
1995	21	21	0	3	16,541	5468	0.331
1996	18	16	2	15	16,556	5427	0.328
1997	28	28	0	17	16,573	5240	0.316
1998	19	19	0	-2	16,571	5276	0.318
1999	28	28	0	9	16,580	5357	0.323
2000	29	29	0	16	16,596	5355	0.323
2001	31	31	0	15	16,615	5565	0.335
2002	148	49	99	131	16,746	5486	0.328
2003	247	122	125	241	16,987	5524	0.325
2004	223	93	130	223	17,210	5614	0.326
2005	218	83	135	218	17,428	5633	0.323
2006	145	95	50	136	17,564	5527	0.315
2007	80	78	0	69	17,633	5539	0.314
2008 est.	24	24	0	24	17,657	5459	0.309
1992-2001:							
3-Year Ave.	83	66	17	76	17,618	5,508	0.313
5-Year Ave.	138	75	63	134	17,498	5,554	0.317
10-Yr. Ave.	117	63	54	108	17,102	5,506	0.322
W. 3-Yr. Ave.	63	54	8	58	17,634	5,497	0.312
W. 5-Yr. Ave.	102	65	37	98	17,572	5,527	0.315

Sources: 1970, 1980, and 1990 figures are decennial U. S. Census data. The remaining data are from the Connecticut Department of Housing. Columns (1) through (4) are from local sources and they are different from the data from the Connecticut source.

*54 of the 90 permits were for condominium units in age restricted attaché units

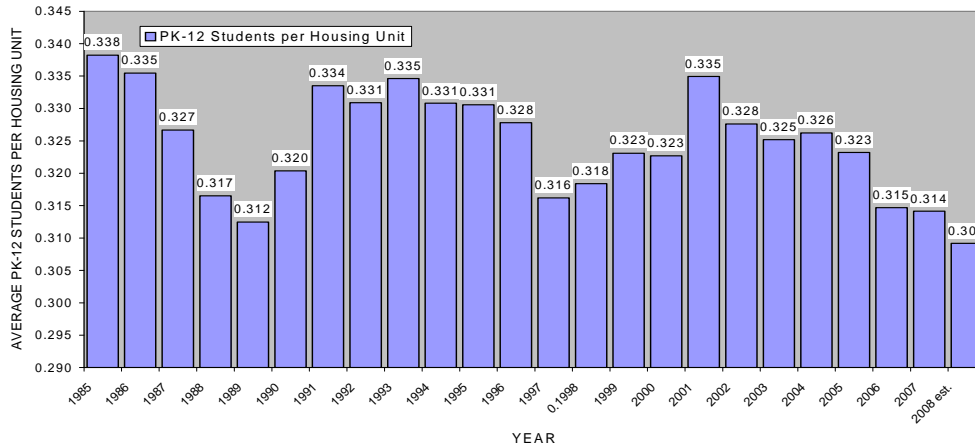
* *20 new homes were built between January-September, 2008 according to the Connecticut State Department of Economic Development.

2.10 Average Number of K-12 Students Per Housing Unit

Table 2.9 (column 7) and Figure 2-10 below show that the enrollment multiplier in Norwich (the average number of public school children (PK-12) per housing unit) went up and down three times since 1985. The average enrollment multiplier was 0.338 students per housing unit in 1985 and went down to 0.312 students per housing unit in 1990. In 1993, it then went up to 0.335 and down again to 0.316 students per unit in 1997. Recently, it went up again to 0.325 students per unit in 2001 only to dwindle to 0.309 students per unit in 2008. It is difficult to forecast the future pattern of the enrollment multipliers but the number is likely to decline because the average household size in the city will most likely decrease due to an increasing elderly population. These numbers imply that even though the housing inventory of Norwich will continue to grow over the next ten years, the

new dwelling units will produce a much smaller impact on future public school enrollments than they did in the past due to diminishing household size and enrollment multipliers.

FIG. 2-10
TRENDS OF PK-12 STUDENTS PER HOUSING UNIT IN NORWICH 1985-2006



2.11 Residential Construction and the Unemployment Rate

The residential construction activities in an area are highly cyclical and are inversely related to the area's economic conditions as measured by the unemployment rate. This relationship is captured by the following regression equation and illustrated in Figure 2.11. As shown below, the number of new homes built in Norwich (DU) was reduced by 32 units when the unemployment rate in Norwich four years prior, UNW(-4), increased by one percent or vice versa.

$$[2.4] \quad DU(T) = - 32.252UNW(-4) + 7.500 T \quad [1991 - 2008]$$

(-4.46) (6.53)

$R^2 = 0.605$ $SEE = 50.83$ $DW = 0.79$ $MDV = 76.44$

* Suppose Norwich's housing stock (17,757 units in 2008) increase by a net gain of 106 units per year (average net gain of past ten years). Then, within ten years, the housing stock is estimated to increase to 18,827 units in 2018. Assume also that the housing multiplier will decline to 0.300 from the current 0.309 PK-12 students per housing unit. Then, the estimated total K-12 enrollment in 2018 will be 5,651 students in 2018, showing approximately 200 more students than 2008 enrollments.

2.12 Home Sales in Norwich

As shown in Table 2.10, the average number of home sales (new and used home sales) during the past three years was 498 dwelling units per year. Of these, 347 units were residential units, and the remaining 151 units (30.3%) were classified as condominiums. As expected, the residential real estate market in Norwich was lively during the boom period of 1985-88 (not shown in Table 2.10), but stagnated during the mild economic recession of the late 1980's and early 1990's. During the mild economic recession in 1991, only 117 homes were sold in Norwich, but this number was boosted to 802 home sales in 2004.

TABLE 2.10
ANNUAL HOME SALES IN NORWICH, 1988-2008

Calendar Year	Number of Sales				Median Sales Price	
	Residential	Condo	% Condo	All Sales	Residential	Condo
1988	382	221	36.7%	603	\$118,000	\$114,000
1989	244	167	40.6%	411	117,250	124,900
1990	180	48	21.1%	228	115,000	96,875
1991	142	35	19.8%	<u>177</u>	108,000	<u>38,625</u>
1992	181	56	23.6%	237	<u>91,000</u>	50,750
1993	175	53	23.2%	228	93,000	54,000
1994	180	27	13.0%	207	90,500	55,000
1995	183	48	20.8%	231	93,600	54,950
1996	198	59	23.0%	257	94,250	68,000
1997	229	51	18.2%	280	89,900	70,000
1998	246	68	21.7%	314	93,250	66,250
1999	347	71	17.0%	418	103,000	68,000
2000	281	46	14.1%	327	108,800	70,500
2001	457	69	13.1%	526	112,000	70,000
2002	451	111	19.8%	562	132,000	84,900
2003	542	149	21.6%	691	150,000	127,900
2004	585	217	27.1%	<u>802</u>	170,833	165,000
2005	509	268	34.5%	777	200,000	159,900
2006	460	216	32.0%	676	206,500	<u>182,450</u>
2007	328	141	30.1%	469	<u>210,000</u>	179,900
2008	252	96	27.6%	348	190,000	188,950
3-Year Ave.	347	151	30.3%	498	\$202,167	\$183,767
5-Year Ave.	427	188	30.5%	614	195,467	175,240
10-Year Ave.	421	138	24.7%	560	158,313	129,750
W. 3-Yr. Ave.	312	131	29.6%	443	199,417	184,850
W. 5-Yr. Ave.	370	163	30.6%	533	198,689	179,767

Source: Warren Information Services / The Commercial Record

As the regression equation below indicates, the annual home sales in Norwich (HSALES) increased by 60 units when Norwich's unemployment rate (UWH) decreased by one percent between 1991 and 2008. The equation also notes that the number of home sales has been

increasing at the rate of 23 units per year since 1991, but has been reduced by the impact of the unemployment rate.

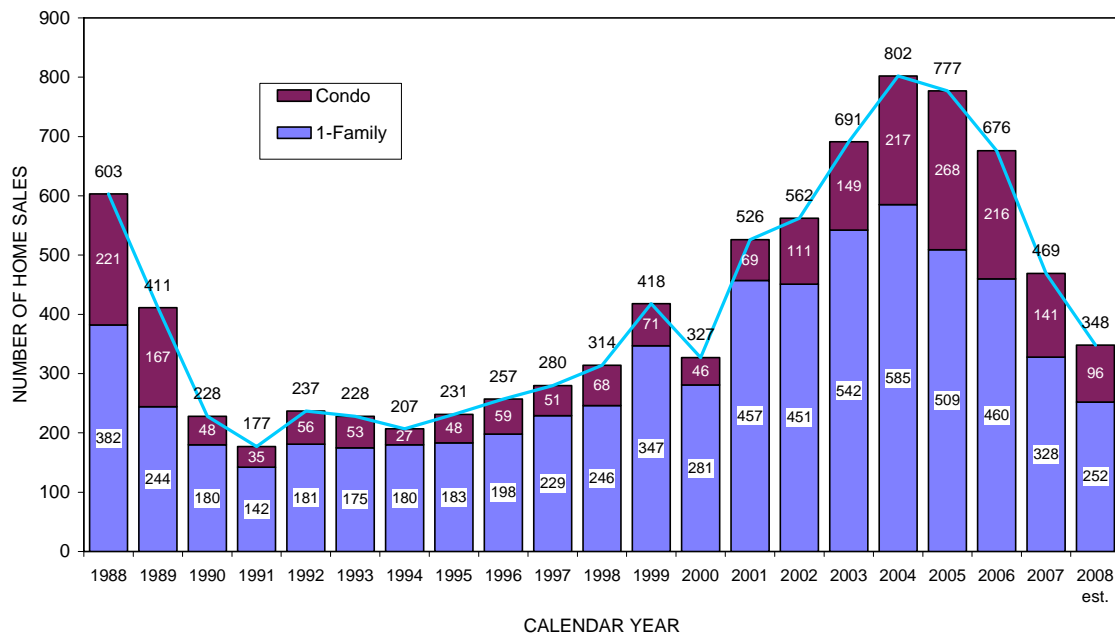
$$[2.5] \quad \text{HSALES}(T) = -60.207 \text{UCT}(-3) + 23.284T \quad [1991 - 2008]$$

$$\quad \quad \quad (-3.55) \quad (8.52)$$

$$R^2 = 0.655 \quad \text{SEE} = 121.64 \quad \text{DW} = 0.78 \quad \text{MDV} = 418.2$$

To summarize, the economy plays a very important role in determining home sale trends, which in turn strongly affect public school enrollments. Note that the number of home sales has been increasing since the 1991 trough, reflecting the improved economic condition in the nation until the peak home sales in 2004. However the number of home sales rapidly declined since 2004 as the national economy faltered. Also, the median price of homes declined until 1991-92 and then as the economy improved, the home price also gradually increased to peak in median condo prices in 2005 and median single-family unit sales prices in 2006.

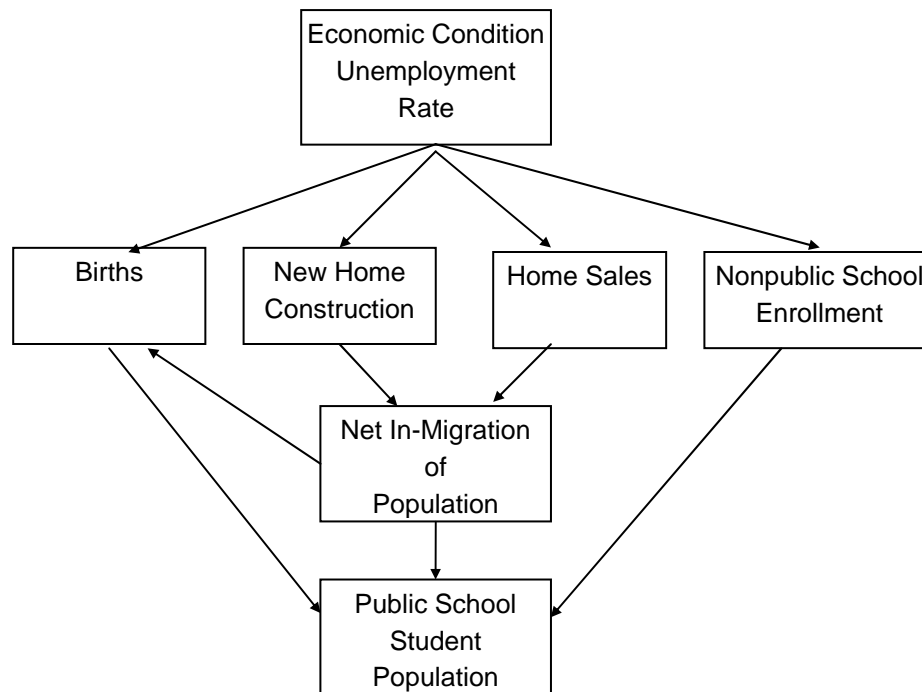
FIG.2-11
ANNUAL HOME SALES IN NORWICH, 1988-2008



2.13 Concluding Observations

In this section, it was demonstrated that family decisions are greatly affected by the parents' sense of economic security and wellbeing. It was found that economic conditions (unemployment rate) turned out to be the underlying factor that regulated the four major factors (births, new home

construction, home sales, and nonpublic school enrollments), which in turn have the most influence on enrollments in public schools.



For example, a low unemployment rate in an area increases the number of births, which in turn enlarges the kindergarten enrollment five years later. At the same time, a low unemployment rate boosts new home construction and home sales, bringing more families with children (an increase in net in-migration) into the town, and adding yet more children to the public schools. However, the low unemployment rate also encourages more families to send their children to private schools, thus reducing the public school enrollments. According to the Family Cycle Model,* what happens in one year will have long-term multi-year effects on school enrollments. The size of the public school student population at a given year is therefore a cumulative result of events taking place in all previous years.

* H. C. Planning Consultants (HCPC) has developed a unique model called the Family Cycle Model. The FamilyCycle™ Model is based on the premise that the enrollment impact of a residential unit on a town varies from year to year. This variation over time in the number of schoolchildren living in the unit is determined by the composition of the family living in the unit, which is determined in turn by the family's length of residence in the unit. Through surveys of various towns, it was found that the average number of schoolchildren contributed by a household varies depending on the number of years that the household has lived in the town. In general, the changing pattern of schoolchildren produced per residence can be represented by a bell curve showing fewer schoolchildren in the early period of a household's residence in a town, and a greater number of children after 8 to 12 years of residency. This bell curve describes a family's life cycle: when a young family moves into a town, it has one or two pre-school children; the children then attend an elementary school, a middle and a high school, before leaving for college or independent life. A survey of Norwich households was not conducted to obtain the multi-year enrollment multipliers for this study.

APPENDIX 2-A REGRESSION CONCEPTS AND TERMINOLOGY

Regression Equation: A method of Least Squares is used. This is a method of developing an equation that relates one variable (such as enrollment) to one or more other variables, which should explain the first (such as births, unemployment rate, etc.). This method is mathematically derived so that the resulting combination of explanatory variables produces the smallest error between the historic actual values and those estimated by the regression.

R Squared: R^2 is the best-known indicator of the success of a regression equation fit. Basically, the R squared measures the percentage of the change in the dependent variable in the equation, which has been explained, by changes in the explanatory variables.

Standard Error of the Estimates: The S.E.E. gives a measure of how close the fitted values are to the actual values from the past. When regression analysis is being used to develop an equation, it is desirable to have as small a S.E.E. as possible. Also, this statistics may be used to gain some idea of the forecasting accuracy, which can be expected.

T-Ratio: The t-ratio shows the significance of each explanatory variable in predicting the dependent variable. It is desirable to have as large (either positive or negative) a t-ratio as possible for each explanatory variable. Generally, any statistic greater than +2.0 or less than -2.0 is acceptable. The t-ratio is derived by dividing the estimated coefficient for a variable by its Standard Error.

Durbin-Watson Statistics: One principal assumption of regression analysis is that the errors (between the fitted and actual values) are independent from one observation to the next. That is, knowledge of the error in one year will not help us anticipate the error in the next year. Autocorrelation is the case where there is a correlation between successive errors. The D.W. Statistic provides the standard test for autocorrelation. Generally, if the D.W. Statistic is between 1.5 and 2.5, there is no serious autocorrelation in a regression equation.

3 ENROLLMENT PROJECTION ASSUMPTIONS

3.1 Introduction

As discussed in Section 1, errors occur in school enrollment forecasts because of the impracticality of trying to forecast the outcome of coincident cyclical variables. Cyclical factors such as the birth rate, home sales, and the percentage of residents sending their children to nonpublic schools are based on the unpredictable variability of the economy. Since we cannot accurately forecast long-term economic conditions, it is very difficult to forecast cyclical variations in school enrollment growth. For this reason, projections are based on a number of assumptions with respect to those variables that cannot be forecast with a high degree of accuracy.

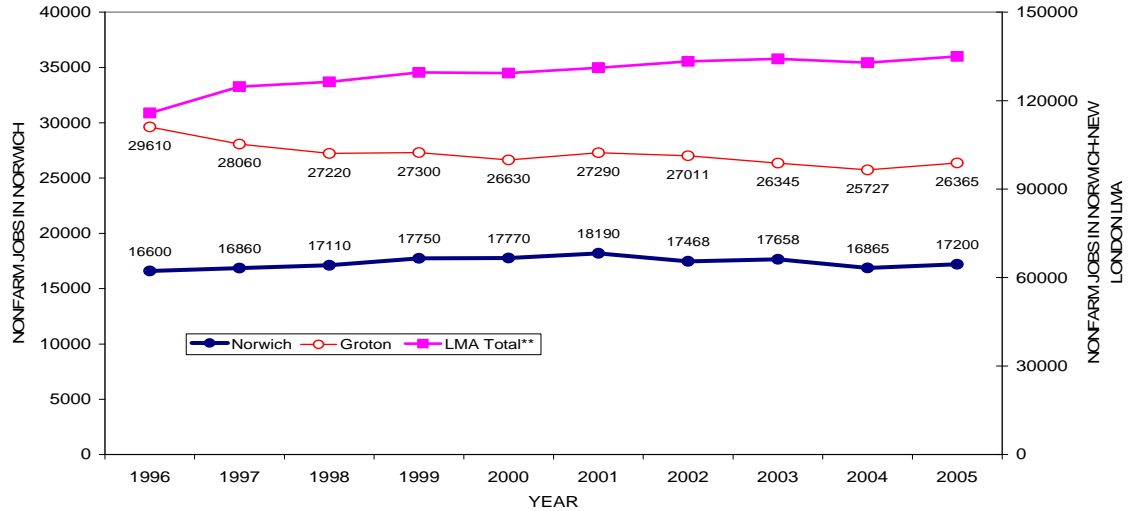
Section 2 also concluded that economic conditions affect household decisions on births, new home construction, home sales, and nonpublic school enrollments. Thus, understanding the economy of the New London-Norwich Labor Market Area is important in forecasting school enrollments for Norwich.

3.2 Trends in Nonfarm Employment in the New London-Norwich Labor Market Area

Between 1988 and 1989, employment throughout New England soared. But, when the real estate boom of the mid-1980's bottomed out at the end of that decade, employment levels in the Northeast declined. More importantly, when the cold war ended with the demise of the Soviet Union in 1991, defense cutbacks followed quickly, and employment levels in New England dropped sharply because the local manufacturing base was largely dependent on defense contracts. Thus, the New England states had hit their low point by the end of 1992. But the economic recession was short lived. The economy was turning around and both the nation and the New England states were beginning an unprecedented seven-year economic boom. By 1999 every northeastern state had recovered the number of jobs it lost during the recession.

As shown in Figure 3-1 on the next page, during the booming economy of the 1990's and early 2000's, nonfarm employment in the 20-town New London-Norwich Labor Market Area increased steadily from 115,790 jobs in 1996 to 135,014 jobs in 2005, adding 19,224 jobs or increasing by 16.6% during the ten-year period. In the meantime, Norwich also increased from 16,600 jobs in 1996 to 18,190 jobs in 2001, adding 1,590 jobs in five years, but began to decline gradually to 172,000 jobs in 2005, losing 1,010 jobs in the subsequent five years. The net effect is that Norwich gained only 600 jobs or increased by 3.6% within a ten-year period.

FIG. 3-1
NONFARM EMPLOYMENT OF NORWICH -NEW LONDON LMA
AND NORWICH 1996-2005



The previous statements, however, mask what really happened in the labor market between 1996 and 2005. Actually, as shown in Fig. 3-2 below, all the job growth in the LMA took place only in two towns: Ledyard where Foxwood Resort Casino was established in 1986, and the town of Montville where Mohican Sun Casino was established in Uncasville (an Indian reservation located in Montville) in 1996.

FIG. 3-2
NUMBER OF JOBS ADDED IN THE TOWNS OF
NEW LONDON-NORWICH LABOR MARKET AREA, 1996-2005

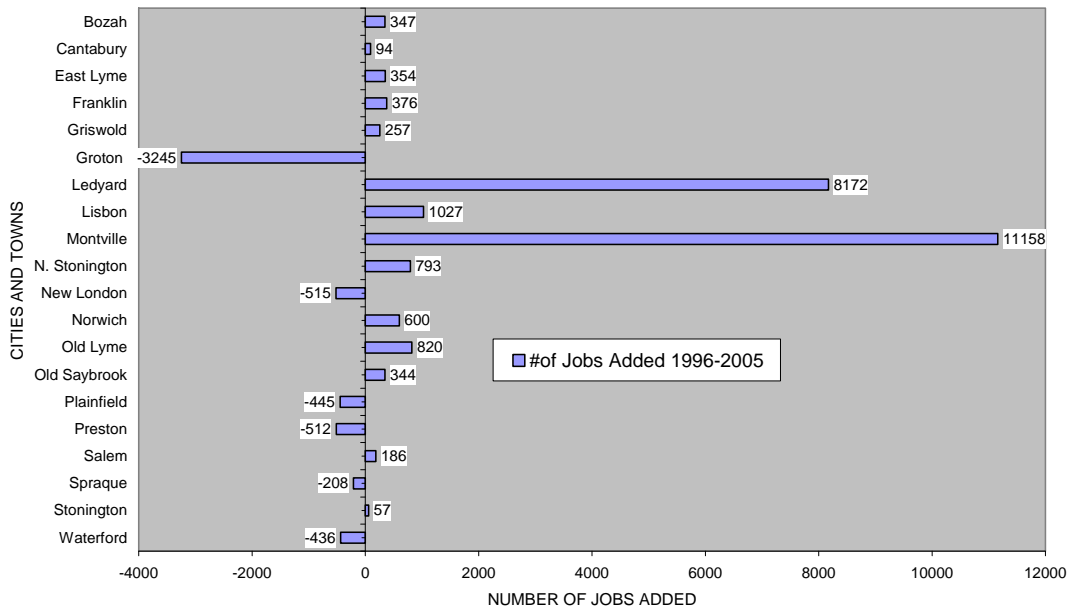


TABLE 3.1
NONFARM EMPLOYMENT BY TOWN IN NEW LONDON-NORWICH
LABOR MARKET, CONNECTICUT
1996 – 2005

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Change 96-05	Percent Change 96-05	% of Region
Bozah	720	740	790	820	860	960	1030	1038	1107	1067	347	48.2%	0.8%
Cantabury	480	460	440	520	510	470	584	595	571	574	94	19.6%	0.4%
East Lyme	4730	4690	5360	4990	5200	4900	4952	4885	4809	5084	354	7.5%	3.8%
Franklin	890	800	890	950	960	650	1362	1279	1294	1266	376	42.2%	0.9%
Griswold	1650	1770	1750	1670	1620	1650	1799	1815	1867	1907	257	15.6%	1.4%
Groton	29610	28060	27220	27300	26630	27290	27011	26345	25727	26365	-3245	-11.0%	19.5%
Ledyard	6650	7762	9059	10357	11654	12951	14249	14434	14603	14822	8172	122.9%	11.0%
Lisbon	610	600	570	660	600	740	1155	1329	1573	1637	1027	168.4%	1.2%
Montville	3770	9250	10046	10841	11637	12433	14024	15047	14732	14928	11,158	296.0%	11.1%
New London	16180	16590	16040	15340	15150	15220	16094	15950	16003	15665	-515	-3.2%	11.6%
N. Stonington	470	1450	1380	1430	1380	1440	1371	1337	1289	1263	793	168.7%	0.9%
Norwich	16600	16860	17110	17750	17770	18190	17468	17658	16865	17200	600	3.6%	12.7%
Old Lyme	1770	1990	2140	2160	2220	2310	2230	2415	2491	2590	820	46.3%	1.9%
Old Saybrook	5580	5580	5700	6350	6160	6470	6117	5768	5773	5924	344	6.2%	4.4%
Plainfield	4830	4770	4760	5040	4900	4670	4170	4144	3854	4385	-445	-9.2%	3.2%
Preston	1300	1130	1050	1040	760	840	868	780	785	788	-512	-39.4%	0.6%
Salem	560	700	620	650	710	850	781	773	731	746	186	33.2%	0.6%
Sprague	900	880	660	830	800	830	807	766	723	692	-208	-23.1%	0.5%
Stonington	6990	7180	7110	7130	7230	7290	6605	6868	6942	7047	57	0.8%	5.2%
Waterford	11500	13440	13640	13720	12600	11020	10640	10929	11132	11064	-436	-3.8%	8.2%
All Town in LMA	115790	124702	126335	129548	129351	131174	133317	134155	132871	135014	19,224	16.6%	100.0%
LMA Excl. L&M**	105370	107690	107230	108350	106060	105790	105044	104674	103536	105264	-106	-0.1%	78.0%

Source: Prepared by HCPC, Inc. based on the data provided by the Connecticut Department of Labor. Figures in Italics are estimates by HCPC, Inc. ** Excluding Ledyard and Montville.

During the ten-year period between 1996 and 2005, Ledyard added 8,172 jobs (an increase of 123%), and Montville added 11,158 jobs, representing an increase of 296%. Combined, these two towns added 19,330 jobs or nonfarm employment, which is slightly higher (by 106 jobs) than the total job growth experienced by the entire New London-Norwich Labor Market Area during the same ten-year period. This is due to the fact that the rest of the 18 towns in the region altogether lost 106 jobs during the ten-year period. Although many towns in the LMA gained a small number of jobs, Groton alone, due to the closing of the atomic submarine construction navy shipyard, lost 3,245 jobs between 1996 and 2005. In short, although the introduction of two major casinos infused a large number of jobs into the region, the negative impact of the naval base closing more than offset the thriving casino or gaming businesses in the region. Thus, the population of the area and, concomitantly, the school enrollments in the area towns, did not grow as much as the increased number of jobs in the gaming industry indicated.

*Groton was the home of the great US Naval Submarine Base, and the submarine construction facilities of the Electric Boat Division of General Dynamics, Inc.

3.3 Trends of Resident Labor Force in Norwich

While the number of jobs in the New London-Norwich Labor Market Area increased by 19,224 jobs (16.6%) between 1996 and 2005, the total labor force (including both employed and unemployed workers) in the New London-Norwich Labor Market Area increased by 10,592 workers (+7.7%) during the same period. The smaller increase in the labor force relative to the growth of jobs in the region is due to the fact that most of the new jobs were occupied by those area resident workers who had lost their previous employment due directly or indirectly to the closing of the navy base in Groton. According to our survey of Montville residents in 2000, we found that 55% of Mohegan Sun Casino workers living in Montville moved to Montville before 1980 or twenty or more years ago. In other words, the majority were Montville residents who took the job at Mohegan Sun Casino when the Casino was established at the present location. Furthermore, nearly 75% of them moved into used or pre-occupied homes rather than new homes. In conclusion, the increasing number of jobs in the expanding casinos has so far brought only moderate increases in population and school enrollments to the area. As shown in Fig. 3-3 below, both the New London-Norwich LMA and the City of Norwich had more resident workers or a larger labor force than the nonfarm jobs located in the areas. As a result, more residents in the Norwich areas are commuting to other areas for work than workers from other areas are commuting to the New London-Norwich LMA.

