Demographic School Analysis: Population Projections for the Hampton Township School District

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This analysis will consist of three parts:

I. An initial analysis with two overall themes—

(1) major changes in the number of births, with decreases in the last three multi-year periods, but with a reversal expected in the next ten years and (2) fluctuations in net migration, with recent rates increasing at all educational levels and muting the effect of decreased births in the most recent five years. As for the shifts in births, these changes are linked to changes in two fundamental demographic variables: (i) shifts in the number of key reproductive age females due to the baby boom and baby bust and (ii) shifts in fertility behavior—the second wave of delayed childbearing, into the late thirties and early forties. We will examine the following in terms of the effects on the expected number of students:

(1) a continuing decrease in the number of births per multi-year period from 1990-94 to1995-99 to 2000-04 to 2005-08. It is currently 65 per year below that of 1990-94, the period in which the current high school students were born;
(2) delayed childbearing into the late thirties and early forties;
(3) a decrease in the number of women in all key reproductive age cohorts from 25-34; this is associated with the aging of the baby bust and its decreased births, yielding an echo bust;
(4) an expected future shift to higher numbers of reproductive females in the next ten years and these shifts should yield increases in three key cohorts: 25-29, 30-34 and 35-39; these are the dominant childbearing cohorts in the school district;
(5) a migration process reflecting the significance of net in-migration, with an increase of approximately 50 new additional students per year in the last five years;
(6) the enrollment outcomes per year reflect both the net migration process and the size difference between the exiting senior class and the entering Kindergarten/Grade 1 class, tied to both the relative number of births in those student cohorts and the net in-migration of pre-school children.

The assessment of these changes and processes is important in determining the nature of demographic modeling to use, in the selection of parameters for such models and in the interpretation of the underlying processes and the results.

II. Development and analysis of grade specific school district projections for the ten-year period, 2011-2020.

The three projections use four-year retention ratios under alternative fertility levels. Retention ratios in this scenario have a baseline level of "growth" embedded in them.

III. Development and analysis of areal specific district student projections for the three (3) elementary schools over the ten-year period, 2011-2020.These projections use the most recent four-year retention ratios, and the specific elementary school attendance area's births. These disaggregate projections map to the more aggregate projections of Scenario III and are referred to as Scenario IV.

I. Overview

Six (6) major demographic processes are examined with respect to projecting the expected shifts in student population in the Hampton Township School District (SD) over the next ten (10) years. The first major factor is a continued decrease in the number of births per year. From 1990-94 to 1995-99 births decreased by 13 per year. The decrease amplified considerably from 1995-99 to 2000-04, decreasing by 35 per year. However, the most recent decrease, from 2000-04 to 2005-09, has once again dampened to half that of the prior period—17 fewer births per year. It is this last decrease that has yet to show up in school enrollments, but as will be shown in this analysis, all decreases are important to the expected future student enrollment. Note that the 1993 birth cohort is currently in Grade 12. The second and third factors pertain to fertility and age structure effects--more specifically, delayed childbearing into the 30's and early 40's and an echo of the baby bust cohorts of the 1970's. A fourth major factor also pertains to age structure effects—in this case, expected future increases in the key reproductive ages 25-39, possibly starting in the next five years, as the baby bust cohorts age out of the key reproductive years and are partially replaced by echo boom cohorts. The fifth major factor may be seen if we momentarily assume migration is zero. In this case, any change in the student population is due to the replacement of seniors who exit by Kindergarteners who enter, and in the case of the Hampton Township SD, by the additional first graders above the prior year Kindergarten enrollment. Contrasting this difference with the observed enrollment change, we may deduce net-migration. Examining this process over the last fifteen years indicates a net inflow of over 600 additional students. The average rate of net in-migration from 1995-99 was 30/year and from 2000-04 it was 22/year. However, in the last five years, 2005-09, the net in-migration rate has increased rather dramatically, to 74 per year, with substantial net gains at each educational level. The sixth factor affecting the number of expected students is the combined or joint impact of net in-migration and the difference in size of the exiting senior class and the entering Kindergarten/Additional Grade 1 classes. The analysis to follow, preceding the student population projections, is important both in terms of determining the nature of the demographic modeling to use, in the selection of parameters for such models and in the interpretation of both the underlying processes and the results. We begin by taking an in-depth look at the fertility side of the process, since its impacts are becoming particularly apparent at the elementary and high school levels.

The annual number of births to Hampton Township School District residents from 1990-2009 and by five-year period is shown in Table 1. It is the summary information in terms of average births per year, on which we will concentrate. (See the bottom quadrant of Table 1.) From 1990 to1994, the average number of births per year was 214.2 and from 1995 to 1999, it decreased by 12.6 (13) to 201.6 per year. Then, from 2000-2004, the drop in the average number of births was much sharper, decreasing by almost a factor of 3 from that previously—by 35.4 per year, to 166.2 per year. In the most recent five years, 2005-2009, with an average number of births per year of 149.2 (a decrease of 17 births per year), the rate of decrease has dampened once again. Two aspects of the shifts in births stand out. First, while there have certainly been oscillations in births on a yearly basis, the overall trend is clear—that of a continuing decrease over the last twenty years. The cumulative difference between the births in 1990-94, (the period in which the current high school students were born) and 2005-09 (the period with the current and near term future Kindergarten classes) is an average of 65 fewer births per year. Second, the sharp decrease in births in 2000-04 coincide, in terms of enrollment 5-6 years later, with the sharp increase in net in-migration in 2005-09, as will be shown subsequently. Thus, the cumulative decrease in births from 1990-94 to 2000-04, of -48 virtually matches the increase in net in-migration from 2005-09 of +52 students. The relevance of this concurrence will become clear later in the analysis, as will its pertinence for the future expected student enrollment. Presently, we will look more closely at the shifts in the number of births and the processes underlying these shifts.

Table 2 reveals part of the nature of the shift in births—delayed childbearing. As can be seen at the top of Table 2, the largest number of births in 1990-94 was to mothers in their early thirties (30-34) and the second largest number of births was to women in their late twenties (25-29). These two age cohorts had 40% and 31% of the total births respectively. The 35-39 age-cohort also accounted for 20% of the total births. Thus, these three age cohorts had over 90% of total births. By 1995-99, the age-cohort 30-34 remained the most dominant (42%) and the 35-39 age-cohort was now equal to the 25-29 age-cohort, with both at 24% of total births. In 2000-04 the age-cohort 25-29 continued to decrease, accounting for 20% of births, while the age-cohort 35-39 remained about the same--at 25% and became the cohort with the second most births. Additionally, the age-cohort 40-44 continued to gradually increase from the 2% in 1990-95 to 6% in 2000-04. By 2005-2008, the age cohorts age 30 and above had 65% of the births. In 1990-94, the same cohorts had 62% of the births. What distinguishes the difference is that the cohorts' ages 35-39 and 40-44 have now increased their share from 22% to 30%, suggesting a second wave of delayed childbearing—into the late thirties and early forties.

A second story, however, becomes equally important if we look into the nature of the decreases in births in Table 2. That is, we need to also take into account the number of reproductive age women in these age groups since the baby boom and baby bust periods have resulted in considerable oscillations in the number of women in the prime childbearing years. The decrease of 13 (214.2 $\rightarrow$201.6) in the average number of births per year from 1990-94 to 1995-99 is primarily due to the drop in births in the age-cohort 25-29. It alone experienced a decline averaging 17 fewer births per year. From 1995-99 to

2000-04, the overall decrease was much greater—from 202 to 166, with large decreases in both the 25-29 and 30-34 age cohorts (the decreases per year averaged -15 and -16, respectively). In the most recent period shift, from 2000-04 to 2005-08, the decrease was from 166 to 155, driven largely by the decrease in the age-cohort 30-34 (-15). What is common in the shifts is that as the period changes from one five-year set to the next, the same birth cohorts are important in all decreases. That is, in the shift from 1990-94 to 1995-99 it is the 25-29 age cohort; in the shift from 1995-99 to 2000-04, it is the 25-29 and 30-34 age cohorts; and in the shift from 2000-04 to 2005-08, it is the age-cohort 30-34. In each case, as the period changed from one five-year period to the next, the age cohorts also changed to the next age bracket; in effect it is the same age cohorts aging in place and what is important here is the relative size of these cohorts. For example, take the age-cohort 25-29 in 1995-99 and the age-cohort 30-34 in 2000-04. In contrast to the prior five-year period, where ½ of the parents were born in the baby boom, in the period experiencing the decline, ½ of the parents were born in the baby bust years. (The other ½ in both cases was a mutual age cohort—the Transition cohort—between the boom and the bust.) Similarly, take the 25-29 age-cohort in 2000-04 and the 30-34 age-cohort in 2005-08. In this case, in contrast to the prior five-year period, where ½ of the parents were born in the Transition cohort, in the period experiencing the decline, ½ of the parents were born in the baby bust years. (The other ½ in both cases was a mutual birth cohort—the other part of the baby bust.) To be more concrete, at the peak of the baby boom (1957) the

Total Fertility Rate[α] was 3.8, while at the trough of the baby bust it was 1.7 (1976), less than ½ that of the baby boom peak. Thus, the number of reproductive age females is much larger if they were born in the baby boom years and reciprocally, much smaller if they were born in the baby bust years. If fertility rates of these cohorts of women were the same, then the number of expected births would vary considerably, with more births to baby boom mothers and fewer births to baby bust mothers. This is at least part of explanation for the decline in births. We will explore this point in more depth below.

To what extent are the decreases in births due to the shifting age structure of reproductive age females? Table 3 provides the data for the changes in the ***female population*** for ages 10 to 49 for the overall school district. For the total school district the only increases in the reproductive age female cohorts, were in the youngest (10-14 and15-19) and oldest (35-39,40-44 and 45+) age cohorts. As may be seen at the bottom of Table 3 (left side), two of the three key reproductive age cohorts had decreases in the number of women, with the percentage changes of -42% and -29% for the 25-29 and 30-34 age cohorts, respectively. In Table 4, we summarize the percentage change in the number of ***reproductive age females*** by age cohort between 1990 and 2000 and in Table 4A we summarize the percentage change in the number of ***births*** by age cohort between 1990-94 and 2000-04. In Table 5 we juxtapose the two sets of percentage changes shown in Tables 4 and 4A. In column 1 of

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[α] The Total Fertility Rate (TFR) is the average expected total number of children that a woman will have under the current age-specific fertility rates.

Table 5, we see very large percentage decreases in births for the teens (15-19), the twenties (20-24, 25-29) and the early thirties (30-34), and large percentage increases in births for the women in their forties (40-44 and 45-49). Column 2 of Table 5 provides a comparable summary for the percentage change in the number of reproductive age females. The point in question now is whether the changes in the population of reproductive age women maps to the changes in the number of births; if not, this indicates a change in fertility behavior. When the signs and sizes of the percentage changes are similar in Table 5, then the shift in the number of births is largely due to changes in the number of reproductive age women in that age cohort. This appears to be the case for almost all of the 20-24 age cohort, where [(-25%)/(-27%)] = 93% and for most of the shift in the 25-29 age-cohort, [-42%/ -50%] =84%. In the latter case, for the age cohort 25-29, the remaining portion of the shift (16%) is due to a behavioral change with lower fertility. For the age-cohort 30-34, there is a 29% drop in population and a smaller 20% drop in births. Thus, all of the decrease in births and 20/29 or 69% of the change in births is due to the decreasing number of women. But the 9% of the 29% change in population has no impact on decreasing births. Rather, just the opposite 9/29 or 31% of the population shift at this age cohort had increased fertility. For the teens (15-19), the shifts in births (-32%) were opposite that in number of young women (+17%) and thus this change was totally behavioral--toward fewer teen births. Similarly, toward the other end of the age distribution, at 35-39, there is a small increase in population (+5%), with virtually no change in births (-1%), indicative of slight change in lower fertility. At ages 40-44, the female population increased 22%, but the births increased 194%. Thus, of the change in births 22/194 or only 11% is accounted for in terms of an increase in the number of women. Hence, we attribute 89% of the increase in births to a behavioral change—increased fertility in this age band--toward later childbearing. In sum, the impact of delayed childbearing is evident in decreased fertility in the 15-19 and 25-29 age-cohorts, in particular; in the relative increase in births (relative to the drop in numbers of women) in the 30-34 age-cohort; and in the actual increases in births in the 40-44 age-cohort. At the same time, we also see the large impacts of the shifts in the numbers of reproductive age women in the 20-24, 25-29 and 30-34 age-cohorts. Thus, we conclude that both processes are operative—there are large drops in the number of women in two of the three key age cohorts and there is delayed childbearing, including the second wave, into the early forties.

Before continuing, we will offer somewhat more context for the changes in the number of reproductive women. What is going on? Is this drop in the population of the key reproductive age cohorts peculiar to the Hampton Township School District? To Western Pennsylvania? To Pennsylvania in general? Or is this a more general phenomenon in the United States? Table 6 provides data for the United States, Pennsylvania and Allegheny County, the most populous county in Western Pennsylvania, for five-year age cohorts from ages 0 to 44. The data extend from 1990 to 2005-2007, using US Census Bureau data. At the national level, there were drops in the 20-24, 25-29 and 30-34 female age cohorts (See Change by Age Cohort Across Time panel) from 1990 to 2000. This represents a shift from the baby boom to the baby bust due to changes in fertility levels as noted above--from total fertility rates, where on average, mothers had 3.8 children in 1957 to 1.7 children in 1976. The low point in fertility rates in the mid-1970s is referred to as the baby bust. To illustrate, there were 21.1 million children born between 1955 and 1959, at the height of the baby boom and 16.5 million births between 1975 and 1979 the trough of the baby bust, a decrease of 4.6 million births. In 1990, the peak of the baby boom was 30-34; in 2000, the trough of the baby bust was 20-24. Thus, what is being observed in the Hampton Township School District between 1990 and 2000 is a national process as well. The baby bust children have matured to key reproductive ages and they have far fewer numbers than the prior baby boom cohorts. Even with national level legal immigration of almost a million per year since 1990, the transition from the baby boom to baby bust process is still dominant and observable at the national level in the key reproductive age cohort shifts between 1990 and 2000. By 2005-07, only the 30-34 age cohort still reflects the dominance of the baby bust at the national level. In Pennsylvania, on the other hand, the evidence of the baby bust is evident in both the 2000 and 2005-07 cohort change data in the lower panel of Table 6. In 2000, there are cohort decreases in the 20-24, 25-29 and 30-34 age cohorts. By 2005-07, there are cohort decreases in the 25-29, 30-34 and 35-39 age cohorts. As for Allegheny County, between 1990 and 2000, there are cohort decreases in all age cohorts from 15-39; only the age-cohort 40-44 has increased. The Hampton Township School District shifts parallel that of Pennsylvania in terms of the direction of changes in age-specific cohorts..

A different way of looking at the data in Table 6 is in terms of aging in place versus net-migration. To the extent that we follow an age cohort across time, it can only increase via net in-migration and decrease by net out-migration, since survival rates are very high at these ages. The second cohort change panel is on page 2 of Table 6. At the national level, there are increases in all age cohorts, but one (and this is probably an error) and such increases reflect immigration. In Pennsylvania, in all age cohorts above age 9, there is net out-migration. In Allegheny County, the same observation holds for all age cohorts above age 14. This result definitely does not hold for the Hampton Township School District. As may be seen on the lower panel of Table 3 (right side) the age-cohort 20-24 and the key 25-29 and 30-34 age cohorts have net in-migration, ranging from +6% to +55%. Given the ten-year time span, these cohorts became 30-34, 35-39 and 40-44 in 2000. In contrast, the 10-14 and 15-19 cohorts have substantially higher out-migration than the county or the state, 50% and 31%, respectively. Note that these two cohorts will become 20-24 and 25-29 in 2000, no doubt, in many cases pursuing higher education, starting their careers and “leaving home”.

