

Quakertown Community School District
Feasibility Study



Draft



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Quakertown Community School District Feasibility Study

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Acknowledgements and Authors' Credentials

Quakertown Community School District Feasibility Study

I · Introduction

Executive Summary

This study is intended to assist the Quakertown (PA) Community School District in developing a strategy for addressing its physical facilities needs over the next decade. Ultimately, the goal is to produce a phased plan that will allow the District to immediately address short-term needs while preparing to meet longer-term needs in a way that allows some flexibility as student enrollments, economic conditions, and educational programs change over time.

The study is based upon the format guidelines of the Pennsylvania Department of Education (PDE). Following is a summary of its major topics and findings:

1. **Population, enrollment projections and school capacity.** The District has experienced substantial population growth in recent decades, and that trend is expected to continue. Enrollment growth in the District's schools is expected to equal or even exceed population growth, increasing by perhaps twenty percent, from the present level of about 5,500 pupils to as many as 6,600 by 2015.

New educational programs could have an impact on the District's facilities in coming years. However, at this time no such programs have been identified for inclusion in this study. On the other hand, the report notes that some of the district's older schools do not have spaces such as art or music rooms that are found in newer facilities.

No schools are currently overcrowded. The impact of continued growth is expected primarily at the elementary and high school levels. At the elementary level, growth could exceed capacity by two to four hundred pupils, necessitating the construction of one or more additions to existing buildings. At the high school level, growth could exceed capacity by one to two hundred pupils. This could be dealt with in an addition/renovation project, which could also address other spatial and facilities issues at the high school. Cost estimates for addressing these issues are included.

No capacity-related issues were identified at the middle school level or at the Freshman Center.

Related sections of the report deal with the District Administration offices, currently in the high school, and currently overcrowded. By relocating these offices to the building recently purchased by the District, spatial issues for both administration and high school can be addressed.

The study also looks beyond the next decade, and notes that the District owns no land suitable for construction of new schools in the future. This is a potential concern that requires further consideration by the administration and the school board.

2. **Condition of existing facilities.** The physical condition of the District's eleven schools varies from fair and in need of significant improvement work to virtually new. The study examines all of the building components of each building (structure, roof, finishes, heating/ventilating/air conditioning, electrical, mechanical, etc.) and identifies major needs.

Also addressed are related physical condition concerns such as accessibility for individuals with disabilities, environmental issues (asbestos, underground tanks, etc.), building code compliance, etc.

The study identifies areas of concern in many of the District's facilities, including evidence of roof leaks, mold or exterior problems that require attention to prevent further deterioration. In a number of cases, these can be dealt with as maintenance items rather than through a capital spending project. No emergency or major safety concerns were found.

With respect to the environment, the study reviews a number of strategies the District may choose to pursue in order to develop more responsible new buildings, and to maintain or improve its current facilities in an environmentally appropriate and/or energy efficient manner.

3. **Cost Estimates.** The study includes cost estimates for addressing all major long-term needs of the District. Separate figures are developed for dealing with enrollment growth, adding needed space to existing schools, repairing or upgrading existing building systems, and air conditioning existing buildings that are currently without air conditioning.
4. **Options and Priorities.** In this first draft of the study, the various cost estimates are not prioritized, but are intended to provide a framework within which the District's priorities can be established. Later drafts of the Feasibility Study will include recommendations, options and priorities.

[Note: It should be mentioned that there are a number of significant, related issues that are outside the scope of this study. In particular, staffing, phasing and transportation needs associated with new buildings or additions are not addressed here, and neither are the potential consequences of major inflation or other unforeseen societal changes. Nevertheless, this study should provide a useful context within which the District can chart a course for the coming years, and a blueprint for the inevitable adjustments that should be made periodically.]

Overview of the District

The Quakertown Community School District consists of six municipalities in the northwestern corner of Bucks County, PA: Haycock, Milford and Richland Townships, and Quakertown, Richlandtown and Trumbauersville Boroughs.

The district comprises 71.4 square miles, with a population in 2000 of 32,194. The boroughs, which contain most of the older housing stock and about one-third of the population, offer limited room for new housing growth. The townships, the terrain of which consists primarily of low hills and plateaus, contain the vast majority of the land area and two-thirds of the population. With a potentially expanding infrastructure of water and sewage treatment systems, there are few impediments to significant future growth in these municipalities. However, this expansion is currently delayed in Richland Township, which is under a sewer moratorium, banning connections to the municipal sewage treatment plant.

The area has grown considerably in recent decades. As a whole, Bucks County's population has doubled in the past 45 years, from just over 300,000 to over 600,000. The regional location of the District suggests that further growth is likely, as the trend from urban to suburban development continues. The District is 40 miles from Philadelphia, less than 20 miles from the Lehigh Valley, and less than 100 miles from New York City. It contains a major north-south highway (a Pennsylvania Turnpike exit) that provides direct access to the job centers of the Philadelphia and Lehigh Valley regions. East-west travel is less direct, but there are nevertheless regional commuting opportunities in both directions. The District itself contains limited, but growing, industrial and business development.

Overall, the District's location, terrain, infrastructure, and economic profile all suggest that significant population growth is likely. In fact, the Delaware Valley Regional Planning Commission projects a population increase of greater than twenty five percent between 2000 and 2015. As will be discussed, this is expected to have a major impact on the District's public schools.

II · Enrollment Growth

Population Projections

Table 1 shows projected long-term population growth in the District of 26% between 2000 and 2015. Such projections are notoriously unreliable: population growth is subject to too many factors that can change over time. Inflation, the local real estate and job market, the public perception of educational quality among local school districts: all of these can have a significant impact on population trends, and none can generally be forecast with accuracy a decade or even a half-decade in advance.

Nevertheless, a continuation of recent growth patterns in the District seems quite likely. Land suitable for development remains available (at prices commensurate with other school districts in the region), and the decades-long population shift in the northeast from urban to suburban shows no signs of diminishing. Consequently, although the District may expect some fluctuation from the Delaware Valley Regional Planning Commission's estimate, it should be considered a reasonable indicator of the trend towards considerable increased population growth in the coming decade.

Table 1
Municipal Population Forecasts*
2000-2015

Municipality	2000 US Census	2015	Projected Growth 2000-2015
Haycock Twp.	2,191	2,770	26%
Milford Twp.	8,810	11,630	32%
Richland Twp.	9,920	14,420	45% **
Quakertown Boro.	8,931	9,110	2%
Richlandtown Boro.	1,283	1,350	5%
Trumbauer Boro.	1,059	1,130	7%
Totals:	32,194	40,410	26%

* Sources: 2000 U.S. Census; Delaware Valley Regional Planning Commission

** See notes, next page, regarding Richland Township sewer moratorium

In evaluating these population projections, it should be kept in mind that they do not necessarily translate directly into school enrollment projections. There are several factors at work in this regard:

- For the past year or so, there has been a sewer moratorium in Richland Township, imposed as the sewage treatment plant (in Quakertown) reached its limit for accepting sewage from the township. (Richlandtown Borough is similarly affected, but projected growth in this municipality is negligible in any event. This moratorium does *not* affect Quakertown Borough, which uses the same treatment plant.) Most major development in the township is at a standstill: in fact, issuance of dwelling unit building permits declined from an average of 450 per year in 2003 and 2004 to 285 in 2005 to only 14 through May 2006. The township is currently preparing a plan to address this issue, but estimates of when construction might resume range from two to five years. Over the next decade, growth in Richland may yet reach projected levels; in the meantime, growth in surrounding municipalities (particularly Milford Township) may increase. At this point, however, short-term growth in Richland will quite likely be limited.
- Most boroughs have relatively stable, aging-in-place populations. The smaller houses generally have fewer children, and longer-term occupants. When the last children in a family finish public school, they are less likely to be replaced as quickly by another family with school-age children.
- Town house developments have fewer children than single family detached developments. Some of the growth in the District is, of course, in townhouse-type units. This generally means that the growth in school enrollment will be *less* than overall population growth (assuming birth rates stay constant).
- Birth rates are often a more important factor than new development as predictors of enrollment. A rapidly increasing or decreasing birth rate will have a major impact. Birth rate changes are generally caused by economic conditions related to many more regional and national factors than local ones. At this point, no significant changes in birth rates are forecast.
- Overall, the most important indicator of enrollment trends in the next decade is not population growth, it is the current school enrollment, and the historic fluctuation in enrollment from one grade to another (“retention rate”). This is looked at more closely in the next section of this report.