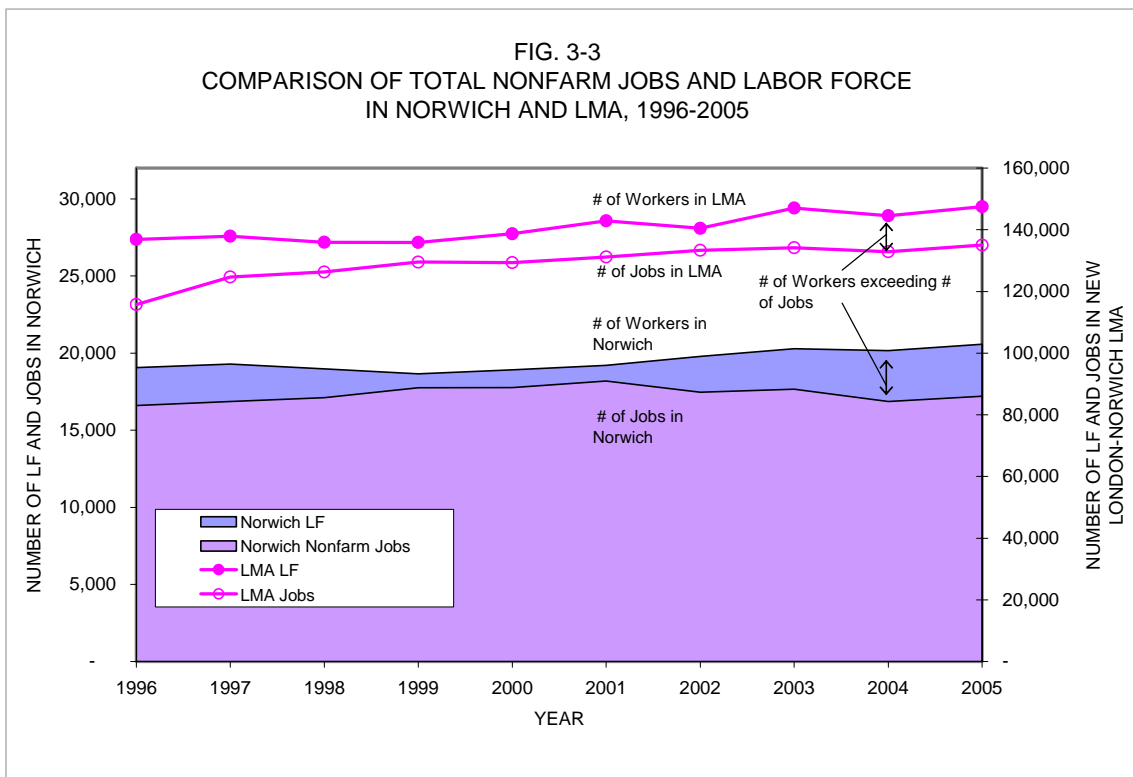


TABLE 3.2
TOTAL LABOR FORCE OF TOWNS IN NEW LONDON-NORWICH LABOR MARKET AREA
1996-2005

Not Seasonally Adjusted

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Change 96-05	Percent Change 96-05	% of Region	Job/ Labor Force Ratio
Bozrah	1514	1473	1464	1444	1468	1514	1415	1444	1438	1471	-43	-2.8%	1.0%	74%
Cantabury	2716	2697	2651	2745	2791	2775	2947	3042	3043	3167	451	16.6%	2.1%	19%
East Lyme	9102	9200	9214	9222	9430	10410	9356	9511	9474	9553	451	5.0%	6.5%	54%
Franklin	924	1113	1092	1083	1105	1146	1140	1168	1161	1183	259	28.0%	0.8%	109%
Griswold	5639	5734	5629	5731	5841	5924	6764	6921	6884	7072	1433	25.4%	4.8%	28%
Groton	18686	18072	17789	17162	17484	17042	18650	19017	18946	19778	1092	5.8%	13.4%	139%
Ledyard	8051	8123	8020	7919	8113	8159	8160	8353	8321	8506	455	5.7%	5.8%	178%
Lisbon	2198	2256	2201	2214	2261	2378	2455	2532	2520	2577	379	17.2%	1.7%	65%
Montville	9874	9973	9790	9648	9823	11333	10546	10785	10729	10808	934	9.5%	7.3%	139%
New London	11551	12733	12469	12981	13196	13105	13324	13498	13469	13588	2037	17.6%	9.2%	116%
N. Stonington	2916	2891	2857	2889	2949	2972	3116	3188	3185	3247	331	11.4%	2.2%	40%
Norwich	19063	19283	18972	18663	18923	19214	19787	20284	20172	20570	1507	7.9%	14.0%	85%
Old Lyme	4003	3800	3774	3773	3857	4334	4123	4183	4162	4218	215	5.4%	2.9%	62%
Old Saybrook	5628	5672	5617	5757	5875	6135	5336	5342	5327	5374	-254	-4.5%	3.6%	111%
Plainfield	7948	8048	7856	8522	8698	8117	6140	9967	8093	8259	311	3.9%	5.6%	54%
Preston	3027	2807	2780	2524	2854	2622	2708	2764	2750	2824	-203	-6.7%	1.9%	29%
Salem	2109	2099	2080	2020	2062	2316	2441	2522	2502	2592	483	22.9%	1.8%	30%
Sprague	1813	1704	1692	1655	1680	1716	1738	1783	1777	1793	-20	-1.1%	1.2%	39%
Stonington	9793	9944	9848	9678	9861	10643	10104	10293	10241	10438	645	6.6%	7.1%	69%
Waterford	10308	10327	10176	10235	10448	11068	10206	10400	10359	10437	129	1.3%	7.1%	107%
LMA Total	136863	137949	135971	135865	138719	142923	140456	146997	144553	147455	10,592	7.7%	100.0%	92%

3.4 Number of Jobs/Workers Ratios

The excess labor force relative to the number of jobs located in an area can be easily expressed as the Job/Worker (J/W) ratio, which can be calculated dividing the number of jobs located in a city/town by the number of people in the labor force living in the city/town. Norwich's J/W ratio was 0.85 in 2005 indicating that Norwich had 0.85 jobs in the town per worker living in the town. However, Norwich is surrounded by towns, which have large J/W ratios; towns contiguous to Norwich have more jobs than workers. For example, the J/W ratio was 1.79 for Ledyard where Foxwoods Resort Casino opened its doors in 1986 and expanded in 1992, 1997 and 2007. Mohegan Sun, the second largest Casino in the area, located its casino in Uncasville, part of the town of Montville, whose Job/Worker ration is 1.39. In addition, there are shoreline communities such as Groton, New London, and Waterford, which have job/worker ratios larger than one. In spite of the fact that many of its U.S. navy-based industries left town, new industries such as Pfizer R&D located their facilities in the Groton/New London sites in June, 2000, replenishing employment opportunities. In conclusion, Norwich is primarily a balanced residential community which is strategically located so that its residents have easy access to major employment centers in the region.

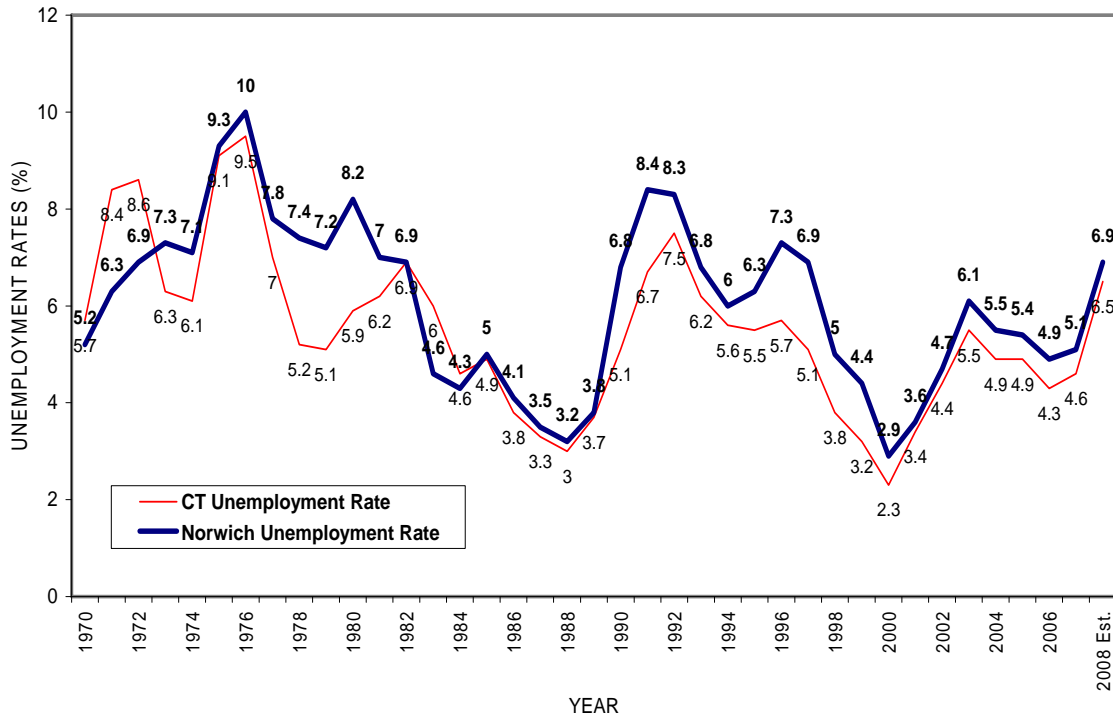
3.5 School Enrollment Projection Assumptions

Based on our analysis of factors contributing to Norwich's growth which was discussed in Section 2 and the strategic location of Norwich as a residential community, various assumptions were adopted in making the public school enrollment projections:

(a) Unemployment Rate: In the 1991-92 economic recession, Connecticut's unemployment rate was as high as 6.7% while Norwich's unemployment rate was 8.4%. The rapid recovery and the ensuing economic boom in the 1990s reduced the unemployment rate for Connecticut to 2.3% and for Norwich to 2.9% as of 2000. However, a mild economic recession in 2001, the tragic event of September 11, the war in Iraq, and economic uncertainty pushed the unemployment rates in 2003 to 5.5% in Connecticut and to 6.1% in Norwich. Following 2003, with moderate economic improvements, the unemployment rate in Connecticut declined to 4.3% and in Norwich to 5.1% in 2006. However, we now find ourselves in the midst of an unprecedented economic crisis in recent years due to excessively leveraged investments without adequate governmental supervision. Thus, our housing market produced large numbers of foreclosures, many large investment banks were found to be insolvent, and the stock market has lost more than 40 percent of its value with severe daily volatility. In such national market conditions, businesses have been laying off a large number of workers pushing up unemployment rates. As of October 2008, the unemployment rate was 6.5% nationally, 6.5% in Connecticut and 6.9% in Norwich. It is reported that the nation's unemployment rate increased to 6.7% in November, and most likely both Connecticut and Norwich's rates increased at the same time. In this economic environment, it is almost impossible to foresee unemployment rates for future years. However, for the purpose of school enrollment projections, it is reasonable to assume that the *long-term* unemployment rates will fluctuate around the *historical averages*. Note from Table 2.3 that the 3-year average unemployment rate was 4.6% for Connecticut and 5.1% for Norwich. On the other hand, the 10-year average rate was 4.1% for Connecticut and 4.8% for Norwich. Accordingly, we assumed for the school enrollment projections a 4.5% to 6.5% unemployment rate for Connecticut and a 5.0%-7.0% rate for Norwich. This means that the enrollment projections should be adjusted upward or downward depending on the economic conditions that may emerge in future years.

The unemployment rate and population growth of Norwich and other towns in the area is greatly dependent on the business conditions of two casinos in the area. In 2008 alone, the Foxwood Resort Casino laid off nearly 900 employees and halted the completion of expansion projects. Similarly, Mohican Sun casino is depending on the normal attrition of employees to reduce its work force, and also stopped the construction of expansion projects. The future of these casinos greatly depends on the national economy, and the situation is still very uncertain and precarious. Clearly, prolonged unhealthy economic conditions would definitely have an adverse impact on public school enrollments in the future.

FIG. 3-4
 UNEMPLOYMENT TRENDS OF CONNECTICUT AND NORWICH
 1970-2008



(b) Births: As shown in Figure 3-5 on the next page, Norwich's births have fluctuated up and down from year-to-year. Following the national and statewide trends since 1990 of declining births, the birthrate in Norwich steadily decreased from 682 births in 1987 to 474 births in 1997. From this low point, the birthrate in Norwich has been gradually increasing, with 535 births recorded in 2007 in spite of annual fluctuations.

For the school enrollment projections, the number of future births was calculated applying unemployment rates of 5.5%-6.0% for Connecticut and 6.0%-7.0% for Norwich using Equation 2.1 (see Table 3.3 Column (A)). In spite of the statewide decline in the number of births, it is *assumed* that *Norwich's births will fluctuate between 510 – 530 births per year*.

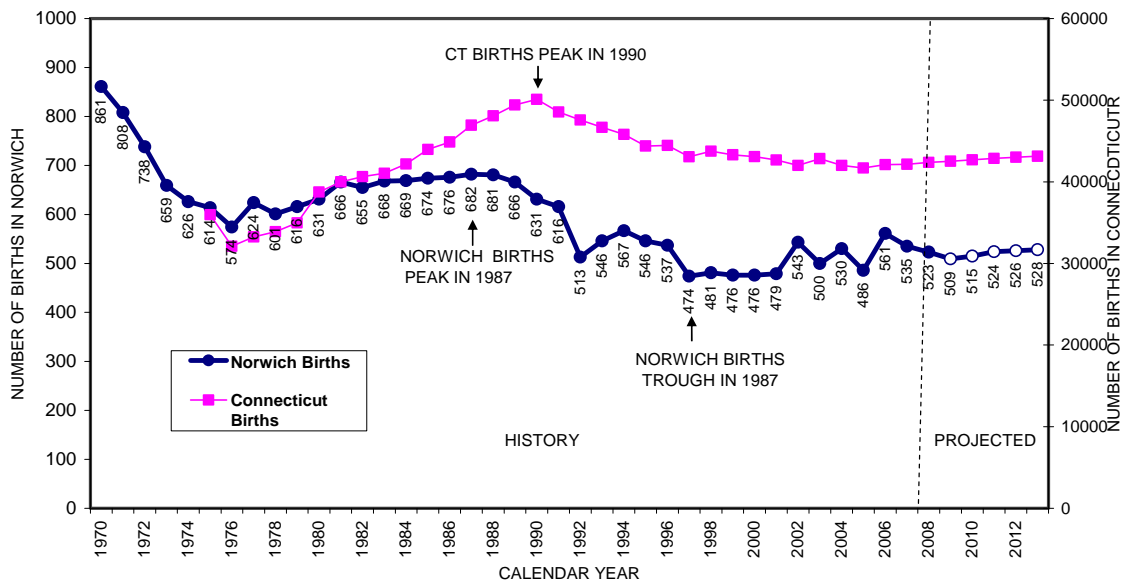
TABLE 3.3
PROJECTED BIRTHS IN NORWICH UNDER DIFFERENT
ASSUMPTIONS, 2008-2013

	Multiple Regression Projected Births 1990-2007*	Multiple Regression Projected Births 1991-2008**	Average of (A) and (B) projections (C)
	(A)	(B)	(C)
2007 (Actual)	535	535	535
2008(Est.)	540	505	523
2009 (Proj.)	520	497	509
2010	510	520	515
2011	518	529	524
2012	520	532	526
2013	531	525	528

*Projections based on a Regression equation which is derived by including estimated 540 births in 2008.

** Projections based on a regression equation which is derived by excluding estimated 540 births in 2008.

FIG 3-5
BIRTH TRENDS IN CONNECTICUT AND NORWICH 1970-2008
AND PROJECTIONS, 2009-2013



Actually, we have calculated two sets of projections for Norwich's birthrate between 2008 and 2013 as shown in Table 3.3. Figures in Column (A) were calculated by regression equation 2.1 which was derived based on the 1991-2007 data, excluding 540 births estimated for 2008. On the other hand, the column (B) figures were calculated by a regression equation which was derived by applying the 1991-2008 data, including 540 births estimated for 2008 (see Equation 2.1-a in Section 2). For the enrollment projections, we adopted the column C figures which are the averages of the column (A) and column (B) projections. (See Fig. 3-6)

(c) Housing Net Gains: It is assumed that 80-120 net gains of homes or an average of 100 units will be annually added to the Norwich housing inventory between 2009 and 2013. As shown in Table 2.7, this assumption is consistent with the 3-, 5-, and 10-year averages. (See also Appendix Table 3-A)

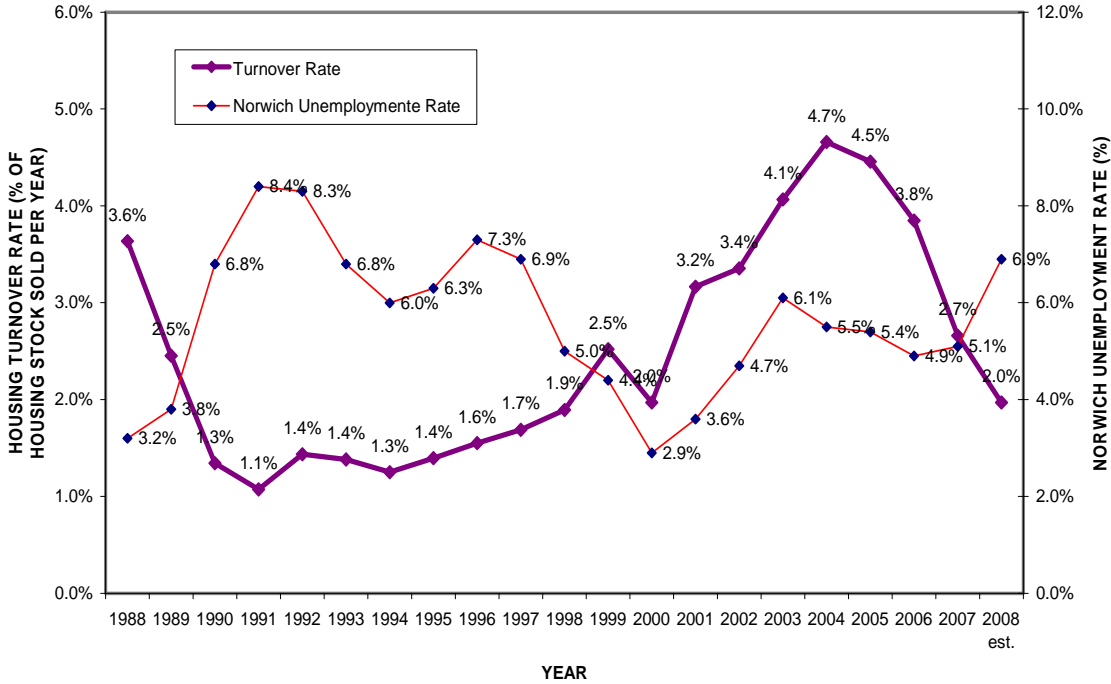
(d) Nonpublic School Enrollment: It is also assumed that the percentage of resident K-12 students enrolled in nonpublic schools will remain at approximately 15.0%-16.0%. This assumption is consistent with the 3-, 5-, and 10-year averages as shown in Table 2.6. A one-percent change in nonpublic school enrollment would signify a change in public school enrollment by 63 K-12 students per year. More specifically, we assumed that the percent of Norwich students attending nonpublic schools would be 16.0% (a range of 15.5%-16.5%) for grades K-5, and 15.5% (a range of 15%-16%) for grades 6-8, consistent with the historical averages. On the other hand, we assumed that the percentage of nonpublic school students enrolled in high school would range from 16%-17%, not including Norwich residents enrolled at NFA.

(e) Housing Turnover (Home Sales): We assume that roughly 450-600 homes, mostly used homes, will be sold per year during the next 10 years. Of these, an estimated 80-100 units will be *new* homes (17%), and the remaining units (83%) will be used homes. Undoubtedly, there will be considerable fluctuation in the housing market, depending on the prevailing economic conditions of the next ten years. The strength of housing sales in a town can be measured in terms of the housing turnover rate, the percent of housing stock which was sold in a year. In Norwich, the housing turnover rate increased from 1.1% in 1991 to 4.7% in 2004. Clearly, during the 1990's Norwich experienced a very low level of home sales, but it was invigorated in the early 2000's. However, since 2004, the turnover rate has been declining due to the economic downturn, reaching 2.0% in 2008.

As shown in the equation below, the housing turnover rates in Norwich (TURN) are positively affected by DU(T), the number of new housing units built in a given year T, and inversely affected by Norwich's unemployment rate in the year T, UNW(T). Note that the variable DU is also negatively impacted by UNW, and it is clear that unemployment rates would have a significant impact on the housing turnover rate. The inverse relationship between TURN and UNW is also illustrated by Figure 4-5 on the next page.*

$$\begin{aligned}
 [3.1] \quad \text{TURN} &= 0.009046 \text{ DU}(T) - 0.13541 \text{ UNW}(T) + 0.083667 T && [1988 - 2008] \\
 &\quad (6.92) \qquad \qquad (-2.71) \qquad \qquad (7.61) \\
 R^2 &= 0.814 \qquad \text{SEE} = 0.495 \qquad \text{DW} = 2.15 \qquad \text{MDV} = 2.481
 \end{aligned}$$

FIG. 3-6
HOUSING TURNOVER RATE AND UNEMPLOYMENT RATE
NORWICH, 1988-2008



(f) Educational Policies: It is assumed that there will be no major changes in educational policies with respect to kindergarten programs, grade retention, pre-kindergarten programs, and special education/need programs.

(g) Economic Development and Land Use Policy: Changes in land use policy such as zoning regulations, policies on affordable housing or transportation systems, and the economic development of Norwich could have significant impacts on public school enrollment through their influence on residential development and population growth. It is assumed that these policies will not change significantly over the next ten years.

3.6 Summary of Assumptions

The assumptions discussed so far are summarized below:

TABLE 3.4
ASSUMPTIONS ADOPTED FOR ENROLLMENT PROJECTIONS
NORWICH PUBLIC SCHOOLS

	Assumptions
Unemployment Rate:	
Connecticut	4.5.0%-6.5%
Norwich	5.0%-7.0%
Births	510 ~ 530 births per year for the next five years.
New Homes	On average 80 ~ 100 units per year.
Home Sales	450 ~ 600 home sales per year (17% new home sales and 83%t used home sales)
Nonpublic School Enrollment	Approx. 15.0%~16.0% of K-12 resident students in nonpublic schools. K-5: 15.5~16.5% 6-8: 15~16% 9-12: 16 ~ 17%
Educational Policies	Extended-day kindergarten. No significant changes in the kindergarten retention policy. No major expansion of school capacity.
Land Use Policies	No significant changes. No downzoning.

3.7 Alternate Projections with Different Assumptions

When a different scenario or set of assumptions is adopted, a different set of enrollment projections results. *Thus, the adoption of the most likely assumptions is of paramount importance.* A set of projections is only as good as the assumptions upon which it is based.

APPENDIX TABLE 3- A
FACTORS INFLUENCING NORWICH PUBLIC SCHOOL ENROLLMENTS, 1998-2008

Year	Births (State Data) (1)	Housing Net Gain (2)	Home Sales (3)	% of K-12 in Nonpublic schools (4)	Ridgefield Unemployment Rate (5)
1998	481	-2	314	13.0%	5.0
1999	476	9	418	13.2%	4.4
2000	476	16	327	13.0%	2.9
2001	479	15	526	12.2%	3.6
2002	543	131	562	16.3%	4.7
2003	500	241*	691	16.7%	6.1
2004	530	223*	802	15.7%	5.5
2005	486	218*	777	15.5%	5.4
2006	561	136*	676	15.7%	4.9
2007	535	69	469	15.7%	5.1
2008 (est.)	523	24	348	NA	6.5
1999-2008 Change:					
3-yr. Avg.	540	76	498	15.6%	5.5
5-yr. Avg.	527	134	614	15.9%	5.5
10-yr. Avg.	511	108	560	14.7%	4.9
W. 3-yr. Avg.	533	58	443	15.7%	5.8
W. 5-yr. Avg.	529	98	533	15.7%	5.6
Assumption:					
2008-2013	510-530	80 - 100	450 - 600	15.0% - 16.0%	5.0%- 7.0%

Sources: Column (1) - Connecticut Department of Public Health; Col. (2) - Connecticut Department of Economic and Community Development; Col. (3) - Warren Information Service; Col. (4) - Connecticut Department of Education
Col. (5) - Connecticut Department of Labor. 2008 data are estimates based on incomplete data. *A major portion of the units is 2-BR condominiums.

4 NORWICH PUBLIC SCHOOL ENROLLMENT GROWTH TRENDS 1985-2008

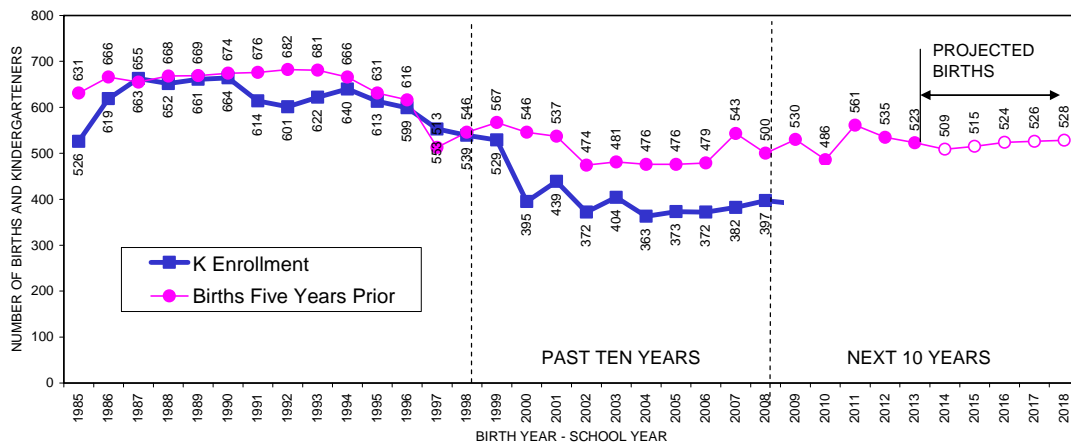
4.1 Norwich Public School Enrollment Growth Trends

In this section, we try to understand the ways in which the factors identified in Section 2 have actually affected enrollment in Norwich public schools over the past 23 years, between 1985 and 2008. As we already discussed the trends in births in Section 2, we begin this section with an analysis of kindergarten enrollment because all upper grade enrollments are derived from the kindergarten enrollment. Obviously, the kindergarten cohort of today will grow up to become the twelfth-graders of tomorrow.

4.2 Kindergarten Enrollment

Kindergarten enrollment in 1985 was 526 students, increasing sharply until 1990 when it reached a high of 664 students -- a gain of 138 students or 19% within a span of five years. Subsequently, K enrollment reversed course and reached a low of 363 students in 2004, a loss of 281 students or a decline by 43.6% in 14 years. Since then, K enrollment has increased slightly, registering 397 kindergarten students in 2008. It appears that the long-term trend of K enrollment in Norwich has been a gradual decline. However, it is unclear from observing past trends in K enrollment alone whether K enrollment is going to decline or increase. Yet the trends seem to indicate that future K enrollment in Norwich will parallel the trend in births of Connecticut and plateau or even grow, as shown in Figure 4-1 below.

FIG. 4-1
BIRTHS AND KINDERGARTEN ENROLLMENT HISTORY (1985-2008) AND PROJECTIONS (2009-2018) NORWICH PUBLIC SCHOOLS



According to regression equation 4.1 shown below, K(T), kindergarten enrollment in a given year T, is dependent on BWH(-5) and BCT(-5), the number of births in Norwich and Connecticut five years ago, respectively; and COSALES(-10), the sales of condominiums ten years ago.* The figures in parentheses in the second row are t-ratios; R² = the coefficient of determination; SEE = Standard Error of Estimates; and D.W. = Durbin-Watson statistics. The R² is 0.931 indicating that 93.1% of the variability of kindergarten enrollments during the last ten years is explained by the three variables included in the equation.

$$[4.1] \quad K(T) = -694.3 + 0.3790BWH(-5) + 0.0201 BCT(-5) + COSALES(-10) \quad [1998-2008]$$

(-2.60)	(2.05)	(3.00)	(-3.00)
R ² = 0.931	SEE = 16.62	D.W. = 3.04	MVD = 413.5

As expected, it was found that Norwich’s kindergarten enrollments were positively related to the number of births in Norwich and in Connecticut five years ago and were also impacted by the number of condominium sales ten years ago. In general, the impact of new home construction and home sales on public school enrollment is small at the beginning and greater in later years. Thus, condominiums or multi-family units built ten years ago are shown to have had their maximum impact on Norwich's K enrollment, as described by the Family Cycle Model on page 2-21 of this report. The kindergarten enrollment in Norwich annually deviated from the trend line within a range of ±33 students or ±8% (2 S.E.E.s) for 95% of the time.

4.3 Enrollment Data by Grade and Grade Level

Table 4.1 on the next page presents the enrollment data by grade and grade level. In this table, there are two panels, Panel A and Panel B. Grade enrollments in Panel A include all the special education and special needs (ESL and bilingual) students; they are not separately listed as ungraded. On the other hand, Panel B presents the grade-by-grade enrollment data excluding special education and special needs students, which are listed separately as enrollments in Hickory Street School, DTZ School, and TRA (Thames River School), and other K-8 students who are listed as special education/needs students. We will use these Panel A and Panel B enrollments in projecting future enrollments in Section 5 of this report. When the enrollments are forecast using Panel B data, special education/needs students are not projected.* In contrast, when the enrollments are projected based on the Panel A data, special education/needs enrollments are also projected as part of the overall graded enrollments. The differences of projected enrollments between Panel A and Panel B may indicate the special education/needs enrollments by grade.

*Customarily, pre-k, special education and needs enrollments are not projected because they are small in number and severely fluctuate annually and are prone to yield large percentage errors when projected.

TABLE 4.1
 NORWICH PUBLIC SCHOOLS ENROLLMENT HISTORY
 1985-2008 (AS OF OCTOBER 1)

Panel A: Fully-graded K-8 grade enrollments include special education and ESL students. Grades 9-12 enrollments include Norwich resident students attending Norwich Free Academy (NFA) but exclude students from Thames River Academy and DTZ schools.