The Total Fertility Rate for the United States from 1917 to 2007 is provided in Table 7. The dark shaded years denote the baby boom (1946-1965) and the lighter shaded years denote the baby bust (1971 to 1980). In Table 7, we may also observe that the peak of the baby boom occurred in 1957 with a TFR of 3.77 and that the trough of the baby bust occurred in 1976 with a TFR of 1.74, as discussed earlier. Here, we may also note that from Table 7, the TFR of 1.74 is the lowest TFR between 1917 and 2007, including the TFRs of the Great Depression. Similarly, the highest TFR between 1917 and 2007 is the TFR of 3.77. Hence, these fertility measures denote the two most distinct fertility points of the past century. Additionally, they are embedded in the most distinct streams of fertility surrounding them, with an entire set of years of relative high fertility and relative low fertility. It is these pivotal streams that are impacting school enrollments nationally, as well as in Pennsylvania, and certainly Allegheny County today, half a century away. They will continue to do so, as well, into the future as they progressively dampen down with each successive generation. Thus, their impact is by no means finished—it will continue for at least another 25 to 50 years and will entail cycles of increased and decreased births until the distinct echoes diminish sufficiently to no longer be distinct.

A second major feature of the national Total Fertility Rate may be seen if we decompose it by race/ethnicity. Table 8 shows the white and white non-Hispanic TFRs from 1970 to 2007. While the overall national TFR has changed from 2.01 to 1.74 to 2.12 between 1972 and 2007, the white/white non-Hispanic TFR has remained between 1.7 and 1.9 for the past 35 years—remarkably stable. Thus, while we may observe a continuation of delayed child bearing in the Hampton Township School District, as we have above, the number of births per woman is not expected to change. The delayed childbearing effect is a one-wave impact and will not recur unless there is a return to more births at lower ages. Thus, once the delayed childbearing effect is complete, the main driver for the number of births, given the stability in the total fertility rates, will be the number of reproductive age women. This can change in two ways—

(1) from large scale shifts in the population in respect to the baby boom and baby bust and (2) from net migration—in this case largely from new jobs, new housing or the relative attractiveness of the area, including the quality of the school district, in the case of in-migration and lack of jobs in the case of out-migration. It should be noted before continuing, that given the stability in the total fertility rate for whites, we may expect in both the short-term and the more long-term, future echo booms and echo busts, as the oscillation in the relative size of the birth cohorts already born dampens down. Both of the mechanisms for change noted above seem to be occurring in the Hampton Township School District. We will now briefly examine whether future changes in key reproductive age cohorts of women may be expected in the Hampton Township School District as well.

First, we underscore the fact that the baby boom and baby bust birth cohorts are clearly evident in the population distribution of Allegheny County in 2000 and 2006-08, as shown in Table 9. The dark shaded area depicts three cohorts of the baby boom. In 2000, its very large size is evident in ages 35-49. The peak is in ages 40-44 with a population of 105,693. The baby bust and its relatively small size are also evident in ages 20-29, with the smallest cohort having a population of 75,792 (ages 20-24). The light shaded area depicts two cohorts of the baby bust and the transition cohort between the baby boom and the baby bust. And the three cohorts younger than the baby bust cohorts depict what we will call the “echo boom”. The echo boom is larger than the baby bust, but smaller than the baby boom, due to the relative size of the baby boom parental cohorts and to the TFRs being less than 2.1 which is the level at which a cohort replaces itself. The relative sizes of the baby boom and the baby bust are very clear in these data, as is the location of the baby bust in the most recent Allegheny County data (2006-2008) in the key reproductive age cohorts for the Hampton Township School District (25-29, 30-34 and 35-39). The location of these key cohorts is important in viewing the most recent drop in births and also the expectation that births may be expected to increase somewhat in the next five years and increase yet again thereafter, as the echo boom takes a more central role in the key reproductive cohorts. Weighting the birth cohorts by the percentage of births in each five-year age cohort, as found in Table 2, we describe the birth cohorts in the 1991-95 period as largely Echo Boom and Transition Echo cohorts; the birth cohorts in the 1996-2000 period as largely Echo Boom/Transition Echo cohorts with an additional Echo Bust component; the birth cohorts in the 2001-2005 period as largely Echo Bust/Transition Echo cohorts with an additional Echo Boom component; and finally the birth cohorts in the 2006-2010 period as largely Echo Bust/Echo-Echo Boom cohorts. It is the latter cohort set that we compare to the 2011-2015 future birth cohorts, using the most recent weighting from the 2005-08 period. Here we find the birth cohorts to again be Echo-Echo Boom/Echo bust, but with a greater weight given to the Echo Boom set and hence an expected modest increase in births over the next five years. Thereafter in the following ten years, we expect consecutive sequential increases in births as the second echo of the baby boom takes on increasing importance in the key reproductive age cohorts. It is, however only the next five years that concerns us now. Using the most recent percentage weightings of the proportion of births, as shown in Table 2 (2005-2008), the Echo Bust decreases by 13% (from 58% to 45%) while the Echo-Echo Boom cohort increases by 25% (from 23% to 48%). Thus, we expect a modest increase in births in the next five years.

We now turn to the issue of migration, and in particular to its relative magnitude. For the net migration of students from Kindergarten through Grade 12, we use an accounting system based on a hypothetical or counterfactual case. What we refer to here as "net migration" pertains to all entries and exits. Thus, we are using the term "migration" in a very restricted sense—migration into or out of the Hampton Township School District student population. Actual migrants into the school from outside the township—whether from other parts of Allegheny County, or other parts of Pennsylvania, or other states, or even from overseas, are in the count, but not distinguished from one another. From the numerical enrollment data alone, we have no information on source of origin of the mover. The same holds for actual migration out of the school district—we do not know the destination. Additionally, we do not know the type of move if it is a local one. For example, a dropout at the high school level is certainly an exit and a second grader who did not attend the first grade in the Hampton Township School District is an entrant. Both are counted as "migrating" out of or into the school. In short, "net migration," as used here refers to the difference of all exits and all entrants to the Hampton Township School District. This "net migration" can be obtained using only enrollment data. Below, we will briefly describe the method.

Initially, we will illustrate the method with the total Hampton Township School District. Then, we will also apply the method at each level—elementary, middle and high school. First, we momentarily assume the counterfactual case of "What if no one migrated?" Then, the change in the student population (C) would be totally determined by the difference in the sizes of the Grade 12 graduates exiting at the end of year t-1 and the size of the Kindergarten class entering in year t as well as the additional Grade 1 students entering in year t who did not enroll in year t-1. That is, $C=K_t-G12_{t-1} + (G1_t - K_{t-1})$. Normally, we would only use $C=K_t-G12_{t-1}$. However, since Hampton operates only a half-day Kindergarten program, a conservative estimate of new initial entrants will use both the initial Kindergarten students and any additional Grade 1 students beyond the prior year's Kindergarten class $(G1_t - K_{t-1})$. Second, we compute the actual change in overall enrollment, denoted by E, where E=(Total Enrollment in t) - (Total Enrollment in t-1). Now, denote "net migration" as F. Then, E=C+F or F=E-C. Table 10 provides these data and outcomes for the Hampton Township School District from 1994-2009. We will first illustrate the process by describing a single year and then we will discuss the overall result. For 2009-10 (Table 10, column A and row t=2010-11; see footnote to the table), 277 seniors from the 2009-10 year exited, while 134 new students entered Kindergarten. (Column A). Thus, with no migration and no additional entrants at Grade 1, the student population would decrease by 143 students. However, as may be seen in column B there were 38 more Grade 1 students than were enrolled in Kindergarten in the prior year; that is (Column B = Column B1 - Column B2 or 204-166 = +38). The actual change was +10 (Column E, which is shown as the difference in Column D of the population at t minus the population at t-1). Therefore, "net-migration" here is positive (more exits than entries), and is +115 (Column F, which is (E-C) or [+10 –(-105)] = +115). That is, there was a difference in [K_t-$G12_{t-1}$ + ($G1_t$ - K_{t-1})] of 105 fewer students due to the replacement of graduates exiting at G12 by the entering K and G1 students. Nevertheless, total enrollment did not decrease. Rather, it increased by 10 students, indicating that there was a net in-migration of 115 students. This is also the case in all but three other years, as shown in Table 10, Column F. Over the last five years the net in-migration was 369 students. Without migration, the school district would have decreased by 370 students or -12% and have a student population of 2,750. Instead, with the net in-migration of 369 students, the actual or observed enrollment was basically stable, decreasing by only one student or no change. Hence, we have a net migration of +369, equivalent to 12% of the original 2005 enrollment. Over the last 10 years, the net in-migration has been +478 students and the [K_t-$G12_{t-1}$ + ($G1_1$ - K_{t-1})] replacement loss has been -621 students. Thus, due to net in-migration, the student enrollment decreased by only 143 students.. In-migration has muted the decreases in births by over 75% (478/621 =.77) and is obviously an extremely important demographic process in the Hampton Township School District. Moreover, it is a summary measure and an outcome of much more dynamic processes at each educational level, which we will now examine.

We can also deduce the net migration at each educational level using similar logic. The results are shown in Tables 10A-10C for the elementary through the high school levels, respectively. As shown in Table 10A net in-migration at the elementary level over the last five years was +152 or +12%. Stated differently, this is equivalent to 30 additional students per year. With no migration, the elementary enrollment would have decreased by 203 students or -16%, whereas the actual enrollment decreased by 51 students or -4%. Net in-migration at the elementary level has also increased in the last five years. From 2000 to 2004, it was equivalent to 12 additional students per year (See column F, 213-152 =61 and 61/5 =12.2) and from 1995-99, it was equivalent to 13 additional students per year (277-213 =64 and 64/5 =12.8). At the middle school level, migration also became more important in the last five years, as shown in Table 10B. Without migration, the middle school enrollment would have decreased by 92 students. Actual enrollment instead, increased by 20 students or +3%. Thus, net in-migration was 112 students, equivalent to 15% of the 2005 middle school student population of 745 students. Net in-migration at the middle school level has averaged 22 additional students per year for the last five years. Finally, at the high school, we get a similar result. Replacement of graduating seniors by freshmen students would have yielded a decrease of 75 students in the last five years. Instead, actual enrollment increased by 30 students and, hence there was a net-migration of 105 additional students at the high school level—equivalent to 21 additional students per year. A summary of "net migration" by year and level is shown in Table 11. As can be seen in Table 11, the summary is obtained by adding net migration at all levels and the results in the overall column match those for the [Kindergarten/Grade 1]-Grade 12 exchange in Table 10. Here, we can also observe that the net-migration gain of 74 (73.8) students per year in the last five years is a result of gains at all levels--+30 (30.4), +22 (22.4) and +21 (21.0) students per year at the elementary, middle and high school level, respectively. Moreover, the increase in net in-migration is 40 to 50 more additional students than in the either of the prior two five-years periods.

Can we also obtain some information regarding migration of families with preschoolers? There are two sets of data pertaining to preschoolers. The first of these pertains to net migration from 1995 to 2000 and affecting Kindergarten enrollment for 2000 to 2005. Here, we compare the children less than five years of age in the 2000 census to the births occurring in the district from 1995 to 1999. The data are provided in Table 12. Similar to the finding regarding net in-migration at the elementary school level, discussed above, these data indicate a net in-migration of 93 pre-school children from 1995 to 2000. This is an increase of 9% (93/1,008) beyond the births to Hampton Township residents, equivalent to about 19 additional children per year. For more recent years, we can examine Birth to Kindergarten and Birth to Grade 1 enrollment ratios. In this way, we can determine whether there was additional in- or out-migration since 2000 by families with preschoolers who entered Kindergarten from 2002 to 2009. To avoid yearly fluctuations and outliers, we take four-year averages. That is, we calculate the ratio of births in 1996-2000 to the Kindergarten enrollment in 2002-2005 and the ratio of births in 2000-2004 to the students enrolled in Kindergarten in 2006-09. These ratios are .943 and .945, respectively (cf. Table 13). If we also take into account the Birth to Grade 1 ratio, which is more apt for the Hampton Township School District, the comparable ratios are also shown in Table 13. They are 1.152 and 1.190, indicating substantial net in-migration of families with preschool children—of 15% and 19% beyond the births to township residents. Together with the prior finding from Table 12 for the five years before 2000, and consistent with the net-migration findings for school age children, we once again find an increase in the level of net in-migration in the most recent years—accelerating at each time period examined. In the present case for preschool children the percentage increases beyond the births to township residents are 9%, 15% and 19%, as we progressively look at more recent data.

In this analysis we will use retention ratios as a baseline for projecting the changes in student population. The annual "retention ratios" and the changes from the prior retention ratios are shown in Table 13. These parameter estimates are averaged over four years to increase reliability of the estimates. "Retention ratios" have an element of growth embedded in them since they may be above one (1). Thus, for instance in Table 13, for the most recent period, 2006-2009, eleven of the twelve retention ratios are greater than 1.0. At Kindergarten to Grade 1 the ratio is 1.261 and six of the remaining ten retention ratios over 1.0 are in the 1.03 to 1.05 range. Retention ratios over 1.0 also capture part of the growth stemming from housing construction (near term or longer term), as well as net in-migration into the district, which is very important in this school district, but they do so indirectly. That is, these ratios are not true "retention/survival rates" of the students in the origin grade or they would necessarily be less than or equal to 1.0. Rather these ratios capture retention of current students, replacements for any students who leave (if ≥1.0) and in-migration of students whose families move into the district, whether into new or existing housing. Thus, while they do not directly relate the specific underlying processes affecting the students, they reflect such processes indirectly. Hence, we refer to the retention ratios as entailing "embedded growth." Presently, we will denote such growth largely as a result net in-migration, whether to newly built homes or to existing housing stock.

The cumulative impact of a set of retention ratios such as those shown in Table 13 for 2006-2009 will be demonstrated below. First, take each ratio, starting with the K→G1, and cumulatively multiply it by the one above it until reaching the G11→G12 ratio. For instance, [(.261) (1.041) (1.047) • • • (1.016)] = 1.74; that is, by Grade 12 the entering Kindergarten class would have increased by 74% or per 100 entering Kindergarten students, twelve years later we would expect to have 174 seniors. This is the nature of the cumulative net in-migration process currently taking place in the Hampton Township School District, a very powerful underlying process indeed. If we take all Kindergarten entering cohorts from the class in 2010 to the current seniors' Kindergarten enrollment,* we can answer the following question: How well do the current retention ratios match the observed increases from Kindergarten onward as the students progress in the grade structure? Table 14 provides these data for Kindergarten classes from Grade 1 to Grade 10. The cumulative impact through Grade 4 is largely confirmed. If we take the observed Kindergarten entering student cohorts per year from 2000-01 to 2009-10 and examine their current grade size or enrollment for each grade, then we can compare this to the "model's" predictions using the cumulative retention

* *Quaker Valley Superintendent Joseph Clapper recognized the large impact of net in-migration on the student enrollment and demonstrated its cumulative impact by looking at the successive growth of the entering Kindergarten students for the entire current student body as it grew to its current numbers in Quaker Valley. See columns 1 and 2 of the lower quadrant of Table 14 for Hampton's case.

ratios. The results are shown in the lower quadrant of Table 14. For Grades 1 to 4, the cumulative error is 1 (0.1%), and the “model” is extremely accurate. Thereafter, however, for Grades 5 to 10 the errors range from 18 to 54 per year and cumulatively total 181. With 1,593 students in these grade cohorts, this is an error of 11%. These higher grades were clearly populated with lower retention ratios. For instance, if we use the 2002-05 lower retention ratios in Table 13 to generate the cumulative impact, the outcome is much better for the higher grades (Grades 6 to 10), with an error of 4%, but it is much worse at Grades 1 to 5 (8%). These joint results indicate that the current retention ratios, while representing the current underlying processes, are too high for prior pathways of students several years out (for example, for student populations in grades 6 to 10 and their “growth” in prior years since their entry at Kindergarten). The results further underscore the increased net in-migration at all educational levels for the most recent years. Equally important is the demonstration of the cumulative nature of the net in-migration process that is occurring in the Hampton Township School District. The impact of such net in-migration is, in fact, very striking! What is very clear is that net in-migration is an extremely important component in the changes in student enrollment in the Hampton Township School District. In fact, it has been the primary factor in muting decreases, as well as maintaining the number of students, as will be shown below, since the number of births has been declining for the past twenty years.