Enrollment Projections

Enrollments in the Quakertown Community School District have grown consistently in recent years. Table 2 shows total enrollment in 5-year increments, beginning in 1990-91.

Table 2
Quakertown Community School District
Enrollments: 1990-91 to 2005-06

Academic Year	Enrollment	5-year Change (%)
1990-91	4,374	...
1995-96	4,845	+ 10.8%
2000-01	5,223	+ 7.8%
2005-06	5,460	+ 4.5%

It is interesting to note that the overall change in District enrollment over the past 15 years, from 4,374 to 5,460 pupils, has been about 25%, almost exactly the population change forecast for the District for the 15 years from 2000 to 2015 (Table 1). This certainly suggests that the past pattern of growth is likely to continue, although, from a pupil enrollment standpoint, it appears to be slowing down.

With regard to future enrollments, the most commonly used source for school district enrollment projections are those published annually by the Pennsylvania Department of Education (PDE). As noted, PDE relies heavily on the historic fluctuation in enrollment from one grade to another (“retention rate”), and recent regional birth rates. In general, PDE’s projections range from quite accurate to somewhat low over a period of years.

For example, in 1999, PDE projected that the total Quakertown enrollment for 2005-06 would be 5,181 pupils. The actual enrollment was 5,460 pupils, about five percent greater than the projections. Table 3 shows the most recent PDE projections for the District (published in October 2005, using actual enrollments through 2004-05).

- * Note: Comparing school district growth with construction permits issue over a period of time establishes a definite pattern. For example, between 1990 and 1994, dwelling unit building permits in the District averaged 150 per year, while enrollment increased by 10.8%. Over the next five years, 1995-2000, permits averaged about 190 per year, a 26% annual increase, while the rate of enrollment growth slowed to 7.8%. Over the five years from 2000-2004, permits grew to 375 per year, an increase of almost 100%, while the rate of enrollment growth

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Table 3

Revised: 09/2005 (2004 Enrollments)		Enrollment Projections														
Prepared by the Pennsylvania Department of Education																
(717) 787-2644																
Quakertown Community SD														1-22-09-840-3		
YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	Total		
2000-2001	370	378	393	346	411	401	436	382	426	478	439	356	407	5223		
2001-2002	331	396	386	400	365	427	405	438	383	460	442	377	377	5187		
2002-2003	355	369	406	386	405	384	436	399	449	426	458	379	378	5229		
2003-2004	329	391	384	416	393	403	408	439	399	495	418	404	391	5270		
2004-2005	407	377	407	379	428	390	424	406	451	445	494	372	400	5379		
P R O J E C T I O N S																
2005-2006	337	395	392	410	390	436	404	423	412	497	434	431	380	5341		
2006-2007	348	368	411	395	422	398	452	403	429	454	485	378	440	5383		
2007-2008	379	380	383	414	406	430	412	451	409	473	443	423	386	5389		
2008-2009	425	414	396	386	426	414	446	411	457	451	461	386	432	5505		
2009-2010	433	464	431	399	397	434	429	445	417	504	440	402	394	5589		
2010-2011	442	473	483	434	410	405	450	428	451	460	491	384	410	5721		
2011-2012	450	482	492	487	446	418	420	449	434	497	448	428	392	5843		
2012-2013	459	492	502	496	501	455	433	419	455	478	485	391	437	6003		
2013-2014	468	501	512	506	510	511	472	432	425	502	466	423	399	6127		
2014-2015	477	511	522	516	520	520	530	471	438	469	489	406	432	6301		
Various Grade Groupings of the Enrollment Projections																
YEAR	K-4	K-5	K-6	K-7	K-8	K-9	K-12	5-8	6-8	7-8	6-9	7-9	7-12	8-12	9-12	10-12
2004-2005	1998	2388	2812	3218	3669	4114	5380	1671	1281	857	1726	1302	2568	2162	1711	1266
2009-2010	2124	2558	2987	3432	3849	4353	5589	1725	1291	862	1795	1366	2602	2157	1740	1236
2014-2015	2546	3066	3596	4067	4505	4974	6301	1959	1439	909	1908	1378	2705	2234	1796	1327
2004-2005 to 2014-2015																
Change	548	678	784	849	836	860	921	288	158	52	182	76	137	72	85	61
Percent	27.4	28.4	27.9	26.4	22.8	20.9	17.1	17.2	12.3	6.1	10.5	5.8	5.3	3.3	5.0	4.8
Notes:	<ol style="list-style-type: none"> 1. Excludes students in full-time out-of-district special education, comprehensive AVTSs, charter schools, state-owned schools, consortium-operated alternative high schools, and juvenile correctional institutions. 2. Enrollment projections beyond five years are subject to errors in the lower grades resulting from inconsistencies between actual and projected live births and should be reviewed closely. 3. Four year old kindergarten students, if any, added to K enrollments. 4. Elementary and secondary ungraded students were distributed among the grades. Therefore, enrollments by grade may differ from those reported by the local education agencies. 															
Sources:	<ol style="list-style-type: none"> 1. Public School Enrollment Report (ESPE) 2. Resident Live Birth file, 2003, supplied the Division of Health Statistics, Pennsylvania Department of Health. The Department of Health specifically disclaims responsibility for any analyses, interpretations or conclusions. 															

In January 2006, the district received its own demographic forecast, prepared by *Envision Analytics, LLC (EAL)*. The methodology and details of that study will not be reviewed here, but its conclusions are of interest. The study's projections were only made through 2010-11 (vs. PDE's 2014-15 projections), and showed a range, depending upon the assumptions used, for minimum, average and maximum growth.

Table 4 compares PDE's 2010-11 projections with EAL's. Looking at PDE's versus EAL's "average" projection, there is a difference of only 20 pupils. For all practical purposes, the figures are the same, with PDE projecting somewhat more students at the elementary level, EAL at the high school level.

Table 4
2010-11 Enrollment Projections
PDE* vs. Environmental Analytics, LLC**

Grades	PDE	EAL Minimum	EAL Average	EAL Maximum
k-5	2,645	2,375	2,465	2,540
6-8	1,330	1,325	1,370	1,415
9	460	435	450	470
10-12	1,285	1,365	1,415	1,460
Totals:	5,720	5,500	5,700	5,885

* PDE Revised 09/2005 (based on 2004-05 enrollments). Figures rounded to nearest five pupils.

** EAL *Demographic Analysis and Student Enrollment Forecast for the Quakertown Community School District*, January 19, 2006, pp. 65-68. Figures rounded to nearest five pupils.

In analyzing these projections, a few additional comments should be kept in mind:

- Although the District's average kindergarten enrollment for the five years beginning in 2000 was 358 pupils, PDE projected a decline in 2005-06 to 337 pupils. Actual 2005-06 kindergarten enrollment was 381 (not including Special Ed). Consequently, PDE's total enrollment projection for the year is low (5,341 projected vs. 5,460 actual), with much of the difference coming in kindergarten.
- After 2005-06, PDE shows kindergarten enrollments increasing at a reasonable, or even somewhat high rate of more than 40% in the years from 2005 to 2014 (from 337 to 477 pupils).