As of Oct. 1	NFA Only												NFA			K-12	PK-12	Sp* Ed	NW HS**		
	PK	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5					6-8	9-12
1985	69	526	416	452	377	368	346	348	382	405	397	375	333	357	2,485	1,135	1,462	5,082	5,151	158	28
1986	68	619	460	391	442	386	372	332	373	373	320	383	348	320	2,670	1,078	1,371	5,119	5,187	152	43
1987	50	663	433	416	390	437	372	355	360	350	290	349	351	343	2,711	1,065	1,333	5,109	5,159	145	41
1988	60	652	432	402	406	386	433	379	361	360	281	283	307	328	2,711	1,100	1,199	5,010	5,070	129	50
1989	48	661	447	418	393	406	372	428	390	341	303	291	268	297	2,697	1,159	1,159	5,015	5,063	116	57
1990	59	664	495	476	416	399	418	366	422	379	291	310	293	301	2,868	1,167	1,195	5,230	5,289	115	28
1991	70	614	484	476	465	404	407	423	365	402	330	296	297	287	3,273	767	1,210	5,250	5,320	139	43
1992	76	601	464	452	444	454	391	401	432	349	317	322	295	291	2,806	1,182	1,225	5,213	5,289	133	41
1993	89	622	430	446	434	442	441	390	403	397	303	317	313	296	2,815	1,190	1,229	5,234	5,323	151	50
1994	101	640	451	447	453	443	443	447	402	401	282	283	300	288	2,877	1,250	1,153	5,280	5,381	41	49
1995	94	613	477	443	444	441	441	437	451	408	280	282	282	294	2,859	1,296	1,138	5,293	5,387	35	46
1996	81	599	458	457	424	436	438	422	442	441	336	303	300	244	2,812	1,305	1,183	5,300	5,381	Na	46
1997	91	553	386	417	439	405	414	420	430	416	363	308	304	251	2,614	1,266	1,226	5,106	5,197	na	43
1998	143	539	402	387	415	423	394	418	411	437	379	337	271	255	2,560	1,266	1,242	5,068	5,211	217	65
1999	180	529	385	404	399	397	422	390	433	425	374	375	300	270	2,536	1,248	1,319	5,103	5,283	177	74
2000	182	395	513	387	405	386	389	411	417	429	353	374	352	276	2,475	1,257	1,355	5,087	5,269	219	86
2001	216	439	391	523	402	411	390	412	417	422	403	373	326	319	2,556	1,251	1,421	5,228	5,444	157	121
2002	165	372	442	391	520	423	414	388	434	412	421	398	317	298	2,562	1,234	1,434	5,230	5,395	205	124
2003	148	404	375	417	403	508	428	409	410	422	453	429	338	304	2,535	1,241	1,524	5,300	5,448	165	90
2004	190	363	388	394	433	394	528	415	416	406	462	386	391	331	2,500	1,237	1,570	5,307	5,497	194	126
2005	232	373	377	383	378	425	407	518	417	414	464	454	409	349	2,343	1,349	1,676	5,368	5,600	207	50
2006	243	372	377	384	387	370	417	382	504	416	437	413	364	354	2,307	1,302	1,568	5,177	5,420	223	109
2007	242	382	389	383	397	412	369	419	388	501	447	448	337	320	2,332	1,308	1,552	5,192	5,434	258	99
2008	253	397	408	397	363	408	407	379	409	386	473	438	373	315	2,380	1,174	1,599	5,153	5,406	209	90

Source: Connecticut State Department of Education. * Special Education/need students are graded and included in K-8 enrollments. ** Alternative high school students in Norwich High School (or Thames River Academy) are not included in grades 9-12 enrollments. Historical data between 1985 and 1997 are reasonably accurate but not 100% accurate because they are obtained from various sources which provided somewhat different figures.

Panel B: Partially-graded PK-8 grade enrollment *excludes* special education/need students. Grades 9-12 enrollments exclude DTZ enrollments. TRA (alternative high school) enrollments are separately shown as graded.

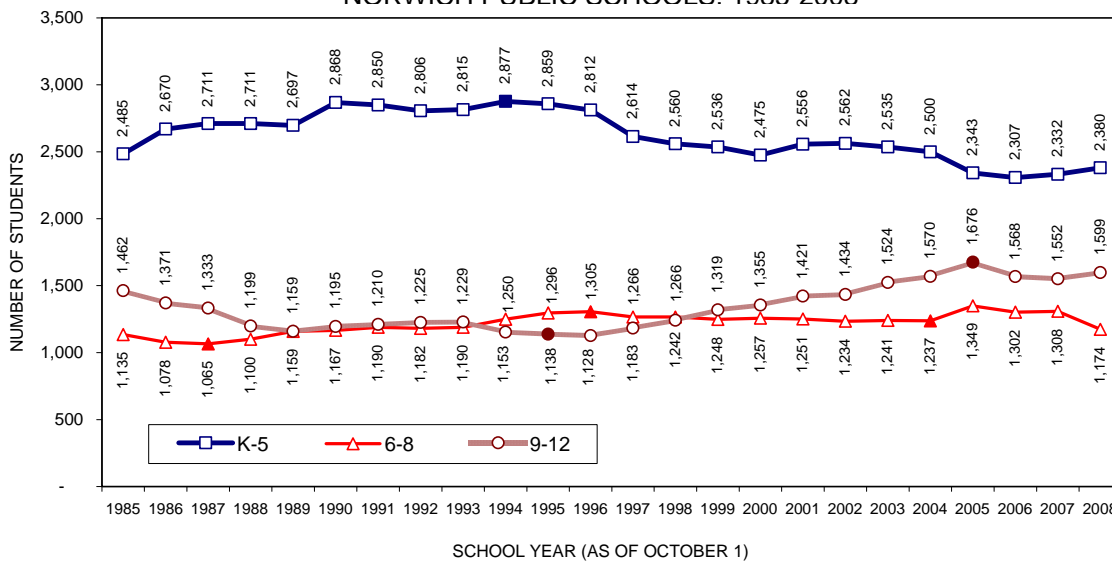
As of Oct. 1	NFA												NFA			K-12	PK-12	Sp* Ed	NW HS**		
	PK	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5					6-8	9-12
1998	127	520	381	363	401	405	374	390	396	407	379	337	271	255	2,444	1,193	1,242	4,879	5,006	217	62
1999	176	510	371	381	377	386	402	372	415	395	374	375	300	270	2,427	1,182	1,319	4,928	5,104	165	65
2000	174	387	492	373	379	365	375	404	396	410	353	374	352	276	2,371	1,210	1,355	4,936	5,110	219	60
2001	213	427	376	504	389	387	371	405	402	402	403	373	326	319	2,454	1,209	1,421	5,084	5,297	157	98
2002	159	355	424	370	490	402	392	382	417	388	420	397	317	297	2,433	1,187	1,431	5,051	5,210	205	74
2003	141	391	363	391	387	479	404	397	396	406	453	429	338	302	2,415	1,199	1,522	5,136	5,277	165	82
2004	187	341	375	380	404	374	491	397	392	387	462	386	390	331	2,365	1,176	1,569	5,110	5,297	233	84
2005	225	360	369	372	365	399	382	493	398	384	464	455	409	349	2,247	1,275	1,677	5,199	5,424	207	85
2006	223	357	367	370	369	349	396	367	476	389	437	413	364	354	2,208	1,232	1,568	5,008	5,231	223	75
2007	185	364	381	368	378	392	350	388	370	477	447	448	337	320	2,233	1,235	1,552	5,020	5,205	258	80
2008	216	381	394	384	348	386	382	370	385	369	473	438	373	315	2,275	1,124	1,599	4,998	5,214	225	90

Source: Norwich Public Schools and Norwich Free Academy. *Special education/need students are not included in the K-8 enrollments;. ** Norwich High School students are not included in grades 9-12 enrollments.

4.4 Grades K-5 Enrollment

Grades K-5 enrollment was 2,485 pupils in 1985, but it increased to 2,877 students in 1994, a gain of 392 students or +15.8% in nine years. Since then, the trend has reversed itself and K-5 enrollment has been declining and reached 2,368 students in 2008, registering a loss of 509 students (-17.7%) within a span of 14 years or an average loss of 36 students per year. Will it continue to decline or increase over the next ten years?

FIG. 4-2
GRADES K-5, 6-8 AND 9-12 ENROLLMENT HISTORY
NORWICH PUBLIC SCHOOLS. 1985-2008



The growth pattern of enrollment in grades K-5 during the past 17 years (1991-2008) is well captured by the following regression equation:

$$\begin{aligned}
 [4.2] \quad K5 = & 0.070914 \text{ BCT}(-5) - 59.32022 \text{ UCT}(-3) - 11.34924 \text{ T} & [1991-2008] \\
 & (32.42) & (-4.73) & (-5.05) \\
 R^2 = & 0.907 & \text{SEE} = 62.04 & \text{D.W.} = 1.76 & \text{MVD} = 2589.7
 \end{aligned}$$

where the variable BCT(-5) is the number of births in Connecticut five years prior, UCT(-3) is the annual average unemployment rate in Connecticut three years ago, and T is the time variable in which 1970 is set to zero (1970 = 0). From this equation, note that the growth pattern of Norwich elementary school enrollments is closely related *not* to the births in Norwich but to the number of births in Connecticut as a whole. At the same time, the growth of K-5 enrollments in Norwich has been negatively impacted by the unemployment rate of Connecticut in the year T: as many as 59 K-5 students were lost when Connecticut's unemployment increased by one percent or vice versa. The coefficient of variable T indicates that the long-term trend has been that Norwich's K-5 enrollment declined by 11 students each year since 1991. The equation indicates that 90.7%

($R^2=0.907$) of the variations in the K-5 enrollment for a given (current) year can be explained by the independent variables included in the equation. The SEE (Standard Error of Estimates) of the regression shows that 95% of the time, annual variations in grades K-5 enrollment fall within a range of ± 124 ($62 \times 2 = 124$ or 2 SEE's) students from the expected mean of grade K-5 enrollments. The SEE also implies that on average the margin of error is within $\pm 4.8\%$ ($124 \div 2590$) at the 95% confidence level. In sum, Equation 4.2 is a reasonably accurate model that describes K-5 enrollment growth during the past 17 years.

4.5 Grades 6-8 Enrollment

As shown in Figure 4-2, Middle school or grades 6-8 enrollment grew from 1,065 students in 1987 to 1,305 students in 1996, gaining 240 students or by 22.5% within nine years. It then gradually declined to a level of 1,237 students in 2004, losing 68 students or 5.2% in eight years. Thereafter, middle school enrollment increased again for a few years but subsequently declined to 1,124 students in 2008. The long-term pattern of the middle school enrollment is that it did not fluctuate significantly during those twenty years.

$$[4.3] \quad G68(T) = 1.2472 \text{ BNW}(-11) + 0.5076 \text{ NETGAIN}(-1) + 0.2464 \text{ NETGAIN}(-8) + 13.8482 T \quad [1991-2008]$$

$$\begin{array}{cccc} (18.05) & (4.55) & (2.46) & (10.16) \\ R^2 = 0.604 & \text{SEE} = 30.07 & \text{D.W.} = 2.56 & \text{MDV} = 1249.8 \end{array}$$

According to the multiple regression equation 4.3 shown above, the middle school enrollment (grades 6-8) in a given year was positively related to the number of births among Norwich residents eleven years ago, $\text{BNW}(-11)$, the net gains in housing stock a year prior, $\text{NETGAIN}(-1)$ and eight years prior, $\text{NETGAIN}(-8)$, and the time variable T where 1970=0. It must be noted that the number of elementary school enrollments in previous years were not found to be closely related to the ensuing middle school enrollments. This is due to the fact that the pattern of grades K-5 enrollment is quite different from the pattern of grades 6-8 enrollment as illustrated in Figure 4-2 on the previous page. It is also clear that the net gains in housing stock in the city have long-term impact on middle school enrollments in accordance with the Family Cycle Model (see page 2-21).

The variables included in the equation explained 60.4% of all variations in middle school enrollment ($R^2 = 0.604$) between 1991 and 2008. The SEE also implies that on average the margin of error is within $\pm 9.6\%$ ($60 \div 1250$) at the 95% confidence level. In sum, Equation 3.3 is not a very accurate model to describe middle school enrollment growth during the past 17 years.

4.6 Grades 9-12 Enrollment

The majority of Norwich resident high school students attend Norwich Free Academy and Table 4-1 shows only the NFA enrollments, excluding DTZ and TRA enrollments. The number of Norwich

high school students in NFA was 1,462 students in 1985, but slowly decreased to a low of 1,138 students by 1995, resulting in a decline of 324 students or 22.2% in ten years. Then, the Norwich high school enrollment in NFA began to ascend, reaching a level of 1,676 students in 2005, an addition of 538 students, or 47.3%, within ten years. However, the Norwich enrollment in NFA dipped again and reached the level of 1,599 students in 2008. It is therefore difficult to foresee future trends in Norwich high school enrollment in NFA.

$$[4.4] \quad G912(T) = 0.1645 K5(-9) - 28.917 UCT(-5) + 33.782 T \quad [1994-2008]$$

$$\quad \quad \quad (6.27) \quad \quad (-4.94) \quad \quad (19.03)$$

$$R^2 = 0.974 \quad SEE = 28.92 \quad D.W. = 2.32 \quad MDV = 1397.0$$

According to the multiple regression equation 4.4 shown above, the Norwich high school enrollment in NFA in a given (current) year is positively related to the variable K5(-9), the K-5 enrollments nine years prior; UCT(-5), the annual average unemployment rate of Connecticut five years prior, and the time variable T. It is important to note that it is not the middle school enrollments but the past elementary school enrollments which have statistically significant correlations with the high school enrollments. The three variables included in the equation explained 97.4% of all variations in high school enrollment during the past fourteen years (1994-2008). Clearly, the high school enrollments are largely determined by past events. The range of error for the estimates is plus or minus 57.8 (2 SEEs) students out of, on average, 1,397 high school students, or $\pm 4.1\%$ for a 95% confidence level. In sum, Equation 4.4 is reasonably an accurate model that describes high school enrollment growth during the past 14 years.

4.7 Trends of Cohort-Survival Ratios

Practically all school districts use only the Cohort-Survival Method (CSM) for making enrollment projections. This method traces annual changes in cohort-survival or retention ratios, which are derived by dividing the lower grade enrollment of a year ago into the current grade enrollment. The advantages of the CSM are that it is simple to use and easy to understand. Over the years, the method has shown itself capable of producing fairly accurate projections as long as it can initially project the size of kindergarten classes accurately, and as long as the retention ratios are stable. However, the CSM is limited because it relies on one variable, the previous year's enrollment, and the stable retention ratios are assumed as shown by the equation below:*

$$[4.5] \quad G(T) = f G(-1)$$

$$[4.6] \quad G(T) = a + b G(-1) \quad \text{where } a=0 \text{ or } G(T) = b G(-1)$$

* Similarly, the kindergarten enrollments are projected by:

$$4.7 \quad K(T) = f B(-5)$$

$$4.8 \quad K(T) = a + b B(-5) \quad \text{where } a=0 \text{ or } K(T) = b B(-5)$$

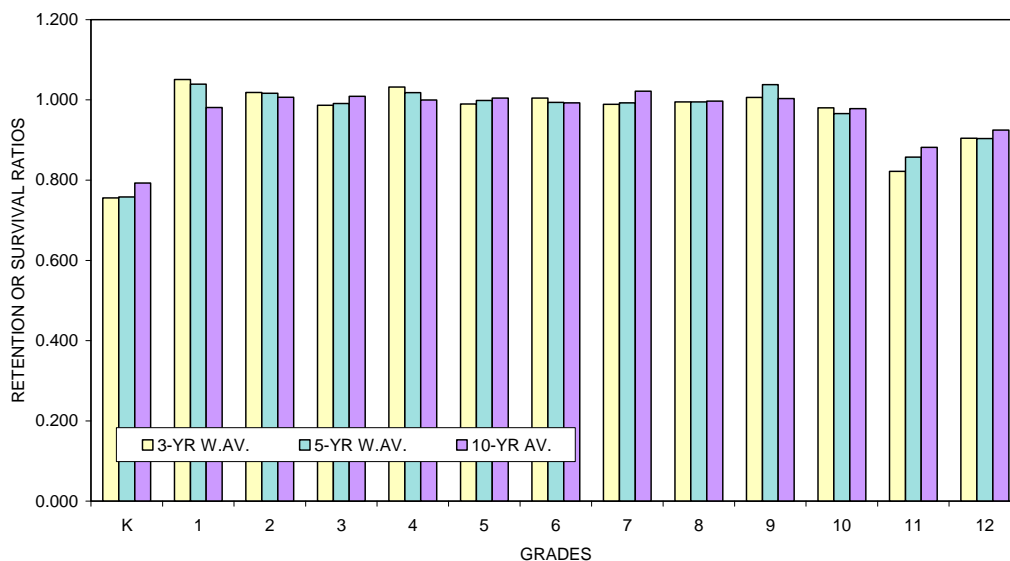
Where K(T) = kindergarten enrollments in the current year T; B(-5) = the number of births five years ago; a = constant; and b = coefficient of variable B(-5).

Equation 4.5 says that $G(T)$, grade enrollment in current year T , is a function of $G(-1)$, its enrollment in the previous year. When Equation 3.1 is expressed in a linear form, it is expressed as Equation 4.6 where b is the coefficient of independent variable $G(-1)$. In short, the CSM is a Simple (one variable) Linear Regression Method where the independent variable coefficient b = survival ratio, and $a = 0$. The coefficient b is usually estimated by 3- or 5-year average survival ratios.

Table 4.2 on page 4-9 compares the 3-, 5-, and 10-year average survival ratios for Norwich as well as the b coefficient estimated by the Simple Regression Method. For each b , the R^2 is also shown. In addition, the maximum and minimum survival ratios experienced since 1996 are included. From this table and Figure 4-3 below, observe the following:

- 1) The variations among the 3-, 5-, and 10-year average cohort survival ratios are very small and the past trends are irregular among the grades, that is, no distinct trends are exhibited. Thus, it is likely that the application of these survival ratios would yield more or less the same enrollment projections and we cannot foresee which survival ratios are going to produce high or low enrollment projections.

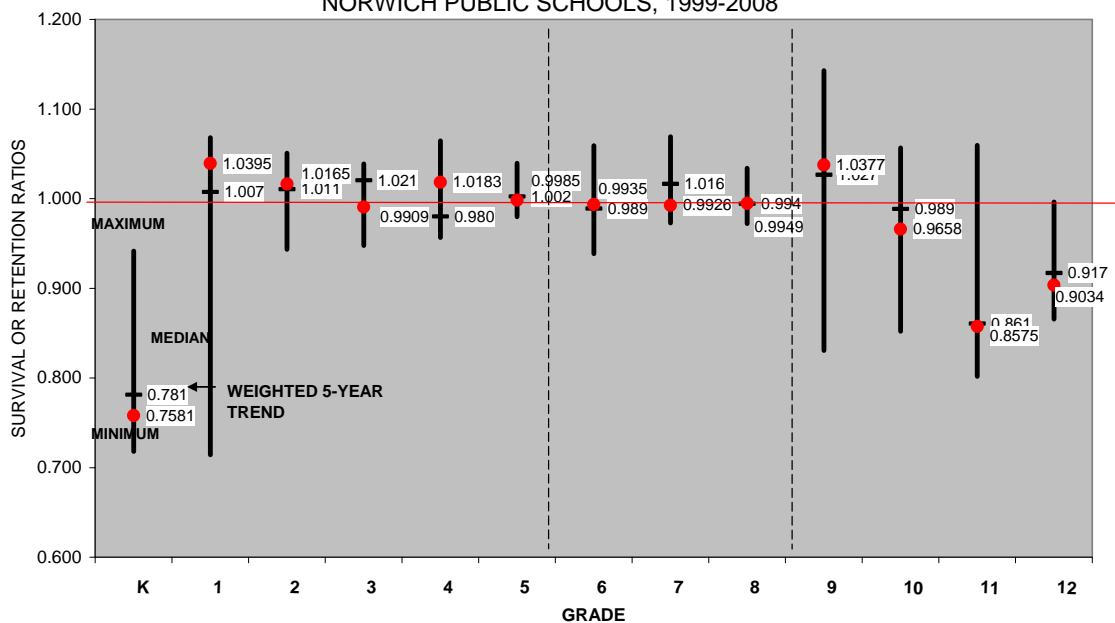
FIG. 4-3
3-, 5-, AND 10-YEAR AVERAGE SURVIVAL RATIOS
NORWICH PUBLIC SCHOOLS, 1999-2008



- 2) Stability or Variability Index of Survival Ratios: As noted earlier, the stability assumption of the b coefficient or the survival ratio is crucial in applying the constant survival ratios derived from

past trends to the next ten years. We have chosen the max-min range* (see Table 4.2) to assess the variability of survival ratios during the past 10 years. A broad max-min range indicates that survival ratios varied considerably from year to year, and a narrow max-min range indicates that survival ratios did not change much from year to year. Thus, a large max-min range indicates less stability than does a small max-min range. From Table 4.2 and also from Figure 4.4, it is clear that the max-min ranges of the kindergarten, 1st, and 9th thru 12th grades are relatively large indicating the difficulty of forecasting these grade enrollments. Note that the first grade has the largest mini-max range, followed by the ninth grade.

FIG. 4-4
MINI-MAX RANGE OF INTER-GRADE ENROLLMENT SURVIVAL RATIOS
NORWICH PUBLIC SCHOOLS, 1999-2008



* A better index for assessing the stability of survival ratios is the *standard deviation* of b. The standard deviation measures the extent of spread or dispersion of the b coefficient in various years from its mean. Thus, when survival ratios are very different from each other, the standard deviation is large, and when survival ratios are more or less the same, the standard deviation is small. In short, a large standard deviation signals that survival ratios are not stable (they are highly variable from year to year), while a small standard deviation indicates that survival ratios are temporally stable (do not change too much from year to year).

Table 4.2
 GRADES K-12 COHORT-SURVIVAL RATIOS
 NORWICH PUBLIC SCHOOLS, 1998-2008

BIRTH YEAR	SCHOOL														
	BIRTHS	YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12
1993	546	1998	0.980	0.727	1.003	0.995	0.964	0.973	1.010	0.979	1.016	0.911	0.928	0.880	0.839
1994	567	1999	0.941	0.714	1.005	1.031	0.957	0.998	0.990	1.036	1.034	0.856	0.989	0.890	0.996
1995	546	2000	0.726	0.970	1.005	1.002	0.967	0.980	0.974	1.069	0.991	0.831	1.000	0.939	0.920
1996	537	2001	0.840	0.990	1.019	1.039	1.015	1.010	1.059	1.015	1.012	0.939	1.057	0.872	0.906
1997	474	2002	0.781	1.007	1.000	0.994	1.052	1.007	0.995	1.053	0.988	0.995	0.985	0.850	0.911
1998	481	2003	0.842	1.008	0.943	1.031	0.977	1.012	0.988	1.057	0.972	1.100	1.021	0.851	0.953
1999	476	2004	0.762	0.960	1.051	1.038	0.978	1.039	0.970	1.017	0.990	1.095	0.852	0.911	0.979
2000	476	2005	0.782	1.039	0.987	0.959	0.982	1.033	0.981	1.005	0.995	1.143	0.983	1.060	0.893
2001	479	2006	0.754	1.011	1.019	1.010	0.979	0.981	0.939	0.973	0.998	1.056	0.890	0.802	0.866
2002	543	2007	0.718	1.046	1.016	1.034	1.065	0.997	1.005	1.016	0.994	1.075	1.025	0.816	0.879
2003	500	2008	0.751	1.031	0.987	0.909	0.972	0.927	1.003	0.919	0.951	0.944	0.980	0.833	0.935
3-YR AV.			0.752	1.041	1.016	0.996	1.021	0.985	0.988	0.978	0.988	1.025	0.965	0.817	0.893
5-YR AV.			0.760	1.025	1.017	0.997	1.005	1.005	0.983	0.991	0.990	1.062	0.946	0.884	0.910
10-YR AV.			0.793	0.981	1.006	1.008	0.999	1.003	0.992	1.019	0.995	1.003	0.978	0.882	0.924
W. 3-YR AV.			0.757	1.051	1.015	0.984	1.028	0.984	1.002	0.973	0.983	1.006	0.980	0.822	0.905
W. 5-YR AV.			0.759	1.040	1.014	0.989	1.016	0.994	0.992	0.982	0.987	1.038	0.966	0.858	0.903
MIN.			0.718	0.714	0.943	0.943	0.957	0.976	0.939	0.945	0.972	0.831	0.852	0.802	0.866
MAX.			0.941	1.068	1.051	1.039	1.065	1.039	1.059	1.069	1.034	1.143	1.057	1.060	0.996
RANGE (Spread)			<u>0.224</u>	<u>0.354</u>	0.107	0.096	0.108	0.064	0.121	0.124	0.062	<u>0.312</u>	<u>0.205</u>	<u>0.258</u>	0.131
MEDIAN			0.782	1.007	1.009	1.021	0.980	1.002	0.989	1.016	0.992	1.025	0.987	0.862	0.916
Simple Regression Coeff. (1991-2008)			0.878	0.810	0.983	0.988	0.987	0.993	0.989	1.011	0.983	0.921	0.973	0.908	0.920
R BAR SQ			<u>0.722</u>	<u>0.445</u>	0.835	0.829	0.847	0.882	0.884	0.774	0.837	<u>0.290</u>	0.855	<u>0.420</u>	<u>0.707</u>
S.E.E.			<u>56.6</u>	<u>70.3</u>	16.3	15.8	12.5	12.1	10.9	14.2	12.5	<u>55.1</u>	22.3	29.3	16.9
MDV			461	421	421	422	420	418	415	420	415	382	363	326	297
Avg. Margin of Projection Deviations (95% confidence level)			±25%	±33 %	±8%	±7%	±6%	±6%	±5%	±7%	±6%	±29%	±12%	±18%	±11%

Source: H. C. Planning Consultants, Inc.

- 3) The R² statistics of the Simple Regression Method or Cohort-Survival Method show very low values for grades K, 1, 9, 11 and 12 over the 10 years between 1999 and 2008. These small R square statistics coupled with large SEEs indicate that it is probable that the enrollment projections using the cohort survival methods for Norwich are unreliable (produced ±25% margin of projection deviations for K, 33% for grade 1, 29% for grade 9, and 18% for grade 11). Although many other Connecticut school districts also exhibit small R square values for K and 9th grades (thus, a probability of high projection deviations), Norwich has especially small R squares and large SEEs for many grades other than K and 9, indicating the high unreliability of enrollment projections. *

* Although R^2 of 0.722 for Norwich is reasonably large, unusually small R^2 for the grades 1 and 9 tend to minimize the accuracy of projections.

4.8 Conclusions

In this section, we reviewed growth trends in enrollments of Norwich public schools and more importantly, we have discovered the way various factors have contributed to the changes in enrollments of various grade levels. It was found that indeed the number of births, new home construction, and unemployment rates were good indicators of growth and decline of school enrollments in Norwich. Thus, we have laid out the foundations for projecting enrollment into the future.

It was also found that the Cohort-Survival Method of enrollment projections is a valid method for *short-term* forecasts as long as the inter-grade survival ratios are stable. Nonetheless, large variations of survival ratios for grades K, 1, and 9 through 12 tend to produce large projection errors, especially for long-term projections. Accordingly, in the next section, we will prepare the enrollment projections by three different methods to check the consistency of the projections.

5 10-YEAR ENROLLMENT PROJECTIONS NORWICH PUBLIC SCHOOLS

5.1 Norwich Public School Enrollment Projections

In this section, we finally present the 10-year enrollment projections for the Norwich public schools. Three methods were used in forecasting K-12 enrollments: (1) the Share Ratio Method; (2) the Cohort Survival Method; and. (3) the Multiple-Regression Method.

Note that all projections are made as of October 1 of each school year. The cohort survival method and the share ratio method projections are made based on 3-, 5-, and 10-year trends of school enrollments by grade, whereas the multiple-regression method projections are made based on the enrollment trends longer than the 10-year period.

5.2 Importance of Kindergarten Enrollment

The enrollment projections for grades K through 12 are derived from forecasts of the size of entering kindergarten classes. In order to form an accurate forecast of kindergarten enrollments, information about the number of births that occurred five years ago is necessary. However, birth data alone are not sufficient because over a period of five years some of the preschool children born in Norwich will leave the town, and other preschool children born elsewhere will migrate into Norwich. The size of the net migration varies each year and is dependent on economic conditions in Norwich and in Connecticut. In addition, the number of children attending non-public kindergarten schools varies each year. Although projections of kindergarten enrollments are most important, they are also problematical to forecast as discussed in an earlier chapter.