We first take a direct look at the changes in the student population by level and overall for the last 16 years. Table 15 shows the number of students and the direction of change per year from 1994 to 2010. We will focus on the summary data at the bottom of the table. There are basically four major points that we wish to draw from this table. First, there was growth of 142 students between 1995 and 2000 (+267 students between 1994 and 2000) and a decrease of 142 students between 2000 and 2005. This is an average growth of 29 students per year in the first five years, 1995-99 and an average decline of 29 per year in the second five years, 2000-04. The total change over the last 15 years has been a decrease of one student—from 3,120 to 3,119. Second, as the sequential five-year shifts of +142 to -142 to -1 indicate, there have been both “growth” years and “decline” years, in terms of enrollment. From 1995 to 2000, there were 5 successive years with enrollment increases, ranging from +19 to +55. Then from 2000 to 2004, there were five successive years with enrollment decreases, ranging from -9 to -60. Third, in the most recent five years, three years had very small enrollment increases (+2, +3 and +10), while the remaining two years had an increase of 22 students and a decline of 38 students. The net change was a decrease of one student or no change. Thus, with increases and decreases of 4½% cancelling each other in the earlier two five-year periods and increased net in-migration muting the continued drop in births in the most recent five years, the total enrollment has remained rather stable for the last fifteen years and remarkably stable for the last five years. In 1995 total enrollment was 3,120. It then had the matching increase and decrease of 142 students, arriving ten years later at 3,120 once again. Then in 2010, total enrollment is again within one student of 3,120 at 3,119. Fourth, it is important to note that total enrollment is comprised of three components—

enrollment at the three different educational levels and thus the next question to address is whether or not each of these streams also have the above type of stability or are moving along different paths, with the mixture resulting in the overall apparent stability found.

Underneath the overall stability or apparent stability in enrollment discussed above, we will now examine the three educational levels. The level most closely matching the overall case is that of the middle school. As may be seen in Table 15, student enrollment at each five-year point starting in 1995 was as follows: 741, 822, 745 and 765. Thus, we have an increase of 81 in the first five years, followed by a decrease of 77 in the second five years. In the most recent period, the shift differs from the overall case in that it has an increase of 20 students or +3% versus no change. However, the initial increase is virtually matched by a subsequent decrease, like that of the overall case. It is at the elementary and high school levels that we see a substantial departure in the enrollment trajectories. At the high school, there is an increase in each of the three five year periods—of +162, +24 and +30 for 1995-99 to 2000-04 to 2005-09, respectively. At the elementary school, the shifts are in the opposite direction, with decreases in each period as follows: -101, -89 and -53 for 1995-99, 2000-04 and 2005-09, respectively. Thus, the matching shifts at the overall level in the first two five-years (+142 and -142) is comprised basically of decreases of 190 students at the elementary level and increases of 186 students at the high school level, with the middle school shift of +4 making up the small difference. Stated differently, in the first five-year period the gains at the middle and high school levels were 142 more than the losses at the elementary level, while in the second five-year period the losses at the middle and elementary levels of 166 students were 142 more than the gain of 24 students at the high school level. In the most recent period, 2005-09, for the case of the “overall draw” with a change of only one student, it takes the gains at both the middle and high school levels (+50) to match the loss at the elementary level (-51). At issue for the future is whether elementary enrollment will continue to decline and how the changes at the middle and high school levels will coincide with those at the elementary level. Looking at Table 15 and the elementary level changes from 1995 to 2010, we can see a dampening down of the rate of decrease from -101 to -89 to -53. We can also observe the initial drop at the elementary level shifting to a subsequent drop at the middle school in the next five-year period (looking diagonally, -101 to -77). The same type of effect is not seen in the last two periods, however (looking diagonally, -89 to +20). Similarly, the drop at the middle school level of 77 in the 2000-04 period does not show up at the high school level in 2005-09 (looking diagonally, -77 to +30). Is the more recent shift to a higher level of net in-migration a “game changer” or will it take another spike in net in-migration to again match the most recent drop in births that has yet to show up in Kindergarten?

We now tie together key elements of the above analysis to evaluate the manner in which births and migration account for changes in student enrollment. The births are operative primarily in Kindergarten enrollments—near term, five to six years prior to enrollment and longer term, via the subsequent graduating seniors, twelve years later. There is also a component of migration in the senior graduates, as shown in Table 14. In that example, 74 per 174 seniors were migrants, or 43%. When we took a close look at the cumulative impact involved, it was clear that such effects have occurred to date only in the near term—through Grade 4 and since they are estimated from the most current data, they are expected to show up at higher grade levels in the future. In terms of assessing the enrollment changes that have occurred over the last ten years, the first major variable affecting yearly student enrollment is the replacement of graduating seniors in year t-1 by the new Kindergarten students in year t, or [$K_t – G12_{t-1}$] and, as discussed in the coverage of migration the additional enrollment of first graders who did not enroll in the district in Kindergarten, [$G1_t – K_{t-1}$]. These results were earlier shown in Table 10 and are in the second column from the right in Table 16. The second major variable affecting yearly student enrollment is net-migration, shown in Tables 10 and 11. Table 20 shows the joint effect of these two processes over the last decade. The next to last column has the K_t - $G12_{t-1}$ + ($G1_t – K_{t-1}$). outcomes and in each of the past 10 years enrollment would have declined had there been no migration. In which case, total enrollment in 2010 would have been 2,641 students—a decrease of 621 students. Instead, we must also take into account the overall net-migration, shown in the third column from the right of Table 20. Net-migration is positive all but one of the 10 years and had the Kindergarten and new Grade 1 students equaled the number of graduating seniors, then student enrollment would have increased by 478 students and total 3,740 students in 2010. However, as already shown, in each of the past 10 years, the entering Kindergarten/Grade 1 cohort was smaller than the graduating senior cohort. Thus, changes in student enrollment is a joint outcome of these two processes and the enrollment fluctuations seen in Table 15 and shown in the last column of Table 20 may now be decomposed into these two processes. For instance, in the first five years the net migration was +109, but the K/G1 and G12 exchange was -251 and thus enrollment declined by 142 students (109-251 = -142). In the most recent five years the Kindergarten/Grade1 and Senior exchange was much greater than before, totaling -370, but net migration increased by over a factor of 3, totaling 369 and thus matched the potential decrease and therefore enrollment was essentially unchanged—from 3,120 to 3,119. As may be seen in the last two rows of Table 16, over the ten-year period enrollment decreased by 143 students or by 4%, but without migration the decrease would have been 19% (-621); net in-migration made up the difference—equivalent to 15% of the student population in 2000.

The last two factors that we will examine before making the projections are alternative schooling and housing development. Table 17 provides the data for alternative schooling of Hampton township students. Since 2003, the cyber charter/charter and home schooled students have basically cancelled each other, with the former increasing slightly and the latter decreasing by about a third. More specifically, the cyber charter/charter enrollment increased by ten students and the students being home schooled decreased by 8 students. The combined set has been quite small and fairly stable since 2003. Enrollment of special needs students attending alternative schools is also quite small, with a range from 13 to 25 students. It shows no particular pattern, but enrollment was 15 in 2001 as well as in 2010. The set of students in alternative schools whose population is changing is also the largest— in private/parochial schools.

This student population increased steadily from 2001 to 2005 from 458 students to 496 students (+38) and has decreased steadily since then—from 496 to 361, a decrease of 135 students. This is a decline of 27% in five years. Overall, the number of students in alternative schools increased from 2001 to 2006 (500→555), but has declined steadily since 2006. Total such enrollment currently stands at 412 students. This is a decrease of 143 students since 2006, a decline of 26%. It is clearly driven by the decline in private/parochial enrollment. The second factor pertinent to alternative school enrollment is that the bulk of the decrease is at the elementary and high school levels. Since 2006, elementary enrollment has decreased from 263 to 195 students (-68 students or -26%) and high school enrollment has declined from 151 students to 98 students (-53 students or -35%). Prior to 2006 enrollment was stable at the elementary level (261-274), while at the high school level enrollment increased from 2001 to 2006 (89→151). It is worth noting that the declines observed here—since 2006--coincide with the timing of the elevated rate of net in-migration found above. It is by no means sufficient to account for most of such in-migration, but it is likely no coincidence, either. It very likely contributed as one component of the increase.

We now turn to housing development. Table 18 provides the data for new housing development by year for the last decade. We have attempted to cluster yearly sequences that have a similar number of new homes built. The average number of new homes built over the last eleven years has been 52 per year. But this average includes the 2004-2006 “housing boom” and the current 2009-2010 period which has basically stalled out with new home construction at about 1/3 the baseline level of 50/year. In 2000-2003, before the “housing boom”, an average of 50 new homes were built per year. Similarly, in 2007-2008 an average of 50 new houses were built per year. In contrast, in 2004-2006, the construction level averaged 82 houses per year, an increase of 64%--a large jump indeed. Over the last eleven years, 575 new houses have been built in Hampton Township. Currently, the number of new homes being built is quite low—17 in 2009 and 14 through October of this year. Thus, in terms of expected impact on new students, one question of importance is what to expect once the economy gains momentum, or more specifically, when the housing market returns to a more normal level. Will there be a backlog and will housing construction return to a relatively high level—above the baseline level of 50/year observed before and after the 2004-2006 “housing boom”? If new housing construction does not go above 50/year, then this baseline level of construction should be captured by the retention ratios in Table 13, which we pointed out had embedded growth in them—including in-migration to new and existing housing stock. Should housing construction be expected to go above the 50/year baseline, then any increment above 50 would need to be taken into account in terms of additional direct impact from housing.

We can get some insight into the magnitude of any backlog, in terms of new housing, by examining the housing plans that had new homes built over the last ten years. Then we can assess, at least for existing housing plans, how many new homes remain to be built out of the total number of lots/units in such plans. Table 19 provides data on housing plans completed, near completion and on-going/not near completion. In these 16 housing plans there are 518 housing units, of which 398 were built between 2000 and 2010. There are 120 housing units remaining to be built in this set of plans or 23%. While 120 homes is no small number, it would appear that neither is it sufficient to expect additional new plans to ramp up to the point of surpassing 50 new homes being built per year. We note here that the number of new homes actually built in Hampton Township over the last eleven years was likely pertinent to the higher level of net in-migration found in the last five years. In some housing plans, where new families with preschool children move in, the impacts from such development continue to accumulate in terms of new Kindergarten or Grade 1 students for many years. Thus, we do necessarily rely on new housing construction remaining at the baseline level of 50/year to maintain the relatively high current retention ratios that we will use in the projections to follow. However, neither do we now expect that there will be a direct impact from new housing beyond the impact embedded in the retention ratios

II. Development and Analysis of Grade-Specific School District Projections for the Ten-Year Period 2011-2020.

Scenario I: Projections with Fertility, Aging and Embedded Growth (Current Fertility Level)

The Scenario I projections use the following:

1. 2010 observed student populations per grade;
2. 2006-2009 four year retention ratios (Table 13) based on beginning of year school enrollment for 2006-2009;

3. Expected Kindergarten enrollment mapped to t-5 and t-6 births (see notes to Table 13) using a four-year Birth to Kindergarten enrollment ratio of .945 (Table 13);

4. For years 2011-2014, the observed births in the Hampton Township SD were used (Table 1);

5. For 2015-2020, the expected number of births is based on the 2005-2009 annual average (149).

That is, this scenario takes into account the following: (1) the most recent birth data; (2) the most current retention ratios, which have embedded growth or net migration; and (3) the most recent Birth to Kindergarten enrollment ratio of .945. Note that with a K→G1 retention ratio of 1.261 the Birth to Grade 1 cumulative ratio is 1.19 (.945x1.261=1.192) indicating substantial net in-migration of families with preschool children. Table 20 presents the results for this scenario. In the first five years, the elementary level decreases by 130 students (-11%), while the middle school is expected to decrease by 25 students (-3%) and the high school is essentially stable (+2). In the second five years, the elementary level is basically stable, decreasing by only 3 students, but there is a rather large decrease of 87 students (-12%) at the middle school and a moderate decrease at the high school (-53 students or -5%). By 2020, there is an expected decrease of 133 (-11%), 112 (-15%) and 51 (-5%) students at the elementary, middle and high school levels respectively. Overall, in this scenario, by 2020 the total student enrollment is expected to decrease by 296 students or by 9%.

Scenario II: Projections with Fertility, Aging and Embedded Growth (Higher Fertility)

This scenario uses the same parameters as Scenario I, except that for 2015-2019, the expected number of births is now based on a return to the level of births in 2000-2004, 166 per year. This is an increase from Scenario I of 17 births per year. Table 21 shows the results. Since the only change occurs in 2015, the results for 2011 to 2014 are the same as in Scenario I. From 2015 on, however, the results are quite different and this difference will be evident in the second five years. In addition, only the elementary level is affected since the change does not occur until 2015 and it's impact is initially at the Kindergarten level. After six years, cumulatively it has only reached Grade 5. Thus, in this scenario, in the first five years there is an expected decrease of 114 students at the elementary level, followed by an increase of 105 students in the second five years. Overall, by 2020 there is now a small decrease of 9 students at the elementary level, (less than 1%) with no difference from Scenario I at the other levels. The overall change in students in this case is a decrease in total enrollment of 172 students (-6%). . It has the most recent in-migration for both the school age students and the preschool children. It also has an expected turnaround or reversal in the trajectory of births. Rather than taking the current trajectory and extrapolating it into the future--even if at a decelerating rate-- or assuming that the birth trajectory will flatten out and remain constant with an average of 149 per year (as assumed in Scenario I), here we have used the analysis in the first Section as a basis for making a more informed assumption, taking into account the shifts in the baby bust and echo boom that are expected to occur in the next five years. The logic involved is described below.

In Section I we evaluated the basis for the shifts in births over the last 15 years and there were two primary factors—delayed childbearing into the late thirties and early forties and the number of reproductive females in the key age cohorts—25-29, 30-34 and 35-39. Delayed childbearing is a one-wave phenomenon. Once it occurs, it cannot recur without a reversal to higher fertility at younger ages. Since the data indicate that it is in its last stage with the second part of the wave extending into the late thirties and early forties, there is no realistic extension into the late forties and early fifties, at least for most births. Even in the early forties, it remains small and the exception. Thus, in the future, the main force driving the number of births will be the number of women in the key reproductive age cohorts. In Hampton Township the key cohorts are ages 25-29, 30-34 and 35-39, as shown in Section I. However, we have used all ages from 15-44. We first weight the cohorts by the most recent share of births in 2005-08 (see Table 2). For example, the 15-19 age-cohort had .028 (2.8%) of the births in 2005-08 and the 30-34 age cohort had .352 of the births (35.2%). Second, we use the date of birth of the female population to determine their allocation into the following categories or cohorts for the female populations: Baby Boom, baby bust, Transition (between the Baby Boom and baby bust), Echo Boom and Transition Echo (For an example of the first three of these for Allegheny County, see Table 9). Using the weights described above and the type of cohort occupying the age band (eg. 15-19, 20-24, etc.) in 2006-2010 and in 2011-2015, we can ascertain the relative influence of the type of cohort and hence the relative number of reproductive women. In 2006-2010, the most recent period for which we have births (at least for 2006-09), the baby bust cohorts have a 58% share of births, the Echo Boom cohorts a 23% share and the Transition/Transition Echo cohorts have a 16% share (the remainder is s small share by a Baby Boom cohort of 3%). The key point is that the baby bust cohorts have a 58% share and the Echo Boom cohorts a 23% share. For 2011-2015 the relative influence of the baby bust cohorts decline from 58% to 45% and, more importantly, the Echo Boom cohorts' share more than doubles—from 23% to 48%. The remaining 7% is allocated to the Transition/Transition Echo cohorts, who also have more women than are in the baby bust cohorts. In sum, there is a strong basis for expecting a reversal in the birth trajectory—from declines to increases. In this scenario over the next five-year period we expect that this reversal will take place and are therefore assuming that births will return to their level in 2000-04, an increase of 17 births per year. This is the assumption incorporated in Scenario II. Here our discussion has pertained to the cohorts of mothers; in Section I the comparable discussion pertained to the children born. The two discussions are totally consistent, with the one here providing more detail regarding the logic underlying the assumption to reverse the trajectory of births from continued decreases to one with increases in births.

Scenario III: Projections with Fertility, Aging and Embedded Growth (Moderately Higher Fertility).