- PDE’s total enrollment projection increase in the ten years from 2005 to 2014 is about 18% (from 5,341 to 6,301 pupils). This is consistent with the projected District-wide 26% fifteen-year increase in population forecast for 2000 to 2015 by the planning commission, and the actual 25% fifteen-year increase in enrollment experienced by the District between 1990 and 2005, as discussed above.
- Taking into account all of the above, it seems appropriate to accept PDE’s general enrollment projections, provided that they are adjusted to account for the discrepancy in current 2005-06 enrollments. This comes to an increase of about sixty additional pupils in the entire District for any given year.
- EAL’s “maximum” growth projections are about 3% greater than its average growth projections. In developing its long-range plans, the district should certainly be considering the possibility of this kind of additional growth, and this study will do so.

It should also be kept in mind that fluctuations in grade size are less significant than the maximum total projected enrollment for the District, averaged out over 13 grade levels (k-12). The following figures are therefore proposed as the basis for maximum enrollment projections over the next ten years:

PDE Enrollment Projection 2014-15:	6,301
Adjustment for 2005-06 enrollment:	<u>+ 60</u>
Total projected enrollment, 2014-15:	6,361
Approximate average projected grade size, k-12:	490

The approximate average projected grade size of 490 pupils compares to 420 pupils/grade in 2005-06 (4,460 pupils total), a projected increase of about 17 percent in the next decade.

For purposes of developing a building program, it is prudent to anticipate some fluctuation in ten-year growth. For planning purposes, an average grade size of 470 to 510 (total enrollment between 6,110 and 6,630 pupils) should be anticipated by 2014-15. Ideally, short-term building programs will be based on the lower figure, and long-term programs on the higher figure.

Capacity

A school district's projected enrollment must be evaluated in the context of the capacity of its school buildings. In general, this is done based on the grade level structure of its schools. Quakertown's current grade structure of k-5, 6-8, 9, 10-12, is a consequence of its 1990's master planning process. While this structure can, at times, be driven by the nature of a district's actual facilities, it is more often driven by a district's educational philosophy. At this point, we are not aware of any proposals to change the existing grade structure.

It should be noted, however, that this does not preclude the development of educational programs *within* the existing grade structure, such as a full-day kindergarten center, for example. We should also not rule out the possibility of modifying the present structure should it be necessary to do so to meet particular enrollment needs.

A further note: enrollment and capacity issues are often complicated by redistricting issues. Where children live in relationship to available classroom space is certainly a factor in developing a building program. *Specific issues of redistricting are beyond the scope of this study.*

Before looking at the District's enrollment with respect to the capacity of its schools, some general comments are in order with regard to the way that capacity is calculated. This is especially important in that these calculations have a significant impact on the extent of reimbursement from PDE that the District is liable to receive on any given construction project.

- **Elementary School Capacity.** According to PDE, the capacity of an elementary school is 25 pupils for every classroom plus 50 for every half-time kindergarten or 25 for every full-time kindergarten. Obviously, an elementary school may (or may not) have music rooms, an auditorium, cafeteria, offices, etc. But insofar as elementary level students spend most of their time in a classroom, *elementary school classrooms are the only required or relevant indicators of elementary school capacity.*

Should a district determine that it intends to achieve an average classroom size above or below 25 pupils, its capacity will of course change. Historically, Quakertown (like most school districts) has attempted to keep its elementary class sizes somewhat smaller, particularly in the lower grades. A goal for elementary school class sizes has been 18 to 23 pupils in grades k-3 and 23 to 25 pupils in grades 4 and 5. Class size for ESL programs (English as a Second Language) has been 17 to 18 pupils. Overall, for purposes of this study, the impact of average elementary grade class sizes of about 23 students will be considered.

- **Middle School Capacity.** PDE guidelines indicate certain pupil capacities for various types of middle school spaces. Twenty-five for a classroom, for example, 20 for a science lab, etc. This is consistent with District averages of 20 to 25 pupils per class.

PDE guidelines further provide for a 90% *utilization factor*, meaning that any given academic space is expected to be in use ninety percent of the time. In reality, particularly at middle schools where a team approach is used, it is virtually impossible to achieve this utilization factor. A utilization factor of about 70% is far more realistic, and will generally be used in this study.

- **High School Capacity.** PDE guidelines employ the same capacity calculation methods as are used at middle schools. On the high school level, this method works somewhat better than at the middle school level (since teaming is less of an issue) but a 90% utilization factor is still slightly high. (There are a number of reasons for this, including the relatively small enrollments in many advanced courses commonly offered to juniors and seniors, study halls in the schedules of many students, and partial schedules for some seniors, etc.) In this study, high school capacity (including the Freshman Center) will be as calculated with a utilization factor between 85% and 90%.
- **Special Education.** Capacity figures do not include spaces set aside for special education purposes. In fact, special ed somewhat complicates the entire capacity issue, since special ed spatial needs may grow independently of enrollment. Recent educational mandates have tended to increase the number of special ed rooms that are required.

Related to the expansion of special ed programs are other growing program needs that require additional space. Among these programs (which are not defined as “special ed” by PDE) are English as a Second Language, Title I, writing and math, etc. Given the growth of both special ed and other targeted programs, districts like Quakertown may lose capacity even if there is no change in total enrollment.

In recent years, this issue has been addressed with relative ease by the District because new schools have been built, all with a number of special ed rooms. Going forward, it is important to recognize that special ed and related educational program needs may reduce the capacity of some existing buildings.

(Note: the trend towards adding special ed rooms has been somewhat counter-balanced in recent years by the goal of “mainstreaming” special ed students: keeping them in regular classroom situations. However, mainstreaming often requires the presence of one or two adult aides in the classroom, in addition to the teacher. This again reduces capacity.)

- **“Substandard” spaces.** Capacity figures do not include spaces that PDE considers “substandard.” These may be temporary or modular classrooms (“relocatables”) that are not permanently incorporated into a school building, or spaces that PDE considers too small for normal use, such as classrooms that are less than 660 square feet. PDE requires that substandard spaces be eliminated on any school site following the completion of a PDE-reimbursed building project,

but otherwise, there is nothing to prevent a district from using such spaces. However, because they are not PDE-approved or recognized (and could limit reimbursement on various construction projects) they are omitted from figures used in this report.

- **New uses.** It should be noted that capacity calculations for any given school can change over time. A classroom can become a special ed room, a science classroom can become a science lab, depending upon how it is used (and how PDE defines such spaces). Just as pupil enrollment in a district can change from week to week, it is to be expected that the capacity of a district's facilities may change from year to year, even in the absence of a building program.
- **New Programs.** Another factor to be considered relative to capacity is the possibility of Quakertown developing new educational programs that will need additional space. *Full-day kindergarten*, for example, would effectively create the need for an additional capacity of 300 to 400 or so additional pupils. *Distance Learning Programs*, on the other hand, could actually increase available capacity. Part of this study will include defining new programs, if any, that the District might intend to implement in the coming years, so that their impact can be assessed.

Table 5 shows the capacity of each of the District's schools according to PDE calculation methods, and based upon the District's actual use of each facility. (Note: the PDE calculations and floor plans of each school will be provided in an appendix to this report.)