5.3 Components of Kindergarten Enrollments

Annual kindergarten enrollment is a result of various components that make up K enrollment as shown below:

$$[5.1] \quad K \text{ enrollment} = \text{Adjusted births five years ago} - \text{kindergartners in nonpublic schools} + \\ \text{the number of kindergartners retained} + \text{the } \textit{net number} \text{ of preschool children} \\ \text{who moved in and out of a school district during the past five years}$$

Table 5.1 on the following page illustrates the components of annual kindergarten enrollments including the number of births five years ago, the number of kindergartners in nonpublic schools, and the cumulative net in- or out-migration of preschool and kindergarten-age children during the

past five years. The Norwich public schools reported that there were no kindergartners retained (repeating K program) in the past school years so that we assumed the retention rate is zero.*

TABLE 5.1
COMPONENTS OF ANNUAL KINDERGARTEN ENROLLMENT
AS OF OCTOBER 1, 1998-2008
NORWICH PUBLIC SCHOOLS

School Year	Adj. Birth 5-YRS AGO*	Non- Public K	Estimated Net In-Migration	Public K	Annual K Enrollment Change	Annual B -to-K Change	B-to-K Survival Ratio***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1998	550	58	47	539	-14	-11	0.980
1999	562	54	21	529	-10	-33	0.941
2000	544	51	-98	395	-134	-149	0.726
2001	523	50	-34	439	44	-84	0.840
2002	477	82	-23	372	-67	-105	0.781
2003	480	78	2	404	32	-76	0.842
2004	476	85	-28	363	-41	-113	0.762
2005	477	68	-36	373	10	-104	0.782
2006	494	75	-47	372	-1	-122	0.754
2007	532	80	-70	382	10	-150	0.718
2008 est.	508	80	-57	398	16	-110	0.784
<u>1999-2008</u>							
3-Yr. Average	511	78	-58	384	8	-127	0.752
5-Yr. Average	497	78	-48	378	-1	-120	0.760
10-Yr. Average	507	70	-37	403	-14	-105	0.793
W. 3-Yr. Avg.	514	79	-60	388	11	-125	0.757
W. 5-Yr. Avg.	505	78	-54	383	6	-122	0.759
10-Yr. Maximum	562	85	21	529	44	-33	0.941
10-Yr. Minimum	476	50	-98	363	-134	-150	0.718
10-Yr. Range	86	35	119	166	178	117	0.223
Median	501	77	-35	389	5	-108	0.782

*1.6% born six years ago, 75.6% born five years ago, and 22.8% born four years ago. ** Based on the data from the Norwich Public Schools.
K Enrollment (T) = Adjusted Births (T-5) – Nonpublic School K Enrollment + K pupils retained + Net Migration

*** These ratios may be off due to computer rounding. Actual calculations include numerical digits after the decimal point.

Most children in kindergarten classes are five years old, but there are also four-year and six-year old children who are enrolled. According to the data supplied by the Norwich Public Schools (see Table 5.2), 75.6% were five years old, 22.8% were four years old and 1.6% were six years old as of October 1 of each school year. Accordingly, when we forecast the kindergarten enrollments, we adjusted the number of births in accordance with these percentages. As shown in column 1 of Table 5.1, the adjusted births dropped from 562 births in 1999 to 476 children in 2004, recording a variance of 76 students within a ten-year span. Clearly, the size of the kindergarten classes was significantly affected by the number of births each year.

Table 5.2 shows the age composition of kindergartners during the past five years, between 2004 and 2008. The annual age composition in terms of percentages did not change too much from year to year during the past five years.

* Usually, the K retention rate is relatively small so that it would not have a significant impact on the K enrollments.

TABLE 5.2
 AGE COMPOSITION OF ANNUAL KINDERGARTEN ENROLLMENTS
 AS OF OCTOBER 1, 2004-2008
 NORWICH PUBLIC SCHOOLS

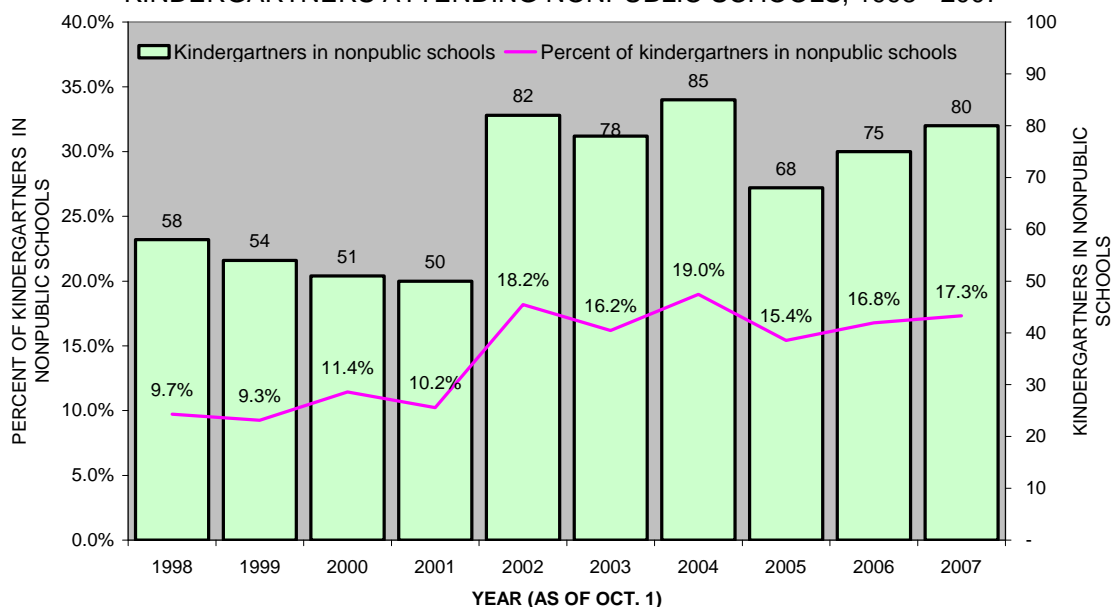
Age	2004		2005		2006		2007		2008		5-Year Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
4-years old	65	20.0%	79	23.4%	81	24.0%	79	23.2%	88	23.5%	392	22.8%
5 years old	253	77.8%	252	74.6%	254	75.1%	256	75.3%	282	75.2%	1297	75.6%
6 years old	7	2.2%	7	2.1%	3	0.9%	5	1.5%	5	1.3%	27	1.6%
Total	325	100.0%	338	100.0%	338	100.0%	340	100.0%	375	100.0%	1716	100.0%

Source: Norwich Public Schools

5.4 Kindergartners in Nonpublic Schools

Kindergarten enrollment in each year is also affected by the annual number of kindergartners attending private/parochial schools. Figure 5-1 (see also Table 5.1, column 2) shows the number of kindergartners attending nonpublic schools from 1998-2008. Observe that the number of kindergartners attending private schools varied from 62 students in 2000 to 51 students in 2004. The 3- and 5-year average is 52 ~ 53 kindergartners in private schools. In terms of percentages, Norwich residents attending nonpublic school kindergarten classes rose from 9.3% in 1999 to 19.0% in 2004 and then dropped sharply to 15.4% in 2005. However, the figure has settled at 17.3% since 2007. (5-year average is 16.9%). The number of kindergartners in nonpublic schools dropped from 61 students in 2003 to 51 students in 2004 and more or less stabilized at this level in the following years.

FIG. 5-1
 NUMBER AND PERCENT OF NORWICH RESIDENT
 KINDERGARTNERS ATTENDING NONPUBLIC SCHOOLS, 1998 - 2007



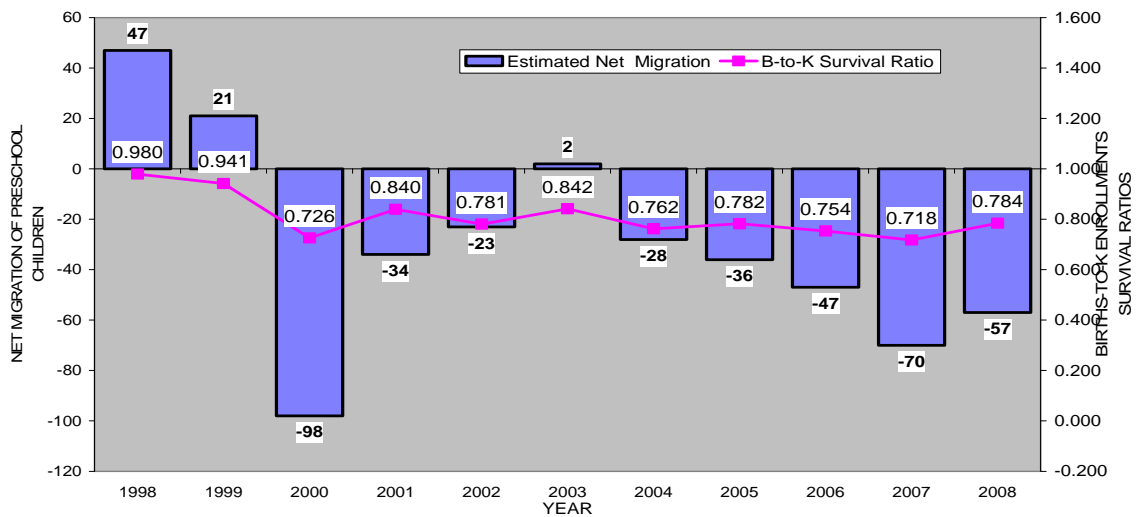
5.5 Net Migration of Preschool and Kindergarten-Age Children

Although the actual or historical data for births, nonpublic school enrollments and retention rates are available from various sources, there are no sources which supply actual net migration of preschool and kindergarten age children for each year. However, as shown Table 5.1 (column 4), we can estimate the cumulative net in- or out-migration of children during the five years prior to their entry into kindergarten classes. Rearranging Equation 5.1, we can derive Formula 5.2:

$$[5.2] \quad \text{Net Migration of K} = \text{Actual K enrollment} - \text{Adj. Births} - \text{Nonpublic K} + \text{K retained}$$

The net in-migration is shown as a positive number and the net out-migration is shown by a negative number. During the past eleven years between 1998 and 2008, there was a net in-migration of kindergartners to Norwich in only two years, 1998 and 1999 (see Fig. 5-2). There was a net in-migration of 47 preschool children who enrolled at Norwich public schools in 1998. But, in the following year 1999, only 25 preschool children moved, on net, into Norwich. Furthermore, the net migration plummeted into even a negative territory in which 98 preschool children moved out (as a net) of Norwich in 2000. Indeed, the year 2000 was a watershed as far as the net migration of preschool children was concerned.* Since 2000, there has been a net out-migration of preschool children until the most recent year 2008. The net migration pattern has thus affected the size of

FIG. 5-2
ESTIMATED NET MIGRATION OF PRESCHOOL CHILDREN PRIOR TO ENTERING INTO NORWICH PUBLIC SCHOOLS AND B-TO-K SURVIVAL RATIOS, 1998-2008



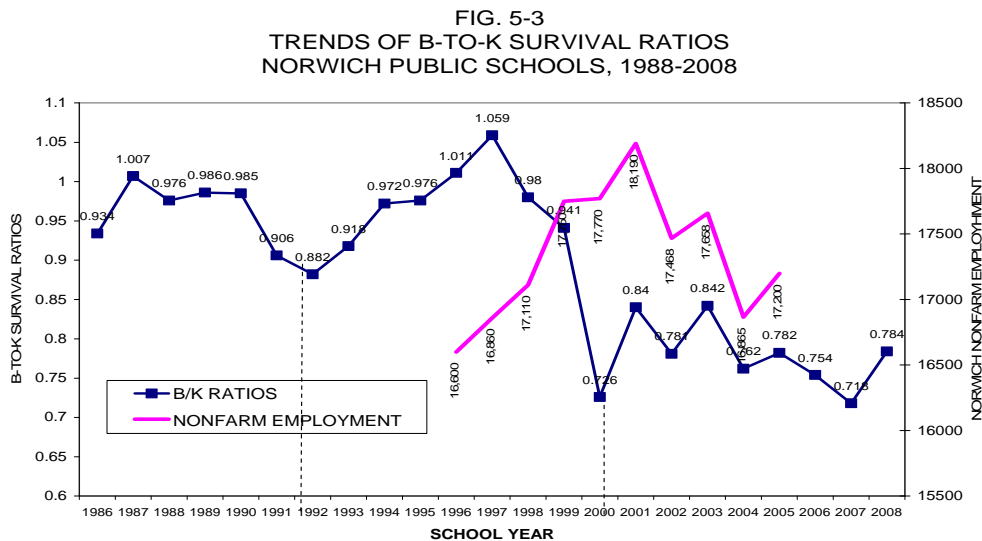
* This phenomenon of out-migration may be due to an accelerated out-migration of white population and slower in-migration of minority population since 2000 due to sluggish economic conditions in the area. Beginning 2001, the number of nonfarm employment in Norwich began to decline (see pages 3-1 and 3-2).

Kindergarten enrollments and the ratio between the number of births and the kindergarten enrollments of a give year, called B-to-K survival ratios. Note in Figure 5.2 that the K-to-B ratios sharply dropped from 0.941 in 1999 to 0.726 in the year 2000 to remain at a level below 0.800 most of the time (see Table 5-1 last column).

To repeat, the net migration of kindergartners and preschool children is a major factor influencing the size of kindergarten enrollments in Norwich. What then causes the movement of preschool children into Norwich and thus affects the Births-to-K survival ratios? The B-to-K ratios are affected by jobs available in Norwich and also by Connecticut's unemployment rates. When Connecticut's unemployment rates are high and jobs are scarce, people move out Norwich and the New London-Norwich labor market area.

$$\begin{aligned}
 [5.3] \quad K/BRATIO(T) &= 0.000084 \text{ NONF}(2) + 0044072 \text{ UCT}(T) - 0.025074T \quad [1994-2008] \\
 &\quad (8.83) \quad (4.00) \quad (-5.10) \\
 R^2 &= 0.855 \quad SEE = 0.0414 \quad D.W. = 1.46 \quad MVD = 0.9128
 \end{aligned}$$

According to Equation 5.3, the K/B ratio in a given year T is positively correlated to NONF, nonfarm employment in Norwich two years later, and also positively correlated to UCT(T), the unemployment rate of Connecticut in the current year T, but negatively correlated to the time variable T. These relationships are well illustrated by Figure 5-3.



When the unemployment rate of Connecticut is much higher than that of Norwich, and more jobs (nonfarm employment) are *expected* in Norwich due to introduction and expansions of two casinos in the region, then more kindergarten-age children moved into Norwich during the 1990s while the B-K ratios also rose. Since 2000, however, the economic growth has been relatively moderate and

in recent years the further expansion of the casinos was abruptly halted in response to national economic fears. Thus, the B-K ratios have been declining.

5.6 Annual K Enrollment Changes

In general, Kindergarten enrollment grows and declines annually as a result of variations in the number of births, nonpublic school enrollments, students repeating the K program, and the size of net migration. Since these factors vary a great deal annually, the actual kindergarten enrollments also vary considerably from year to year. Observe from Table 5.1 (column 6) that in the past ten years between 1999 and 2008, K enrollments declined in five years and increased in five years, so that there is a fifty-fifty chance of an annual K enrollment increase or decrease.

5.7 Kindergarten Enrollment Projections

Recognizing the importance and difficulty of preparing reliable kindergarten enrollment projections, we applied two methods of projecting kindergarten enrollments: the B-to-K (births to kindergarten enrollment) survival ratio method and the multiple regression method. Note that the K component method and the B-to-K survival ratio method is essentially the same method.

TABLE 5.3
ANNUAL KINDERGARTEN ENROLLMENT PROJECTIONS BY THE COMPONENT METHOD
AS OF OCTOBER 1, 2009-2018, NORWICH PUBLIC SCHOOLS

Assumptions: Constant Weighted 5-Year Survival Ratios and constant nonpublic K

	Adj. Birth 5-YRS AGO*	Non- Public K	Estimated Net Migration	Public School K	Annual K Enrollment Change	Annual B -to-K Change	B-to-K Survival Ratio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2003-2008:							
W. 5-Year Avg.	508	80	-57	383	6	-122	0.759
PROJECTIONS:							
2009	505	80	-42	383	6	-122	0.759
2010	562	80	-55	427	44	-135	0.759
2011	544	80	-51	413	-14	-131	0.759
2012	523	80	-46	397	-16	-126	0.759
2013	477	80	-35	362	-35	-115	0.759
2014	480	80	-36	364	2	-116	0.759
2015	476	80	-35	361	-3	-115	0.759
2016	477	80	-35	362	1	-115	0.759
2017	494	80	-39	375	13	-119	0.759
2018	532	80	-48	404	29	-128	0.759

K Projections by the B-K Survival Ratio Method: We can derive K enrollments directly from the known number of births five years ago. First, we calculate the B-K (births to kindergarten enrollment) ratios for past years by dividing the current school year enrollment for kindergartners by the adjusted number of births five years earlier (Table 5.1 column 7). Then we calculate 3-, 5-, or 10-year average survival ratios (or weighted 3- and 5-year averages), and multiply one of these ratios to the projected number of births to derive the kindergarten enrollments for future years. If

the B-K ratio >1 , there will be more kindergartners than the number of births five years before, and if the B-K ratio < 1 , then there will be fewer kindergarten enrollments than the number of births five years before. The B-K survival ratios vary a great deal from year to year, that is, they are unstable, so that the projections based on *constant* B-K ratios tend to produce larger deviations from the actual K enrollments. In Table 5.3, the adjusted births are given, and the nonpublic enrollments and K-to-B ratios (weighted 5-year average survival ratios) are assumed to be constant. Therefore, the public K enrollments are derived by the multiplying K-B ratio to adjusted births; afterwards, the net migrations (col. 3) are calculated.

K Projections by Multiple Regression Equations: K enrollments were also projected applying the regression equations developed in this report (see Equation 4.1 in Section 4). Assuming that the past relationships among the variables in Equation 4.1 will remain the same over the next ten years and that assumptions for independent variables are valid, future enrollments were projected by applying the regression equation. *The MRM method does not necessarily produce more accurate projections, but it has the advantage of providing information on the probability statistics so it helps to tell how reliable the projections are, based on past trends.* Results of these K projections are shown on Table 5.4 on the next page.

5.8 District-Wide Enrollment Projections by Grade and Grade Level

Table 5.5 summarizes the district-wide K-12 enrollment projections by grade level. The grade-by-grade projections are shown in Appendix Table 5-A and also Table 1 in the Summary Report.

Enrollment Projections by the Share Ratio Method: School enrollment projections by grade were derived by applying the Share Ratio Method. Under the Share Ratio Method, Norwich's future enrollments were calculated by projecting Norwich's share of enrollments as a percent of the statewide enrollments for each grade, and then multiplying these percentages by the statewide enrollment projections by grade (see Appendix Table 5-B). The Share Ratio Method has the advantage of being capable of showing Norwich's enrollment changes relative to statewide enrollment changes. In this report, projections by the Share Ratio Method were presented. We also projected school enrollments using the Cohort Survival Method, but we found the results are more or less the same as the projections by the Share-Ratio Method so that the projections by the CSM are not shown in this report.

Enrollment Projections by the Multiple Regression Method: Table 5.4 below shows the projections from the Multiple Regression Method (MRM). Equations used for projections were already presented in Section 4 of this report. Note that the MRM projections are prepared applying long-term past trends (much longer than 10 years), thus the K-5 enrollments are projected to decline by 5.1%, the grades 6-8 enrollments are projected to increase by 9.0% and the high school (NFA)

enrollments are projected to grow by 11.1% over the next 10 years. We will compare the MRM and SRM projections later.

TABLE 5.4
NORWICH PUBLIC SCHOOL ENROLLMENT PROJECTIONS
BY MULTIPLE REGRESSION METHOD, 2008-2018

(Fully-graded enrollments: includes graded special education/needs students)

		K	K-5	6-8	9-12	K-12	K-8
Actual	2008	397	2,327	1,174	1,689	5243	3,501
Projections	2009	387	2,242	1,238	1,599	5263	3,480
	2010	353	2,206	1,248	1,626	5233	3,454
	2011	400	2,200	1,266	1,673	5236	3,466
	2012	410	2,189	1,267	1,725	5191	3,456
	2013	434	2,219	1,272	1,745	5219	3,491
	2014	461	2,215	1,267	1,736	5216	3,482
	2015	485	2,215	1,272	1,726	5249	3,487
	2016	466	2,213	1,280	1,768	5270	3,493
	2017	435	2,211	1,280	1,820	5291	3,491
	2018	420	2,208	1,280	1,877	5341	3,488
Changes:	2008-13	37	-108	98	56	-24	-10
	2013-18	-14	-11	8	132	122	-3
	2008-18	23	-119	106	188	98	-13
Percent	2008-13	9.3%	-4.6%	8.3%	3.3%	-0.5%	-0.3%
Changes	2013-18	-3.2%	-0.5%	0.6%	7.6%	2.3%	-0.1%
	2008-18	5.8%	-5.1%	9.0%	11.1%	1.9%	-0.4%

Enrollment Projections by SRM: Table 5.5 presents enrollment projections applying the Share-Ratio Method, and contains three panels: Panel A, B and C. Panel A presents fully-graded K-5, 6-8, and 9-12 enrollments, which *include* special education/needs students. The 9-12 enrollments are only for NFA and exclude TRA and DTZ students. Panel B presents the partially-graded K-5, 6-8 and 9-12 enrollments, which *exclude* special education/needs students from grade enrollments. The grades 9-12 enrollments are only for NFA and exclude special education/needs students attending NFA, grades 9-12 students attending DTZ, and alternative high school students attending Thames River Academy (TRS). By deducting enrollments in Panel B from those in Panel A, we can obtain the number of special education/needs students as shown in Panel C.

* We prepared enrollment projections applying 3-, 5-, 10-, weighted 3-, and weighted 5-year average survival ratios applying the Share Ratio Method and the Cohort Survival Method. We found that the projections by CSM are almost the same as the projections by SRM and decided not to present them in this report. Application of the SRM resulted in five different projections corresponding to each survival ratios applied. Although these five projections were not too different from each other, we classified them into low (10-year trend) and high (W. 3-year trend) projections. By averaging the low and high projections, we derived the middle projections. In this report, we are using the middle projections without naming it as such in order to avoid possible confusions because there are so many different projections we prepared in the course of the study.

TABLE 5.5
 NORWICH PUBLIC SCHOOLS ENROLLMENT PROJECTIONS
 BY THE SHARE-RATIO METHOD, 2008-2018,

Panel A: Fully-Graded* Enrollments (including special education students)

		K	K-5	6-8	9-12 NFA	K-12
Actual Projections	2008	397	2380	1174	1599	5153
	2009	414	2399	1194	1566	5160
	2010	379	2385	1193	1526	5104
	2011	438	2469	1180	1466	5115
	2012	418	2500	1173	1418	5090
	2013	408	2506	1183	1437	5125
	2014	397	2506	1226	1398	5129
	2015	402	2494	1253	1413	5159
	2016	409	2524	1228	1428	5180
	2017	410	2495	1270	1435	5199
	2018	412	2488	1273	1485	5246
Changes:	2008-13	11	126	9	-162	-28
	2013-18	4	-18	90	48	121
	2008-18	15	108	99	-114	93
Percent Changes	2008-13	2.8%	5.3%	0.8%	-10.1%	-0.5%
	2013-18	1.0%	-0.7%	7.6%	3.3%	2.4%
	2008-18	3.8%	4.5%	8.4%	-7.1%	1.8%

*Fully-graded K-8 enrollments include special education/needs students. Grades 9-12 projections are only for NFA excluding DTZ and TRA enrollments. However, NFA enrollments include SPED students.

Panel B: Partially-Graded* Enrollments (excluding special education students)

		K	K-5	6-8	9-12 NFA	K-12
Actual Projections	2008	381	2275	1124	1353	3399
	2009	386	2300	1134	1349	3434
	2010	354	2295	1131	1305	3426
	2011	409	2373	1114	1244	3487
	2012	390	2406	1112	1191	3518
	2013	381	2418	1122	1210	3540
	2014	371	2407	1174	1175	3581
	2015	375	2396	1202	1189	3598
	2016	382	2424	1184	1203	3608
	2017	383	2396	1214	1210	3610
	2018	384	2389	1217	1260	3606
Changes:	2008-13	0	143	-2	-143	141
	2013-18	3	-29	95	50	66
	2008-18	3	114	93	-93	207
Percent Changes	2008-13	0.0%	6.3%	-0.2%	-10.6%	4.1%
	2013-18	0.8%	-1.2%	8.5%	4.1%	1.9%
	2008-18	0.8%	5.0%	8.3%	-6.9%	6.1%

*Partially-graded K-8 enrollments exclude special education/needs students. Grades 9-12 projections are only for NFA excluding DTZ and TRA enrollments. However, NFA enrollments include SPED students.

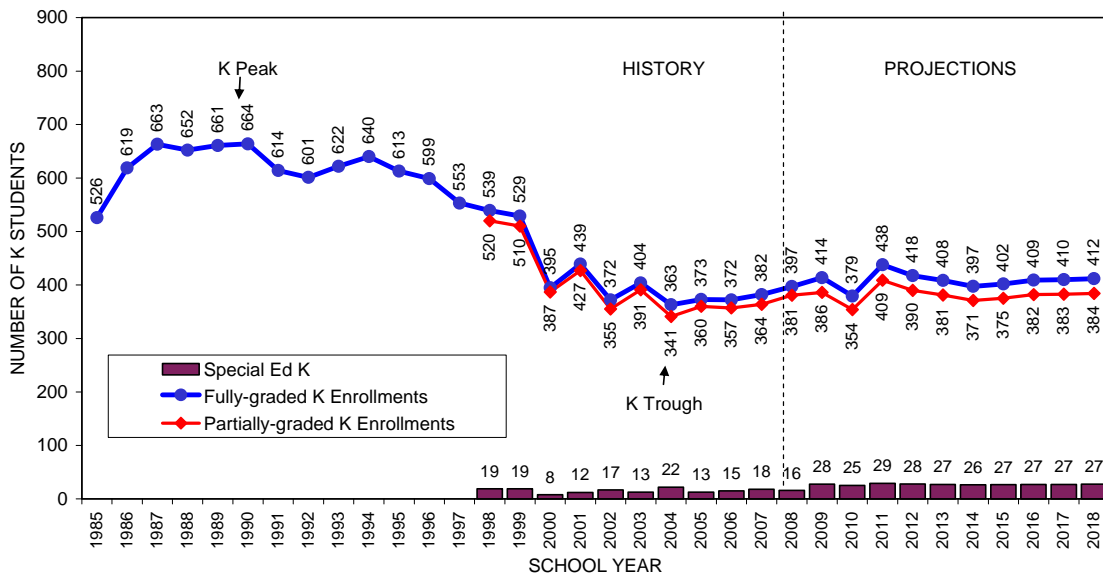
Panel C: Special Education & Needs Enrollments*

		K	K-5	6-8	9-12 NFA	K-8
Actual Projections	2008	16	105	50	246	155
	2009	28	99	60	218	159
	2010	25	90	62	221	152
	2011	29	96	66	223	162
	2012	28	94	61	226	155
	2013	27	88	61	227	149
	2014	26	99	52	223	151
	2015	27	98	51	224	149
	2016	27	100	44	225	144
	2017	27	99	56	225	155
	2018	28	99	56	225	155
Changes:	2008-13	11	-17	11	-19	-6
	2013-18	1	11	-5	-2	6
	2008-18	12	-6	6	-21	0
Percent Changes	2008-13	68.8%	-16.2%	22.0%	-7.8%	-3.9%
	2013-18	3.7%	12.5%	-8.2%	-0.9%	4.0%
	2008-18	75.0%	-5.7%	12.0%	-8.7%	0.0%

* Panel C = Panel A – Panel B.