This scenario takes the same parameters as in Scenarios I and II, except that now for 2015-2019, we assume that there is a more moderate increase in births, recovering ½ of the decrease in the last five years. Thus, births are now set at 158 per year, an increase of 9 births per year above the level in Scenario I. As with Scenario II, this is consistent with the findings in Section I of an expected modest increase in births due to what we have termed the echo boom—a likely increase in the number of reproductive age females in the key ages 25-34. The data for Hampton Township (Table 3), as well as Allegheny County (Table 9), showing the most recent population data (2006-08), provide a basis for the expected turnaround in births incorporated in the projections in Scenarios II and III. As in Scenario II, the only changes are at the elementary level from 2015 to 2020. The results for Scenario III are shown in Table 22. There is a decrease of 122 students in the first five years, and in the second five years there is an increase of 52 students. By 2020 the elementary school enrollment is expected to decrease by 70 students. The results for the middle and high schools do not change since the new level of births do not start until 2015 and therefore no changes occur above Grade 5. Thus, after ten years, in this scenario we have an overall decrease of 233 students, with decreases at all levels as follows: -70, -112 and -51 at the elementary, middle and high school levels, respectively. Since this scenario uses a relatively moderate increase in the number of births, consistent with the analysis regarding the expected turnaround in births in Section I, ***it is this scenario, Scenario III, which is viewed as the most likely scenario for the Hampton Township School District.*** Should births increase even higher, as in Scenario II, it would then provide the most likely upper bound for enrollment in the near term. Similarly, if births stay at their present level, then the results in Scenario I provide a lower bound for enrollment.

Summary

To more fully understand the projected results from Scenarios II and III, we also provide a breakdown of the outcomes in terms of net-migration and the K/G1—G12 exchange, as we did for the past 10 years in Table 16. Based on the retention ratios in Table 13 and consistent with the overall cumulative impact of such ratios, as shown in Table 14, the net in-migration in the next 10 years is expected to range from +71 to +80 per year and cumulatively across all 10 years, in Scenario III we expect a net total of +767 additional students to enroll in the Hampton Township School District. This compares to the +478 additional students from net in-migration observed between 2000 and 2010, a very large difference indeed—60% higher. What about the K/G1—G12 exchange? In this case, over the next 10 years we expect 1,000 fewer students, in contrast to the prior 10 years' 621 fewer students. This difference is 379 or 61% higher. What is most significant is the last five years in which the net in-migration rate jumped dramatically. As discussed in Section I, in the most recent five years, 2005-09, the spike in net in-migration was virtually equal to the losses that would accrue due to the K/G1—G12 exchange (+369 and -370). We also found that the full impact of the new net in-migration process had only reached Grade 4. Here the new in-migration rates are operative from 2010 onward, in addition to the start-up that had already reached Grade 4. Thus, in effect the present projections will have embedded in them the cumulative impact demonstrated in Table 14, with a "growth" of 74% by Grade 12 or an expected increment from Kindergarten to Grade 12 of 1.74. Such in-migration rates were operative only in the last five years and thus they should be comparable to those in the present projections. More specifically, in the last five years, the net in-migration was +369. In the Scenario III projections, the net in-migration for the first five years is +375 and in the second five years it is +392. Thus, the main difference in the projections hinge on the K/G1—G12 exchange. In the last five years this exchange had 370 fewer students. For the Senario III projections, in the first five years this exchange had 520 fewer students and in the second five years there were 480 fewer students. Births had returned halfway to their prior level by the second five years and thus the –480 outcome is still quite different from that of the last five years, -370. In the projections, the key lies in the K/G1-G12 part of the exchange. For the most part, this is already determined—the births are known for four of the five years and the bulk of the future senior classes are already enrolled. In the first five years of the projections the K/G1—G12 exchange yield a decrease of 520 students, but net in-migration adds 375 students, for a net expected decrease of 145 students. In the second five years, the K/G1—G12 exchange yields a decrease of 480 students, with net in-migration adding an expected 392 students and therefore a much smaller decrease of 88 students. Combined, after ten years the expected student enrollment is a decrease of 233 students, stemming from a decrease of 1,000 students from the K/G1—G12 exchange, largely offset by the addition of 767 students from net In-migration. The outcome is -1,000 +767 = -233 or 233 fewer students. These comparisons for Scenarios II and III, relative to the changes in the last five and ten years are provided below. The first panel shows the cumulative numbers; the second panel the averages per year.

	K/G1—G12 Exchange	Net Migration	Δ Student Enrollment
	Panel I		
SII Projections			
First 5 Years	-525.	+388	-137
Second 5 Years	-402	+367	-35
$\sum$	-927	+755	-172
SIII Projections			
First 5 Years	***-520***	***+375***	***-145***
Second 5 Years	***-480***	***+392***	***-88***
$\sum$	***-1000***	***+767***	***-233***
Last 5 Years	.-370	+369	-1
Last 10 Years	-621	+478	-143
	Panel II		
SII Projections			
First 5 Years	-105 ave./yr.	+78 ave/yr.	-27 ave/yr.
Second 5 Years	-80 ave/yr.	+73 ave/yr.	-7 ave/yr.
SIII Projections			
First 5 Years	***-104 ave./yr.***	***+75 ave/yr.***	***-29 ave/yr.***
Second 5 Years	***-96 ave/yr.***	***+78 ave/yr.***	***-18 ave/yr.***
Last 5 Years	-74 ave/yr.	+74 ave/yr.	-0.6 ave/yr.

Lastly, we consider what it would take to reverse the findings and once again see growth or even stability in the near term. There are two primary reasons that the K—G12 exchange component of the enrollment change is expected to yield even greater decreases in expected students, especially in the first five years. First, births have continued to decline—from 166 to 149 per year, a decrease of 17--and only the first cohort of this lower level of births has entered Kindergarten in 2010. The second, third, fourth and fifth of these smaller cohorts have yet to enter Kindergarten. Second, the senior classes in the first five years are expected to be larger. They are projected to average 288 students compared to the average of 277 in the last five years. Both of these factors will increase the K-G12 part of the

K/G1—G12 Exchange. Since births determining the future Kindergarten cohorts for the next four years are already known, the only effective change here would be an increase in the Birth to Kindergarten ratio—an increase above the .945 ratio that has been operative for the last four years. (See Table 13.) Should net in-migration of families with preschool children increase yet further, then this ratio might increase, compensating for the decrease in births. The current .945 Birth to Kindergarten ratio undoubtedly has net in-migration embedded in it. Also, as shown in the analysis in Section I, by Grade 1, the Birth→K→G1 compound ratio is 1.192, implying that by Grade 1 the student enrollment is 19% above the number of births. Thus, it requires an even higher level of such net in-migration beyond the 19% increase by Grade 1. A second type of change would be for the level of births to increase even higher. We have assumed a moderate increase in births to an average of 158 births per year for 2010-2015, affecting the expected Kindergarten cohorts entering from 2015-2020. Births in the near term would have to increase more than this, returning to their level 2000-04 level, as shown in Scenario II, for example. Then the expected decrease would be -172 or 61 more students than in Scenario III. Alternatively, births would have to return to a level before 2000. This is quite likely as the "Echo Boom" females dominate the key reproductive ages in the future. But this will be after the next five years. None of the above changes would affect the expected enrollments in the middle and high schools. Rather, what would be necessary for these to change would be another increase or spike in net in-migration beyond the level of 2006-09. In this case the retention ratios would increase, and the cumulative impact by Grade 12 would be greater than 1.74. Such changes would also no doubt increase the elementary enrollment.

Presently, none of these cases seem likely, though they are certainly possible. In this set, however, Scenario II is probably more likely than such possibilities. Here, we are viewing it as an upper bound. Similarly, we are viewing Scenario I, with births remaining at their present level, as a lower bound. We also do not view it as likely as either Scenario II or III***. Thus, in sum, as stated earlier, we view Scenario III as the most likely case***. What also is extremely likely is that births will continue to increase in the future beyond the moderate increase expected in the next five years. That is, as discussed in Section I, we are now entering a turnaround period in which the baby bust females are aging out of the reproductive years and the number of reproductive age females will increase due to the echo boom. We expect that these cohorts of echo boom mothers will take center stage in five to ten years and will dominate the expected births thereafter for the following 10-15 years. Thus, the downturn in enrollment currently projected will be reversed and enrollments should again return to the current levels and possibly even higher.

III. Development and Analysis of Areal Specific District Student Projections for the Three Elementary Schools: 2011-2020.

Projections for the Three Elementary Schools

Scenario IV covers three elementary schools and all projections use the same four-year retention ratios (2006-2009) as in Scenario III. (See Table 13.) Likewise, a Birth to Kindergarten enrollment ratio of .945 is assumed for all schools here, as well as in the most likely aggregate case of Scenario III. What differs here is that the births must be disaggregated and melded to the specific elementary school attended. Thus, we have used the 2010 attendance boundaries and estimated the number of Kindergarten students by school within each census tract. A map of Hampton Township delineating the three census tracts and the three elementary school attendance areas is shown in Figure 1. The areas within the more heavily marked boundaries/perimeters pertain to the census tracts. As may be seen in Figure 1, Tract 4141.01 is in the Northeast section of the township. Tract 4141.02 is in the Northwest and extends south to the middle of the Southwestern section of the township. Route 8 divides these two census tracts in terms of East and West. Tract 4142 is in the Southern section of the township, taking up the Southeastern section East of Route 8 and the southern most part of the Southwestern section of the township, West of Route 8.

The attendance areas in Figure 1 are delineated with the narrower band markings and a letter to denote the elementary school attended by that section of the census tract. For example, the Poff Elementary students come from the northernmost part of Tracts 4141.01 and 4141.02, with a small section on the western side of Tract 4141.02 attending Wyland Elementary. Wyland students come from the southern half and the extreme western section of Tract 4141.02 as well as the western section of Tract 4142, West of Route 8. The students attending Central Elementary come from all three census tracts—from the eastern section of Tract 4142, east of Route 8; from the southern part of Tract 4141.01, also East of Route 8; and from the southern part of the northern section of Tract 4141.02, extending to Hardts Road and then south along Wildwood until, but not including “Twelve Oaks”. Thus, both Poff and Wyland draw from part of two census tracts and Central draws from parts of all three of the census tracts. Taking proportions of the births 5-6 years earlier (.75 x Births in t-5 and .25 x Births in t-6) from each census tract, modified by the actual Birth to Kindergarten ratio for 2010 (.899), we match the numbers to the student enrollment at each elementary school in 2010. Overall, we found the following distributions (Columns add to 1.0) perfectly matched the 2010 Kindergarten enrollments for each school:

	Census Tract		
Elementary School	Tract 4141.01	Tract 4141.02	Tract 4142
Poff	.50	.30	
Central	.50	.40	.50
Wyland		.30	.50

The key, presently, is that the above distributions have been used to allocate the proportion of births in each census tract that will reach Kindergarten age in five years. Then for the total number of births per school, we utilize the Birth to Kindergarten ratio of .945 to estimate the initial Kindergarten enrollment five years later. Of course, for all elementary schools, the transportation/attendance boundaries may change, shifting these distributions, depending on the number of students available and the building capacities. Thus, it is taken as given that such flexibility exists and that these projections may, in fact, serve as a planning device to change the above underlying distributions. For the present purpose, acknowledging such possibilities, in the projections to follow we will assume that the attendance boundaries are fixed. Births by census tract for 2005-2008 are taken as observed, as shown in Table 1. The above distributions are then aggregated per school to arrive at an expected birth to K enrollment process.

Once births are estimated in this way, we will assume a birth to K enrollment ratio of .945, as used in Scenario III.

The results of the projections are given in Tables 23A,B and C. For the Central Elementary School, shown in Table 23A, there is an expected decrease of 15 students in Grades K to G2 in the first five years, followed in the second five years by an increase of 21 students. By 2020, the enrollment in K-G2 is expected to be 250 students, an increase of 6 students (+2%). For Grades 3 to 5, there are increases of 17 students in the first five years, followed in the second five years by another expected increase of 13 students. By 2020 the enrollment is expected to increase by 30 students, from 264 to 294. Overall, the Central Elementary enrollment is expected to be stable for the next five years (+2), but to increase by 34 students in the second five years. By 2020 the projection is that Central will increase by 36 students (+7%), from 508 to 544 students.

The projections for Poff Elementary are given in Table 23B. In the Poff Elementary, for Grades K to G2 there is an initial decrease of 7 students in the first five years, followed by an equal increase (+7) in the second five years. After ten years, the student enrollment is expected to remain the same, at 136 students. For grades 3 to 5, the story is much different. In the first five years there is a decrease of 25 students, followed in the second five years by a decrease only one student. By 2020, the expected enrollment is expected to decrease by 26 students, from 186 to 160 or -14%. Overall, the Poff enrollment is expected to decrease by 32 students in the first five years and then increase by 6 students in the second five years. In 2020, the projected enrollment is expected to decrease by 26 students (-8%), from 322 to 296 students.

Finally, the Wyland Elementary projections are shown in Table 23C. In the first five years in Grades K to G2 there is an expected decrease of 43 students (-24%), followed in the second five years by an increase of 14 students (+10%). Thus, by 2020, enrollment is expected to decrease by 29 students or -16%. In Grades 3 to 5 there is an expected drop in enrollment in the first five years of 50 students (-22%), followed in the second five years by an increase of 5 students. By 2020, the expected enrollment is 178, a decrease of 45 students or -20%. Overall, the Wyland enrollment is expected to decrease by 93 students in the first five years (-23%), followed in the second five years by an increase of 19 students (+6%). By 2020, enrollment at Wyland is expected to have decreased by 74 students (-18%).

A summary of the expected changes in Scenario IV is given below*

Elementary	2010 Population	Change 2010→2015	Change 2015→2020	2020 Population.	% Change
Central	508	+2	+34	544 (+36)	(+7%)
Poff	322	-32	+6	296 (-26)	(-8%)
Wyland	402	-93	+19	328 (-74)	(-18%)
Total	1232	-123	+59	1168 (-64)	(-5%)

The student projections in Scenario IV map very closely to those at the elementary level in Scenario II. For instance in 2015, there is a difference of 1 and in 2020 the difference is seven. These small differences are due to multiple multiplication round offs and are less than one per cent. In short, the two levels of projections in terms of the aggregate and disaggregate results are extremely consistent. The Scenario III results are as follows:

* In Appendix I we provide the results for Grades K to G2 and for Grades 3 to 5 which were discussed above.

Educational Level	2010 Population	Change 2010→2015	Change 2015→2020	2020 Population.	% Change
K→G5	1232	-122	+52	1162 (-70)	(-6%)
G6→G8	766	-25	-87	654 (-112)	(-15%)
G9→G12	1121	+2	-53	1070 (-51)	(-5%)
Total	3119	-145	-88	2886 (-233)	(-7%)

Note that in this case the initial decreases at the elementary level cascade to the middle school in the second five-year period and the decreases at the middle school cascade to the high school. This differs from the outcome in the prior five years (2005-2010) due to the fact that the most recent decline in births are only now reaching Kindergarten and that there is no expected second wave or additional spike in net in-migration comparable to the one observed in the last five years. As shown in the analysis in Section I, the recent increase in net in-migration averaging 50 more students enrolling per year than in prior years, was the factor almost perfectly balancing the decline that would have occurred due to the K/G1-G12 exchange. In the projections in this analysis, we have no such comparable balancing force. It seems extremely unlikely that another similar increase in net migration, taking the net new student migration level to 100 per year beyond that occurring in years prior to 2005[†] will occur to once again mute the additional difference expected from the K/G1-G12 exchange.

[†] This would bring net in-migration to the 120-130 level per year.