**Table 5
School Building PDE Capacity vs. Enrollment**

School	PDE Capacity	District Actual	2005-2006 Enrollment
Elementary Schools (Grades k-5)			
Haycock Elementary	125	115	
Neidig Elementary	425	390	
Pfaff Elementary	525	485	
Quakertown Elementary	325	300	
Richland Elementary	450	415	
Tohickon Valley Elementary	500	460	
Trumbauersville Elementary	500	460	
Elementary School Totals	2,850	2,625	2,450
Projected Enrollment, 2015-16 (6 grades @ 470-510 pupils):			
		2,820 – 3,060 pupils	
Middle Schools (Grades 6-8)			
Milford Middle	604	450	
Strayer Middle	1,414	1,200	
Middle School Totals	2,020	1,650	1,265
Projected Enrollment (3 grades @ 470-510 pupils):			
		1,410 – 1,530 pupils	
Freshman Center (Grade 9)			
Total Freshman Center Capacity	625	550	475
Projected Enrollment (1 grade @ 470-510 pupils):			
		470 – 510 pupils	
Quakertown High School (Grades 10-12)			
Total High School Capacity	1,480	1,350	1,275
Projected Enrollment (3 grades @ 470-510 pupils):			
		1,410 – 1,530 pupils	
District Totals, grades k-12			
	6,975	6,175	5,465
Range of Projected Enrollment			
		6,110 – 6,630 pupils	

Capacity vs. Enrollment Projections

Table 6
Current and Projected Enrollment
vs.
Current District Actual Capacity (%)

Grades	% of Capacity Current Enrollment	% of Capacity Enrollment (2014-15) Maximum Projected
k-5	93%	117%
6-8	77%	93%
9	86%	93%
10-12	94%	113%
Total District	90%	109%

In reviewing the information in Tables 5 and 6, a few points should be made:

1. PDE standards, which are largely unchanged since the 1970's, do not reflect the actual capacity of a district schools with complete accuracy. Factors over the last four decades that have tended to reduce the capacity of public schools include the increase in special ed programs and requirements; the introduction of needed (or sometimes mandated programs) such as Title I or ESL; team-teaching methods; class size norms; computers and computer-driven teaching methods, etc. Given all of these and other factors, it is safe to say that the actual capacity of the District's schools is currently about 6,200 pupils.
2. Capacity is currently adequate for all grade levels vs. enrollment, but not necessarily so for many grade levels over the next decade.
3. In terms of long range planning, it is advisable to keep certain scheduling guidelines in mind:
 - *A small to medium size addition to an existing school will generally take at least two years to move from initial planning stage to occupying the completed structure.*
 - *Medium to large additions: two to three years.*
 - *New buildings on district-owned land: three to four years.*
 - *New buildings on land to be identified/acquired: four to five years.*

Assuming that the grade configuration does not change, the District's ability to meet potential enrollment growth over the next ten years is as follows:

Elementary Schools (grades k-5). Current enrollment capacity 2,450 pupils vs. projected enrollment of 2,820 to 3,060 pupils. There is currently sufficient over-capacity at the elementary level to accommodate an additional 200 or so pupils in kindergarten through fifth grade. (It should be kept in mind that at the elementary school level, the number of grades and number of schools gives the District somewhat more flexibility in dealing with sudden spurts of growth and unequal grade sizes. Redistricting issues, however, frequently limit this flexibility.)

At anticipated growth rates, it appears safe to say that (in the absence of major changes in program) no new elementary school construction seems indicated for at least a few years. Over the next decade, however, the data suggest that enrollment will exceed capacity by two to four hundred pupils. This projected need could best be met through the construction of additions to existing facilities, rather than new schools.

Each of the District's seven elementary school sites has been reviewed for suitability to be expanded. Primary considerations include:

1. The location of the site within the district relative to anticipated growth.
2. The ability of the site to sustain an addition (acreage, topography, availability of utilities, configuration of existing building).
3. The capacity of the existing school relative to the District's educational preference for limiting its elementary schools to about 500 pupils.
4. The ability of the existing school's infrastructure (kitchen, cafeteria, multi-purpose area, mechanical systems, etc.) to serve more pupils without major modifications.

With regard to site acreage, PDE guidelines *suggest* that every school have a site of at least one acre per 100 pupils *plus* 10 acres for an elementary school, 20 acres for a middle school and 35 acres for a high school. A 500-pupil elementary school would therefore need 15 acres. However, it should be noted that these are simply guidelines, not requirements, and particularly in the case of urban ("neighborhood") elementary schools, PDE has and will approve sites that are far smaller.

The evaluation for each school follows (municipality, approximate current actual capacity and acreage shown in parentheses):

- **Haycock** (Haycock Township, 115 pupils, 12 acres). This is a unique facility in the District. It is by far the smallest school: one classroom each for grades 1-5, no kindergarten. It serves a largely rural area which is expected to grow rapidly (26%) from a percentage standpoint, but relatively in terms of actual population (about 600 residents in the next decade). Part of the site is heavily wooded and it is *not* served by municipal sewer or water systems, making the possibility of expansion problematic (but not out of the question). Like most District elementary school sites, it is not large enough to meet PDE acreage guidelines, but is nevertheless sufficiently large to accommodate a small addition.

From an economic/operational standpoint, it would certainly be efficient to consider an addition at Haycock. Virtually any administrative or maintenance position except that of classroom teacher could be carried out with greater efficiency in a larger school, and adding a kindergarten would benefit the already very strong “neighborhood” character of the facility. This character, in turn, presents a very strong argument for keeping the school open, but the lack of municipal utilities and the relatively low existing and anticipated population density suggest that expanding Haycock should not be a high priority.

- **Neidig** (Quakertown Borough, 390 pupils, 12 acres). Although this school is in Quakertown Borough, it is adjacent to Richland Township, which is expected to see the greatest growth in the District in coming years (both percentage and absolute population). It is also one of the closer sites to Haycock Township: this will be important if that township grows as expected and no addition is constructed at Haycock Elementary.

The present Neidig school has a small enough enrollment to accept a modest addition. The site is small, and its configuration will not readily allow the construction of a large addition. However, a small addition could be accommodated. Should it prove unfeasible to add onto Richland, as discussed below (or if long-term growth requires further school capacity), this site should be considered.

- **Pfaff** (Milford Township, 485 pupils, 20 acres). An addition could be accommodated at this location (the largest of any of the district’s elementary properties). In fact, when the school was designed, sufficient core facilities were included (kitchen, storage, etc.) to accommodate an addition without needing to expand all aspects of the building’s educational program and mechanical systems.

A negative aspect of expansion is that with a capacity of 485 pupils, Pfaff is already the largest school in the District, and expansion takes its enrollment beyond the 500 pupil *optimum* elementary school size. That size, however, is a general guideline, not an absolute standard. **Overall, an elementary school addition at Pfaff, in the western part of the District, is an appropriate site to meet anticipated enrollment growth in the western portion of the District.** Given the sewer moratorium in Richland Township (the District’s eastern portion), growth in Milford Township (in the vicinity of Pfaff) is most likely to strain the District’s facilities in the next two to five years.

- **Quakertown** (Quakertown Borough, 300 pupils, 6 acres). This site, which is already highly developed (70% paved or building), is the smallest in the District. The building could not readily be added to without loss of playing area, windows in existing spaces, etc.
- **Richland** (Richland Township, 415 pupils, 19 acres). This site is larger than Neidig’s, and also in the general area of the greatest anticipated growth in the district. However, much of the site is occupied by a detention basin, limiting expansion potential. **Once the sewer moratorium issue in Richland Township is resolved (anticipated to be two to five years from now), an elementary school addition at Richland is a logical choice to meet the growth that is likely in the eastern portion of the District.**

- **Tohickon Valley** (Milford Township, 460 pupils, 10 acres). The relatively small, narrow site does not lend itself to construction of a significant addition. Adding a few classrooms appears feasible.
- **Trumbauersville** (Trumbauersville Borough, 460 pupils, 17 acres). Although a stream along one property line reduces the developable acreage of this relatively large site, there is nevertheless sufficient area for a small addition, but this would be less easily achieved and more costly than an addition at Pfaff.

Middle Schools (grades 6-8). Current enrollment capacity 1,265 pupils vs. projected enrollment of 1,425 to 1,575. There appears to be no short-term need for expansion of middle school facilities. This is not surprising, given recent construction programs. Over the next ten years, it is likely that some expansion of the current middle schools will be needed. The logical location for this will be at Milford Middle School, which already has three relocatable classrooms to meet current needs. (These relocatables are not included in the capacity calculations.) By replacing these with a permanent addition to the building, which can also meet other spatial needs in the school discussed below, the capacity of the school will become sufficient to meet all the District's projected middle school requirements for the next decade.

Freshman Center (grade 9). Current enrollment capacity 475 pupils vs. projected enrollment of 470 to 510. There appears to be no short or long term need for expansion of ninth grade facilities, although a one-grade school allows for limited flexibility should a large grade size (bubble) occur. The 2005-06 fifth and seventh grade classes could represent such a bubble, but it does not appear that either of them will exceed the Freshman Center's capacity.