(1) K Enrollments: Fig. 5-4 below shows the K enrollments presented in Table 5.6 Panel A, B, and C. The first thick line in blue color is the fully-graded K enrollments shown in Panel A, the second thin line in red presents the partially-graded K enrollments shown in Panel B, and the bar graph at the bottom shows the number of special education/needs students. Both fully-graded and partially-graded enrollment lines are almost parallel to each other so that the numbers of special education are almost the same. The differences between the two lines represent the number of special education/needs students and are shown as a bar graph. It is forecast that K enrollments will more or less plateau at the level of 410 K students over the next ten years

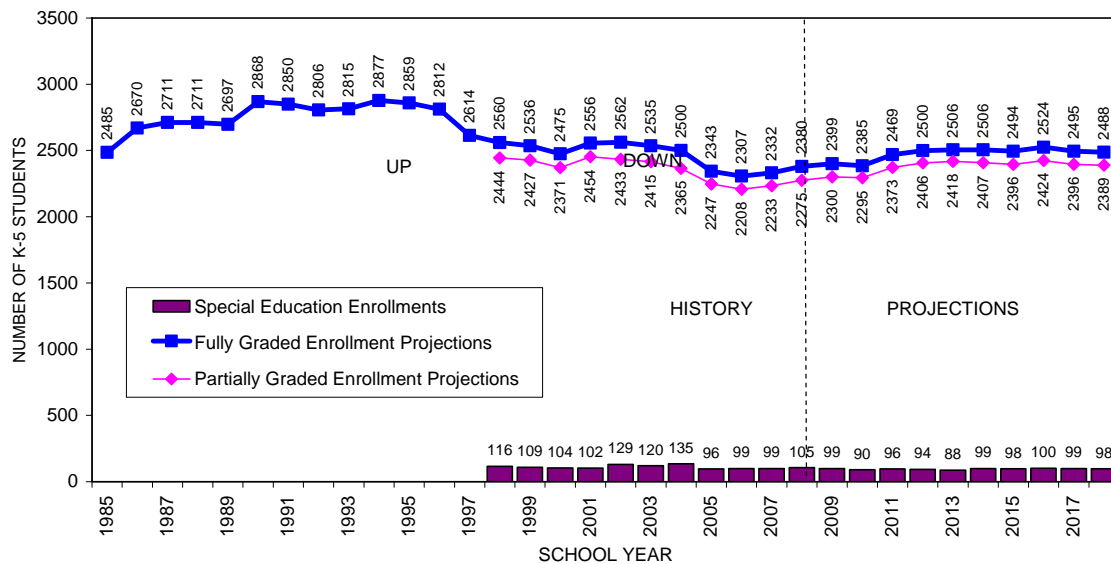
FIG. 5-4
KINDERGARTEN ENROLLMENTS HISTORY AND PROJECTIONS
NORWICH PUBLIC SCHOOLS, 1985-2018



(2) K-5 Enrollments: fully-graded K-5 enrollment began to decline from the peak-year enrollment of 2,877 students in 1994 to 2,307 students in 2006, a reduction of 570 students within a span of twelve years or a decrease at the rate of 47.5 students per year. Then, K-5 enrollments grew moderately for two consecutive years, to 2,332 students in 2007 and to 2,380 students in 2008, an addition of 73 more students in two years. From Figure 5-5, if we do not look at the projected enrollments, it would be quite difficult to see what could be the future course of K-5 enrollments. It could easily decline following the long-term trend that has been present since 1994. However, the K-5 enrollment projections based on the 3-, 5-, and 10-year trends indicated a moderate growth in K-5 enrollments over the next five years, an increase from 2,380 students in 2008 to 2,508

students in 2013, after which K-5 enrollments are projected to plateau, i.e., enrollments will maintain a level just below 2,500 students for five more years. The partially-graded K-5 enrollments are approximately 100 students less than the fully-graded enrollments. That is, the special education/need students number approximately 100 students or constitute approximately 4 percent of total K-5 enrollments.

FIG. 5-5
 GRADES K-5 ENROLLMENTS HISTORY (1985-2008) AND
 PROJECTIONS (2009-2018), NORWICH PUBLIC SCHOOLS



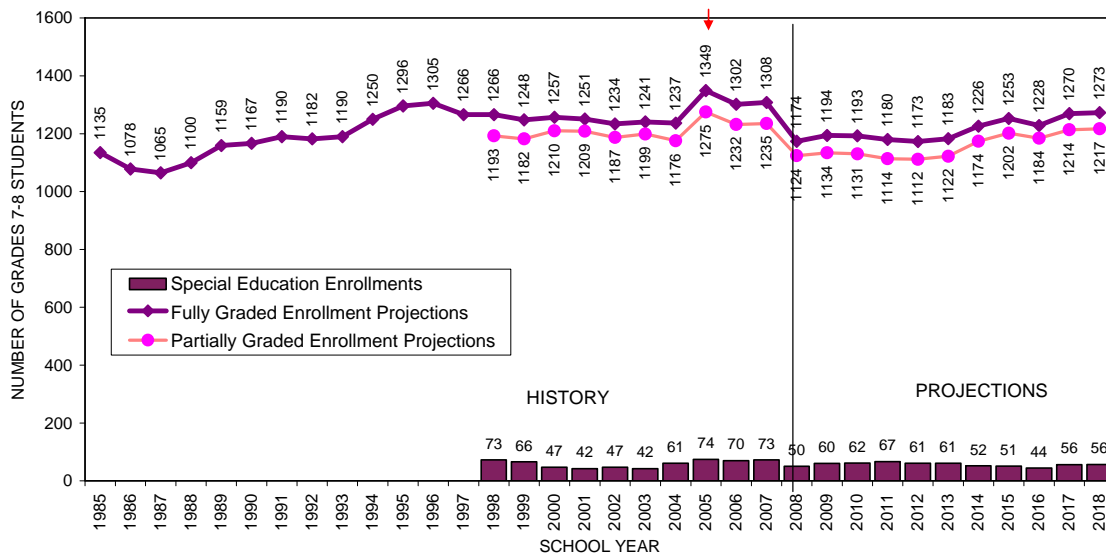
According to the multiple regression projections shown in Table 5.4, K-5 enrollments are projected to decrease moderately to 2,208 students, almost 300 fewer students than the enrollments projected by the Share-Ratio Method, which is based on the short-term recent trends. The difference seem to have resulted from the MRM projections being based on a long-term trend of declining elementary school enrollments vis à vis the SRM projections which adopted short-term trends (3-, 5- or 10-year average trends) and exhibited a moderate enrollment growth during the past two years. It is difficult to determine which projections will turn out to be accurate, but we prefer the SRM's short-term trend projections because of rapidly changing economic conditions.*

*As a compromise, it is possible to adopt the 10-year or mid-term trend projections which indicate K-5 enrollments will plateau at a level of 2,300 students over the next ten years.

Grades 6-8 Enrollments: The grades 6 through 8 enrollments grew from 1,065 students in 1987 to 1,305 students in 1996, and then declined gradually to 1,237 students in 2004. However, the enrollment suddenly climbed up by 112 students in a year, reaching 1,349 students in 2005. It is not clear at this time why the middle school enrollments increased so suddenly. But the enrollment declined in the subsequent three years and finally dropped to 1,124 students in 2008, losing 225 students in three years.

The SRM projections show that Norwich’s middle school enrollments will plateau at the level of about 1,180 students over the next five years, between 2008 and 2013. Enrollment will then begin to grow, reaching 1,273 students in 2018. In comparison, the MRM long-term trend projections indicate that middle school enrollments will flatten at the level of about 1,270 students over the entire ten years. The 10-year average for projected special education students is 50.3 students.

FIG. 5-6
 GRADES 6-8 ENROLLMENTS HISTORY (1985-2008) AND PROJECTIONS (2009-2018), NORWICH PUBLIC SCHOOLS



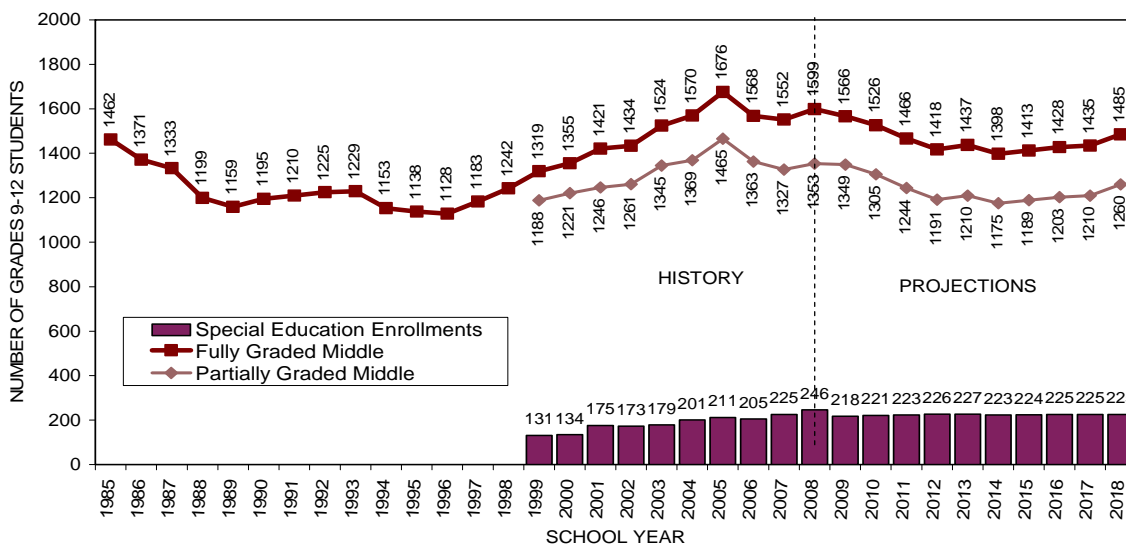
Grades 9-12 Enrollments: The number of Norwich high school students in Norwich Free Academy declined for eleven years from 1,462 students in 1985 to 1,128 students in 1996. Then, the number of students in NFA increased for nine years reaching 1,676 students, an addition of 548 students or 48.6% in nine years. From its peak in 2005, the Norwich high school students in NFA began to decline to 1,599 students in 2008. Just looking at the long-term enrollment trends, it is difficult to determine future direction of Norwich high school enrollment at NFA.

However, It is projected that Norwich high school enrollments at NFA will continue to decline, reaching 1,398 students in 2014, but then begin to grow again, attaining 1,485 students in 2018

according to the SRM middle projections. In comparison, the MRM projections indicate that the Norwich high school enrollments at NFA will continue to grow over the next ten years, reaching 1,877 students in 2018. The projected growth produced by the MRM is the result of linearly extending long-term growth trends, and such growth is highly improbable in the future due to changing population compositions and economic conditions.

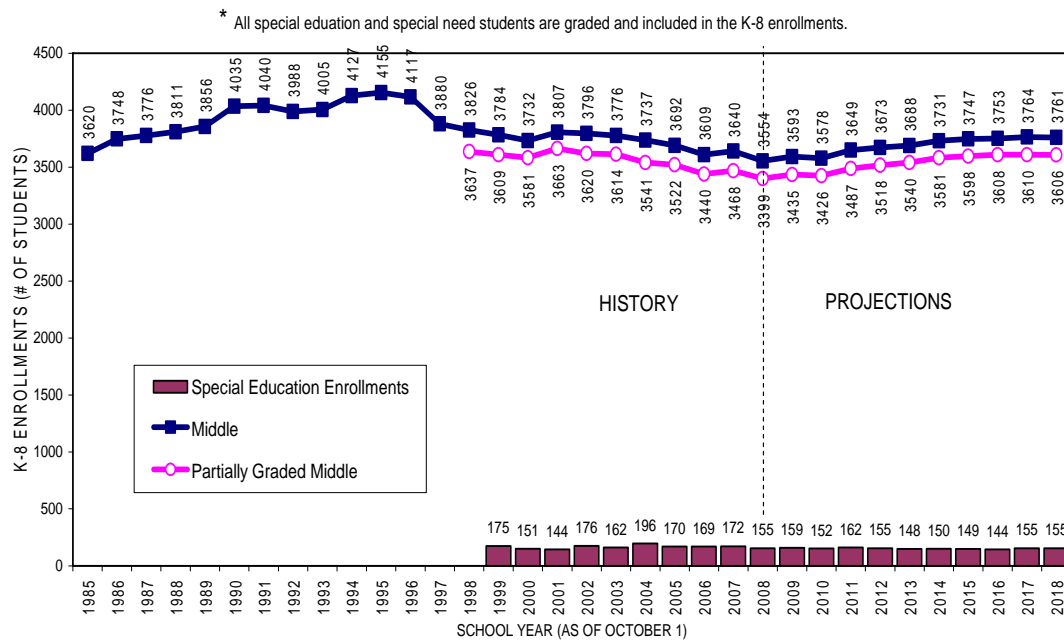
As shown in Figure 5-7, the number of special education students at NFA is estimated to be more or less 220 students over the next 10 years.

FIG. 5-7
 NORWICH RESIDENT STUDENTS ATTENDING NORWICH FREE
 ACADEMY, ENROLLMENT HISTORY AND PROJECTIONS
 1985-2018



Grades K-8 Enrollments: By adding the projected K-5 and Gr. 6-8 enrollments, we derived projected K-8 enrollments. As shown in Figure 5-8 on the previous page, K-8 enrollments have been steadily declining from 4,155 students in 1995 to 3,554 students in 2008, a reduction of 601 K-8 students (-14.5%) in a span of 13 years. According to the Share-Ratio Method projections, K-8 enrollments will gradually increase to 3,761 students in 2018, adding 207 students (+5.8%) over the next ten years. In comparison, the MRM projections indicate that K-8 enrollments will stabilize at slightly below the 2008 K-8 enrollment level.

FIG. 5-8
 FULLY-GRADED* K-8 ENROLLMENT HISTORY AND PROJECTIONS
 NORWICH PUBLIC SCHOOLS, 1985 - 2018



Of the projected K-8 enrollments, special education/need enrollments are assumed to be on average 153 students each year, constituting approximately 4% of total K-8 enrollments.

Enrollments Left Out: The following enrollments are not projected and not included in the enrollments presented in this report. These are: pre-K students plus the grades 9-12 students attending DTZ and TRA (Thames River Academy). The projected K-8 enrollments include all special education, special needs (ESL, Bilingual programs) students attending all Norwich Public Schools/BOE administered schools including regular elementary and middle schools plus Hickory Street and DTZ (7th and 8th grade students). Accordingly, in order to come up with complete counts of PK-8 enrollments, estimated PK enrollments need to be added to project fully-graded K-8 enrollments. For the high school enrollments, grades 9-12 students from DTZ and TRS need to be added to the NFA enrollments.

5.9 Norwich's Share of Connecticut's Enrollments

Table 5.6 summarizes Norwich's shares of Connecticut's enrollments by grade level (in percentages) as shown in Appendix Table 5-B (see pages 5-25 and 5-26). Note that in 2008 Norwich's K-12 enrollment represented 0.967 percent of the state's total K-12 enrollment. According to the fully-graded enrollment projections, this percentage is expected to increase slightly to 1.000% in 2013, but will decrease to 0.992% in 2018. Note that Norwich's population represented also 1.061% of the state's total population in 2007 (36,422 ÷ 3,502,309) according to the estimates by the Connecticut State Department of Public Health (see page 2-3).

TABLE 5.6
NORWICH'S ENROLLMENT AS A PERCENT OF
CONNECTICUT'S ENROLLMENT
BY GRADE LEVEL, 1998 - 2018

Share-Ratio Method Projections					
	K	K-5	6-8	9-12*	K-12
1998	1.269%	0.972%	0.858%	0.954%	1.269%
1999	1.254%	0.959%	0.884%	0.945%	1.254%
2000	0.951%	0.938%	0.880%	0.928%	0.951%
2001	1.048%	0.974%	0.892%	0.941%	1.048%
2002	0.897%	0.980%	0.876%	0.933%	0.897%
2003	0.955%	0.976%	0.906%	0.940%	0.955%
2004	0.867%	0.973%	0.911%	0.941%	0.867%
2005	0.897%	0.919%	0.959%	0.953%	0.897%
2006	0.912%	0.912%	0.892%	0.924%	0.912%
2007	0.945%	0.929%	0.885%	0.934%	0.945%
2008	0.963%	0.951%	0.925%	0.934%	0.963%
2009	1.022%	0.965%	0.918%	0.943%	1.023%
2010	0.944%	0.966%	0.903%	0.940%	0.945%
2011	1.079%	1.004%	0.879%	0.948%	1.081%
2012	1.028%	1.017%	0.855%	0.948%	1.030%
2013	1.000%	1.018%	0.870%	0.958%	1.001%
2014	0.970%	1.019%	0.853%	0.961%	0.971%
2015	0.977%	1.012%	0.868%	0.969%	0.978%
2016	0.990%	1.019%	0.886%	0.974%	0.992%
2017	0.991%	1.004%	0.893%	0.978%	0.992%
2018	0.992%	0.998%	0.929%	0.987%	0.993%
2018/2008 Share Ratios	1.030	1.005	1.004	1.035	1031

*Includes only the Norwich resident high school students attending FNA.

Table 5.6 also shows in bold figures the ratio of Norwich's shares of Connecticut enrollments for the year 2018 divided by those of 2008 for each grade level. When Norwich's enrollment growth is the same as that of Connecticut, Norwich's share is expected not to change (to stay the same), and the 2018-to-2008 share ratios are expected to be one (1.00). However, when Norwich's enrollment growth is less (or declines faster) than that of Connecticut, Norwich's share is expected to decline and the share ratios are less than one; conversely, when Norwich's enrollment growth is greater than that of Connecticut, the share ratios are greater than one. Observe from Table 5.6 that the 2018/2008 share ratios are greater than 1 for all grade levels. This is surprising because Norwich's share of Connecticut's total population has been declining. However, the increasing

enrollment share ratios in Norwich may well be due to the minority population in Norwich increasing faster than that of Connecticut (see Section 7).

5.10 Application of Enrollment Projections for School Facilities Planning

We prepared many different enrollment projections applying three different methods (SRM, CSM and MRM) and five different past trends (3-, 5-, 10-, W3-, and W5-year trends). Among these diverse enrollment projections, we have chosen the lowest and the highest SRM projections and then derived the Middle projections by averaging the lowest and the highest projections. Table 5.7 presents a summary of SRM and MRM projections we have reviewed so far. In the table, we also show the differences between the SRM lowest and highest projections in number and percent. Note that the differences are very small: the largest difference is -3.8%. In the same table, we also show the MRM projections and their differences from the SRM 'middle' projections (see columns 7 and 8). As we reviewed earlier, the SRM K-5 projections are 3.8% higher than the MRM projections, but the SRM grades 9-12 projections for NFA are 6.2% less than the MRM projections. The SRM grades 6-8 projections are almost same as the MRM projections. Because the SRM K-5 projections are higher but the SRM NFA enrollment projections are lower than MRM projections, their deviations cancel each other out so that the overall K-12 projections by SRM and MRM are almost identical. Given these several projections, which one should the school authority use for school facilities planning purposes? Since the variations among these projections are not too significant, the school authority may adopt any one of these projections, but we preferred the SRM 'middle' projections for the following reasons.

TABLE 5.7
SUMMARY OF SRM AND MRM PROJECTIONS

Grade Level	Year (As of October 1)	The Lowest (10-Yr Trend) -1-	The Highest (W. 3-Yr. Trend) -2-	Difference Between Low and High -3-	Percent Difference -4-	The Middle Projections -5-	MRM Projections -6-	Difference Between Middle and MRM -7-	Percent Difference -8-
K-5	2013	2466	2546	80	3.2%	2506	2219	96	3.8%
	2018	2458	2517	59	2.4%	2488	2208	94	3.8%
6-8	2013	1179	1186	7	0.6%	1183	1272	(29)	-2.5%
	2018	1250	1296	46	3.7%	1273	1280	(2)	-0.2%
9-12	2013	1562	1503	-59	-3.8%	1533	1745	(70)	-4.6%
	2018	1580	1588	8	0.5%	1584	1877	(98)	-6.2%
K-8	2013	3645	3732	87	2.4%	3688	3491	65	1.8%
	2018	3709	3813	104	2.8%	3761	3488	91	2.4%
K-12	2013	5207	5235	28	0.5%	5221	5219	1	0.0%
	2018	5288	5401	113	2.1%	5345	5341	2	0.0%

Accuracy of Projections: The most important criterion is the accuracy of projections. Everyone may ask which projection is most accurate. But we cannot determine the accuracy of forecasts ahead of time. In short, the projections are not predictions. But it can be assumed that the enrollment forecasts, especially for the distant future, are prone to produce relatively large projection deviations due to the uncertain number of births over the next five years and the unstable pattern of net migration of students, especially among pre-school children. Furthermore, we assumed that the most recent trends are more important than the long-term trends from the distant past. Accordingly, we prefer the SRM projections over the MRM projections. In addition, the SRM projections show that Norwich's projected shares of Connecticut's future enrollments appear to closely follow the patterns established during the past decade. For example, the continued growth of NFA enrollments will increase the share of Norwich high school enrollment, an increase that is much faster than past trends would dictate. It is important to emphasize that the future outcome will be greatly dependent on the future economic conditions of the Southeastern Connecticut Region as well as Norwich's status relative to the statewide economic conditions. The Norwich Public Schools should be ready to update their long-term enrollment projections if future economic conditions substantially differ from the assumptions adopted in this report. Thus, emphasis on the probable accuracy of the forecasts should be placed on the short-term projections, e.g., projections over the next four to five years.

We tend to discount the lowest projections on the grounds that Connecticut's births over the next five years are likely to gradually increase. On the other hand, we may also discount the highest projections due to economic uncertainty and malaise in the national and regional economies. Thus, the middle projections may be more likely to produce the least projection errors in the long run.

Risk Taking: The choice of which projection to use for the purpose of school facilities planning is dependent not only on the perceived accuracy of the projections, but also on the school authority's attitude toward risk-taking.

If one assumes that the middle and high projections presented in this report are equally plausible (low projections are least preferred due to low probability), one may choose the "middle" projections if the school system prefers to err on the side of "under-planning". If the school system "under-plans", the short-term costs will be lower and there remains the option of adding more facilities when needed. However, under-planning or an incremental approach risks that educational quality may suffer due to temporary overcrowding and that overall school construction costs may escalate. This escalation will be due to the rising price of construction over the years and the increase in cost and time when expansion is negotiated as a series of jobs rather than as a single construction job.

On the other hand, the school system may choose the “high” projections if it prefers the risk of “over-planning” or building more facilities than needed. Over-planning will build more facilities than required in the short-run, but this strategy foresees that in a *growing community*, schools can always grow into the excess capacity. Though the short-term costs will be higher, educational quality will not be compromised and long-term overall costs may be lower.

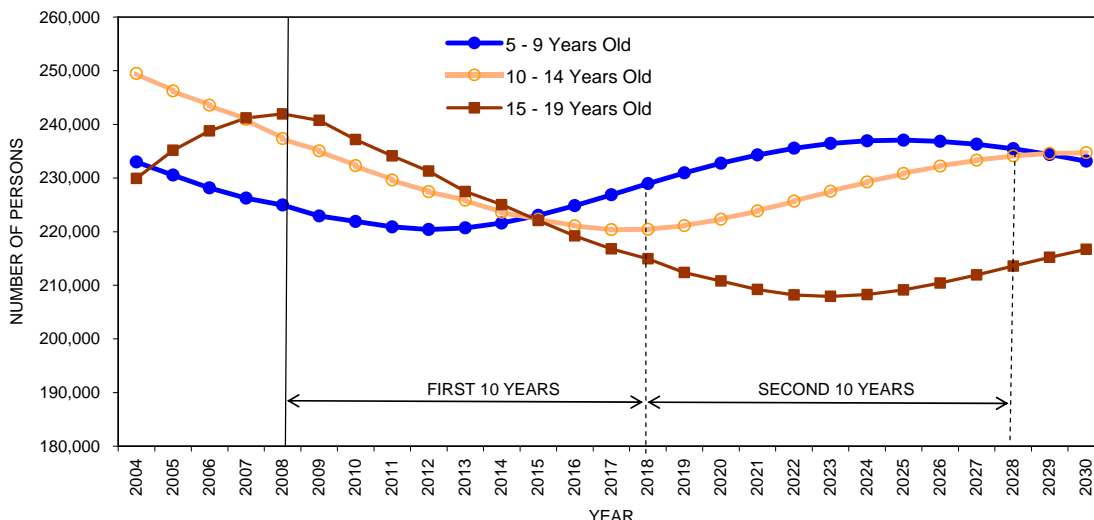
Uncertainty of Enrollment Projections and Flexibility in School Facilities Planning: As stated earlier, enrollment projections are not predictions, and they are susceptible to errors. Accordingly, school facilities must be planned with considerable flexibility in design. Flexibility means the ability to build additions, to convert existing spaces for different uses, to change the size of rooms from small to large spaces or vice versa, and the ability to keep up with changing technology and pedagogical requirements. An obvious fact should be noted: small facilities lose flexibility to meet unexpected situations.

For these reasons we recommend the use of SRM middle projections for school facilities planning purposes. However, it is up to the school authority to determine which projections are most consistent with their risk-taking philosophy. In any event, as mentioned earlier, the differences among the various projections are very small.

5.11 Enrollment Growth over the Next Twenty Years

What will be the trend in enrollment growth beyond the ten-year projections included in this study? This is a very pertinent question for the school facilities policy makers. They have to manage the excess or shortage of school facilities to maintain desirable educational standards at the same time achieving financial efficiency.

FIG. 5-9
CONNECTICUT'S SCHOOL-AGE POPULATION PROJECTIONS
2004 - 2030



The Connecticut population projections show that Connecticut school enrollments may grow in the longer-term future, perhaps within the next twenty years, if not within ten years.* To gain a glimpse of 20 or more years of changes in school enrollments, it is necessary to have at least 20-year population projections.* In such longer-term population projections, we make projections for each school-age population, e.g. 5 to 9 year olds, 10 to 14 year olds, and 15 to 19 year olds.

Observe from Figure 5-9 on the previous page that the number of the elementary school-age children who are 5 to 9 years old is projected to increase beginning in 2013; the middle/junior high school age population aged between 10 and 14 years are projected to increase beginning in 2017-18; and the high school age children aged between 15 and 19 years are projected to increase beginning in 2023. In sum, the school age populations in Connecticut are projected to increase sooner or later during the 2010s and 2020s.

5.12 Trend Line and Deviations Due to Cyclical and Random Factors

The projections presented in this report are long-term *trend lines*. But the actual outcomes in the future are likely to deviate somewhat from these trend lines to the extent that *cyclical and random factors* such as war, natural calamities, unemployment rates, residential construction, the number of school children attending nonpublic schools, etc., deviate from the assumptions. Deviations from the trend lines are likely to occur within a plus/minus 5% to 10% range.

5.13 Annual Updating of School Enrollment Projections

The cyclical variations in enrollment can be easily captured by the annual updating of school enrollment projections. The annual updating will confirm the validity of assumptions adopted in this report, and should be able to fine-tune the projections, based on the additional data available each year.

5.14 Summary and Conclusions

1) The number of annual births is the primary factor that determines the future school age population and school enrollments. Two other important factors are the net migration of school children and the number of children attending nonpublic schools; these factors are reflected in the inter-grade survival or retention rates.

2) We need ten-year *births* data in order to make 10-year enrollment projections. The first four years (2003-2006) are already known, but the next six years (2007-2012) must be projected or estimated.

* The U. S. Census Bureau, Population Division, *Interim State Projections of Population for Five-Year Groups and Selected Age Group by Sex: 2004 to 2030*, issued in 2005.

- 3) We prepared many enrollment projections applying three methods (CSM, SRM and MRM), and we also made projections by applying short, medium and long-term past trends (3-, 5-, 10-, weighted 3-, and weighted 5-year trends). We found the projections prepared by CSM and SRM are more or less identical, and chose the Middle projections as an average of the lowest and highest projections prepared by SRM. We also found that the differences among the various projections are very small.
- 4) Enrollment projections made in this report are long-term trend-line projections that ignore the annual cyclical fluctuations due to economic and random events. Thus, actual enrollments may be significantly above or below the trend-line projections.*
- 5) The school authority may choose one of the low, middle, and high projections presented in this report in accordance with its own risk-taking philosophy to maximize the educational goals in the most cost-effective manner.
- 6) Annual updating of enrollment projections is strongly recommended in order to detect the validity of assumptions employed in this report.

* Norwich's enrollments exhibited roughly plus/minus 5% to 10% Standard Error of Estimates at the 95% confidence level as shown in multiple regression equations in Section 4 of this report. In other school districts with large enrollments, there were \pm 5% SEEs. It is statistically justifiable if Norwich decides to use larger than 5% in adjusting the trend-line projections.