APPENDIX I

Central Elementary School

Educational Level	2010 Population	Change 2010→2015	Change 2015→2020	2020 Population.	% Change
K→G2	244	-15	+21	250 (+6)	(+2%)
G3→G5	264	+17	+13	294 (+30)	(+11%)
Total	508	+2	+34	544 (+36)	(+7%)

Poff Elementary School

Educational Level	2010 Population	Change 2010→2015	Change 2015→2020	2020 Population.	% Change
K→G2	136	-7	+7	136 (0)	(0%)
G3→G5	186	-25	-1	160 (-26)	(-14%)
Total	322	-32	+6	296 (-26)	(-8%)

Wyland Elementary School

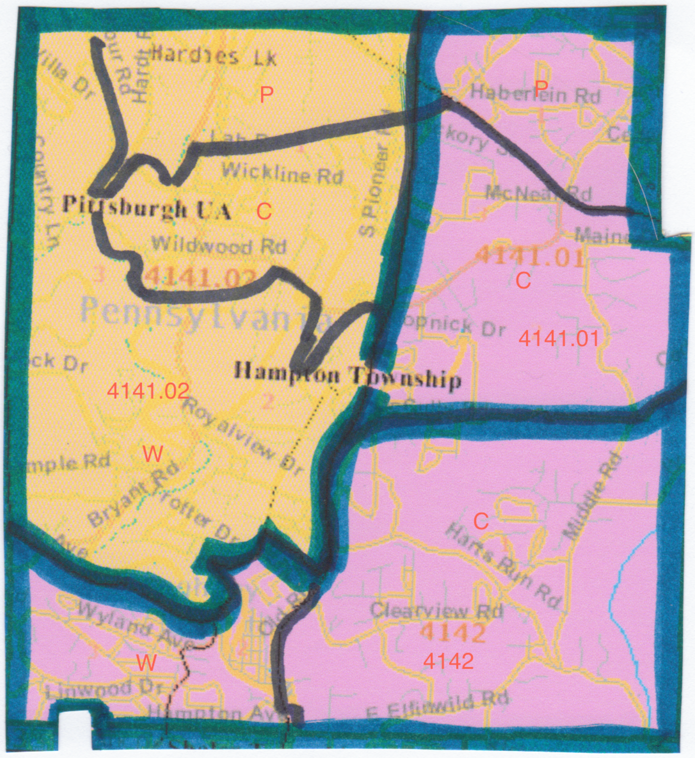
Educational Level	2010 Population	Change 2010→2015	Change 2015→2020	2020 Population.	% Change
K→G2	179	-43	+14	150 (-29)	(-16%)
G3→G5	223	-50	+5	178 (-45)	(-20%)
Total	402	-93	+19	328 (-74)	(-18%)

TOTAL

Educational Level	2010 Population	Change 2010→2015	Change 2015→2020	2020 Population.	% Change
K→G2	559	-65	+42	536 (-23)	(-4%)
G3→G5	673	-58	+17	632 (-41)	(-6%)
Total	1232	-123	+59	1168 (-64)	(-5%)

Figure 1

Hampton Township by Census Tract and Elementary School Attendance Area



C: Central Elementary School
P: Poff Elementary School
W: Wyland Elementary School

Table 1

Annual Number of Births to Hampton Township School District Residents by Census Tract and Year: 1990-2009*

	Tract 4141.01	Tract 4141.02	Tract 4142	Total
1990	63	70	70	203
1991	72	62	76	210
1992	72	74	78	224
1993	87	61	60	208
1994	69	91	66	226
1995	78	62	74	214
1996	86	85	68	239
1997	59	61	71	191
1998	60	65	56	181
1999	72	69	42	183
2000	42	58	52	152
2001	59	71	55	185
2002	45	53	56	154
2003	53	61	67	181
2004	40	71	48	159
2005	36	58	51	145
2006	48	77	44	169
2007	46	51	57	154
2008+	52	58	41	151
2009	NA	NA	NA	127
∑ 1990-1994	363	358	350	1,071
∑ 1995-1999	355	342	311	1,008
∑ 2000-2004	239	314	278	831
∑ 2005-2008	182	244	193	619 (746)
Average/Year				
1990-1994	72.6	71.6	70.0	214.2
1995-1999	71.0	68.4	62.2	201.6
2000-2004	47.8	62.8	55.6	166.2
2005-2008	45.5	61.0	48.3	154.8 (149.2)
Δ_1^{∂}	-8	-16	-39	-63
Δ_2^{δ}	-116	-28	-33	-177
Δ_3^{ζ}	NA	NA	NA	-85
Δ_4^{λ}	-1.6	-3.2	-7.8	-12.6
Δ_5^{∞}	-23.2	-5.6	-6.6	-35.4
Δ_6^{ξ}	-2.3	-1.8	-7.3	-11.4 (-17.0)
Δ_7^{ϕ}	-27.1	-10.6	-21.7	-59.4 (-65.0)

* Sources: Allegheny County Health Department (1990-2008) and Pennsylvania Department of Health (2009).

\+ Preliminary

$^{\partial}$ Δ_1 (1990-1994) → (1995-1999)

$^{\delta}$ Δ_2 (1995-1999) → (2000-2004)

$^{\zeta}$ Δ_3 (2000-2004) → (2005-2009)

$^{\lambda}$ Δ_4 (1990-1994 average) → (1995-1999 average)

$^{\infty}$ Δ_5 (1995-1999 average) → (2000-2004 average)

$^{\xi}$ Δ_6 (2000-2004 average) → (2005-2008 average)

$^{\phi}$ Δ_7(1990-1994 average)→(2005-2008 average) if Tract; 2005-2009 Total and average (in parenthesis)

Table 2

Number of Births by Age of Mother and Year for the Hampton Township School District Residents[1]

		15-19	20-24	25-29	30-34	35-39	40-44	45+	$\sum$
1990-1994	1990	3	16	72	77	33	1	0	203
	1991	2	13	64	93	35	3	0	210
	1992	3	11	76	89	40	5	0	224
	1993	47	15	52	87	44	3	0	208
	1994	7	5	68	82	57	6	0	226
	$\sum$	22	60	332	428	209	18	0	1,071
	% of $\sum$	.021	.056	.311	.400	.196	.017	0	
	Avg/Yr	4.4	12.0	66.4	85.6	41.8	3.6	0	214.2
1995-1999	1995	1	11	54	94	46	8	0	214
	1996	4	10	61	94	61	9	0	239
	1997	2	11	45	77	46	9	1	191
	1998	6	3	47	74	43	8	0	181
	1999	2	11	37	82	46	5	0	183
	$\sum$	15	46	244	421	242	39	1	1,008
	% of $\sum$	.015	.046	.242	.418	.240	.039	.001	
	Avg/Yr	3.0	9.2	48.8	84.2	48.4	7.8	0.2	201.6
2000-2004	2000	2	10	32	66	35	7	0	152
	2001	3	12	39	74	47	10	0	185
	2002	4	8	30	55	44	13	0	154
	2003	1	9	34	82	43	12	0	181
	2004	5	5	32	67	38	11	1	159
	$\sum$	15	44	167	344	207	53	1	831
	% of $\sum$	.018	.053	.201	.414	.249	.064	.001	
	Avg/Yr	3.0	8.8	33.4	68.8	41.4	10.6	0.2	166.2
2005-2008	2005	3	19	29	47	36	10	1	145
	2006	5	17	25	66	44	10	0	169
	2007	3	13	44	49	38	7	0	154
	2008	6	12	34	55	38	6	0	151
	$\sum$	17	61	132	217	156	33	1	619
	% of $\sum$	.028	.099	.214	.352	.253	.053	.002	
	Avg/Yr	4.3	15.3	33.0	54.3	39.0	8.3	0.3	154.8
	Δ_1[2]	-1.4	-2.8	-17.6	-1.4	+6.6	+4.2	+0.2	-12.6
	Δ_2	0	-0.4	-15.4	-15.4	-7.0	+2.8	0	-35.4
	Δ_3	+1.3	+6.5	-0.4	-14.5	-2.4	-2.3	+0.1	-11.4
	Δ_4	-1.4	-3.2	-33.0	-16.8	-0.4	+7.0	+0.2	-48.0
	Δ_5	-0.1	+3.3	-33.4	-31.3	-2.8	+4.7	+0.3	-59.4
	$\%\Delta_1$	-.003	-.003	-.110	+.014	+.053	+.047	+.001	
	$\%\Delta_2$	+.010	+.046	+.013	-.062	+.004	-.011	+.001	
	$\%\Delta_3$	+.007	↑+.043	↓ -.097	↓ -.048	↑ +.057	↑+.036	+.002	

[1] NOTE 1: Source: Allegheny County Health Department; NOTE 2: 1 Unknown age in 1990 & 1994; 2 Unknown ages in $\sum$ 1990-94 and in 2006 and $\sum$ 2005-08; NOTE 3: Δ_1=(1990-94 avg)$\rightarrow$(1995-99 avg)
Δ_2=(1995-99 avg)$\rightarrow$(2000-04 avg) Δ_3=(2000-04 avg)$\rightarrow$(2005-08 avg) Δ_4=(1990-94 avg)$\rightarrow$(2000-04 avg)
Δ_5=(1990-94 avg)$\rightarrow$(2005-08 avg) $\%\Delta_1$=Δ of % for (1990-94 avg)$\rightarrow$(2000-04 avg)
$\%\Delta_2$=Δ of % for (2000-04 avg)$\rightarrow$(2005-08 avg) $\%\Delta_3$=Δ of % for (1990-94 avg)$\rightarrow$(2005-08 avg)

Table 2A

Number of Births by Age of Mother and Year for the Hampton Township Census Tract 4141.01 Residents*

		15-19	20-24	25-29	30-34	35-39	40-44	45+	∑
1990-1994	1990	0	3	26	29	5	0	0	63^{+}
	1991	0	3	24	36	8	1	0	72
	1992	1	1	21	37	11	1	0	72
	1993	5	2	24	38	16	2	0	87
	1994	2	1	16	27	22	0	0	69
	∑	8	10	111	167	62	4	0	363
	% of ∑	.022	.028	.307	.461	.171	.011	--	
	Avg/Yr	1.6	2.0	22.2	33.4	12.4	0.8	0	72.6
1995-1999	1995	0	5	18	37	15	3	0	78
	1996	1	4	18	36	25	2	0	86
	1997	1	2	14	27	13	2	0	59
	1998	1	0	16	26	16	1	0	60
	1999	1	4	11	38	17	1	0	72
	∑	4	15	77	164	86	9	0	355
	% of ∑	.011	.042	.217	.462	.242	.025	--	
	Avg/Yr	0.8	3.0	15.4	32.8	17.2	1.8	0	71.0
2000-2004	2000	0	3	7	18	10	4	0	42
	2001	1	7	9	23	15	4	0	59
	2002	1	1	11	18	11	3	0	45
	2003	0	2	8	26	13	4	0	52
	2004	0^{β}	1	9	18	12	0	0	40
	∑	2	14	44	103	61	15	0	239
	% of ∑	.008	.059	.184	.431	.255	.063	--	
	Avg/Yr	0.4	2.8	8.8	20.6	12.2	3.0	0	47.8
2005-2008	2005	0	1	9	14	7	4	1	36
	2006	1	4	8	20	12	3	0	48^{ψ}
	2007	1	5	10	18	12	0	0	46
	2008	3	4	14	17	12	2	0	52
	∑	5	14	41	69	43	9	1	182
	% of ∑	.027	.077	.225	.379	.236	.049	.005	
	Avg/Yr	1.3	3.5	10.3	17.3	10.8	2.3	0.2	45.5
	Δ_1	--0.8	+1.0	-6.8	-0.6	+4.8	+1.0	0	-1.6
	Δ_2	-0.4	-0.2	-6.6	-12.2	-5.0	+1.2	0	-23.2
	Δ_3	+0.9	+0.7	+1.5	-3.3	-1.4	-0.7	+0.2	-2.3
	Δ_4	-1.2	+0.8	-13.4	-12.8	-0.2	+2.2	0	-24.8
	Δ_5	-0.3	+1.5	-11.9	-16.1	-1.6	+1.5	+0.2	-27.1
	$\%\Delta_1$	-.014	-.031	-.123	+.030	+.084	+.052	0	
	$\%\Delta_2$	+.019	+.018	+.041	-.052	-.019	-.014	+.005	
	$\%\Delta_3$	+.005	↑+.049	↓ -.082	↓ -.082	↑ +.065	↑+.038	+.005	

* NOTE 1: Source: Allegheny County Health Department; ; NOTE 2: 1 Unknown age in 1990 & 1994; 2 Unknown ages in ∑ 1990-94; NOTE 3: Δ_1=(1990-94 avg)→(1995-99 avg) Δ_2=(1995-99 avg)→(2000-04 avg)
Δ_3=(2000-04 avg)→(2005-08 avg) Δ_4=(1990-94 avg)→(2000-04 avg)
Δ_5=(1990-94 avg)→(2005-08 avg)
$\%\Delta_1$=Δ of % for (1990-94 avg)→(2000-04 avg) $\%\Delta_2$=Δ of % for (2000-04 avg)→(2005-08 avg)
$\%\Delta_3$=Δ of % for (1990-94 avg)→(2005-08 avg)

Table 2B

Number of Births by Age of Mother and Year for the Hampton Township Census Tract 4141.02 Residents*

		15-19	20-24	25-29	30-34	35-39	40-44	45+	∑
1990-1994	1990	2	5	25	23	15	0	0	70
	1991	0	6	17	28	10	1	0	62
	1992	0	4	27	24	17	2	0	74
	1993	2	9	11	28	10	1	0	61
	1994	3	2	32	32	18	4	0	91
	∑	7	26	112	135	70	8	0	358
	% of ∑	.020	.073	.313	.377	.196	.022	--	
	Avg/Yr	1.4	5.2	22.4	27.0	14.0	1.6	0	71.6
1995-1999	1995	1	2	22	27	7	3	0	62
	1996	1	3	30	35	13	3	0	85
	1997	1	4	12	26	15	3	0	61
	1998	3	1	19	24	15	3	0	65
	1999	0	6	16	30	16	1	0	69
	∑	6	16	99	142	66	13	0	342
	% of ∑	.018	.047	.289	.415	.193	.038	--	
	Avg/Yr	1.2	3.2	19.8	28.4	13.2	2.6	0	68.4
2000-2004	2000	2	4	14	23	12	3	0	58
	2001	1	4	19	26	16	5	0	71
	2002	0	6	9	19	16	3	0	53
	2003	1	3	17	25	11	4	0	61
	2004	2	3	13	29	16	7	1	71
	∑	6	20	72	122	71	22	1	314
	% of ∑	.019	.064	.229	.389	.226	.070	.003	
	Avg/Yr	1.2	4.0	14.4	24.4	14.2	4.4	0.2	62.8
2005-2008	2005	3	12	8	19	14	2	0	58
	2006	3	9	8	29	19	7	0	77
	2007	1	3	16	14	14	3	0	51
	2008	1	4	13	21	16	3	0	58
	∑	8	28	45	83	63	15	0	244
	% of ∑	.033	.116	.186	.343	.260	.062	0	
	Avg/Yr	2.0	7.0	11.3	20.8	15.8	3.8	0	61.0
	Δ_1	--0.2	-2.0	-2.6	+1.4	-0.8	+1.0	0	-3.2
	Δ_2	0	+0.8	-5.4	-4.0	+1.0	+1.8	+0.2	-5.6
	Δ_3	+0.8	+3.0	-3.1	-3.6	+1.6	-0.6	-0.2	-1.8
	Δ_4	-0.2	-1.2	-8.0	-2.6	+0.2	+2.8	+0.2	-8.8
	Δ_5	+0.6	+1.8	-11.1	-6.2	+1.8	+2.2	0	-10.6
	$\%\Delta_1$	-.001	-.009	-.084	+.012	+.030	+.048	+.003	
	$\%\Delta_2$	+.014	+.052	+.043	-.046	+.034	-.008	-.003	
	$\%\Delta_3$	↑ +.013	↑ +.043	↓ -.127	↓ -.034	↑ +.064	↑+.040	0	

* NOTE 1: Source: Allegheny County Health Department; ; NOTE 2: 1 Unknown age in 1990 & 1994; 2 Unknown ages in ∑ 1990-94; NOTE 3: Δ_1=(1990-94 avg)→(1995-99 avg) Δ_2=(1995-99 avg)→(2000-04 avg)
Δ_3=(2000-04 avg)→(2005-08 avg) Δ_4=(1990-94 avg)→(2000-04 avg)
Δ_5=(1990-94 avg)→(2005-08 avg)
$\%\Delta_1$=Δ of % for (1990-94 avg)→(2000-04 avg) $\%\Delta_2$=Δ of % for (2000-04 avg)→(2005-08 avg)
$\%\Delta_3$=Δ of % for (1990-94 avg)→(2005-08 avg)

Table 2C

Number of Births by Age of Mother and Year for the Hampton Township Census Tract 4142 Residents*