High School (grades 10-12). Current enrollment capacity 1,275 pupils vs. projected enrollment of 1,410 to 1,530. There is sufficient capacity at the high school level to accommodate current enrollment, with potential overcrowding anticipated within the next decade.

More significant than actual overcrowding, however, is the physical condition of the high school and its lack of various educational spaces. Both of these topics are covered in some detail elsewhere in this report. For now, it need only be stated that by addressing physical conditions and lack of specific spaces (such as science labs), the District can at the same time deal with potential overcrowding issues in the coming decade.

Taking all of this into account, the construction of a totally new high school does not seem warranted over the next decade, but a modest expansion of the current one seems in order. *Given the time line for developing such a project and constructing one within the confines of a fully-utilized existing structure, it seems appropriate for the District to begin the planning process sooner rather than later.*

There are several concerns related to renovating the existing building and/or developing a high school addition on the existing site. These are:

- The limited available space on the site itself (most of which is taken up with building, parking and athletic fields).
- The suspect nature of its underlying soils (which may contain the covered-over remains of an old landfill site).
- The difficulty of conducting a major construction project on a heavily-used site occupied by more than a thousand students.

The District’s recent purchase of a new facility within which the District administration offices can be located helps address these issues. The current administration spaces, once vacated, could be renovated for educational use and occupied by students, vacating other areas to be renovated. (For comparison purposes, the current high school, including the District Administration Offices, comprises about 235,000 square feet.)

Building an addition (or additions) to meet current spatial needs would create further “swing space” for renovations. Overall, it appears feasible to meet the relatively modest spatial needs for expansion on the current site.

[Another issue related to a high school construction project concerns potential PDE reimbursement to the District for some of the costs. In general, PDE limits a District to obtaining reimbursement at any given school to once per 20 years (except for unexpected enrollment increases). Anticipating this, the District did NOT seek reimbursement for its 2002 cafeteria addition/renovation project at the high school or for any other high school project in the last two decades. Therefore, another high school project would in all likelihood be eligible for full reimbursement.]

Enrollment Growth Beyond the Next Decade

Over the next decade, it seems quite likely that all construction programs needed to accommodate growth in the District can be addressed by constructing additions and/or renovating existing facilities. No new projects need to be developed.

Unfortunately, it is not likely that population and enrollment growth in the Quakertown area will cease, or even level off, by 2015 or so. Long range projections of the Delaware Valley Regional Planning Commission project a District population of nearly 51,000 by 2030, an increase of twenty percent beyond the 2015 forecast, and more than fifty percent greater than the population of about 32,000 residents established in the 2000 U.S. Census. **If the student population were to increase commensurately, District enrollment by 2030 would exceed 8,300 pupils, about three thousand more than current enrollment.** Long before that figure would be reached, new schools would probably have to be developed.

Even at a lower growth rate, some new schools will likely be needed after 2015. The possibility also exists, of course, that enrollment growth in the decade or more could take place more rapidly than now projected, also triggering the need for more schools.

At this point, the District owns no properties that could be used for the construction of a new school (at any grade level). Given the long-range likelihood that new schools will be needed, the almost inexorable increase in land costs, and the increasing scarcity of large, suitable and available parcels, it seems reasonable for the District to begin exploring the possibility of purchasing land for future development.

Many school districts, particularly in eastern Pennsylvania, are in a similar situation. For Quakertown, no particular timetable is suggested for this process: the current need for land is not urgent. However, given the complexity of the process, and the very long lead time to develop a school project on a new site (particularly if the project is something as involved as a new high school), the District might be well served if the process starts sooner rather than later.

III · Program Growth

New Requirements & Programs

The preceding discussion has focused on meeting the District's capacity needs based upon enrollment growth only. However, it must be recognized that the introduction of new regulations, programs and academic requirements can also have a significant impact on school capacity.

Looking at schools now versus twenty five years ago, it is remarkable to consider the changes that have in many cases taken space within schools while not allowing for additional students. These changes have included:

- **Technology.** Space for computers, wiring, technology staff, technology education, etc.
- **Required new programs and facilities.** Many laws have been passed on both the federal and state levels that require the use of space in schools for new programs or new or larger facilities. (Often, these laws carry no subsidies or very little of the funding needed for their implementation.) Examples include the requirements of the *Americans with Disabilities Act*, the *Individuals with Disabilities in Education Act*, the *No Child Left Behind* program, etc. In addition, numerous changes in the way special needs students are identified and taught have increasingly occupied more space in schools. As noted above, on a District-wide basis, at least one classroom per year is likely to be converted into a special use, with a commensurate reduction in overall pupil capacity.
- **Societal changes.** An increased need for security on school properties, the development of such programs as *English as a Second Language*, the administrative and accountability requirements placed on public institutions, the greater emphasis on health care (both in the classroom and in the nurse's station), the expansion of guidance and extra-curricular programs have all impacted the way schools are used. Programs for students with special needs (but not categorized as "special education") such as math, reading and writing remediation, Title I, speech therapy, etc. also require additional space. Various programs (many of which are mandated by law) require space in virtually every school. Others may need only one space per age group, or one space for the entire district.
- **Building and zoning code requirements.** These requirements have generally resulted in buildings that are safer and land development that is more environmentally sensitive. They have not tended to make construction projects larger (although they have tended to make them much more expensive). In some cases, however, they have increased spatial requirements, even in existing buildings. The *Americans with Disabilities Act*, for example, often requires larger rest room facilities, "areas of refuge," wider corridors, etc.

- **New academic programs.** Many school districts in Pennsylvania schools have implemented pre-school, early intervention, or full day kindergarten programs (generally on a voluntary basis for parents wishing to enroll their children). The special needs of such programs could vary widely. For example, based upon current kindergarten enrollments and programs, the District would have to add fifteen to twenty new kindergarten rooms (depending upon class size) to convert to full-day kindergarten. Other programs, such as specialized science or vocational studies could also be initiated. In some cases, entirely new facilities for specific career options (performing arts, technology, etc.) could be developed. At this point, however, no such initiatives have been identified within the District, and none have been included in this study.

In general, none of the programs listed above are expected to require additional space in the immediate future. However, this study will remain cognizant of these items, and where relevant will factor them into discussions of additions or renovations that may be needed for potential future building programs.

Existing Programs

An issue related to the possibility of new programs being developed in the future is the adequacy of current facilities to meet current program needs. For example, many of the District's elementary schools have dedicated art rooms, computer rooms, etc. Some do not. In other cases, a school may have a designated space (such as a nurse's station) that is not large enough to meet current needs. In many instances, of course, it is not economically feasible to address these deficiencies; the staff has dealt with them in the past, and will continue to do so.

Frequently, it becomes appropriate to address the absence or inadequacy of a given space when an addition or major renovation is undertaken at a given school. For that reason, a review was done of all existing schools to determine which, if any, spaces might be lacking in any given school that are generally present in others at the same grade level, or would be highly desirable should a suitable project occur in which they could be included.

In reviewing this list, it is important to note that differences between school facilities are not uncommon. Quakertown, like all school districts, faces this issue whenever it renovates or builds a new school: almost by definition, the newer project will be built to current educational and/or construction standards which are different than in older facilities. In the absence of an explicit goal to achieve relative equity of all facilities, certain differences are inevitable. With that in mind, the following program spaces were identified as lacking at each school:

Elementary Schools

- **Haycock.** No art or music rooms, no special ed, kindergarten, teacher workroom or teacher lunchroom, limited space for small or large group activities. Given the size of the site and potential expansion issues related to the on-site sewer and water systems, it may be difficult to develop *any* addition on the site. However, a small addition that would *not* result in an enrollment increase (e.g.: no kindergarten) could probably proceed with relatively few site approval issues.
- **Neidig.** Limited teacher workspace, limited space for small or large group activities. A small addition could be accommodated on the site.
- **Pfaff.** No spatial needs identified.
- **Quakertown.** Shared music and art room, no teacher workroom, limited space for small or large group activities. The site could perhaps accommodate a very small addition. Alternatively, some needed spaces could be developed in existing rooms by transferring some students from this school to one of the other nearby facilities.