APPENDIX TABLES

DISTRICT-WIDE ENROLLMENT PROJECTIONS BY GRADE
(LOW, MIDDLE AND HIGH PROJECTIONS)

APPENDIX TABLE 5 -A
 NORWICH PUBLIC SCHOOL ENROLLMENT HISTORY AND PROJECTIONS BY GRADE
 SHARE-RATIO METHOD PROJECTIONS

(Middle Projections)

SCHOOL YEAR	Norwich Public Schools												Norwich Free Academy				FNA			
	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5	6-8	9-12	K-12			
HISTORY: Fully-Graded Enrollments																				
1985	526	416	452	377	368	346	348	382	405	397	375	333	357	2485	1135	1462	5082			
1986	619	460	391	442	386	372	332	373	373	320	383	348	320	2670	1078	1371	5119			
1987	663	433	416	390	437	372	355	360	350	290	349	351	343	2711	1065	1333	5109			
1988	652	432	402	406	386	433	379	361	360	281	283	307	328	2711	1100	1199	5010			
1989	661	447	418	393	406	372	428	390	341	303	291	268	297	2697	1159	1159	5015			
1990	664	495	476	416	399	418	366	422	379	291	310	293	301	2868	1167	1195	5230			
1991	614	484	476	465	404	407	423	365	402	330	296	297	287	2850	1190	1210	5250			
1992	601	464	452	444	454	391	401	432	349	317	322	295	291	2806	1182	1225	5213			
1993	622	430	446	434	442	441	390	403	397	303	317	313	296	2815	1190	1229	5234			
1994	640	451	447	453	443	443	447	402	401	282	283	300	288	2877	1250	1153	5280			
1995	613	477	443	444	441	441	437	451	408	280	282	282	294	2859	1296	1138	5293			
1996	599	458	457	424	436	438	422	442	441	318	301	245	264	2812	1305	1128	5245			
1997	553	386	417	439	405	414	420	430	416	336	303	300	244	2614	1266	1183	5063			
1998	539	402	387	415	423	394	418	411	437	379	337	271	255	2560	1266	1242	5068			
1999	529	385	404	399	397	422	390	433	425	374	375	300	270	2536	1248	1319	5103			
2000	395	513	387	405	386	389	411	417	429	353	374	352	276	2475	1257	1355	5087			
2001	439	391	523	402	411	390	412	417	422	403	373	326	319	2556	1251	1421	5228			
2002	372	442	391	520	423	414	388	434	412	421	398	317	298	2562	1234	1434	5230			
2003	404	375	417	403	508	428	409	410	422	453	429	338	304	2535	1241	1524	5300			
2004	363	388	394	433	394	528	415	416	406	462	386	391	331	2500	1237	1570	5307			
2005	373	377	383	378	425	407	518	417	414	464	454	409	349	2343	1349	1676	5368			
2006	372	377	384	387	370	417	382	504	416	437	413	364	354	2307	1302	1568	5177			
2007	382	389	383	397	412	369	419	388	501	447	448	337	320	2332	1308	1552	5192			
2008	397	408	397	363	408	407	379	409	386	473	438	373	315	2380	1174	1599	5153			
PROJECTIONS:																				
2009	414	402	413	396	369	406	406	380	407	387	463	374	342	2399	1194	1566	5160			
2010	379	419	407	412	401	367	406	408	379	408	379	396	343	2385	1193	1526	5104			
2011	438	384	424	405	418	400	367	407	406	380	400	324	363	2469	1180	1466	5115			
2012	418	443	389	422	412	416	399	368	406	407	372	342	297	2500	1173	1418	5090			
2013	408	422	449	387	429	410	416	401	366	407	399	318	313	2506	1183	1437	5125			
2014	397	413	428	447	393	427	410	417	399	367	398	341	291	2506	1226	1398	5129			
2015	402	402	418	426	454	392	426	411	415	400	360	341	312	2494	1253	1413	5159			
2016	409	407	407	417	433	452	391	428	409	416	392	307	312	2524	1228	1428	5180			
2017	410	413	412	405	423	431	451	392	426	410	408	336	281	2495	1270	1435	5199			
2018	412	414	419	410	412	421	430	452	391	427	401	349	307	2488	1273	1485	5246			

Source: H. C. Planning Consultants, Inc. Estimate and projections are shown in italics.

APPENDIX TABLE 5-A (Continued)

--Figures in the shaded areas are enrollment projections based on actual number of births--

PANEL A: LOW PROJECTIONS (10-Year Trend Projections)

SCHOOL YEAR	Norwich Public Schools												Norwich Free Academy				FNA			
	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5	6-8	9-12	K-12			
2008	397	408	397	363	408	407	379	409	386	473	438	373	315	2380	1174	1599	5153			
2009	424	386	411	399	363	409	404	386	408	385	463	389	346	2391	1198	1583	5172			
2010	388	412	389	413	399	363	406	411	385	407	377	412	361	2365	1201	1556	5123			
2011	449	378	415	391	413	399	360	413	410	384	398	335	381	2445	1183	1499	5127			
2012	428	437	381	418	391	413	396	367	412	409	376	354	311	2467	1175	1450	5091			
2013	418	416	440	383	417	391	410	403	366	411	400	334	328	2466	1179	1473	5119			
2014	407	407	419	442	383	418	389	418	402	365	402	356	310	2476	1208	1433	5117			
2015	412	396	410	421	442	383	415	395	416	401	357	357	330	2464	1226	1446	5136			
2016	419	401	399	412	421	442	380	422	394	415	393	318	331	2494	1197	1457	5148			
2017	420	407	404	401	412	422	439	387	421	393	406	350	294	2465	1247	1444	5155			
2018	422	408	410	405	400	412	418	446	386	420	385	362	324	2458	1250	1491	5199			
2008-18 Change	25	0	13	42	-8	5	39	37	0	-53	-53	-11	9	133	-61	-108	-37			

PANEL B: MIDDLE PROJECTIONS (AVG. OF 10- AND W. 3-Year Trend Projections)

SCHOOL YEAR	Norwich Public Schools												Norwich Free Academy				FNA			
	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5	6-8	9-12	K-12			
2008	397	408	397	363	408	407	379	409	386	473	438	373	315	2380	1174	1599	5153			
2009	414	402	413	396	369	406	406	380	407	387	463	374	342	2399	1194	1566	5160			
2010	379	419	407	412	401	367	406	408	379	408	379	396	343	2385	1193	1526	5104			
2011	438	384	424	405	418	400	367	407	406	380	400	324	363	2469	1180	1466	5115			
2012	418	443	389	422	412	416	399	368	406	407	372	342	297	2500	1173	1418	5090			
2013	408	422	449	387	429	410	416	401	366	407	399	318	313	2506	1183	1437	5125			
2014	397	413	428	447	393	427	410	417	399	367	398	341	291	2506	1226	1398	5129			
2015	402	402	418	426	454	392	426	411	415	400	360	341	312	2494	1253	1413	5159			
2016	409	407	407	417	433	452	391	428	409	416	392	307	312	2524	1228	1428	5180			
2017	410	413	412	405	423	431	451	392	426	410	408	336	281	2495	1270	1435	5199			
2018	412	414	419	410	412	421	430	452	391	427	401	349	307	2488	1273	1485	5246			
2008-18 Change	15	6	22	47	4	14	51	43	5	-46	-37	-24	-8	108	99	-114	93			

PANEL C: HIGH PROJECTIONS (W. 3-Year Trend Projections)

SCHOOL YEAR	Norwich Public Schools												Norwich Free Academy				FNA			
	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5	6-8	9-12	K-12			
2008	397	408	397	363	408	407	379	409	386	473	438	373	315	2380	1174	1599	5153			
2009	404	418	416	392	374	404	409	375	407	389	464	359	338	2407	1191	1549	5147			
2010	370	425	425	410	404	371	406	405	373	410	381	380	325	2405	1184	1496	5085			
2011	427	389	432	420	423	400	373	402	403	376	402	313	344	2493	1177	1434	5104			
2012	408	450	397	427	433	419	402	369	400	405	368	329	283	2533	1171	1386	5089			
2013	399	429	458	392	440	429	421	398	367	403	397	302	298	2546	1186	1400	5132			
2014	388	419	437	452	404	436	431	417	396	369	395	326	273	2535	1243	1363	5142			
2015	392	408	427	431	466	400	438	426	414	399	362	324	295	2524	1279	1379	5182			
2016	399	413	415	421	444	462	402	434	424	417	391	297	293	2555	1260	1398	5212			
2017	400	419	420	410	435	440	464	397	431	427	409	321	269	2524	1293	1426	5243			
2018	402	420	427	415	423	430	442	459	395	434	418	336	291	2517	1296	1479	5292			
2008-18 Change	5	12	30	52	15	23	63	50	9	-39	-20	-37	-24	192	-15	-126	51			

APPENDIX TABLE 5-B
 NORWICH PUBLIC SCHOOL ENROLLMENT HISTORY & PROJECTIONS
 BY GRADE LEVEL
 SHARE-RATIO METHOD PROJECTIONS
 2009-2018

SCHOOL YEAR	K	K-5	6-8	9-12 NFA	K-12	K	K-5	6-8	9-12 NFA	K-12
	Norwich Public School Enrollments (Middle Projections)					Norwich Share (%) of Connecticut's Grade Enrollments				
1985	526	2485	1135	1462	5082	1.467%	1.240%	0.955%	1.125%	1.467%
1986	619	2670	1078	1371	5119	1.668%	1.296%	0.927%	1.140%	1.668%
1987	663	2711	1065	1333	5109	1.740%	1.280%	0.961%	1.149%	1.740%
1988	652	2711	1100	1199	5010	1.692%	1.235%	0.908%	1.120%	1.692%
1989	661	2697	1159	1159	5015	1.674%	1.196%	0.914%	1.116%	1.674%
1990	664	2868	1167	1195	5230	1.640%	1.238%	0.953%	1.144%	1.640%
1991	614	2850	1190	1210	5250	1.497%	1.204%	0.959%	1.127%	1.497%
1992	601	2806	1182	1225	5213	1.448%	1.167%	0.962%	1.101%	1.448%
1993	622	2815	1190	1229	5234	1.468%	1.148%	0.956%	1.086%	1.468%
1994	640	2877	1250	1153	5280	1.471%	1.148%	0.880%	1.072%	1.471%
1995	613	2859	1296	1138	5293	1.388%	1.119%	0.855%	1.053%	1.388%
1996	599	2812	1305	1128	5245	1.386%	1.087%	0.822%	1.023%	1.386%
1997	553	2614	1266	1183	5063	1.304%	1.005%	0.842%	0.973%	1.304%
1998	539	2560	1266	1242	5068	1.269%	0.972%	0.858%	0.954%	1.269%
1999	529	2536	1248	1319	5103	1.254%	0.959%	0.884%	0.945%	1.254%
2000	395	2475	1257	1355	5087	0.951%	0.938%	0.880%	0.928%	0.951%
2001	439	2556	1251	1421	5228	1.048%	0.974%	0.892%	0.941%	1.048%
2002	372	2562	1234	1434	5230	0.897%	0.980%	0.876%	0.933%	0.897%
2003	404	2535	1241	1524	5300	0.955%	0.976%	0.906%	0.940%	0.955%
2004	363	2500	1237	1570	5307	0.867%	0.973%	0.911%	0.941%	0.867%
2005	373	2343	1349	1676	5368	0.897%	0.919%	0.959%	0.953%	0.897%
2006	372	2307	1302	1568	5177	0.912%	0.912%	0.892%	0.924%	0.912%
2007	382	2332	1308	1552	5192	0.945%	0.929%	0.885%	0.934%	0.945%
2008	397	2380	1174	1599	5153	0.963%	0.951%	0.925%	0.934%	0.963%
	PROJECTIONS									
2009	414	2399	1194	1566	5160	1.023%	0.965%	0.918%	0.943%	1.023%
2010	379	2385	1193	1526	5104	0.945%	0.966%	0.903%	0.940%	0.945%
2011	438	2469	1180	1466	5115	1.081%	1.004%	0.879%	0.948%	1.081%
2012	418	2500	1173	1418	5090	1.030%	1.017%	0.855%	0.948%	1.030%
2013	408	2506	1183	1437	5125	1.001%	1.018%	0.870%	0.958%	1.001%
2014	397	2506	1226	1398	5129	0.971%	1.019%	0.853%	0.961%	0.971%
2015	402	2494	1253	1413	5159	0.978%	1.012%	0.868%	0.969%	0.978%
2016	409	2524	1228	1428	5180	0.992%	1.019%	0.886%	0.974%	0.992%
2017	410	2495	1270	1435	5199	0.992%	1.004%	0.893%	0.978%	0.992%
2018	412	2488	1273	1485	5246	0.993%	0.998%	0.929%	0.987%	0.993%

Source: H. C. Planning Consultants, Inc.

APPENDIX TABLE 5-B (Continued)

LOW PROJECTIONS (10-Year Trend)

SCHOOL YEAR	K	K-5	6-8	9-12 NFA	K-12	K	K-5	6-8	9-12 NFA	K-12
2008	397	2380	1174	1599	5153	0.963%	0.951%	0.925%	0.934%	0.963%
2009	424	2391	1198	1583	5172	1.048%	0.962%	0.928%	0.945%	1.048%
2010	388	2365	1201	1556	5123	0.968%	0.958%	0.921%	0.943%	0.968%
2011	449	2445	1183	1499	5127	1.107%	0.994%	0.898%	0.951%	1.107%
2012	428	2467	1175	1450	5091	1.054%	1.004%	0.874%	0.948%	1.054%
2013	418	2466	1179	1473	5119	1.025%	1.002%	0.892%	0.956%	1.025%
2014	407	2476	1208	1433	5117	0.994%	1.007%	0.874%	0.959%	0.994%
2015	412	2464	1226	1446	5136	1.002%	0.999%	0.888%	0.964%	1.002%
2016	419	2494	1197	1457	5148	1.016%	1.007%	0.904%	0.968%	1.016%
2017	420	2465	1247	1444	5155	1.016%	0.992%	0.898%	0.970%	1.016%
2018	422	2458	1250	1491	5199	1.017%	0.986%	0.933%	0.978%	1.017%
2008-18 Change	25	133	-61	-108	-37	0.071%	0.063%	0.014%	0.036%	0.071%

MIDDLE PROJECTIONS (Average of Low and High Projections)

SCHOOL YEAR	K	K-5	6-8	9-12 NFA	K-12	K	K-5	6-8	9-12 NFA	K-12
2008	397	2380	1174	1599	5153	0.963%	0.951%	0.925%	0.934%	0.963%
2009	414	2399	1194	1566	5160	1.023%	0.965%	0.918%	0.943%	1.023%
2010	379	2385	1193	1526	5104	0.945%	0.966%	0.903%	0.940%	0.945%
2011	438	2469	1180	1466	5115	1.081%	1.004%	0.879%	0.948%	1.081%
2012	418	2500	1173	1418	5090	1.030%	1.017%	0.855%	0.948%	1.030%
2013	408	2506	1183	1437	5125	1.001%	1.018%	0.870%	0.958%	1.001%
2014	397	2506	1226	1398	5129	0.971%	1.019%	0.853%	0.961%	0.971%
2015	402	2494	1253	1413	5159	0.978%	1.012%	0.868%	0.969%	0.978%
2016	409	2524	1228	1428	5180	0.992%	1.019%	0.886%	0.974%	0.992%
2017	410	2495	1270	1435	5199	0.992%	1.004%	0.893%	0.978%	0.992%
2018	412	2488	1273	1485	5246	0.993%	0.998%	0.929%	0.987%	0.993%
2008-18 Change	15	108	99	-114	93	0.030%	0.047%	0.004%	0.053%	0.030%

HIGH PROJECTIONS (Weighted 3-Year Trend)

SCHOOL YEAR	K	K-5	6-8	9-12 NFA	K-12	K	K-5	6-8	9-12 NFA	K-12
2008	397	2380	1174	1599	5153	0.963%	0.951%	0.925%	0.934%	0.963%
2009	404	2407	1191	1549	5147	0.999%	0.968%	0.908%	0.941%	0.999%
2010	370	2405	1184	1496	5085	0.923%	0.974%	0.885%	0.937%	0.923%
2011	427	2493	1177	1434	5104	1.055%	1.013%	0.860%	0.946%	1.055%
2012	408	2533	1171	1386	5089	1.005%	1.030%	0.836%	0.948%	1.005%
2013	399	2546	1186	1400	5132	0.977%	1.034%	0.848%	0.959%	0.977%
2014	388	2535	1243	1363	5142	0.948%	1.031%	0.831%	0.964%	0.948%
2015	392	2524	1279	1379	5182	0.955%	1.024%	0.847%	0.973%	0.955%
2016	399	2555	1260	1398	5212	0.968%	1.032%	0.867%	0.980%	0.968%
2017	400	2524	1293	1426	5243	0.968%	1.016%	0.887%	0.986%	0.968%
2018	402	2517	1296	1479	5292	0.969%	1.010%	0.925%	0.996%	0.969%
2008-18 Change	5	192	-15	-126	51	0.023%	0.087%	0.002%	0.053%	0.023%

APPENDIX TABLE 5-C
PUBLIC SCHOOL ENROLLMENT PER HOUSING UNIT
NORWICH, CONNECTICUT, 2009-2018

	Total HU	K-5	6-8	9-12 NFA	K-12	K-5	6-8	9-12 NFA	K-12
1994	16,538	2877	1250	1153	5280	0.174	0.076	0.070	0.319
1995	16,541	2859	1296	1138	5293	0.173	0.078	0.069	0.320
1996	16,556	2812	1305	1128	5245	0.170	0.079	0.068	0.317
1997	16,573	2614	1266	1183	5063	0.158	0.076	0.071	0.305
1998	16,571	2560	1266	1242	5068	0.154	0.076	0.075	0.306
1999	16,580	2536	1248	1319	5103	0.153	0.075	0.080	0.308
2000	16,596	2475	1257	1355	5087	0.149	0.076	0.082	0.307
2001	16,615	2556	1251	1421	5228	0.154	0.075	0.086	0.315
2002	16,746	2562	1234	1434	5230	0.153	0.074	0.086	0.312
2003	16,987	2535	1241	1524	5300	0.149	0.073	0.090	0.312
2004	17,210	2500	1237	1570	5307	0.145	0.072	0.091	0.308
2005	17,428	2343	1349	1676	5368	0.134	0.077	0.096	0.308
2006	17,564	2307	1302	1568	5177	0.131	0.074	0.089	0.295
2007	17,633	2332	1308	1552	5192	0.132	0.074	0.088	0.294
2008	17,657	2380	1174	1599	5153	0.135	0.066	0.091	0.292
		LOW							
2009	17,755	2391	1198	1583	5172	0.135	0.067	0.089	0.291
2010	17,853	2365	1201	1556	5123	0.132	0.067	0.087	0.287
2011	17,951	2445	1183	1499	5127	0.136	0.066	0.084	0.286
2012	18,049	2467	1175	1450	5091	0.137	0.065	0.080	0.282
2013	18,147	2466	1179	1473	5119	0.136	0.065	0.081	0.282
2014	18,245	2476	1208	1433	5117	0.136	0.066	0.079	0.280
2015	18,343	2464	1226	1446	5136	0.134	0.067	0.079	0.280
2016	18,441	2494	1197	1457	5148	0.135	0.065	0.079	0.279
2017	18,539	2465	1247	1444	5155	0.133	0.067	0.078	0.278
2018	18,637	2458	1250	1491	5199	0.132	0.067	0.080	0.279
		MIDDLE							
2009	17755	2399	1194	1566	5160	0.135	0.067	0.088	0.291
2010	17853	2385	1193	1526	5104	0.134	0.067	0.085	0.286
2011	17951	2469	1180	1466	5115	0.138	0.066	0.082	0.285
2012	18049	2500	1173	1418	5090	0.139	0.065	0.079	0.282
2013	18147	2506	1183	1437	5125	0.138	0.065	0.079	0.282
2014	18245	2506	1226	1398	5129	0.137	0.067	0.077	0.281
2015	18343	2494	1253	1413	5159	0.136	0.068	0.077	0.281
2016	18441	2524	1228	1428	5180	0.137	0.067	0.077	0.281
2017	18539	2495	1270	1435	5199	0.135	0.069	0.077	0.280
2018	18637	2488	1273	1485	5246	0.133	0.068	0.080	0.281
		HIGH							
2009	17755	2407	1191	1549	5147	0.136	0.067	0.087	0.290
2010	17853	2405	1184	1496	5085	0.135	0.066	0.084	0.285
2011	17951	2493	1177	1434	5104	0.139	0.066	0.080	0.284
2012	18049	2533	1171	1386	5089	0.140	0.065	0.077	0.282
2013	18147	2546	1186	1400	5132	0.140	0.065	0.077	0.283
2014	18245	2535	1243	1363	5142	0.139	0.068	0.075	0.282
2015	18343	2524	1279	1379	5182	0.138	0.070	0.075	0.283
2016	18441	2555	1260	1398	5212	0.139	0.068	0.076	0.283
2017	18539	2524	1293	1426	5243	0.136	0.070	0.077	0.283
2018	18637	2517	1296	1479	5292	0.135	0.070	0.079	0.284

**APPENDIX TABLE 5-D
INTER-GRADE ENROLLMENT CHANGES* BY GRADE AND GRADE LEVEL
NORWICH PUBLIC SCHOOLS**

*Enrollment changes when students in a grade advance to the next grade.

SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5	6-8	9-12	K-12
1999	-33	-154	2	12	-18	-1	-4	15	14	-63	-4	-37	-1	-192	25	-105	-272
2000	-149	-16	2	1	-13	-8	-11	27	-4	-72	0	-23	-24	-183	12	-119	-290
2001	-84	-4	10	15	6	4	23	6	5	-26	20	-48	-33	-53	34	-87	-106
2002	-105	3	0	-3	21	3	-2	22	-5	-1	-5	-56	-28	-81	15	-90	-156
2003	-76	3	-25	12	-12	5	-5	22	-12	41	8	-60	-13	-93	5	-24	-112
2004	-113	-16	19	16	-9	20	-13	7	-4	40	-67	-38	-7	-83	-10	-72	-165
2005	-104	14	-5	-16	-8	13	-10	2	-2	58	-8	23	-42	-106	-10	31	-85
2006	-122	4	7	4	-8	-8	-25	-14	-1	23	-51	-90	-55	-123	-40	-173	-336
2007	-150	17	6	13	25	-1	2	6	-3	31	11	-76	-44	-90	5	-78	-163
2008	-111	26	8	-20	11	-5	10	-10	-2	-28	-9	-75	-22	-91	-2	-134	-227
3-Yr. Avg.	-127	16	7	-1	9	-5	-4	-6	-2	9	-16	-80	-40	-101	-12	-128	-242
5-Yr. Avg.	-120	9	7	-1	2	4	-7	-2	-2	25	-25	-51	-34	-98	-11	-85	-195
10-Yr. Avg.	-105	-12	2	3	-1	2	-4	8	-1	0	-11	-48	-27	-109	3	-85	-191
W 3-Yr. Avg.	-126	19	7	-5	13	-4	2	-5	-2	0	-9	-78	-35	-96	-6	-122	-224
W 5-Yr. Avg.	-123	15	6	-3	7	0	-3	-4	-2	14	-16	-63	-36	-98	-9	-101	-208
MINIMUM	-150	-154	-25	-20	-18	-8	-25	-14	-12	-72	-67	-90	-55	-192	-40	-173	-336
MAXIMUM	-33	26	19	16	25	20	23	27	14	58	20	23	-1	-53	34	31	-85
RANGE	117	180	44	36	43	28	48	41	26	130	87	113	54	139	74	204	251
MEDIAN	-108	3	4	8	-8	1	-5	7	-3	11	-5	-52	-26	-92	5	-89	-164

LOW PROJECTIONS: (10-Year Trend)

SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5	6-8	9-12	K-12
2009	-96	-11	3	2	0	1	-3	7	-1	-1	-10	-49	-27	-101	3	-87	-185
2010	-115	-11	3	2	0	1	-3	7	-1	-1	-8	-51	-29	-121	3	-89	-207
2011	-105	-10	3	2	0	1	-3	7	-1	-1	-9	-42	-30	-110	3	-81	-189
2012	-105	-12	3	2	0	1	-3	6	-1	-1	-8	-44	-25	-112	2	-78	-187
2013	-102	-11	3	2	0	1	-3	7	-1	-1	-9	-42	-26	-108	3	-77	-182
2014	-104	-11	3	2	0	1	-3	7	-1	-1	-9	-44	-24	-109	3	-78	-184
2015	-105	-11	3	2	0	1	-3	7	-1	-1	-8	-45	-26	-111	3	-79	-188
2016	-105	-11	3	2	0	1	-3	7	-1	-1	-9	-40	-26	-111	3	-75	-183
2017	-106	-12	3	2	0	1	-3	6	-1	-1	-9	-43	-23	-113	2	-76	-188
2018	-107	-12	3	2	0	1	-3	7	-1	-1	-9	-44	-26	-114	3	-80	-190

MIDDLE PROJECTIONS:

SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5	6-8	9-12	K-12
2009	-106	5	5	-1	6	-2	-1	1	-2	1	-10	-64	-31	-93	-1	-104	-198
2010	-124	5	5	-2	6	-1	-1	1	-1	1	-8	-67	-31	-112	-1	-106	-218
2011	-116	4	5	-2	6	-2	0	1	-2	1	-8	-55	-33	-103	-1	-96	-200
2012	-115	5	5	-2	6	-2	-1	1	-2	1	-8	-58	-27	-102	-1	-92	-195
2013	-112	5	6	-2	6	-2	-1	1	-1	1	-8	-54	-29	-98	-1	-90	-188
2014	-113	5	5	-2	6	-2	0	1	-2	1	-8	-58	-27	-101	-1	-92	-193
2015	-115	5	5	-2	7	-2	-1	1	-2	1	-8	-58	-29	-101	-1	-93	-196
2016	-115	5	5	-2	7	-2	0	1	-2	1	-8	-52	-29	-102	-1	-88	-191
2017	-116	4	5	-2	7	-2	-1	1	-2	1	-9	-56	-26	-104	-1	-90	-196
2018	-117	4	5	-2	6	-2	-1	1	-2	1	-9	-59	-28	-105	-1	-95	-200

HIGH PROJECTIONS: (W. 3-Year Trend)

SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-5	6-8	9-12	K-12
2009	-116	21	8	-5	11	-4	2	-4	-2	3	-9	-79	-35	-85	-4	-121	-210
2010	-134	21	8	-5	12	-4	2	-4	-2	3	-8	-83	-34	-102	-4	-122	-228
2011	-126	19	8	-5	13	-4	2	-4	-2	3	-8	-69	-36	-96	-5	-110	-211
2012	-125	22	7	-5	13	-4	2	-4	-2	3	-7	-72	-30	-92	-4	-107	-203
2013	-121	21	8	-5	13	-4	2	-4	-2	3	-8	-66	-31	-88	-4	-103	-195
2014	-123	21	8	-6	12	-4	2	-4	-2	3	-8	-71	-29	-92	-5	-105	-202
2015	-125	20	8	-6	14	-4	2	-5	-2	3	-7	-71	-31	-92	-5	-107	-203
2016	-125	20	8	-5	13	-4	2	-5	-2	3	-8	-65	-31	-94	-5	-101	-199
2017	-126	20	8	-6	13	-4	2	-5	-2	3	-8	-70	-28	-95	-5	-104	-203
2018	-127	20	8	-6	13	-4	2	-5	-2	3	-9	-73	-31	-96	-5	-109	-210

6

INDIVIDUAL SCHOOL ENROLLMENT PROJECTION

6.1 Introduction

In this section, we present the 10-year enrollment projections by grade for each of Norwich's nine elementary and two middle schools. We did not project school enrollments for the following schools: Norwich High School, also called Thames River Academy (TRA), which serves as an alternative high school for grades 9 through 12 students, Hickory Street School which serves grades 4 to 7 students with special needs, and Deborah Tenant-Zinewicz School (DTZ) which serves grades 7-12 special education students. Enrollment projections for Norwich Free Academy are the same as the ones shown in the district-wide enrollment projections by grade.

6.2 Limitations of Projections

In general, enrollment projections for individual schools are fraught with difficulty for several reasons. First, small area projections are inherently more likely to be subject to large percentage errors than larger area projections are; second, although the enrollment projections are made based on the known annual births in an area, we normally do not have birth data for each elementary school zone; third, practices of grade retention among schools may vary from year to year; fourth, because of redistricting and/or reorganization of grade levels, the long-term historical enrollment data for each school do not give consistent statistics which can be used for the projections*; and fifth, not all students in a school attendance zone attend their designated neighborhood schools for various reasons. **

6.3 School-by-School Enrollment Projection Assumptions

It is also necessary to adopt the following assumptions for projecting enrollments for individual schools:

1. There will be no redistricting during the projection period.
2. School capacities will not be significantly altered by additions and new construction. School capacities are very closely related to the school enrollments of each school. As the school enrollments grow, school capacities are enlarged by building more classrooms and other core facilities. But once the school capacities are set, then school enrollments are very often allocated to each school in accordance with its capacity.

*In 2000, grade 6 was assigned to the middle school. In 2003, William A. Buckingham elementary school was closed, and the number of elementary schools was reduced from 10 to 9, resulting in a district-wide redistricting. Therefore, inter-grade ratios beyond the five year averages are invalid.

** For example, redistributing students to equalize the racial/ethnic mix of school enrollments may create situations in which some students are attending schools to which they were not originally assigned.

3. There will be no significant changes in special education, pre-kindergarten and kindergarten programs. In 2002, full-day kindergarten was eliminated. Currently, Norwich public schools have an extended-day kindergarten program.
4. The propensity of students to attend their own neighborhood schools will not significantly change in the future.
5. In the future, the total number of births in the district will be distributed among the six elementary school zones in a similar way to their allocation among the schools in the recent past.

The above list consists of a rather stringent set of assumptions. Whenever any one of these assumptions is significantly violated in the future, the projections should be readjusted or updated.

6.4 Enrollment Projections for Each Elementary School

Table 6.1 presents the results of ten-year enrollment projections for each elementary school in Norwich.