		15-19	20-24	25-29	30-34	35-39	40-44	45+	∑
1990-1994	1990	1	8	21	25	13	1	0	70
	1991	2	4	23	29	17	1	0	76
	1992	2	6	28	28	12	2	0	78
	1993	0	4	17	21	18	0	0	60
	1994	2	2	20	23	17	2	0	66
	∑	7	24	109	126	77	6	0	350
	% of ∑	.020	.069	.312	.361	.221	.017	--	
	Avg/Yr	1.4	4.8	21.8	25.2	15.4	1.2	0	70.0
1995-1999	1995	0	4	14	30	24	2	0	74
	1996	2	3	13	23	23	4	0	68
	1997	0	5	19	24	18	4	1	71
	1998	2	2	12	24	12	4	0	56
	1999	1	1	10	14	13	3	0	42
	∑	5	15	68	115	90	17	1	311
	% of ∑	.016	.048	.219	.370	.289	.055	.003	
	Avg/Yr	1.0	3.0	13.6	23.0	18.0	3.4	0.2	62.2
2000-2004	2000	0	3	11	25	13	0	0	52
	2001	1	1	11	25	16	1	0	55
	2002	3	1	10	18	17	7	0	56
	2003	0	4	9	31	19	4	0	67
	2004	3	1	10	20	10	4	0	48
	∑	7	10	51	119	75	16	0	278
	% of ∑	.025	.036	.183	.428	.270	.058	--	
	Avg/Yr	1.4	2.0	10.2	23.8	15.0	3.2	0	55.6
05-2008	2005	0	6	12	14	15	4	0	51
	2006	1	4	9	17	13	0	0	44
	2007	1	5	18	17	12	4	0	57
	2008	2	4	7	17	10	1	0	41
	∑	4	19	46	65	50	9	0	193
	% of ∑	.021	.098	.238	.337	.259	.047	--	
	Avg/Yr	1.0	4.8	11.5	16.3	12.5	2.3	0	48.3
	Δ_1	--0.4	-1.8	-8.2	-2.2	+2.6	+2.2	+0.2	-7.8
	Δ_2	+0.4	-1.0	-3.4	+0.8	-3.0	-0.2	-0.2	-6.6
	Δ_3	-0.4	+2.8	+1.3	-7.5	-2.5	-0.9	0	-7.3
	Δ_4	0	-2.0	-11.6	-1.4	-0.4	+2.0	0	-14.4
	Δ_5	-0.4	0	-10.3	-8.9	-2.9	+1.1	0	-21.7
	$\%\Delta_1$	+.005	-.033	-.129	+.067	+.049	+.041	0	
	$\%\Delta_2$	-.004	+.062	+.055	-.091	-.011	-.011	0	
	$\%\Delta_3$	↑ +.001	↑ +.029	↓ -.074	↓ -.024	↑ +.038	↑+.030	0	

* NOTE 1: Source: Allegheny County Health Department; ; NOTE 2: 1 Unknown age in 1990 & 1994; 2 Unknown ages in ∑ 1990-94; NOTE 3: Δ_1=(1990-94 avg)→(1995-99 avg) Δ_2=(1995-99 avg)→(2000-04 avg)
Δ_3=(2000-04 avg)→(2005-08 avg) Δ_4=(1990-94 avg)→(2000-04 avg)
Δ_5=(1990-94 avg)→(2005-08 avg)
$\%\Delta_1$=Δ of % for (1990-94 avg)→(2000-04 avg) $\%\Delta_2$=Δ of % for (2000-04 avg)→(2005-08 avg)
$\%\Delta_3$=Δ of % for (1990-94 avg)→(2005-08 avg)

Table 3

Population Distribution and Change via Two Mechanisms for the Reproductive Female Population in the Overall School District

Age Cohort	Female Population	
	1990	2000
10-14	539	724
15-19	500	583
20-24	340	254
25-29	539	310
30-34	745	528
35-39	757	792
40-44	741	907
45-49	530	804

	1990→2000 Population Distribution Change via "Replacement" by Younger Cohorts	1990→2000 Population Distribution Change via Cohort Aging and Migration[α]
10-14	+185	-285
15-19	+83	-190
20-24	-86	+188
25-29	-229	+162
30-34	-217	+47
35-39	+35	
40-44	+116	
45-49	+63	

	1990→2000 Percentage Change in Population Distribution via "Replacement" by Younger Cohorts	1990→2000 Percentage Distribution Change via Cohort Aging and Migration
10-14	+34%	-53%
15-19	+17%	-38%
20-24	-25%	+55%
25-29	-42%	+30%
30-34	-29%	+6%
35-39	+5%	
40-44	+22%	
45-49	+12%	

[α] For example, the 10-14 age cohort in 1990 due to aging and migration over ten years will become the 20-24 age cohort in 2000.

Table 4

Percentage Change in the Number of Reproductive Females in the Hampton Township School District by Age Cohort: 1990-1994 and 2000-2004

	1990-1994	2000-2004	Δ	Percentage Δ
15-19	500	583	+83	+17%
20-24	340	254	-86	-25%
25-29	539	310	-229	-42%
30-34	745	528	-217	-29%
35-39	757	792	+35	+5%
40-44	741	907	+166	+22%
45-49	530	804	+63	+12%

Table 4A

Summary of Births and Change in Births by Age Cohort 1990-1994 and 2000-2004

	1990-1994	2000-2004	Δ	Percentage of Δ
15-19	22	15	-7	-32%
20-24	60	44	-16	-27%
25-29	332	167	-165	-50%
30-34	428	344	-84	-20%
35-39	209	207	-2	-1%
40-44	18	53	+35	+194%

Table 5

Age-Specific Shifts in Births Relative to Age-Specific Shifts in Number of Reproductive Age Females (NRAF)

	A	B	C
	Shifts in Births (1990-94)-(2000-2004)	Shifts in NRAF (1990→2000)	Δ (A-B)
15-19	-32%	+17%	-15%
20-24	-27%	-25%	+2%
25-29	-50%	-42%	+8%
30-34	-20%	-29%	-9%
35-39	-1%	+5%	+4%
40-44	+194%	+22%	+172%
45-49	+100%*	+12%	+88%

* 0→3; since there is no positive denominator, we set this increase at 100%.

Table 6[β]

SHIFTS IN AGE COHORTS OF FEMALES IN THE UNITED STATES IN PENNSYLVANIA AND IN ALLEGHENY COUNTY: 1990-2007

	United States			**Pennsylvania**			**Allegheny County**		
	1990[α]	**2000**	**2005-07**	**1990**	**2000**	**2005-07**	**1990**	**2000**	**2005-07**
0-4	8962	9365	10006	387926	355356	356661	41156	34721	31907
5-9	8837	10026	9640	383947	403701	361023	39193	38610	33700
10-14	8347	10008	10031	368709	420247	396339	36073	40548	36384
15-19	8651	9829	10443	402320	417294	443614	40160	39916	41755
20-24	9345	9276	10104	432692	373203	398697	47352	37861	39041
25-29	10617	9583	9960	503220	366399	355793	53801	38593	30611
30-34	10986	10189	9717	466320	417281	361571	59283	43097	34678
35-39	10061	11388	10498	418201	482595	423349	54269	49714	41624
40-44	8924	11313	11307	337594	504367	466216	47016	54439	46096

CHANGE BY AGE COHORT ACROSS TIME[β]

	United States		**Pennsylvania**		**Allegheny County**	
	x(1990)-x(2000)	x(2000)-x(2005-07)	x(1990)-x(2000)	x(2000)-x(2005-07)	x(1990)-x(2000)	x(2000)-x(2005-07)
0-4	+403k(+4.5%)	+641k(+6.8%)	-32570(-8.4%)	+1305(+0.4%)	-6435(-15.6%)	-2814(-8.1%)
5-9	+1189k(+13.5%)	-386k(-3.8%)	+19754(+5.1%)	-42678(-10.6%)	-583(-1.5%)	-4910(-12.7%)
10-14	+1661k(+19.9%)	+23k(-0.2%)	+51538(+14.0%)	-23908(-5.7%)	+4475(+12.4%)	-4164(-10.3%)
15-19	+1178k(+13.6%)	+614k(+6.2%)	+14974(+3.7%)	+26320(+6.3%)	-244(-0.6%)	-1839(-4.6%)
20-24	-69k(-0.7%)	+828k(+8.9%)	-59489(-13.7%)	+25494(+6.8%)	-9491(-20.0%)	+1180(+3.1%)
25-29	-1034k(-9.7%)	+377k(+3.9%)	-136821(-27.2%)	-10606(-2.9%)	-15208(-28.3%)	-7982(-20.7%)
30-34	-797k(-7.3%)	-472k(-4.6%)	-49039(-10.5%)	-55710(-13.4%)	-16186(-27.3%)	-8419(-19.5%)
35-39	+1327k(+13.2%)	+890k(+7.8%)	+64394(+15.4%)	-59246(-12.3%)	-4555(-8.4%)	-8090(-16.3%)
40-44	+2389k(+26.8%)	-6k(-0.1%)	+166773(+49.4%)	-38151(7.6%)	+7423(+15.8%)	-8343(-15.3%)

[β] Sources: (1) 1990 and 2000 Data: U.S Census Bureau, Decennial Census; (2) 2005-07 Data: U.S. Census Bureau, American Community Survey.

[α] In thousands e.g., 8,962 is 8962000 or 8.962 million

[β] Cross-Sectionally by Period; in other words, change (Δ) in age group x in 1990 vs. 2000 and 2005 for the same age group x.

CHANGE WITHIN AGE COHORT ACROSS TIME[δ]

	United States		Pennsylvania		Allegheny County	
	1990→2000	2000→2005-07	1990→2000	2000→2005-07	1990→2000	2000→2005-07
	x→x+10[δ]	x→x+5	x→x+10	x→x+5	x→x+10	x→x+5
0-4	+1046K(+11.7%)	+275K(+2.9%)	+32321(+8.3%)	+5667(+1.6%)	-608(-1.5%)	-1021(-2.9%)
5-9	+992K(+11.2%)	+5K(+0.1%)	+33347(+8.9%)	-7362(-1.8%)	+723(+1.8%)	-2226(-5.8%)
10-14	+929K(+11.1%)	+435K(+4.3%)	-4494(-1.2%)	-23367(-5.6%)	+1788(+5.0%)	+1207(+3.0%)
15-19	+932K(+10.8%)	+275K(+2.8%)	-35921(-8.9%)	-18597(-4.5%)	-1567(-3.9%)	-875(-2.2%)
20-24	+844K(+9.0%)	+684(+7.4%)	-15411(-3.6%)	-17410(-4.2%)	-4275(-9.0%)	-7250(19.1%)
25-29	+771K(+7.3%)	+134K(+1.4%)	-20625(-4.1%)	-4828(-1.3%)	-4087(-7.6%)	-3915(-10.1%)
30-34	+327K(+3.0%)	+309K(+3.0%)	-38047(-8.2%)	-6068(-1.5%)	-4844(-8.2%)	-1493(-3.4%)
35-39		-81K(-0.7%)*		-16379(-3.4%)		-3618(-7.3%)
40-44						

δ Longitudinally following an age cohort over time, including net migration; in other words change (Δ) in age cohort x in 1990 vs. age cohort x+10 in 2000 and for age cohort x in 2000 vs. age cohort x+5 in 2005-07. The age cohorts include net migration.

δ For example, A) the female age cohort 0-4 in 1990 (8,962) compared to B) the female age cohort 10-14 in 2000 (1,008) that is, B-A.

* likely estimation error—this number and % of Δ should be positive at the national level.

Table 7

Total Fertility Rate for the United States: 1917-2007[Φ]

1917	3.33	1942	2.63	1967	2.56	1992	2.05
1918	3.31	1943	2.72	1968	2.46	1993	2.02
1919	3.07	1944	2.57	1969	2.46	1994	2.00
1920	3.26	1945	2.49	1970	2.48	1995	1.98
1921	3.33	1946	2.94	1971	2.27	1996	1.98
1922	3.11	1947	3.27	1972	2.01	1997	1.97
1923	3.10	1948	3.11	1973	1.88	1998	2.00
1924	3.12	1949	3.11	1974	1.84	1999	2.01
1925	3.01	1950	3.09	1975	1.77	2000	2.06
1926	2.90	1951	3.27	1976	1.74	2001	2.03
1927	2.82	1952	3.36	1977	1.79	2002	2.01
1928	2.66	1953	3.42	1978	1.76	2003	2.04
1929	2.53	1954	3.54	1979	1.81	2004	2.05
1930	2.53	1955	3.58	1980	1.84	2005	2.05
1931	2.40	1956	3.69	1981	1.81	2006	2.10
1932	2.32	1957	3.77	1982	1.83	2007	2.12
1933	2.17	1958	3.70	1983	1.80		
1934	2.23	1959	3.71	1984	1.81		
1935	2.19	1960	3.65	1985	1.84		
1936	2.15	1961	3.62	1986	1.84		
1937	2.17	1962	3.46	1987	1.87		
1938	2.22	1963	3.32	1988	1.93		
1939	2.17	1964	3.19	1989	2.01		
1940	2.30	1965	2.91	1990	2.08		
1941	2.40	1966	2.72	1991	2.06		

[Φ] Data Sources: (1) 1917-39 "Trends in Fertility in the United States," U.S. Dept. of Health, Education and Welfare, 1977, Table 13, DHEW Pub #78-1906;
(2) 1940-1980 Vital Statistics of the United States, Vol. 1, Natality, 2003. Table 1-7.
(3) 1980-2007 "Births: Final Data for 2007" National Vital Statistics Reports, Vol. 58, No. 24, August 2010, Table 4 (Department of Health and Human Services).

Table 8

Total Fertility Rate for the United States—
White and White (non-Hispanic): 1970-2007

	ALL	White (including Hispanic)	White (non-Hispanic)	Hispanic		ALL	White (including Hispanic)	White (non-Hispanic)	Hispanic
1970	2.5	2.4			1990	2.1	2.0	1.9	3.0
1971	2.3	2.2			1991	2.1	2.0	1.8	3.0
1972	2.0	1.9			1992	2.1	2.0	1.8	3.0
1973	1.9	1.8			1993	2.0	2.0	1.8	2.9
1974	1.8	1.7			1994	2.0	2.0	1.8	2.8
1975	1.7	1.7			1995	2.0	2.0	1.8	2.8
1976	1.7	1.7			1996	2.0	2.0	1.8	2.8
1977	1.8	1.7			1997	2.0	2.0	1.8	2.7
1978	1.7	1.7			1998	2.1	2.0	1.8	2.7
1979	1.8	1.7			1999	2.1	2.1	1.8	2.6
1980	1.8	1.8			2000	2.1	2.1	1.9	2.7
1981	1.8	1.7			2001	2.0	2.0	1.8	2.7
1982	1.8	1.8			2002	2.0	2.0	1.8	2.7
1983	1.8	1.7			2003	2.0	2.1	1.9	2.8
1984	1.8	1.7			2004	2.0	2.1	1.8	2.8
1985	1.8	1.8			2005	2.1	2.1	1.8	2.9
1986	1.8	1.8			2006	2.1	2.1	1.9	3.0
1987	1.9	1.9			2007	2.1		1.9	3.0
1988	1.9	1.9							
1989	2.0	1.9							

Table 9*

Population Age Distribution for Allegheny County: 2000 and 2006-2008

	2000	Birth Years		2006-08ζ	Birth Years	
<5	71,081	1996-2000		64,979		
5-9	79,385	1991-95		68,963		
10-14	82,688	1986-90		72,107		
15-19	81,721	1981-85		85,001		
20-24	75,792	1976-80	Baby Bust	82,051		
25-29	76,718	1971-75	Baby Bust	60,223	1978-82	Baby Bust
30-34	84,559	1966-70		65,280	1973-77	Baby Bust
35-39	96,281	1961-65	End of Baby Boom	81,565	1968-72	
40-44	105,693	1956-60	Peak of Baby Boom	84,544	1963-67	End of Baby Boom
45-49	98,284	1951-55		100,782	1958-62	Peak of Baby Boom
50-54	83,258	1946-50	Start of Baby Boom	98,449	1953-57	
55-59	63,512	1941-45		83,900	1948-52	Start of Baby Boom
60-64	54,278	1936-40	Great Depression	65,086	1943-47	
65-69	53,251	1931-35	Great Depression	50,066	1938-42	
70-74	59,298	1926-30		41,660	1933-37	Depression Cohort
75-79	51,853	1921-25		45,357		
80-84	35,871	1916-20		35,096		
85+	28,143	pre 1916		33,821		
Total	1,281,666			1,218,970		