- **Richland.** Two existing relocatables attached to building and two not attached to building should be replaced with permanent facilities. Music in relocatable structure, limited space for small group activities, no teacher workroom. These needs could be met through construction of a permanent, larger addition or additions at the current location of the relocatables, and elsewhere on the site.
- **Tohickon Valley.** No teacher workroom, limited space for small or large group activities. There is sufficient space for a small addition.
- **Trumbauersville.** No spatial needs identified.

Middle Schools

- **Milford MS.** Five existing relocatables (not attached to building) should be replaced with permanent facilities. Limited teacher workspace, limited space for small or large group activities. Library space very limited. There is a sufficient space for a small addition, particularly in the location of the current relocatables.
- **Strayer MS.** No spatial needs identified.

Secondary Schools

- **Freshman Center.** No spatial needs identified.
- **Quakertown HS.** The number and size of science labs, art and music/performance spaces for a school of this enrollment (especially if expanded to accommodate more pupils) is quite limited; limited faculty workspace, storage.

District Administration

One of the issues already identified in this study has been the need for additional space in the high school, to meet educational program needs, possible enrollment growth, and to serve as “swing space” during any high school construction program. A potentially related issue is that of the District Administration offices, which are located in a two-story section of the high school facility.

Recently, as part of a separate study, the District identified a number of deficiencies in its current administrative space, including insufficient space for administrators and records storage, inefficient layout, lack of meeting rooms, inadequate security and handicapped access, etc.

It was determined that there was no economically viable way to expand this area within the confines of the existing high school facility, and the District decided to relocate to a recently purchased building of its own. This decision offered several benefits: administrative operations could become more efficient, and almost 10,000 square feet of space within the existing high school building could become available for high school uses. The economic ramifications of this move are addressed in the *Cost Estimate* section of this report.

IV · Existing Facilities and Systems

Inspections have been conducted of all the District's facilities, to determine the viability of their building systems as well as to identify any issues that do not meet applicable or current building codes.

[Note: the distinction between *applicable* and *current* building codes is an important one. *Applicable* codes refer to those that have been in existence since the facility went into service, or that require any such building, regardless of age, to meet them. For example, many code requirements for smoke detectors or emergency lighting did not exist when some of the District's older schools were built, but all schools must now have such systems. On the other hand, some recent requirements, such as meeting certain structural standards for resistance to earthquakes, are not retroactively required.

In some cases, new code requirements are triggered when a facility is renovated, even if the renovation is for an unrelated purpose. For example, with regard to hazardous materials, the most recent of the District's ongoing studies (done in October 2004, by Suburban Energy & Environmental Consultants), showed only minor items in need of immediate attention. These have been addressed. However, the more complete removal or remediation of hazardous materials such as asbestos may be needed in order to execute some renovation projects. Upgrading some facilities to the current standards of the Americans with Disabilities Act, or installing sprinkler systems, may also be required. (In many cases, implementing the standards of newer codes is highly desirable, even if not required.)

The reviews done for this study have taken current codes and common building standards into account. Unless otherwise noted, where a building description indicates a code-compliance issue, it refers to *current* code standards rather than violations of *applicable* codes for that particular building.]

In looking at this information it should be noted that just as there are differences in the scope of educational programs offered in each school, there are differences in the physical quality or characteristics of the facilities themselves. Some schools (Neidig Elementary or Quakertown High School, for example) have beautiful landscaping features, such as mature trees, shrubs and flowers. In others, these features are noticeably absent. Some schools are exceptionally attractive, others are not. In general, it is assumed that any future improvements will be developed to the standards of the District's newer facilities, but few esthetic evaluations or recommended esthetic improvements have been included in this study.

Site & General Construction Systems

The site and general construction systems of all District facilities were reviewed by a team led by a Registered Architect. The findings are summarized in Table 7. The complete analysis will be provided in the appendix to the Feasibility Study.

Some general comments are in order:

- Much of the land in the District has a high water table. As a result, many of the District's schools have site drainage issues and require sump pumps that operate frequently to help prevent dampness problems from developing. Both drainage and sump pump systems in a number of schools are in need of improvement.
- A number of sidewalks, driveways and playing fields throughout the District need attention. In general, work of this type falls into the category of maintenance issue rather than building program concern. Unless problems of this nature are relatively severe, they are not noted in this study.
- Many of the electronic systems in the District (security, cable television, communications) have been installed on a school-by-school basis. There is very little compatibility and a great deal of variation in the quality of the systems between schools. A look at the potential advantages or disadvantages of linking or making some of these systems (especially security systems) more uniform is beyond the scope of this study, but it might be worthwhile to consider at some point in the future.

The major observations at each property were as follows:

Elementary Schools

- **Haycock.** Paving needs repair, numerous accessibility issues; roof repair or replacement needed; vinyl asbestos tile (VAT) floor throughout (underneath carpet in corridors).
- **Neidig.** Paving and accessibility issues; VAT throughout; terrazzo floor in addition corridors cracking. The boiler room is prone to flooding.
- **Pfaff.** Musty odor and signs of rusting at main entrance ceiling and lintel, some water damage. The storm system backs up into the school during heavy rains.
- **Quakertown.** Accessibility issues; replacement windows not working properly; ceiling of addition leaking at gym windows; VAT throughout; terrazzo in corridors is cracking; dampness in basement.

- **Richland.** Paving in poor condition, drainage issues at driveway and entrance, significant accessibility issues; VAT throughout (under carpet in corridors); carpet is in poor condition; roof leaking with visible water damage at ceilings; doors and windows need replacement; toilet rooms in poor condition with rusting metal grid ceiling system; modular classrooms not connected to main building.
- **Tohickon Valley.** Paving in poor condition; exterior stucco (Drivit) in need of cleaning and repair, especially at west side of building; VAT throughout (under carpet in corridors); multi-purpose room ceiling in poor condition; classroom toilets in poor condition; heating vents starting to rust; basement pipes leaking adjacent to electrical panels.
- **Trumbauersville.** Drainage and field problems, sidewalks beginning to spawl; numerous interior and exterior signs that moisture is penetrating exterior molding, with water spots and possible mold in some locations including lintel at library exterior door: interior air quality testing is recommended.

Middle Schools

- **Milford MS.** Pavement, sidewalk and playfields need repairs; roof leaks have caused moisture problems and bowed ceiling tiles throughout. (As of this writing, the roof is being repaired/replaced.) Interior air quality testing is recommended. Accessibility issues; lack of classroom storage/casework; movable partitions need repair. Two of the relocatables are leaking badly (and can no longer be used as classrooms).
- **Strayer MS.** No items in need of attention.

Secondary Schools

- **Freshman Center.** Some paving needs repair; ground water and dampness problems at entrance; minor issues of accessibility (door hardware, locker rooms, etc.); water damage at ceilings.
- **Quakertown HS.** Parts of the building are built on an old landfill site, and there appear to be differential settlement problems resulting in cracking of walls and floors. This situation should be monitored. Sidewalk and paving need repairs, exterior curtain walls need repair/replacement of some panels; leaks from roof and walls in some sections of the building; moisture problems visible in classroom walls and bowed ceiling tiles, particularly in non-air conditioned sections. Interior air quality testing is recommended. The lower gym is subject to flooding. VAT throughout; accessibility issues; windows, doors and door hardware in poor condition; auditorium finishes, systems, seating in fair to poor condition. (A positive comment regarding the high school: several of the architects inspecting the site as part of their research for this study independently made note of some exceptional landscaping design, planting and maintenance, particularly around the northwest and north sides of the building.)