TABLE 6.1
10-YEAR ENROLLMENT PROJECTIONS FOR EACH K-5 ELEMENTARY SCHOOL
NORWICH, CONNECTICUT, 2004-2018
(SRM Middle Projections)

Year	Bishop	Greenville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonnoc	Total
2004	136	339	359	256	406	306	257	209	232	2500
2005	118	328	344	224	390	273	231	200	235	2343
2006	131	325	362	228	376	260	224	179	222	2307
2007	157	342	369	232	371	236	193	197	208	2305
2008	158	327	350	239	427	302	182	187	208	2380
2009	164	328	356	237	445	301	180	184	205	2399
2010	168	329	344	222	447	302	183	185	204	2385
2011	177	325	369	235	460	314	189	186	212	2469
2012	178	316	373	238	483	316	193	189	213	2500
2013	171	318	379	240	476	320	203	187	213	2506
2014	174	330	377	241	467	313	197	190	215	2506
2015	174	328	376	240	465	312	197	189	214	2494
2016	175	333	380	243	472	317	198	191	215	2524
2017	174	329	376	240	465	312	197	189	213	2495
2018	173	328	375	240	463	311	196	189	213	2488
<u>2008-2013</u>										
Number	13	-9	30	2	46	16	22	0	5	126
Percent	8.1%	-2.6%	8.5%	0.7%	10.8%	5.5%	12.3%	0.2%	2.3%	5.3%
<u>2013-2018</u>										
Number	2	9	-4	0	-13	-9	-7	2	1	-18
Percent	1.3%	2.9%	-1.1%	0.1%	-2.7%	-2.7%	-3.2%	1.1%	0.3%	-0.7%
<u>2008-2018</u>										
Number	15	1	25	2	33	8	16	2	5	108
Percent	9.5%	0.2%	7.3%	0.8%	7.8%	2.6%	8.8%	1.3%	2.6%	4.5%

Note: Totals may be one or two off due to rounding.

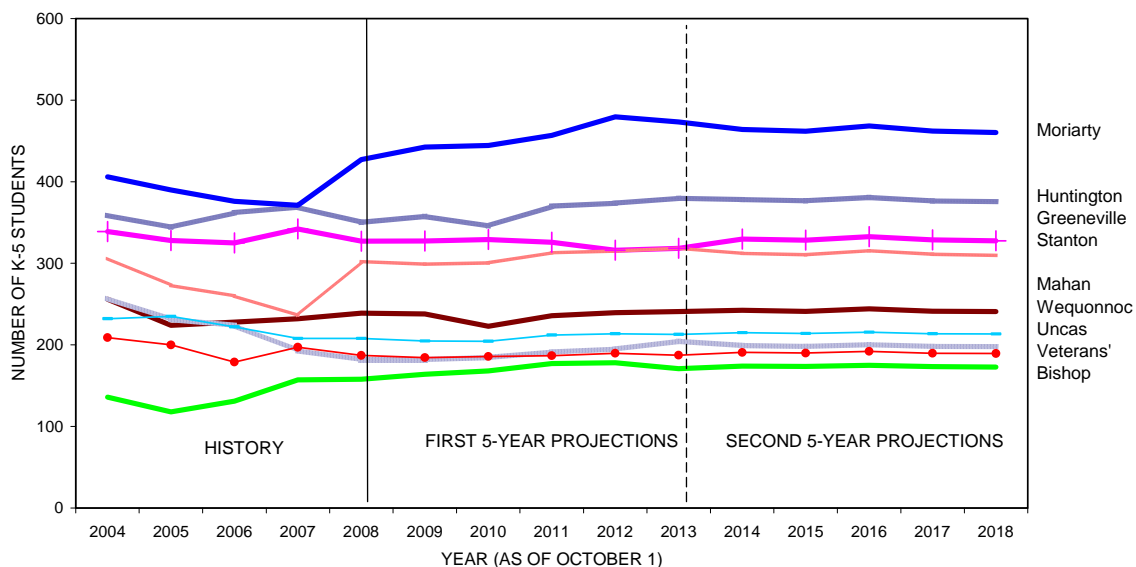
Note the following from Table 6.1:

- First Five Forecast Years:** All Norwich's elementary schools, except Greenville ES, are projected to increase their enrollments: Moriarty ES will increase most by adding 46 students, followed by Huntington (30 students), Uncas (22 students), Stanton (16 students), Bishop (13 students), Wequonnoc (5 students), Moriarty (2 students), and Veterans (0 students). However, Greenville is projected to lose 9 students. Altogether, it is projected that K-5 enrollments will increase by 126 students or by 5.3% over the next five years. These projections were based on the actual number of births in the Norwich school district, and they reflect the weighted 5-year average enrollment growth trend.

- The Second Five Forecast Years:** While the K-5 enrollments are projected to add 126 students in the first five forecast years, the enrollments are then projected to lose 18 students over the second five years. Accordingly, Norwich's elementary schools are projected either to add or to lose a few students. In short, the elementary school enrollments will be flat or plateau over the second five forecast years.

As shown in Figure 6-1, Moriarty will remain as the largest school in terms of enrollments, followed by Huntington, Greenville, Stanton, Mahan, Wequonnoc, Uncas, Veterans', and Bishop. These school-by-school enrollment projections were made by assuming that each school has an ample capacity to accommodate the projected peak enrollments. Note that the second five-year projections were made based on the projected number of births (unlike the first-year projections which were based on the actual number of births). Accordingly, these later projections are more prone to larger projection errors.

FIG. 6-1
 GRADES K-5 ENROLLMENT PROJECTIONS BY SCHOOL
 NORWICH PUBLIC SCHOOLS, 2009 - 2018



6.5 Enrollment Projections for Middle Schools

As shown in Table 6.2, the enrollments for Norwich’s two middle schools are projected to add only 9 students (+0.7%) over the next five years: the larger Kelly Middle School is projected to lose 11 students while the smaller Teachers’ Memorial Middle School is projected to gain 19 students. In short, the middle schools will hardly grow between 2008 and 2013.

However, it is projected that the two Norwich middle schools will add 91 students (+7.7%) over the subsequent five years: of these, 52 students (+7.6%) will be added to Kelly MS, and the remaining 39 students (+7.7%) to Teachers’ MS. In sum, the middle schools are projected to grow very slowly over the first five years, but to grow more rapidly during the second five forecast years. These projections also assume that the school capacities of both middle schools are sufficient in capacity to accommodate the projected enrollments.

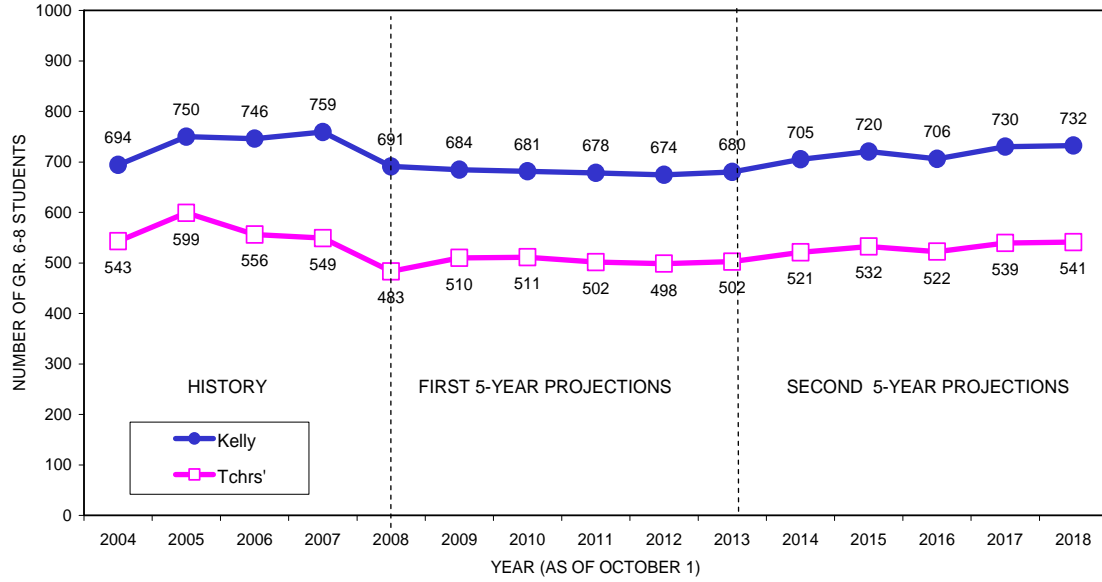
All in all, the Kelly Middle School is projected to add 41 students (6.0%) over the next ten years while the Teachers Memorial Middle School is projected to add 58 students (12.0%). These forecasts are valid as long as the projection assumptions are not violated.

TABLE 6.2
10-YEAR ENROLLMENT PROJECTIONS OF MIDDLE SCHOOLS
NORWICH, CONNECTICUT, 2009-2018

		Kelly	Teachers’ Memorial	TOTAL
Actual:	2004	694	543	1237
	2005	750	599	1349
	2006	746	556	1302
	2007	759	549	1308
	2008	691	483	1174
Projections:	2009	684	510	1194
	2010	681	511	1193
	2011	678	502	1180
	2012	674	498	1173
	2013	680	502	1183
	2014	705	521	1226
	2015	720	532	1253
	2016	706	522	1228
	2017	730	539	1270
	2018	732	541	1273
<u>2008-2013</u>				
	Number	-11	19	9
	Percent	-1.6%	4.0%	0.7%
<u>2013-2018</u>				
	Number	52	39	91
	Percent	7.6%	7.7%	7.7%
<u>2008-2018</u>				
	Number	41	58	99
	Percent	6.0%	12.0%	8.5%

Totals may be one or two off due to rounding.

FIG. 6-2
 GRADES 6-8 ENROLLMENT PROJECTIONS BY SCHOOL
 NORWICH PUBLIC SCHOOLS, 2009-2018



APPENDIX TABLES
SCHOOL-BY SCHOOL ENROLLMENT PROJECTIONS BY GRADE

APPENDIX TABLES

ENROLLMENT PROJECTIONS BY SCHOOL & BY GRADE

<FULLY-GRADED ENROLLMENTS>

BISHOP ELEMENTARY SCHOOL

		K	1	2	3	4	5	K-5	SPED	PK*	PK-5
History:	2004	20	23	18	29	17	29	136	0	32	168
	2005	26	20	22	19	14	17	118	0	17	135
	2006	32	20	23	26	17	13	131	0	16	147
	2007	41	29	22	20	29	16	157	0	15	172
	2008	28	38	27	22	22	21	158	0	15	173
Projections:	2009	34	24	38	27	21	19	164	0	15	179
	2010	31	29	24	39	27	18	168	0	15	183
	2011	36	27	29	25	38	23	177	0	15	192
	2012	34	31	27	30	24	32	178	0	15	193
	2013	33	29	31	27	29	20	171	0	15	186
	2014	32	29	30	32	27	25	174	0	15	189
	2015	33	28	29	30	31	23	174	0	15	189
	2016	33	28	28	29	29	26	175	0	15	190
	2017	34	29	29	29	29	25	173	0	15	188
	2018	34	29	29	29	28	25	173	0	15	188

Totals may be one or two off due to rounding. *Pre Kindergarten enrollments are not projected.

GREENEVILLE ELEMENTARY SCHOOL

		K	1	2	3	4	5	K-5	SPED	PK	PK-5
History:	2004	58	54	49	53	50	75	339	0	0	339
	2005	58	60	46	52	59	53	328	0	0	328
	2006	62	56	49	46	54	58	325	0	0	325
	2007	44	71	63	52	59	53	342	0	0	342
	2008	41	55	63	59	53	56	327	0	0	327
Projections:	2009	54	44	51	62	64	52	327	0	0	327
	2010	49	58	41	50	68	63	329	0	0	329
	2011	57	53	54	40	55	67	326	0	0	326
	2012	54	61	50	53	44	54	316	0	0	316
	2013	53	58	57	49	58	43	318	0	0	318
	2014	52	57	54	56	53	57	330	0	0	330
	2015	52	56	53	54	62	52	328	0	0	328
	2016	53	56	52	53	59	60	333	0	0	333
	2017	53	57	52	51	57	57	329	0	0	329
	2018	53	57	53	52	56	56	328	0	0	328

Totals may be one or two off due to rounding

HUNTINGTON ELEMENTARY SCHOOL

		K	1	2	3	4	5	K-5	SPED	PK	PK-5
History:	2004	55	48	55	57	61	83	359	0	28	387
	2005	55	55	52	51	63	68	344	0	32	376
	2006	50	54	73	60	61	64	362	0	29	391
	2007	63	58	55	79	59	55	369	0	30	399
	2008	63	54	62	44	73	54	350	0	30	380
Projections:	2009	63	60	59	61	44	70	358	0	30	388
	2010	58	60	65	58	62	43	346	0	30	376
	2011	67	55	66	64	58	59	370	0	30	400
	2012	64	64	60	65	65	56	374	0	30	404
	2013	63	61	70	59	65	62	380	0	30	410
	2014	61	59	66	68	60	63	378	0	30	408
	2015	62	58	65	65	69	58	377	0	30	407
	2016	63	59	63	64	66	67	381	0	30	411
	2017	63	59	64	62	65	63	376	0	30	406
	2018	63	60	65	63	63	62	375	0	30	405

Totals may be one or two off due to rounding.

MAHAN ELEMENTARY SCHOOL

		K	1	2	3	4	5	K-5	SPED	PK	PK-5
History:	2004	35	40	48	41	33	59	256	0	8	264
	2005	29	47	44	38	37	29	224	0	53	277
	2006	44	31	45	37	38	33	228	0	58	286
	2007	42	38	33	45	34	40	232	0	48	280
	2008	39	39	39	30	49	43	239	0	51	290
Projections:	2009	42	38	41	36	29	52	238	0	51	289
	2010	39	41	39	38	36	31	223	0	51	274
	2011	45	37	43	36	37	38	236	0	51	287
	2012	43	43	39	40	36	39	239	0	51	290
	2013	42	41	45	36	39	38	241	0	51	292
	2014	41	40	43	42	36	41	242	0	51	293
	2015	41	39	42	40	41	38	241	0	51	292
	2016	42	40	41	39	39	44	244	0	51	295
	2017	42	40	41	38	38	41	241	0	51	292
	2018	42	40	42	38	37	41	241	0	51	292

Totals may be one or two off due to rounding.

MORIARTY ELEMENTARY SCHOOL

		K	1	2	3	4	5	K-5	SPED	PK	PK-5
History:	2004	48	58	67	78	76	79	406	0	0	406
	2005	56	57	56	64	74	83	390	0	0	390
	2006	49	63	61	60	63	80	376	0	0	376
	2007	69	45	64	63	65	65	371	0	1	372
	2008	74	74	58	72	76	73	427	0	2	429
Projections:	2009	68	75	81	60	76	80	442	0	2	444
	2010	63	70	83	84	64	81	444	0	2	446
	2011	72	64	77	86	90	68	457	0	2	459
	2012	69	74	70	80	91	95	479	0	2	481
	2013	68	70	81	73	85	96	473	0	2	475
	2014	66	69	77	84	78	90	464	0	2	466
	2015	67	67	76	80	90	82	462	0	2	464
	2016	68	68	74	79	86	95	468	0	2	470
	2017	68	69	74	76	84	91	462	0	2	464
	2018	68	69	76	77	82	89	460	0	2	462

Totals may be one or two off due to rounding.

STANTON ELEMENTARY SCHOOL

		K	1	2	3	4	5	K-5	SPED	PK	PK-5
History:	2004	49	53	38	50	49	67	306	0	59	365
	2005	40	46	54	38	51	44	273	0	48	321
	2006	40	41	40	53	34	52	260	0	45	305
	2007	31	42	33	39	52	39	236	0	46	282
	2008	48	47	47	45	50	65	302	0	87	389
Projections:	2009	44	55	45	52	48	55	299	0	87	386
	2010	41	50	52	49	55	53	301	0	87	388
	2011	47	46	48	57	53	61	313	0	87	400
	2012	45	53	44	53	61	58	315	0	87	402
	2013	44	51	51	49	57	67	318	0	87	405
	2014	43	50	49	56	52	63	312	0	87	399
	2015	43	48	47	54	60	58	310	0	87	397
	2016	44	49	46	53	57	66	315	0	87	402
	2017	44	50	47	51	56	63	311	0	87	398
	2018	44	50	48	52	54	62	310	0	87	397

Totals may be one or two off due to rounding.

UNCAS ELEMENTARY SCHOOL

		K	1	2	3	4	5	K-5	SPED	PK	PK-5
History:	2004	34	39	50	45	37	52	257	0	0	257
	2005	38	33	33	43	46	38	231	0	0	231
	2006	37	31	35	35	38	48	224	0	0	224
	2007	21	36	34	30	37	35	193	0	0	193
	2008	43	23	33	27	27	29	182	0	0	182
Projections:	2009	38	41	23	29	26	25	182	0	0	182
	2010	35	36	41	20	29	24	184	0	0	184
	2011	40	33	36	36	20	26	191	0	0	191
	2012	38	38	33	32	35	18	195	0	0	195
	2013	37	36	38	29	31	32	204	0	0	204
	2014	36	36	36	34	29	29	199	0	0	199
	2015	37	35	35	32	33	26	198	0	0	198
	2016	37	35	34	32	31	30	200	0	0	200
	2017	37	36	35	31	31	29	198	0	0	198
	2018	38	36	35	31	30	28	198	0	0	198

Totals may be one or two off due to rounding.

VETERANS' MEMORIAL ELEMENTARY SCHOOL

		K	1	2	3	4	5	K-5	SPED	PK	PK-5
History:	2004	26	30	37	37	36	43	209	0	44	253
	2005	36	23	31	36	38	36	200	0	65	265
	2006	25	36	26	31	27	34	179	0	74	253
	2007	29	34	39	34	36	25	197	0	82	279
	2008	27	35	30	34	28	33	187	0	49	236
Projections:	2009	31	28	35	31	33	27	185	0	49	234
	2010	29	33	28	36	29	31	186	0	49	235
	2011	33	30	33	28	34	28	187	0	49	236
	2012	32	35	30	33	27	33	190	0	49	239
	2013	31	33	35	31	32	26	187	0	49	236
	2014	30	32	33	35	29	31	191	0	49	240
	2015	31	31	32	34	34	28	190	0	49	239
	2016	31	32	31	33	32	33	192	0	49	241
	2017	31	32	32	32	32	31	190	0	49	239
	2018	31	32	32	32	31	30	189	0	49	238

Totals may be one or two off due to rounding.

WEQUONNOC ELEMENTARY SCHOOL

		K	1	2	3	4	5	K-5	SPED	PK	PK-5
History:	2004	38	43	32	43	35	41	232	0	20	252
	2005	35	36	45	37	43	39	235	0	18	253
	2006	33	45	32	39	38	35	222	0	21	243
	2007	34	43	38	30	30	33	208	0	19	227
	2008	34	43	38	30	30	33	208	0	19	225
Projections:	2009	38	37	40	36	26	27	205	0	19	224
	2010	35	42	34	38	32	24	204	0	19	223
	2011	41	38	39	33	33	29	212	0	19	231
	2012	39	44	36	37	29	30	214	0	19	233
	2013	38	42	41	34	32	26	213	0	19	232
	2014	37	41	39	39	30	29	215	0	19	234
	2015	37	40	38	37	34	27	214	0	19	233
	2016	38	41	37	36	33	31	216	0	19	235
	2017	38	41	38	35	32	29	214	0	19	233
	2018	38	41	38	36	31	29	213	0	19	232

Totals may be one or two off due to rounding.

KELLY MIDDLE SCHOOL

		6	7	8	6-8
History:	2004	227	234	233	694
	2005	280	232	238	750
	2006	234	278	234	746
	2007	252	237	270	759
	2008	215	236	240	691
Projections	2009	235	213	236	684
	2010	235	233	213	681
	2011	212	233	233	678
	2012	231	210	233	674
	2013	241	229	210	680
	2014	237	239	229	705
	2015	247	235	238	720
	2016	227	245	235	706
	2017	262	224	245	730
	2018	249	259	224	732

Totals may be one or two off due to rounding.

TEACHERS' MEMORIAL MIDDLE SCHOOL

		6	7	8	6-8
History:	2004	188	182	173	543
	2005	238	185	176	599
	2006	148	226	182	556
	2007	167	151	231	549
	2008	164	173	146	483
Projections	2009	171	167	172	510
	2010	171	175	166	511
	2011	154	174	173	502
	2012	168	157	173	498
	2013	175	172	156	502
	2014	172	179	170	521
	2015	179	176	177	532
	2016	165	183	174	522
	2017	190	168	182	539
	2018	181	194	166	541

Totals may be one or two off due to rounding.

NORWICH FREE ACADEMY

		9	10	11	12	9-12
History:	2000	353	374	352	276	1355
	2001	403	373	326	319	1421
	2002	421	398	317	298	1434
	2003	453	429	338	304	1524
	2004	462	386	391	331	1570
	2005	464	454	409	349	1676
	2006	437	413	364	354	1568
	2007	447	448	337	320	1552
	2008	473	438	373	315	1599
Projections:	2009	387	463	374	342	1566
	2010	408	379	396	343	1526
	2011	380	400	324	363	1466
	2012	407	372	342	297	1418
	2013	407	399	318	313	1437
	2014	367	398	341	291	1398
	2015	400	360	341	312	1413
	2016	416	392	307	312	1428
	2017	410	408	336	281	1435
	2018	427	401	349	307	1485

* Totals may be one or two off due to rounding.

7 IMPACT OF MINORITY POPULATION ON SCHOOL ENROLLMENTS

7.1 Introduction

According to the 2000 U. S. Census of Population, Norwich’s minority population (American Indian, Asian American, Black, and Hispanic) constituted 16.8% of the city’s total population. Also, the number and percent of individuals from minority groups in Norwich has been increasing while the number of white individuals has been declining. In this section, we look into the potential impact of this growing segment of the population vis à vis the declining white on the growth and racial/ethnic composition of public school enrollments in Norwich.

7.2 The Growth of Norwich’s Minority Population and Students

According to the U. S. Census of Population, the minority population in Norwich grew from 3,605 persons in 1990 to 5,583 persons in 2000, an increase of 2,278 persons or 63% within a decade. In the meantime, the white population declined from 33,586 persons in 1990 to 29,054 persons in 2000, a decline of 4,532 persons or -13.5%. The net effect was that the total population declined by 2,254 persons between 1990 and 2000.

TABLE 7.1
NORWICH POPULATION CHANGES BY ETHNIC-RACIAL GROUP
1990-2000

	1990		2000		1990-2000 Change	
	Number	Percent	Number	Percent	Number	Percent
White alone	33586	90.3%	29054	83.2%	-4532	-13.5%
Minority Total	3605	9.7%	5883	16.8%	2278	63.2%
Total Population*	37191	100.0%	34937	100.0%	-2254	-6.1%
Minority Breakdown:						
Black alone	1701	4.6%	2306	6.6%	605	35.6%
Am. Indian alone	229	0.6%	409	1.2%	180	78.6%
Asian-Pacific Is.	385	1.0%	760	2.2%	375	97.4%
Other	129	0.3%	200	0.6%	71	55.0%
Hispanic/Latinos	1161	3.1%	2208	6.3%	1047	90.2%

Source: 1990 and 2000 U. S. Census of Population Summary files (SF-1) 100-percent data.

*Single race alone.

From Table 7.1, we can observe that Hispanics added 1,047 persons, the largest number during the last decade. But, in terms of percent growth, it was the number of Asian-Pacific islanders who grew the most, by 97.4%. It is also noteworthy that the number of Native Americans grew by 78.6%. In terms of percent growth, the number of African Americans grew the least amount, 35.6%, and yet still added 605 persons.

*We use these nomenclatures as they were used in the U.S. Censuses and the Connecticut State Department of Education publications.

7.3 Growth of Minority Student Populations

As the number in Norwich of individuals from minority backgrounds increased rapidly, so did the student population for these groups. Table 7.2 (below) provides these figures for the past ten years (between 1999 and 2008). In the table, total minority enrollments increased from 1,203 students in 1999 to 2,132 students in 2008, 77% within 10 years. In the meantime, the number of white students in Norwich decreased by 38%, a loss of 1,078 students. As a result, the proportion of minority students increased from 30% in 1999 to 55% in 2008 while the percent of white students dropped sharply from 70% in 1999 to 45% in 2008.

TABLE 7.2
GROWTH TRENDS OF MINORITY AND WHITE STUDENTS IN NORWICH PUBLIC SCHOOLS
1999 – 2008

	American Indian	Asian American	Black	Hispanic	White	Total Minority	Total PK-12	% of Minority
1999	70	68	682	383	2805	1203	4008	30%
2000	56	99	736	426	2683	1317	4000	33%
2001	59	116	787	473	2709	1435	4144	35%
2002	92	151	745	520	2537	1508	4045	37%
2003	84	199	819	614	2350	1716	4066	42%
2004	94	227	869	637	2218	1827	4045	45%
2005	92	239	866	667	2093	1864	3957	47%
2006	107	249	913	733	1959	2002	3961	51%
2007	103	289	928	824	1848	2144	3992	54%
2008	105	286	914	827	1727	2132	3859	55%
5-Yr. Growth #	1	284	909	820	1718	2120	3817	
5-Yr. Growth %	1.1%	125.1%	104.6%	128.7%	77.5%	116.0%	94.4%	
10-Yr. Growth #	35	218	232	444	-1078	929	-149	
10-Yr. Growth %	50.0%	320.6%	34.0%	115.9%	-38.4%	77.2%	-3.7%	

Source: Connecticut State Department of Education. Note the data are slightly different from the data available from the Norwich Public Schools.

Hispanic enrollments increased the most, an addition of 444 students during the past decade, while African American enrollments increased by 232 students, Asian American students by 213 students, and Native American students by 35 students. In terms of growth rates, the fastest growth *rate* was exhibited by Asian Americans, an increase of 320% during the past decade, followed by Hispanic students (+116%), Native Americans (+50%), and African American students (+34%). Note that African American students are still the largest minority in Norwich public schools. Nonetheless, the number of Hispanic/Latino students may surpass that of African American students in Norwich public schools in the foreseeable future. From Fig. 7-1 on the next page, observe how fast the number of Hispanic students in Norwich public schools has been growing relative to the number of Afro-American students.

FIG. 7-1
GROWTH TRENDS OF MINORITY AND WHITE STUDENTS IN
NORWICH PUBLIC SCHOOLS, 1999-2008

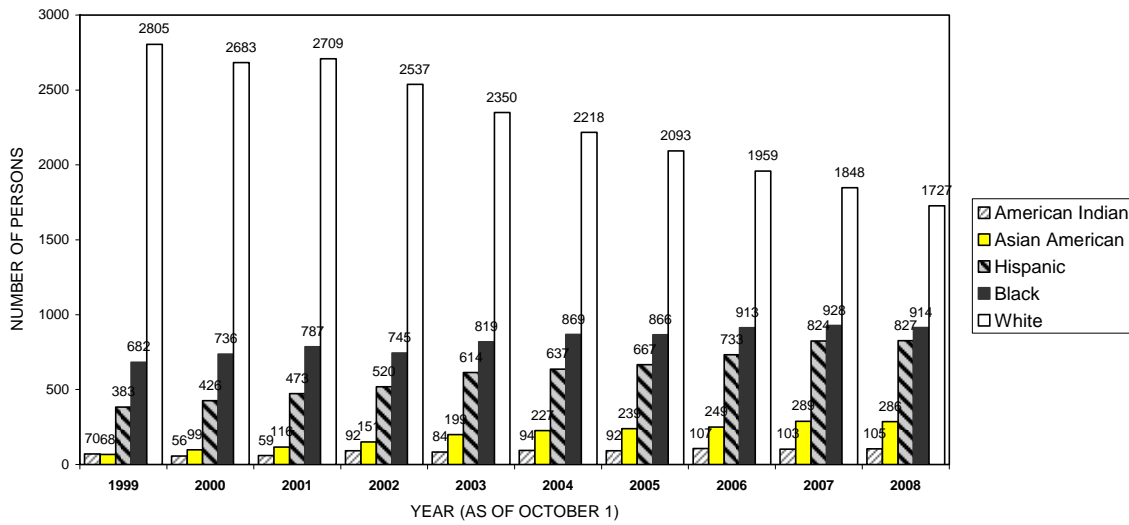
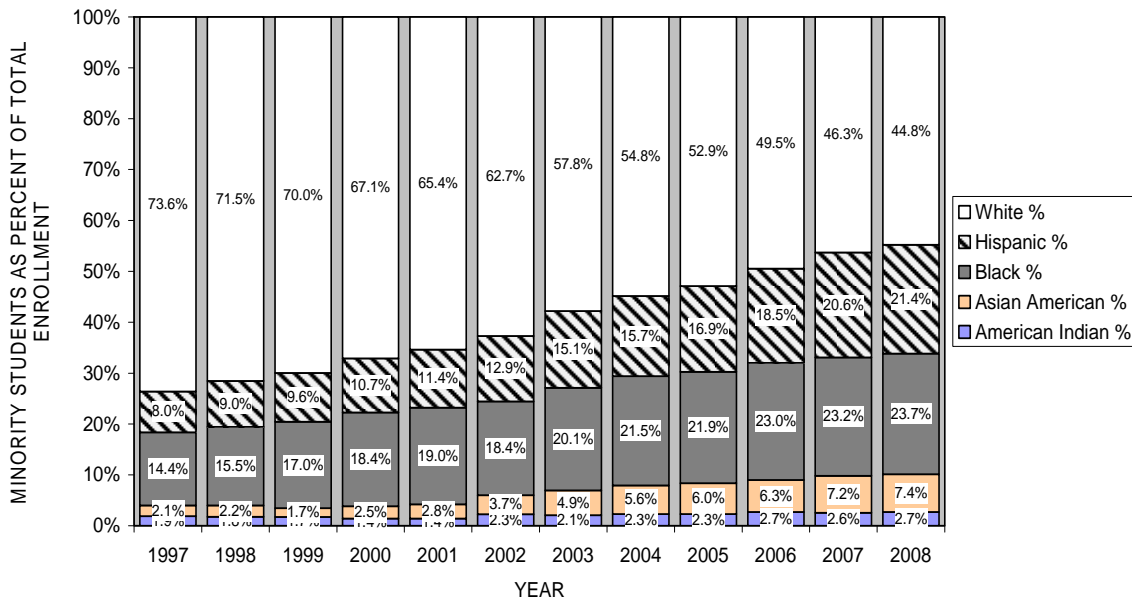


Figure 7-2 below illustrates the increasing shares of minority students over the past decade, and at the same time rapidly the shrinking shares of white enrollments in the Norwich public schools.