* Sources: (1) 2000 Data – U.S. Census Bureau, Decennial Census
(2) 2006-2008 Data – U.S. Census Bureau, American Community Survey

ζ Three year average population

Table 10

Overall Net Migration for the Hampton Township School District Using Baseline “Replacement” of Grade 12 Students in Year t-1 by Kindergarten/Additional Grade 1 Students in Year t: 1994-2009

	A		B			C = A+B	D	E	F	F’
	K_t	$G12_{t-1}$	$G1_t$	K_{t-1}	$(G1_t - K_{t-1})$	Δ_1 without migration$^{\varsigma}$	Total Student Population$_t$	Δ_2^{ξ}	Net Migration$^{\lambda}$	
t= 1995-96	197	210	288	226	+62	-13+62=+49	3,120	+125	+76 (+62)	+138
1996-97	178	211	242	197	+45	-33+45=+12	3,143	+23	-11 (+45)	+34
1997-98	200	202	215	178	+37	-2+37=+35	3,164	+21	-14 (+37)	+23
1998-99	190	244	233	200	+33	-54+33=-21	3,183	+19	+40 (+33)	+73
1999-00	193	243	226	190	+36	-50+36=-14	3,207	+24	+38 (+36)	+74
2000-01	199	244	218	193	+25	-45+25=-20	3,262	+55	+75 (+25)	+100
2001-02	201	258	242	199	+43	-57+43=-14	3,238	-24	-10 (+43)	+33
2002-03	185	248	227	201	+26	-63+26=-37	3,229	-9	+28 (+26)	+54
2003-04	172	268	229	185	+44	-96+44=-52	3,219	-10	+42 (+44)	+86
2004-05	179	272	202	172	+30	-93+30=-63	3,159	-60	+3 (+30)	+33
2005-06	154	265	205	179	+26	-111+26=-85	3,120	-39	+46 (+26)	+72
2006-07	158	259	204	154	+50	-101+50=-51	3,123	+3	+54 (+50)	+104
2007-08	150	312	196	158	+38	-162+38=-124	3,085	-38	+86 (+38)	+124
2008-09	166	267	199	150	+49	-101+49=-52	3,087	+2	+54 (+49)	+103
2009-10	166	246	208	166	+42	-80+42=-38	3,109	+22	+60 (+42)	+102
2010-11	134	277	204	166	+38	-143+38=-105	3,119	+10	+115 (+38)	+153
Last 15 years: ∑ 1995-2009						-629 (-8)		-1 (+142)	+628 (+150)	(+326)
Last 10 years: ∑ 2000-2009						-621(-251)		-143 (142)	+478 (+109)	(+278)
Last 5 years: ∑ 2005-2009						-370		-1	+369	(+586)

$^{\varsigma}$ $\Delta_1 = K_t - G12_{t-1} + (G1_t + K_{t-1})$. ie., assuming the counterfactual case of “what if” no one migrated; rather there was only G12 students exiting via graduation and K students entering as well as any additional G1 students entering beyond the prior year’s K enrollment. Thus the “net migration” pertains to year t-1.

$^{\xi}$ Δ_2=Student Population$_t$ – Student Population$_{t-1}$; in 1994 the total student population was 2,995.

$^{\lambda}$ Net migration is $(\Delta_2 - \Delta_1)$ where Δ_2 is the change in actual or observed total students and Δ_1 is the counterfactual “what if” case depicting would happen to the total student population with no migration—in or out. Thus, the difference $(\Delta_2 - \Delta_1)$ is net migration.

Table 10A

"Net Migration" at the Elementary Level: 1994-2009

	A		B			C = A+B	D	E	F	F′
	K_t	$G5_{t-1}$	$G1_t$	K_{t-1}	$(G1_t\text{-}K_{t-1})$	Δ_1 without migration[ς]	Total Student Population_t	Δ_2[ξ]	Net Migration[λ]	
t= 1995-96	197	247	288	226	+62	-50+62=+12	1,473	-39	-51 (+62)	+11
1996-97	178	243	242	197	+45	-65+45=-20	1,460	-13	+7 (+45)	+52
1997-98	200	263	215	178	+37	-63+37=-26	1,416	-44	-18 (+37)	+19
1998-99	190	258	233	200	+33	-68+33=-35	1,412	-4	+31 (+33)	+64
1999-00	193	249	226	190	+36	-56+36=-20	1,407	-5	+15 (+36)	+51
2000-01	199	288	218	193	+25	-89+25=-64	1,372	-35	+29 (+25)	+54
2001-02	201	249	242	199	+43	-48+43=-5	1,371	-1	+4 (+43)	+47
2002-03	185	233	227	201	+26	-48+26=-22	1,368	-3	+19 (+26)	+45
2003-04	172	251	229	185	+44	-79+44=-35	1,349	-19	+16 (+44)	+60
2004-05	179	238	202	172	+30	-59+30=-29	1,326	-23	+6 (+30)	+36
2005-06	154	239	205	179	+26	-85+26=-59	1,283	-43	+16 (+26)	+42
2006-07	158	245	204	154	+50	-87+50=-37	1,279	-4	+33 (+50)	+83
2007-08	150	248	196	158	+38	-98+38=-60	1,249	-30	+30 (+38)	+68
2008-09	166	249	199	150	+49	-83+49=-34	1,242	-7	+27 (+49)	+76
2009-10	166	220	208	166	+42	-54+42=-12	1,252	+10	+22 (+42)	+64
2010-11	134	232	204	166	+38	-98+38=-60	1,232	-20	+40 (+38)	+78
Last 15 years: $\sum$ 1995-2009						-1,080+562=-518 (-165)		-241(-101)	+277 (+562)	+839
Last 10 years: $\sum$ 2000-2009						-739+386=-353 (-150)		-140 (-89)	+213 (+386)	+599
Last 5 years: $\sum$ 2005-2009						-420+217 = - 203		-51	+152 (+217)	+369

[ς] $\Delta_1 = K_t - G5_{t-1} + (G1_t - K_{t-1})$

[ξ] Δ_2=Elementary Student Population_t – Elementary Student Population_{t-1}; in 1994 the total Elementary student population in grades K-G5 was 1,434.

[λ] The basic equation for net migration is (Δ_2-Δ_1); that is, the actual change in elementary student population minus what it would have been without migration, i.e., replacing the G5 population at t-1 who move up to middle school by t with the new entrants at K in t as well as the additional G1 students beyond the prior year's enrollment in K, with all other grades having all students staying and moving up one grade. The difference (Δ_2 - Δ_1) is the net migration that occurred.

Table 10B

"Net Migration" at the Middle School[*] Level: 1994-2009

	$G5_{t-1}$	$G8_{t-1}$	Δ_1 without migration$^{\varsigma}$	Middle School Population_t	Δ_2^{ξ}	Net Migration$^{\lambda}$
t= 1995-96	247	209	+38	741	+56	+18
1996-97	243	235	+8	752	+11	+3
1997-98	263	245	+18	757	+5	-13
1998-99	258	259	-1	749	-8	-7
1999-00	249	248	+1	765	+16	+15
2000-01	288	257	+31	822	+57	+26
2001-02	249	270	-21	793	-29	-8
2002-03	233	251	-18	790	-3	+15
2003-04	251	297	-46	756	-34	+12
2004-05	238	254	-16	729	-27	-11
2005-06	239	229	+10	745	+16	+6
2006-07	245	252	-7	752	+7	+14
2007-08	248	253	-5	771	+19	+24
2008-09	249	250	-1	790	+19	+20
2009-10	220	269	-49	756	-34	+15
2010-11	232	262	-31	765	+9	+39
Last 15 years: ∑ 1995-2009			-126 (+57)		+24 (+81)	+150 (+24)
Last 10 years: ∑ 2000-2009			-183 (-91)		-57 (-77)	+126 (+14)
Last 5 years: ∑ 2005-2009			-92		+20	+112

$^{\varsigma}$ $\Delta_1 = G5_{t-1} - G8_{t-1}$

$^{\xi}$ Δ_2=Middle School Population_t – Middle Student Population_{t-1}; in 1994 the Middle School (G6-G8) Student Population was 685.

$^{\lambda}$ Net migration is Δ_2-Δ_1.

Table 10C

"Net Migration" at the High School* Level: 1994-2009

	$G8_{t-1}$	$G12_{t-1}$	Δ_1 without migration[1ς]	High School $Population_t$	Δ_2^{ξ}	Net Migration$^{\lambda}$
t= 1995-96	209	210	-1	906	+30	+31
1996-97	235	211	+24	931	+25	+1
1997-98	245	202	+43	991	+60	+17
1998-99	259	244	+15	1,022	+31	+16
1999-00	248	243	+5	1,035	+13	+8
2000-01	257	244	+13	1,068	+33	+20
2001-02	270	258	+12	1,074	+6	-6
2002-03	251	248	+3	1,071	-3	-6
2003-04	297	268	+29	1,114	+43	+14
2004-05	254	272	-18	1,104	-10	+8
2005-06	229	265	-36	1,092	-12	+24
2006-07	252	259	-7	1,092	0	+7
2007-08	253	312	-59	1,065	-27	+32
2008-09	250	267	-17	1,055	-10	+7
2009-10	269	246	+23	1,101	+46	+23
2010-11	267	277	-15	1,122	+21	+36
Last 15 years: $\sum$ 1995-2009			+15 (+100)		+216(+162)	+201 (+62)
Last 10 years: $\sum$ 2000-2009			-85 (-10)		+54 (+24)	+139 (+34)
Last 5 years: $\sum$ 2005-2009			-75		+30	+105

ς $\Delta_1 = G8_{t-1} - G12_{t-1}$

ξ Δ_2=High School $Population_t$ – High Student $Population_{t-1}$; in 1994 the High School Student Population in Grades 9-12 was 876.

λ Net migration is Δ_2-Δ_1

Table 11

Summary of "Net Migration" by Year And Level: 1994-2009[δ]

	Elementary School	Middle School	High School	Overall
1994-95	-51	+18	+31	-2
1995-96	+7	+3	+1	+11
1996-97	-18	-13	+17	-14
1997-98	+31	-7	+16	+40
1998-99	+15	+15	+8	+38
1999-2000	+29	+26	+20	+75
2000-01	+4	-8	-6	-10
2001-02	+19	+15	-6	+28
2002-03	+16	+12	+14	+42
2003-04	+6	-11	+8	+3
2004-05	+16	+6	+24	+46
2005-06	+33	+14	+7	+54
2006-07	+30	+24	+32	+86
2007-08	+27	+20	+7	+54
2008-09	+22	+15	+23	+60
2009-10	+40	+39	+36	+115
Last 15 years	+277 (+64)	+150 (+24)	+201 (+62)	+629 (+150)
Last 10 years	+213 (+61)	+126 (+14)	+139 (+34)	+478 (+109)
Last 5 years	+152	+112	+105	+369
Avg/Yr				
1995-2009	18.5 (12.8)	10.0 (4.8)	13.4 (12.4)	41.9 (30.0)
2000-2009	21.3 (12.2)	12.6 (2.8)	13.9 (6.8)	47.8 (21.8)
2005-2009	30.4	22.4	21.0	73.8

[δ] Note No. 1: In this table, the "net migration" is for the year listed. However, in Table 10 and Tables 10A-10C only K_t and $G1_t$ start at t; all other exits and entrants (deduced or observed) pertain to t-1. Therefore, the "net migration" for years specified in Table 10 and 10A-10C pertains to year t-1.

Table 12

Evidence of Net In-Migration of Families with Preschool Children by Municipality and Overall School District

Census Tract	Column A 2000 Census Children < 5 Yrs. Of Age	Column B Births 1995-99	Column C Net In-Migration (Preschoolers) Δ (A-B)	Column D Avg. No. of New Children per Year of Age (0-4)
4141.01	382	355	+27	5.4
4141.02	388	342	+46	9.2
4142	331	311	+20	4.0
TOTAL	1,101	1,008	+93	18.6

Table 13

Hampton Township School District
Retention Ratios 2002-2009[§]
Four Year Averages

	2002-2005	2006-2009
K→G1	1.217	1.261
G1→G2	1.014	1.041
G2→G3	1.028	1.047
G3→G4	1.027	1.014
G4→G5	1.009	1.038
G5→G6	1.036	1.043
G6→G7	.998	1.034
G7→G8	.998	1.022
G8→G9	1.074	1.073
G9→G10	.982	1.016
G10→G11	1.002	.989
G11→G12	.996	1.016
$B_{t-5} \to K_t$[*]	.943	.945
$B_{t-6} \to G1$	1.152	1.190

[§] Data for the retention ratios for 2006-2009 included student populations for 2006-2010—the beginning of school year enrollment (third day); data for the retention ratios for 2002-2005 included student populations for 2002-2006—the beginning of school year enrollment (day three).
[*] Four year averages for (.75 x Birth at t-5) + (.25 x Birth at t-6) and Kindergarten enrollment at t; e.g., the 2006-2009 header for B→K here refers to K in 2007-2010 and births from 2001-2005.

Table 14

Demonstration of the Cumulative Impact of Retention Ratios Over 1.0 and the Comparisons with Students' Entering Classes Graduating from 2013 to 2023

Retention ratios (2006-2009 averages) used in the Hampton analysis (Table 13)—if used cumulatively for entering cohorts of 100 per year:

K → G1	1.261	1.261•100=126 or student/K ratio by Grade 1: 1.26
G1 → G2	1.041	1.041•126=131 or student/K ratio by Grade 2: 1.31
G2 → G3	1.047	1.047•131=137 or student/K ratio by Grade 3: 1.37
G3 → G4	1.014	1.014•137=139 or student/K ratio by Grade 4: 1.39
G4 → G5	1.038	1.038•139=144 or student/K ratio by Grade 5: 1.44
G5 → G6	1.043	1.043•144=150 or student/K ratio by Grade 6: 1.50
G6 → G7	1.034	1.034•150=155 or student/K ratio by Grade 7: 1.55
G7 → G8	1.022	1.022•155=158 or student/K ratio by Grade 8: 1.58
G8 → G9	1.073	1.073•158=170 or student/K ratio by Grade 9: 1.70
G9→G10	1.016	1.016•170=173 or student/K ratio by Grade 10: 1.73
G10→G11	.989	.989•173=171 or student/K ratio by Grade 11: 1.71
G11→G12	1.016	1.016•171=174 or student/K ratio by Grade 12: 1.74

Using the above cumulative ratios by graduating class and current grade yields the following:

		A	**B**		
Grad Class (Year)	# Students in K (Year)	Observed # Students In 2010 (Grade)	Model's "predictions" In 2010	B-A	Cum A-B
2023	132	132 (K)	132	0	0
2022	166	204 (G1)	166x1.261=209	+5	+5
2021	166	222 (G2)	166x1.31=217	-5	0
2020	150	201 (G3)	150x1.37=206	+5	+5
2019	158	224 (G4)	158x1.39=220	-4	+1
2018	154	247 (G5)	154x1.44=222	+25	-24
-2017	179	248 (G6)	179x1.50=269	+21	-3
2016	172	239 (G7)	172x1.55=267	+28	+25
2015	185	278 (G8)	185x1.58=292	+17	+39
2014	201	288 (G9)	201x1.70=342	+54	+93
2013	199	293 (G10)	199x1.71=332	+39	+132

Table 15

Total Student Enrollment in the Hampton Township School District
by Year and Level: 1994-2010

School Yr.	Elementary	Middle	High School	Total	Δ
1994	1,434	685	876	2,995	
1995	1,473	741	906	3,120	+125
1996	1,460	752	931	3,143	+23
1997	1,416	757	991	3,164	+21
1998	1,412	749	1,022	3,183	+19
1999	1,407	765	1,035	3,207	+24
2000	1,372	822	1,068	3,262	+55
2001	1,371	793	1,074	3,238	-24
2002	1,368	790	1,071	3,229	-9
2003	1,349	756	1,114	3,219	-10
2004	1,326	729	1,104	3,159	-60
2005	1,283	745	1,092	3,120	-39
2006	1,279	752	1,092	3,123	+3
2007	1,249	771	1,065	3,085	-38
2008	1,242	790	1,055	3,087	+2
2009	1,252	756	1,101	3,109	+22
2010	1,232	766	1,121	3,119	+10
Δ 1994-2000	-62	+137	+192	+267	
Δ 1995-2000	-101	+81	+162	+142	
Δ 2000-2005	-89	-77	+24	-142	
Δ 2005-2010	-51	+21	+29	-1	
Δ 2000-2010	-140	-56	+53	-143	