100 Commerce Building (District Administration). As per previous studies of this building, extensive renovations are needed in order to develop it for use as the District Administrative Offices. The exterior shell is in good condition, but a good deal of interior reconfiguration is necessary to provide appropriate offices, meeting spaces, communication, security, etc.

Facilities Building. Roof is near the end of its useful life span; some accessibility issues; windows and garage doors need replacement.

Stadium. Minor maintenance issues only.

**Table 7
Building Systems**

Facilities Building
100 Commerce Building
Quakerstown High School
Freshman Center
Strayer Middle
Milford Middle
Trumbauersville Elementary
Tohickon Valley Elementary
Richard Elementary
Quakerstown Elementary
Platt Elementary
Neidig Elementary
Haycock Elementary

	Facilities Building	100 Commerce Building	Quakerstown High School	Freshman Center	Strayer Middle	Milford Middle	Trumbauersville Elementary	Tohickon Valley Elementary	Richard Elementary	Quakerstown Elementary	Platt Elementary	Neidig Elementary	Haycock Elementary
Sitework													
Structure													
Masonry													
Windows													
Doors & Hardware													
Roofing													
Interior Finishes													
Equipment: Lockers / Toilet Partitions													
Building & Restroom Accessibility													
Hazardous Materials													

Honck = 6 blocks
 HS = 6 blocks
 Rich = 5 blocks
 QE = 4 blocks
 Neidig = 4 blocks

No significant work needed
 Some work needed
 Extensive renovation or replacement needed

**Table 8
Mechanical Systems**

	Haycock Elementary	Neidig Elementary	Paft Elementary	Quakertown Elementary	Richard Elementary	Tohickon Valley Elementary	Trumbauersville Elementary	Milford Middle	Strayer Middle	Freshman Center	Quakertown High School	100 Commerce Building	Facilities Building
Air Conditioning & Ventilation	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed
Heating & Temperature Controls	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed
Plumbing & Water Heating	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed
Sprinkler	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed
Electrical Service & Distribution	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed
Lighting	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed
Emergency Systems / Fire Alarm	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed
Communication Systems	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed	No significant work needed

- No significant work needed
- Some work needed
- Extensive renovation or replacement needed; no system or partial system

Mechanical Systems

The mechanical systems of all District facilities were reviewed by a team led by a Professional Engineer. The findings are summarized in Table 8. A complete analysis will be provided in the appendix to the Feasibility Study. The major observations at each property were as follows:

Elementary Schools

- **Haycock.** On-site well and septic systems could limit expansion potential. Boiler piping is corroded. Except the office area, the building is not air conditioned; unit ventilators and boiler have exceeded their projected life span, ventilation systems are inadequate or absent; plumbing fixtures do not meet ADA guidelines; the building is not sprinklered; the well-water tank is beyond its projected life span and there are on-going issues regarding the quality and treatment of well water; electric panels are old and difficult to maintain; there is a general lack of electrical receptacles; single-phase electrical service would not accommodate air conditioning; there are no parking lot lights; there is no emergency generator; the intercom system is antiquated; the fire alarm system does not meet current standards.
- **Neidig.** Most of the building is not air conditioned, and those portions which are could not be integrated into a central system; unit ventilators are nearing the end of their useful life; return air and kitchen ventilation systems do not meet current standards; plumbing does not meet ADA standards, but is generally accessible; there is no emergency generator; the clock system is not working; the electrical distribution system is old and a continuing maintenance problem; kitchen equipment needs upgrading.
- **Pfaff.** No items in need of attention.
- **Quakertown.** Heating, ventilating, unit vents, gym and multi-purpose room air handling systems are all at the end of their projected life span; most of the building is not air conditioned; ventilation systems do not meet current standards; water heating tank and sewage pumping system (used at basement locker/shower rooms) are at the end of their useful lives; plumbing fixture are not ADA compliant; there is no sprinkler system; kitchen hood does not have a fire protection system; most electrical panels are past the end of their projected useful life; emergency panels and lighting need upgrades; the fire alarm system does not meet current codes.
- **Richland.** Most of the building is not air conditioned; unit ventilators beyond the end of their projected life span; kitchen lacks proper ventilation, dishwasher exhaust and range hood; ventilation does not meet code; hot water tank is beyond its project useful life; plumbing fixtures are not ADA compliant; there is

no sprinkler system; electrical distribution system has limited potential for expansion and is a maintenance problem; kitchen equipment needs upgrading.

- **Tohickon Valley.** The heating system and unit ventilators in the original building are beyond their projected life span; most of the building is not air conditioned; some plumbing fixtures are not ADA compliant; the building is partially sprinklered; electrical panels and distribution systems are beyond their projected life span; kitchen equipment needs upgrading.
- **Trumbauersville.** Other than maintenance issues (such as repair of water source heat pumps), no items in need of attention.

Middle Schools

- **Milford MS.** Corridor ventilation does not meet code; plumbing fixtures are not ADA compliant; water heater, electrical system and emergency generator are beyond their projected life span; fire alarm system does not meet code.
- **Strayer MS.** No items in need of attention.

Secondary Schools

- **Freshman Center.** No items in need of attention.
- **Quakertown HS.** Significant portions of the building are not air conditioned; steam heating and ventilating system in the original building (except for boilers) and 1965-addition air conditioning are far beyond their projected life span; corridor ventilation does not meet code; the building is not sprinklered; shower heads and valves, some other plumbing fixtures and gym water heater should be placed; fire alarm does not meet current codes; emergency generator and emergency lighting systems should be expanded; stairwell lighting should be upgraded; electrical panels, distribution system and intercom are beyond their projected life span.

100 Commerce Building (District Administration). Some components of the existing building, such as electrical panels and plumbing distribution systems, are adequate for use in a District Office/Storage renovation project. However, the majority of the mechanical systems do not meet current codes, are inefficient or obsolete, and/or would not work properly in a reconfigured space.

Facilities Building. Garage and welding area ventilation should be provided, heating upgraded; plumbing fixtures are not ADA compliant; electrical system is beyond its useful life; there is no fire alarm system; central District walk-in cooler and freezer are at the end of their useful life and are too small. Gas pumps in need of replacement; underground gas tanks do not meet current codes.

Stadium. Some lighting improvements needed.

Sustainable Design & Energy Conservation

The issue of systems in existing facilities that need replacement raises a related issue about the nature of any renovation work, and for that matter, of any additions or new buildings the District might construct.

School districts (or virtually any other property owners) are always balancing considerations of construction cost, operating cost, long-term maintenance and replacement costs, to say nothing of a system's usefulness (and potential for multiple uses), esthetics, etc. To these concerns should be added an interest in the employment of *sustainable design and energy conservation* principles, wherever feasible.

Sustainable design generally refers to the use of methods and materials that reduce negative environmental consequences of construction. So significant are the cumulative impact of these principles that in 2005, PDE instituted a process whereby districts became eligible to receive grants and "bonus" reimbursements for constructing sustainable design projects that met the standards of the *U.S. Green Building Council's* LEED program (Leadership in Energy and Environmental Design). Simply put, LEED certification can be given to buildings designed along the following *sustainable* principles:

- **Develop sustainable sites.** Reclaim urban land, minimize site disturbance and water run-off, etc.
- **Conserve water.** Recycle rain and waste water for irrigation, toilets and other non-potable uses, etc.
- **Conserve energy, protect the atmosphere.** Use energy efficient heating and cooling methods (such as geothermal or solar powered systems or natural ventilation), do not use ozone-depleting refrigeration or fire suppression systems, etc.
- **Materials and Resources.** Use locally manufactured and recycled materials, rapidly renewable materials, etc.
- **Indoor Air Quality.** Do not permit smoking, monitor CO₂, develop adequate ventilation and mold resistant techniques and systems *during* and after construction, do not use materials (particularly sealants, paints and carpet) that emit toxins, etc.
- **Innovation.** Develop new conservation techniques and systems.