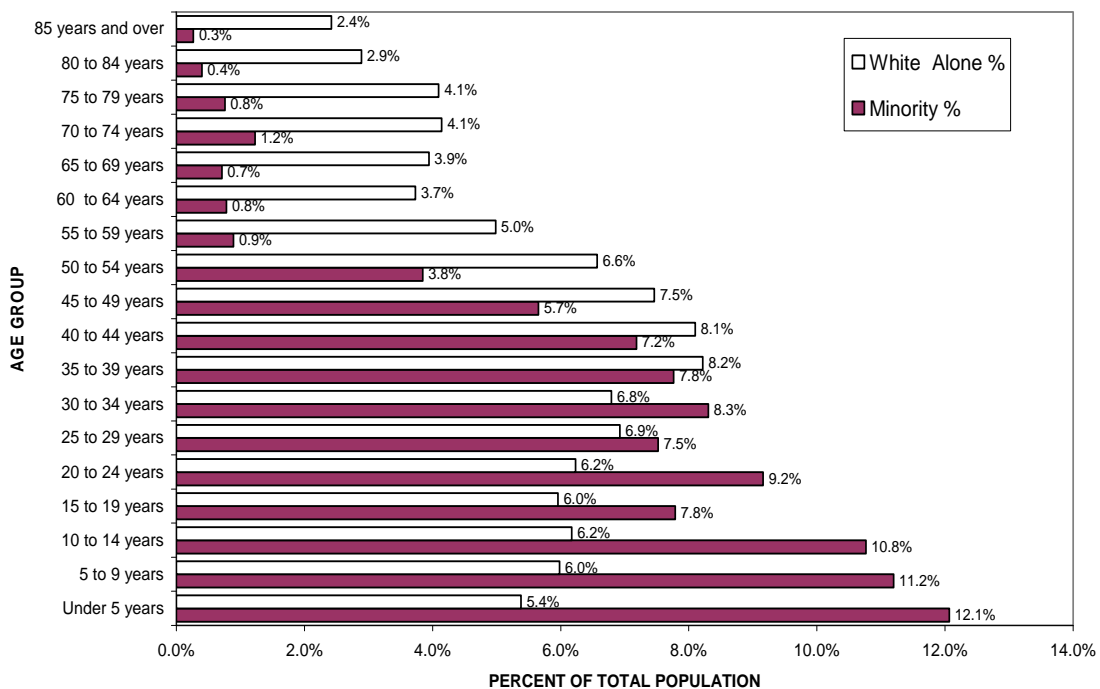
FIG. 7-2
MINORITY STUDENTS AS PERCENT OF TOTAL NORWICH
PUBLIC SCHOOL ENROLLMENTS, 1997-2008



7.4 Age Structure of Minority Students

It is generally believed that minority populations, relatively speaking, have a proportionately larger percent of young individuals than the white population; conversely, these minority populations have a smaller percent of old individuals compared to the white population. This fact is born out by the data obtained from the 2000 U.S. Census of Population conducted in Norwich. Figure 7-3 illustrates the significant difference in the age structure between white and minority populations in Norwich as of April 1, 2000. There was a far higher percent of young persons under 30 years old among the minority groups compared to similarly aged persons among the white population. In contrast, there were far more old people among the white population (30 years and older) than among the minority populations. For the age group under 15 years old or for preschool, elementary and middle school age groups, the percent of minority groups belonging to these age groups were almost twice as high as that for the white population. Thus, it is obvious that the growth of minority populations would have a greater impact on public school enrollments than the growth of the white population would. These figures imply that there were on average twelve 5-to-9 year olds per every 100 minority individuals, but in contrast, there were six 5-to-9 year olds per every 100 total white individuals in 2000. It is obvious that the growth of the minority population would have a far greater impact on school enrollments than the growth of the white population.

FIG. 7-3
COMPARISON OF WHITE AND MINORITY POPULATIONS' AGE COMPOSITION
NORWICH, AS OF APRIL 1, 2000



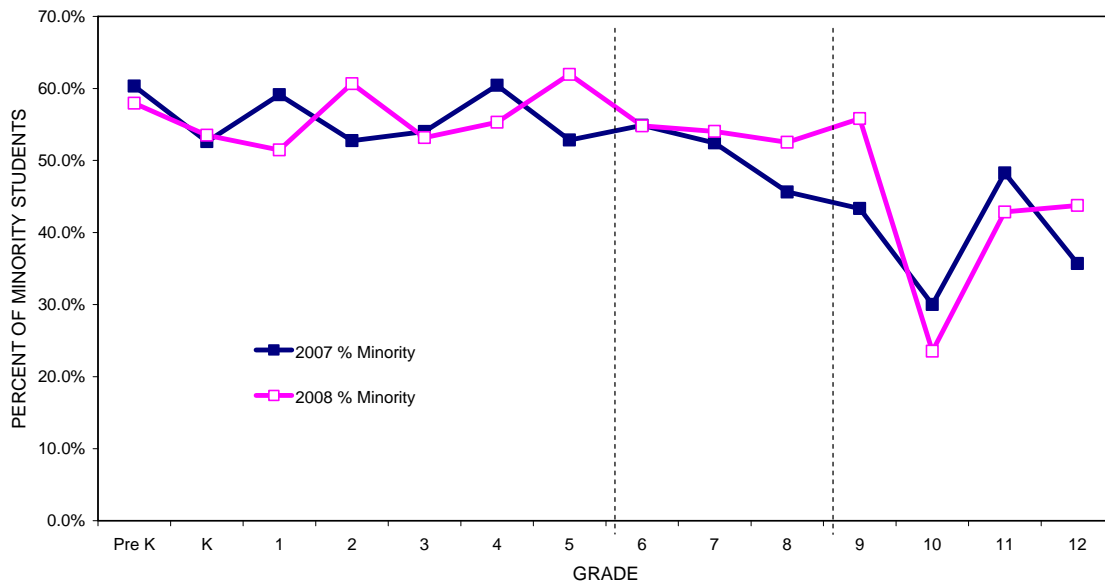
Prepared by H. C. Planning Consultants, Inc. based on the 2000 U. S. Census of Population

7.5 Proportion of Minority Students Enrolled in Each Grade

The fact that minority groups tend to have a much higher percentage of relatively young individuals than their white counterparts is well reflected in the percent of minority students enrolled by grade in Norwich public schools.

Figure 7-4 shows the percent of minority students enrolled by grade for two years 2007 and 2008. The chart clearly indicates that the lower grade enrollments consist predominantly of minority students. For the elementary schools in Norwich, 55% to 63% of enrollments were for minority students, but the percentage declined from 55% in 6th grade to 45% in 8th grade. The percent of minority students then plummeted further to below 40% in grades 9-12. Of course, these percent changes are due to other factors such as changes in the percent of students in private schools (a lower percent of minority students attend private schools), and the school dropout rates among the different race/ethnic groups in high schools. We may therefore conclude that the continued growth of minority populations in the future will tend to yield a larger number of enrollments in Norwich's elementary school while the impact on high school enrollment will be somewhat smaller.

FIG. 7-4
 PERCENT OF MINORITY ENROLLMENTS BY GRADE
 NORWICH PUBLIC SCHOOLS, 2007 AND 2008



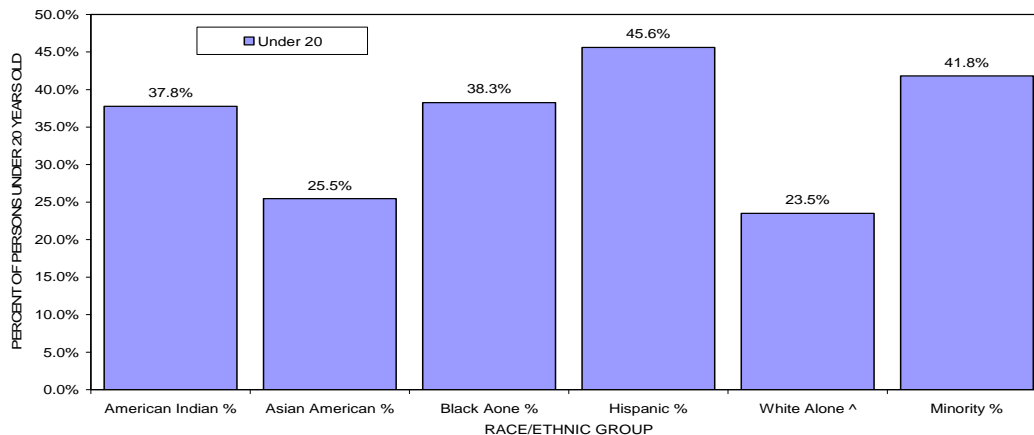
7.6 Age Structure of Minority Population by Race/Ethnicity

As would be expected, minority populations are not alike in their age composition. Below, Table 7.3 presents the age distribution of Native Americans, Asian Americans, African Americans, and Hispanics compared to the white population in Norwich as of April 1, 2000. At the bottom row of this table, we have shown the percent of young persons under 20 years old, which is also illustrated in a chart, Figure 7-5.

**TABLE 7.3
AGE DISTRIBUTION OF NORWICH POPULATIONS
BY RACE AND ETHNICITY
APRIL 1, 2000**

	American Indian Alone %	Asian American Alone %	Black Alone %	Hispanic Alone %	White Alone %	Minority %
Under 5 years	7.8%	7.9%	9.8%	13.6%	5.4%	12.1%
5 to 9 years	13.3%	6.5%	10.8%	12.0%	6.0%	11.2%
10 to 14 years	10.3%	5.8%	10.8%	11.3%	6.2%	10.8%
15 to 19 years	6.4%	5.3%	6.9%	8.7%	6.0%	7.8%
20 to 24 years	7.3%	7.9%	7.7%	10.7%	6.2%	9.2%
25 to 29 years	6.9%	11.2%	5.6%	8.7%	6.9%	7.5%
30 to 34 years	9.8%	10.8%	9.0%	8.7%	6.8%	8.3%
35 to 39 years	7.6%	8.7%	8.7%	7.3%	8.2%	7.8%
40 to 44 years	6.6%	7.1%	9.6%	5.6%	8.1%	7.2%
45 to 49 years	6.6%	8.2%	6.3%	4.8%	7.5%	5.7%
50 to 54 years	5.5%	7.9%	3.8%	2.8%	6.6%	3.8%
55 to 59 years	4.3%	4.7%	3.4%	1.8%	5.0%	0.9%
60 to 64 years	3.4%	3.2%	1.8%	1.6%	3.7%	0.8%
65 to 69 years	1.4%	2.4%	2.1%	0.8%	3.9%	0.7%
70 to 74 years	0.2%	0.8%	1.9%	0.7%	4.1%	1.2%
75 to 79 years	1.4%	0.7%	0.9%	0.5%	4.1%	0.8%
80 to 84 years	0.9%	0.3%	0.4%	0.3%	2.9%	0.4%
85 years and over	0.2%	0.7%	0.5%	0.0%	2.4%	0.3%
All Ages	100.0%	100.0%	100.0%	100.0%	100.0%	96.50%
Under 20	37.8%	25.5%	38.3%	45.6%	23.5%	41.8%

**FIG. 7-5
PERCENT OF PERSONS UNDER 20 YEARS OLD
BY RACE/ETHNIC GROUPS
NORWICH, CONNECTICUT, AS OF APRIL 1, 2000**



Observe from Figure 7-5 that 45.5% of Hispanics were under 20 years old in 2000, the youngest population group in Norwich. The percentages were somewhat smaller for other minority groups: 38.3% for African Americans, 37.8% of Native Americans, and 25.5% of Asian Americans were under 20. Note that the Asian American group had a percent of under-20-year olds, a number which is comparable to the white population which had 23.5% who were under 20-years old. Also, the Hispanic group (45.6%) had a percent that was almost two times larger than the percent for the same age among the white population. Since the Hispanic population has been growing the fastest in terms of overall numbers, it is clear that their impact on public school enrollments will be much greater than the impact of any other group.

7.7 Distribution of Minority Students among the Norwich Public Schools

We surmise that the impact of a district's minority population growth on individual school enrollments will vary depending on the relative size and population mix among schools. Therefore, when the district experiences a continued growth in its minority populations (along with a decline of the white population), we assume that the schools which serve these neighborhoods where minority households move in while white households move out would generate more public school students, other factors being equal. Without a city-wide survey of households, we can not discover the extent of such changes. However, it seems that such variability in impacts among the schools has been considerably diminished by a public policy which has tried to establish a racial/ethnic balance among the schools while at the same time efficiently utilizing existing school capacities.

FIG. 7-6
 MINORITY MIX RATIOS* BY SCHOOL NORWICH PUBLIC SCHOOLS
 1995, 1999, 2003 AND 2007

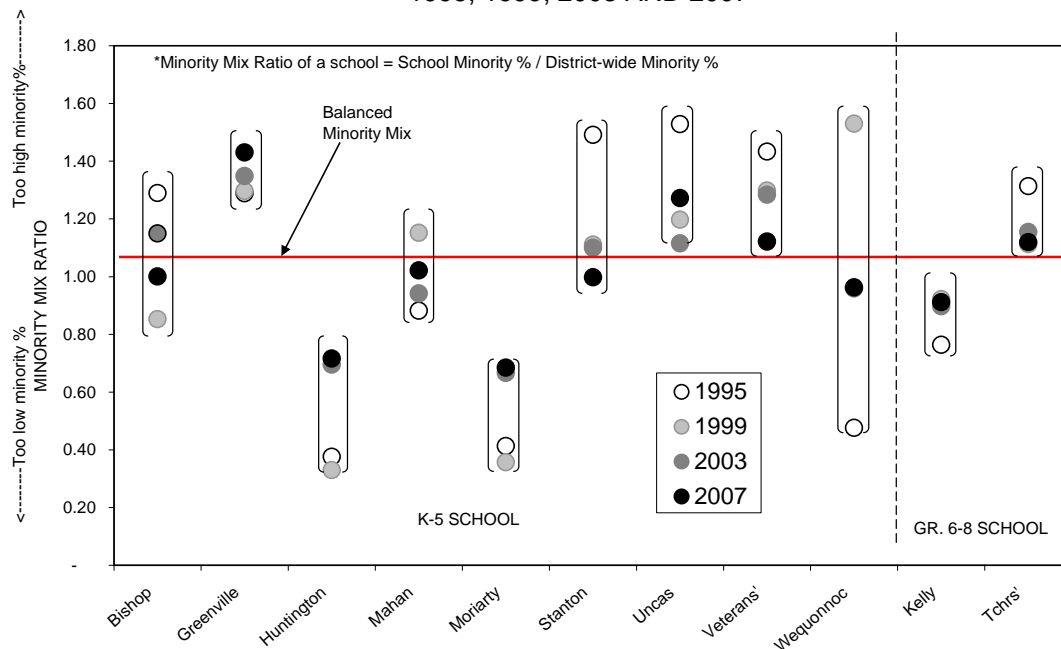


Figure 7-6 and Table 7.4 present the Minority Mix Ratios (MMR) of all nine elementary and two middle schools in Norwich. The MMR of a school is defined by a ratio of the minority percent of a school and the minority percent of the entire district. Thus, when the percent of a minority group at a school is equal to the district-wide minority percent, the MMR = 1, which implies that the given school's minority percent perfectly matches the district-wide minority percent. In Fig. 7-6, MMR = 1 is shown as a horizontal line. As of 2007, MMR is found to be nearly 1 for the following four schools in 2007: Bishop (1.00), Mahan (1.02), Stanton (1.00) and Wequonnoc (0.96).

TABLE 7.4
MINORITY MIX RATIOS OF NORWICH ELEMENTARY AND MIDDLE SCHOOLS
1995, 1999, 2003 AND 2007

	Bishop	Greeneville	Hunting- ton	Mahan	Moriarty	Stanton	Uncas	Veterans"	Wequon- noc	Kelly	Tchrs'
1995	1.29	1.29	0.38	0.88	0.41	1.49	1.53	1.43	0.48	0.76	1.31
1999	0.85	1.30	0.33	1.15	0.36	1.11	1.20	1.30	1.53	0.92	1.11
2003	1.15	1.35	0.70	0.94	0.67	1.10	1.12	1.28	0.96	0.90	1.15
2007	1.00	1.43	0.72	1.02	0.68	1.00	1.27	1.12	0.96	0.91	1.12

Source: Prepared by H. C. Planning Consultants, Inc. based on Appendix Table A.

When MM ratios are larger or smaller than one, they signify that the schools are not in balance in terms of their minority mix. If $MMR > 1$, the schools have a larger percent of minority students than the district-wide minority mix. As shown in Table 7-6, such schools include: Greeneville (1.43), Uncas (1.27) and Veterans" Memorial (1.12). Schools which are further away from a $MMR = 1$ suggest that they are racially/ethnically imbalanced: for example, Greeneville has the largest MMR value among Norwich's elementary and middle schools.

In contrast, when a school's $MMR < 1$, then the school has a too low percent of minority students (or conversely a very high percent of white students) so that the school is, relatively speaking, racially/ethnically imbalanced. Huntington (0.72) and Moriarty (0.68) schools belong to this category.

By showing the MMRs for the years 1995, 1999, 2003, and 2007, we can also identify any progress made every four years for achieving better racial/ethnic balances in all schools. From Fig. 7-6, it is clear that the MMRs have been getting closer to $MMR = 1$ over the past twelve years. Clearly, Norwich public schools have been making significant progress to achieve racial/ethnic balance among its schools. We can also surmise that the enrollment impact by the minority student mix differences among the schools will also eventually diminish.

7.8 Summary and Conclusions

Norwich has been experiencing a rapid growth in its minority population as well as these groups' school children; at the same time, an exodus by its white population can be identified. Ten years ago in 1999, 30% of total PK-12 enrollments were minority students but now in 2008, minority

students constitute 55% of all public school enrollments. This was achieved in spite of the fact that there are more white persons of all ages living in Norwich than there are persons from minority groups today.* This is so because there is a very high percent of school-age children among the minority groups compared to the white population and relatively high percent of minority children attend public schools compare to white children. Hispanic/Latino populations are the most rapidly growing groups in terms of their numbers while Asian Americans are the most rapidly growing group in terms of growth rate.

Most of the school districts in Connecticut have been experiencing a drastic decline in the number of births as well as elementary school enrollments. But Norwich has been able to maintain its birth and enrollment levels. So, as long as the minority population is expected to grow, the district's enrollments will maintain its current level of public school enrollment.

Norwich made great strides in reducing racial/ethnic imbalances among its schools. However, it must be emphasized that the differential impacts on enrollment from varying minority mixes among the Norwich schools will diminish as the Minority Mix ratios for all schools approach one.

*According to the 2000 U. S. Census of Population, Norwich's minority population constituted 16.8% of the city's total population. But minority enrollments constituted 37.9% of Norwich public schools' enrollments in 2000. Comparable data for the current year 2008 are not available.

APPENDIX TABLE 7-A:
SCHOOL-BY-SCHOOL ENROLLMENTS BY RACE/ETHNICITY, 1995, 1999, 2003, AND 2007

AMERICAN INDIAN

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	5	7	1	3	2	3	3	0	3	27	19	11	30
1999	1	13	3	2	4	9	5	2	10	49	9	9	18
2003	5	5	3	1	12	7	12	15	9	69	7	6	13
2007	8	5	2	8	4	10	4	9	11	61	28	12	40

ASIAN

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	2	9	11	5	1	6	2	11	1	48	5	8	13
1999	5	10	15	30	17	23	14	28	5	147	17	35	52
2003	5	5	3	1	12	7	12	15	9	69	7	6	13
2007	13	13	25	67	14	31	21	19	3	206	22	59	81

BLACK

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	33	73	10	31	27	91	52	55	13	385	43	53	96
1999	25	90	11	53	32	92	51	74	91	519	73	50	123
2003	50	106	59	47	40	88	54	69	51	564	133	109	242
2007	43	125	55	38	64	71	55	78	79	608	155	132	287

HISPANIC

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	16	40	9	13	12	38	53	28	15	224	27	50	77
1999	13	47	7	18	13	22	44	26	63	253	41	47	88
2003	43	80	41	28	67	40	42	62	43	446	94	65	159
2007	32	130	77	46	59	45	57	68	44	558	138	107	245

WHITE

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	134	309	330	206	403	267	205	193	262	2309	403	253	656
1999	106	231	267	170	410	250	173	160	179	1946	365	234	599
2003	96	130	259	144	317	161	121	127	142	1497	500	285	785
2007	76	69	239	120	228	125	56	104	118	1135	403	239	642

ALL MINORITY

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	56	129	31	52	42	138	110	94	32	684	94	122	216
1999	39	160	31	97	52	135	105	111	167	897	135	113	248
2003	103	201	118	106	136	158	122	174	108	1226	251	215	466
2007	96	273	159	159	141	157	137	174	137	1433	343	310	653

TOTAL INCLUDING WHITE

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	190	438	361	258	445	405	315	287	294	2993	497	375	872
1999	145	391	298	267	462	385	278	271	346	2843	500	347	847
2003	199	331	377	250	453	319	243	301	250	2723	751	500	1251
2007	172	342	398	279	369	282	193	278	255	2568	746	549	1295

APPENDIX TABLE 7-B
COMPOSITION* OF NORWICH PUBLIC SCHOOL STUDENTS BY RACE/ETHNICITY

* Figures in cells represent given minority percent of total enrollments which are derived from Appendix Table 7-A.

AMERICAN INDIAN

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	3%	2%	0%	1%	0%	1%	1%	0%	1%	1%	4%	3%	3%
1999	1%	3%	1%	1%	1%	2%	2%	1%	3%	2%	2%	3%	2%
2003	3%	2%	1%	0%	3%	2%	5%	5%	4%	3%	1%	1%	1%
2007	5%	1%	1%	3%	1%	4%	2%	3%	4%	2%	4%	2%	3%

ASIAN

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	1%	2%	3%	2%	0%	1%	1%	4%	0%	2%	1%	2%	1%
1999	3%	3%	5%	11%	4%	6%	5%	10%	1%	5%	3%	10%	6%
2003	3%	2%	1%	0%	3%	2%	5%	5%	4%	3%	1%	1%	1%
2007	8%	4%	6%	24%	4%	11%	11%	7%	1%	8%	3%	11%	6%

BLACK

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	17%	17%	3%	12%	6%	22%	17%	19%	4%	13%	9%	14%	11%
1999	17%	23%	4%	20%	7%	24%	18%	27%	26%	18%	15%	14%	15%
2003	25%	32%	16%	19%	9%	28%	22%	23%	20%	21%	18%	22%	19%
2007	25%	37%	14%	14%	17%	25%	28%	28%	31%	24%	21%	24%	22%

HISPANIC

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	8%	9%	2%	5%	3%	9%	17%	10%	5%	7%	5%	13%	9%
1999	9%	12%	2%	7%	3%	6%	16%	10%	18%	9%	8%	14%	10%
2003	22%	24%	11%	11%	15%	13%	17%	21%	17%	16%	13%	13%	13%
2007	19%	38%	19%	16%	16%	16%	30%	24%	17%	22%	18%	19%	19%

WHITE

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	71%	71%	91%	80%	91%	66%	65%	67%	89%	77%	81%	67%	75%
1999	73%	59%	90%	64%	89%	65%	62%	59%	52%	68%	73%	67%	71%
2003	48%	39%	69%	58%	70%	50%	50%	42%	57%	55%	67%	57%	63%
2007	44%	20%	60%	43%	62%	44%	29%	37%	46%	44%	54%	44%	50%

ALL MINORITY

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	29%	29%	9%	20%	9%	34%	35%	33%	11%	23%	19%	33%	25%
1999	27%	41%	10%	36%	11%	35%	38%	41%	48%	32%	27%	33%	29%
2003	52%	61%	31%	42%	30%	50%	50%	58%	43%	45%	33%	43%	37%
2007	56%	80%	40%	57%	38%	56%	71%	63%	54%	56%	46%	56%	50%

SCHOOL'S MINORITY % DEVIATIONS FROM THE DISTRICT MINORITY %

	Bishop	Greeneville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	7%	7%	-14%	-3%	-13%	11%	12%	10%	-12%	0%	-6%	8%	0%
1999	-5%	9%	-21%	5%	-20%	4%	6%	9%	17%	0%	-2%	3%	0%
2003	7%	16%	-14%	-3%	-15%	5%	5%	13%	-2%	0%	-4%	6%	0%
2007	0%	24%	-16%	1%	-18%	0%	15%	7%	-2%	0%	-4%	6%	0%

**APPENDIX TABE 7-C
MINORITY MIX RATIOS* OF NORWICH ELEMENTARY AND MIDDLE SCHOOLS**

*Minority Mix Raio (MMR) = Minority % of a school divided by the District-wide K-5 or grades 6-8 minority %
(minority % data are shown in Appendix Table 7-B)

AMERICAN INDIAN

	Bishop	Greenville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	2.92	1.77	0.31	1.29	0.50	0.82	1.06	-	1.13	1.00	1.11	0.85	1.00
1999	0.40	1.93	0.58	0.43	0.50	1.36	1.04	0.43	1.68	1.00	0.85	1.22	1.00
2003	0.99	0.60	0.31	0.16	1.05	0.87	1.95	1.97	1.42	1.00	0.90	1.15	1.00
2007	1.96	0.62	0.21	1.21	0.46	1.49	0.87	1.36	1.82	1.00	1.22	0.71	1.00

ASIAN

	Bishop	Greenville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	0.66	1.28	1.90	1.21	0.14	0.92	0.40	2.39	0.21	1.00	0.67	1.43	1.00
1999	0.67	0.49	0.97	2.17	0.71	1.16	0.97	2.00	0.28	1.00	0.55	1.64	1.00
2003	0.99	0.60	0.31	0.16	1.05	0.87	1.95	1.97	1.42	1.00	0.90	1.15	1.00
2007	0.94	0.47	0.78	2.99	0.47	1.37	1.36	0.85	0.15	1.00	0.47	1.72	1.00

BLACK

	Bishop	Greenville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	1.35	1.30	0.22	0.93	0.47	1.75	1.28	1.49	0.34	1.00	0.79	1.28	1.00
1999	0.94	1.26	0.20	1.09	0.38	1.31	1.00	1.50	1.44	1.00	1.01	0.99	1.00
2003	1.21	1.55	0.76	0.91	0.43	1.33	1.07	1.11	0.98	1.00	0.92	1.13	1.00
2007	1.06	1.54	0.58	0.58	0.73	1.06	1.20	1.19	1.31	1.00	0.94	1.08	1.00

HISPANIC

	Bishop	Greenville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	1.13	1.22	0.33	0.67	0.36	1.25	2.25	1.30	0.68	1.00	0.62	1.51	1.00
1999	1.01	1.35	0.26	0.76	0.32	0.64	1.78	1.08	2.05	1.00	0.79	1.30	1.00
2003	1.32	1.48	0.66	0.68	0.90	0.77	1.06	1.26	1.05	1.00	0.98	1.02	1.00
2007	0.86	1.75	0.89	0.76	0.74	0.73	1.36	1.13	0.79	1.00	0.98	1.03	1.00

WHITE

	Bishop	Greenville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	0.91	0.91	1.18	1.03	1.17	0.85	0.84	0.87	1.16	1.00	1.08	0.90	1.00
1999	1.07	0.86	1.31	0.93	1.30	0.95	0.91	0.86	0.76	1.00	1.03	0.95	1.00
2003	0.88	0.71	1.25	1.05	1.27	0.92	0.91	0.77	1.03	1.00	1.06	0.91	1.00
2007	1.00	0.46	1.36	0.97	1.40	1.00	0.66	0.85	1.05	1.00	1.09	0.88	1.00

ALL MINORITY

	Bishop	Greenville	Huntington	Mahan	Moriarty	Stanton	Uncas	Veterans'	Wequonoc	K-5 Total	Kelly	Tchrs'	6-8 Total
1995	1.29	1.29	0.38	0.88	0.41	1.49	1.53	1.43	0.48	1.00	0.76	1.31	1.00
1999	0.85	1.30	0.33	1.15	0.36	1.11	1.20	1.30	1.53	1.00	0.92	1.11	1.00
2003	1.15	1.35	0.70	0.94	0.67	1.10	1.12	1.28	0.96	1.00	0.90	1.15	1.00
2007	1.00	1.43	0.72	1.02	0.68	1.00	1.27	1.12	0.96	1.00	0.91	1.12	1.00