Table 16

School Enrollment Change Including Both Net Migration and Replacement of Senior by Kindergarten Students

		A	**B**	**A+B**
Year	Enrollment	Net Migration	Δ K_t - $G12_{t-1}$+$(G_t$-$K_{t-1})$	Enrollment Δ $t \to t+1$
t=2000-01	3,262	-10	-14	-24
2001-02	3,238	+28	-37	-9
2002-03	3,229	+42	-52	-10
2003-04	3,219	+3	-63	-60
2004-05	3,159	+46	-85	-39
2005-06	3,120	+54	-51	+3
2006-07	3,123	+86	-124	-38
2007-08	3,085	+54	-52	+2
2008-09	3,087	+60	-38	+22
2009-10	3,109	+115	-105	+10
2010-11	3,119			
$\sum$ 2000-2004		+109	-251	-142
$\sum$ 2005-2009		+369	-370	-1
$\sum$ 2000-2009		+478	-621	-143
Δ 2000-2009		+.1465	-.1903	-.0438

Table 17

Overall Alternative Schooling by Type of Alternative and Year: 2001-2010

Year	Cyber/Charter (A)	Home School (B)	A+B	Special Needs	Private/Parochial	∑
2001-02	1	26	27	15	458	500
2002-03	5	22	27	16	460	503
2003-04	12	22	34	14	469	517
2004-05	18	21	39	24	486	549
2005-06	20	14	34	17	496	547
2006-07	15	20	35	25	495	555
2007-08	21	18	39	18	447	504
2008-09	27	17	44	16	410	470
2009-10	20	14	34	13	403	450
2010-11	22	14	36	15	361	412

Table 18

New Housing – Hampton Township: 2000-2010

Year	No. of Housing Permits	
2000	46	
2001	60	
2002	50	
2003	38	
2004	82	
2005	98	
2006	66	
2007	53	
2008	47	
2009	17	
2010[1]	14	
	Total	**Avg./Yr.**
∑ 2000-2003	198	49.5
∑ 2004-2006	246	82.0
∑ 2007-2008	100	50.0
∑ 2009-2010	31	16.0-18.0
∑ 2000-2010	575	52.3

[1] Through October

Table 19

Housing Plans with Construction in 2000-2010

	No. of Units	No. Built	No. Left
I. Housing Plans Built Out			
1. Adam Ridge Estates	5	5	0
2. Apple Ridge	55	55	0
3. "Latache Court"	11	11	0
4. McAlester Farms	11	11	0
5. Oakhurst	25[1]	25	0
6. Twelve Oaks	117[2]	117	0
7. Willow Run	12	12	0
$\sum$	236	236	0
II. Housing Plans Near Completion			
1. "Chase Drive"	6	4	2
2. Glades II	49	43	6
3. Shadowrock	16	12	4
$\sum$	71	59	12
III. Housing Plans On-Going & Not Near Completion			
1. "Canyon Creek Trail"	31	13	18
2. "Carriage House Drive"	14	7	7
3. "McCaslin Ridge"	12	5	7
4. The Estates at the Villa	66	48	18
5. The Meadows at Hampton	64	20	44
6. "Whispering Creek"	24	10	14
$\sum$	211	103	108
IV. Total	518	398	120

[1] 25 built in 2000-2008, 74 lots in Planning; No. Left—not know, but over 70% complete.

[2] 49 SFDs, 68 Quad Units, Total 117

Table 20

Hampton Township School District Forecasts per Grade: 2011-2020 Fertility/Aging/Embedded Growth Scenario with Current Retention and Birth to Kindergarten Ratios and Current Fertility Levels [Scenario I]*

	K	G1	G2	G3	G4	G5	Total K→G5	G6	G7	G8	Total G6→G8	G9	G10	G11	G12	Total G9 → G12	Total K → G12
2010	134	204	221	202	224	247	1,232	248	239	279	766	288	293	260	280	1,121	3,119
2011	154	169	212	231	205	233	1,204	258	256	244	758	299	293	290	264	1,146	3,108
2012	149	194	176	222	234	213	1,188	243	267	262	772	262	304	290	295	1,151	3,111
2013	144	188	202	184	225	243	1,186	222	251	273	746	281	266	301	295	1,143	3,075
2014	126	182	196	211	187	234	1,136	253	230	257	740	293	285	263	306	1,147	3,023
2015	141	159	189	205	214	194	1,102	244	262	235	741	276	298	282	267	1,123	2,966
2016	141	178	166	198	208	222	1,113	202	252	268	722	252	280	295	287	1,114	2,949
2017	141	178	185	174	201	216	1,095	232	209	258	699	288	256	277	300	1,121	2,915
2018	141	178	185	194	176	209	1,083	225	240	214	679	277	293	253	281	1,104	2,866
2019	141	178	185	194	197	183	1,078	218	233	245	696	230	281	290	257	1,058	2,832
2020	141	178	185	194	197	204	1,099	191	225	238	654	263	234	278	295	1,070	2,823

	2010	2015	2020	∆2015-2010	∆2020-2015	∆2020-2010
K→G5	1232	1102	1099	-130	-3	-133
G6→G8	766	741	654	-25	-87	-112
G9→G12	1121	1123	1070	+2	-53	-51
Total	3119	2966	2823	-153	-143	-296

* This scenario uses the following parameters: (1) Baseline four-year retention ratios (2006-2009), as shown in Table 13; (2) Birth at t-5 to K enrollment ratio of .945; this is derived as follows: (a) a baseline .75 (t-5 Births) + .25 (t-6 Births) for births in years 2001-2005 and 2007-2010 K enrollments. For years 2011-2014, observed births in 2006-2009 in the Hampton Township School District were used. For years 2015-2020, the average number of births for 2005-2009 was used (149); see Table 1.

Table 21

Hampton Township School District Forecasts per Grade: 2011-2020 Fertility/Aging/Embedded Growth Scenario with Current Retention and Birth to Kindergarten Ratios and Higher Fertility Levels [Scenario II]*

	K	G1	G2	G3	G4	G5	Total K→G5	G6	G7	G8	Total G6→G8	G9	G10	G11	G12	Total G9 → G12	Total K → G12
2010	134	204	221	202	224	247	1,232	248	239	279	766	288	293	260	280	1,121	3,119
2011	154	169	212	231	205	233	1,204	258	256	244	758	299	293	290	264	1,146	3,108
2012	149	194	176	222	234	213	1,188	243	267	262	772	262	304	290	295	1,151	3,111
2013	144	188	202	184	225	243	1,186	222	251	273	746	281	266	301	295	1,143	3,075
2014	126	182	196	211	187	234	1,136	253	230	257	740	293	285	263	306	1,147	3,023
2015	157	159	189	205	214	194	1,118	244	262	235	741	276	298	282	267	1,123	2,982
2016	157	198	166	198	208	222	1,149	202	252	268	722	252	280	295	287	1,114	2,985
2017	157	198	206	174	201	216	1,152	232	209	258	699	288	256	277	300	1,121	2,972
2018	157	198	206	216	176	209	1,162	225	240	214	679	277	293	253	281	1,104	2,945
2019	157	198	206	216	219	183	1,179	218	233	245	696	230	281	290	257	1,058	2,933
2020	157	198	206	216	219	227	1,223	191	225	238	654	263	234	278	295	1,070	2,947

	2010	2015	2020	∆2015-2010	∆2020-2015	∆2020-2010
K→G5	1232	1118	1223	-114	+105	-9
G6→G8	766	741	654	-25	-87	-112
G9→G12	1121	1123	1070	+2	-53	-51
Total	3119	2982	2947	-137	-35	-172

* This scenario uses the following parameters: (1) Baseline four-year retention ratios (2006-2009), as shown in Table 13; (2) Birth at t-5 to K enrollment ratio of .945; this is derived as follows: (a) a baseline .75 (t-5 Births) + .25 (t-6 Births) for births in years 2001-2005 and 2007-2010 K enrollments. For years 2011-2014, observed births in 2006-2009 in the Hampton Township School District were used. For years 2015-2020, a return to the 2000-04 level was used (166); see Table 1.

Table 22

Hampton Township School District Forecasts per Grade: 2011-2020 Fertility/Aging/Embedded Growth Scenario with Current Retention and Birth to Kindergarten Ratios and More Modest Higher Fertility Levels [Scenario III]*

	K	G1	G2	G3	G4	G5	Total K→G5	G6	G7	G8	Total G6→G8	G9	G10	G11	G12	Total G9 → G12	Total K → G12
2010	134	204	221	202	224	247	1,232	248	239	279	766	288	293	260	280	1,121	3,119
2011	154	169	212	231	205	233	1,204	258	256	244	758	299	293	290	264	1,146	3,108
2012	149	194	176	222	234	213	1,188	243	267	262	772	262	304	290	295	1,151	3,111
2013	144	188	202	184	225	243	1,186	222	251	273	746	281	266	301	295	1,143	3,075
2014	126	182	196	211	187	234	1,136	253	230	257	740	293	285	263	306	1,147	3,023
2015	149	159	189	205	214	194	1,110	244	262	235	741	276	298	282	267	1,123	2,974
2016	149	188	166	198	208	222	1,131	202	252	268	722	252	280	295	287	1,114	2,967
2017	149	188	196	174	201	216	1,124	232	209	258	699	288	256	277	300	1,121	2,944
2018	149	188	196	205	176	209	1,123	225	240	214	679	277	293	253	281	1,104	2,906
2019	149	188	196	205	208	183	1,129	218	233	245	696	230	281	290	257	1,058	2,883
2020	149	188	196	205	208	216	1,162	191	225	238	654	263	234	278	295	1,070	2,886

	2010	2015	2020	∆2015-2010	∆2020-2015	∆2020-2010
K→G5	1232	1110	1162	-122	+52	-70
G6→G8	766	741	654	-25	-87	-112
G9→G12	1121	1123	1070	+2	-53	-51
Total	3119	2974	2886	-145	-88	-233

* This scenario uses the following parameters: (1) Baseline four-year retention ratios (2006-2009), as shown in Table 13; (2) Birth at t-5 to K enrollment ratio of .945; this is derived as follows: (a) a baseline .75 (t-5 Births) + .25 (t-6 Births) for births in years 2001-2005 and 2007-2010 K enrollments. For years 2011-2014, observed births in 2006-2009 in the Hampton Township School District were used. For years 2015-2020, the average number of births are assumed to return ½ way to the 2000-04 level (158); see Table 1.

Table 23A

Central Elementary School
Forecasts per Grade: 2011-2020
Fertility/Aging/ Growth Scenario
[Scenario IVa]*

	K	G1	G2	*K→G2*	G3	G4	G5	*G3→G5*	*Total K→G5*
2010	61	95	88	***244***	70	91	105	***264***	***508***
2011	70	77	99	***246***	92	71	94	***257***	***503***
2012	70	88	80	***238***	104	93	74	***271***	***509***
2013	66	88	92	***246***	84	105	97	***286***	***532***
2014	58	83	92	***233***	96	85	109	***290***	***523***
2015	70	73	86	***229***	96	97	88	***281***	***510***
2016	70	88	76	***234***	90	97	101	***288***	***522***
2017	70	88	92	***250***	80	91	101	***272***	***522***
2018	70	88	92	***250***	96	81	94	***271***	***521***
2019	70	88	92	***250***	96	97	84	***277***	***527***
2020	70	88	92	***250***	96	97	101	***294***	***544***

	Δ2015-2010	**Δ2020-2015**	**Δ2020-2010**	**ΔPeak**	**Peak Size**
K→G2	-15	+21	+6	+6	250
G3→G5	+17	+13	+30	+30	294
Overall	+2	+34	+36	+36	544

* This scenario uses the following parameters: (1) Baseline four-year retention ratios (2006-2009), as shown in Table 13; (2) Birth at t-5 to K enrollment ratio of .945. For years 2011-2013, the observed births from 2005-2008 in Census Tracts 4141.01, 4141.02 and 4142 were used, with a percent share allocated from each as follows: .5 (4141.01), .4 (4141.02) and .5 (4142). For 2014, the overall average percentage allocation in years 2011-2013 per school was used. (It was .460, .268 and .272 for Central, Poff and Wyland, respectively.) For 2015-2020 the overall average number of births was the same as for K in 2012. Thus, we used the 2012 allocation—the same as in 2011-2013.

Table 23B

Poff Elementary School
Forecasts per Grade: 2011-2020
Fertility/Aging/ Growth Scenario
[Scenario IVb]*

	K	G1	G2	*K→G2*	G3	G4	G5	*G3→G5*	*Total K→G5*
2010	34	50	52	***136***	56	66	64	***186***	***322***
2011	42	43	52	***137***	54	57	69	***180***	***317***
2012	38	53	45	***136***	55	55	59	***168***	***304***
2013	40	48	55	***143***	47	55	57	***159***	***302***
2014	34	50	50	***134***	58	48	57	***163***	***297***
2015	38	43	52	***129***	52	59	50	***161***	***290***
2016	38	48	45	***131***	54	53	61	***168***	***299***
2017	38	48	50	***136***	47	55	55	***157***	***293***
2018	38	48	50	***136***	52	48	57	***157***	***293***
2019	38	48	50	***136***	52	53	50	***155***	***291***
2020	38	48	50	***136***	52	53	55	***160***	***296***

	Δ2054-2010	**Δ2020-2015**	**Δ2020-2010**	**ΔPeak**	**Peak Size**
K→G2	-7	+7	0	-7	143
G3→G5	-25	-1	-26	-26	186
Overall	-32	+6	-26	-26	322

* This scenario uses the following parameters: (1) Baseline four-year retention ratios (2006-2009), as shown in Table 13; (2) Birth at t-5 to K enrollment ratio of .945. For years 2011-2013, the observed births from 2005-2008 in Census Tracts 4141.01, 4141.02 and 4142 were used, with a percent share allocated from each as follows: .5 (4141.01), .3 (4141.02) and 0 (4142). For 2014, the overall average percentage allocation in years 2011-2013 per school was used. (It was .460, .268 and .272 for Central, Poff and Wyland, respectively.) For 2015-2020 the overall average number of births was the same as for K in 2012. Thus, we used the 2012 allocation—the same as in 2011-2013.

Table 23C

Wyland Elementary School
Forecasts per Grade: 2011-2020
Fertility/Aging/ Growth Scenario
[Scenario IVa]*

	K	G1	G2	*K→G2*	G3	G4	G5	*G3→G5*	*Total K→G5*
2010	39	59	81	***179***	76	67	80	***223***	***402***
2011	42	49	61	***152***	85	77	70	***232***	***384***
2012	42	53	51	***146***	64	86	80	***230***	***376***
2013	38	53	55	***146***	53	65	89	***207***	***353***
2014	35	48	55	***138***	58	54	67	***179***	***317***
2015	42	44	50	***136***	58	59	56	***173***	***309***
2016	42	53	46	***141***	52	59	61	***172***	***313***
2017	42	53	55	***150***	48	53	61	***162***	***312***
2018	42	53	55	***150***	58	49	55	***162***	***312***
2019	42	53	55	***150***	58	59	51	***168***	***318***
2020	42	53	55	***150***	58	59	61	***178***	***328***

	Δ2015-2010	**Δ2020-2015**	**Δ2020-2010**	**ΔPeak**	**Peak Size**
K→G2	-43	+14	-29	-29	179
G3→G5	-50	+5	-45	-70	232
Overall	-93	+19	-74	-93	402

* This scenario uses the following parameters: (1) Baseline four-year retention ratios (2006-2009), as shown in Table 13; (2) Birth at t-5 to K enrollment ratio of .945. For years 2011-2013, the observed births from 2005-2008 in Census Tracts 4141.01, 4141.02 and 4142 were used, with a percent share allocated from each as follows: 0 (4141.01), .3 (4141.02) and .5 (4142). For 2014, the overall average percentage allocation in years 2011-2013 per school was used. (It was .460, .268 and .272 for Central, Poff and Wyland, respectively.) For 2015-2020 the overall average number of births was the same as for K in 2012. Thus, we used the 2012 allocation—the same as in 2011-2013.