No project can possibly meet all LEED guidelines, and increased funding from PDE for sustainable design generally applies to new construction. Nevertheless, consideration of all the above principles can be a part of the process the District goes through on all of its projects.

The District has already employed such sustainable practices as the use of geothermal heating and air conditioning systems at several of its schools. Eventually, many of the “standard” items used throughout the District, such as certain types of paints, carpets, lighting fixtures, windows, refrigerants, etc. can all be specified with LEED or similar environment standards in mind. (Many school districts incorporate the use of sustainable design features into their educational programs.)

Properly handled, many sustainable features can be incorporated into construction projects at no additional initial cost. Overall, construction cost increases of two to five percent can be anticipated for projects achieving LEED certification. In most instances, energy savings over a period of time will compensate for this. In virtually all cases, there are positive environmental consequences.

For purposes of this master plan study, the use of sustainable design principles is not factored into overall cost projections, or proposed for any specific project (although various energy-saving items have been considered in the analysis of existing building and mechanical systems). The discussion of these principles within the master plan itself is included simply to suggest their potentially significant role in the development of any future construction projects the District may take.

V · Cost Estimates

Construction Cost Estimates

A major purpose of this study is to enable the District to establish a long-range plan that will include a logical progression of improvement projects. The pace at which those projects are implemented (or modified) will depend upon the District's current needs, changing needs over time, and finances. Obviously, the cost of any given improvement could be a significant factor in determining when or if it should be implemented.

The exact scope of any given project can only be established through a schematic and design development process that is well beyond the scope of this study, as are other variables. That said, the following should also be explicitly noted:

The primary purpose of the cost estimates included in this study is to establish order-of-magnitude construction costs for any improvement or related group of improvements. This is intended to enable the District to evaluate, prioritize and/or reject any specific proposal.

In considering any given estimate, the following should also be kept in mind:

- **Unless otherwise noted, the cost estimates in this study *include* non-construction expenses normally associated with construction projects, such as the cost of furniture and equipment, professional fees, site and construction testing, district supervision, financing, land acquisition, etc. Typically, these items add 20% to 30% to project costs.**
- Figures are generally rounded off to the nearest \$100,000. Total cost estimates, in the case of larger projects, are rounded off to the nearest \$500,000.
- Estimates are generally based on 2006 cost per square foot figures for new construction at \$175 per square foot, additions at \$200 per square foot, extensive renovations at \$125 per square foot. These figures do *not* include site development cost estimates, which are shown separately. **Each of these figures is then increased by 30% to allow for non-construction costs and contingencies.** These costs are further adjusted by specific factors that may impact on a particular project, if known.
- The 30% allowance for non-construction costs and contingencies *may or may not* include a factor for project phasing. In many cases, if a school project involves construction of an addition, that addition can be completed, various activities located within it, and parts of the existing school can be renovated without serious interruption. At other times, that is not feasible, and construction projects may require the temporary use of relocatables or even the shifting of

pupils from one school to another for a period of time. As the potential for implementing any given project is clarified in this study, the ramifications with regard to phasing and costs will be examined in greater detail.

- **Potential inflation beyond 2006 is *not* factored into cost estimates.** Typically, construction costs escalate five to ten percent a year due to inflation. This should be considered when discussing projects that may not begin for several years.
- Site development costs may vary widely, particularly if estimates are based upon generic or non-specific sites. Actual development costs for any given project may include off-site improvements (roads, sewers, storm drainage systems) which are unknown at this time. Therefore, site development cost estimates must be viewed as being especially subject to fluctuation. No new projects are discussed here, but a base figure of \$4,000,000 would be used for site development of a new 20-acre property. This would further be adjusted based upon any known site conditions for specific properties (topography, availability of utilities, etc.) as well as for the type of school, required or available acreage, etc. A base figure of \$500,000 will be used for site development costs at existing schools, adjusted for known conditions.
- Site acquisition. Estimates for the cost of purchasing land are not included in this study.
- Square foot requirements per pupil, new construction. PDE guidelines suggest that about 100 gross square feet per pupil be allocated for grades k-6 schools, and 125 gross square feet per pupil be allocated for grades 7-12. These figures will be used except at the middle school level (grades 6-8), where experience suggests that a figure of about 175 square feet per pupil is more realistic.
- Square foot requirements per pupil, additions. Depending upon the nature of any given addition, requirements per pupil may be significantly more or less than for new construction. However, for purposes of this study, new construction guidelines will be used unless there are known factors which suggest appropriate modifications. (Pfaff Elementary, for example, was built with core facilities large enough to serve a classroom addition. Consequently, an addition to Pfaff will require less square feet per pupil.)
- The number of pupils proposed for any given project is based on enrollment projections, information discussed in this study, etc. In general, an additional 100 to 200 pupils (4 to 8 classrooms) have been added for special ed needs. Obviously, the total capacity of any given construction project might vary depending upon when it was done, the latest enrollment and capacity projections, what other projects were done as part of a building program, etc.
- *The final construction cost of any improvement may vary considerably from the preliminary estimate included in this study. Costs may vary based upon a number of factors: the exact scope of the work, the quality of materials used, inflation (or deflation) over time, the general level of competitiveness in the construction industry at the time the project is bid, seasonal fluctuations in bidding, etc.*

- This study does *not* include on-going expenses of staffing or operating new spaces or programs, transportation of pupils, specialized equipment needed to operate programs or other non-construction costs.

Since no new schools are proposed for the coming decade, the estimates in this study are organized on an existing site-by-site basis. Each property is looked at in three ways:

1. Cost estimate for additions and related renovations needed to accommodate increases in District enrollment.
2. Cost estimate for additions and/or renovations needed for addressing existing spatial needs (adding an art room or storage area, for example).
3. Cost estimate for renovation of general construction or mechanical systems.
4. Cost estimate for air conditioning areas of existing buildings that are not currently air conditioned or in which the existing system is obsolete. Costs include replacement of ceilings and lighting where it seems necessary to install ductwork or equipment, and installation of a sprinkler system where none currently exists and code requirement might mandate one *if* air conditioning is installed. **Estimated costs for air conditioning are INCLUDED in item #3 estimates.**

Based upon all of the above qualifications and assumptions, following are construction cost estimates for all of the potential projects outlined in this study:

Construction Cost Estimates

Elementary Schools

- **Haycock**
 1. n.a.
 2. Addition for art, music, special ed, misc. activities (not including kindergarten):
6,000 sf @ \$260 psf plus site @ \$200,000: **\$2,000,000**
 - ③ Renovation: general construction and mechanical systems:
9,000 sf @ \$175 psf: **\$1,500,000**
 4. Air conditioning*: **\$ 300,000**
- **Neidig**
 1. n.a.
 2. Addition for teacher workspace, storage:
2,000 sf @ \$200 psf: **\$2,000,000**
 3. Renovation: general construction and mechanical systems:
33,000 sf @ \$125 psf: **\$4,000,000**
 4. Air conditioning*: **\$ 900,000**

- **Pfaff**
 1. **300 pupil addition** (including special ed):
20,000 sf @ \$260 psf plus site @ \$500,000: **\$6,000,000**
 2. n.a.
 3. Minor repairs: n.a.
 4. Air conditioning*: n.a.

- **Quakertown**
 1. n.a.
 2. Addition for music, misc. activities:
2,000 sf @ \$260 psf plus site @ \$200,000: **\$ 700,000**
 3. Renovation: general construction and mechanical systems:
34,000 sf @ \$150 psf: **\$5,000,000**
 4. Air conditioning*: **\$ 900,000**

- **Richland**
 1. **300 pupil addition** (including special ed):
30,000 sf @ \$260 psf plus site @ \$500,000 **\$8,500,000**
 2. Addition to replace relocatables, music, misc. activities:
6,000 sf @\$260 psf plus site @\$200,000 **\$2,000,000**
 3. Renovation: general construction and mechanical systems:
29,000 sf @ \$175 psf: **\$5,000,000**
 4. Air conditioning*: **\$ 800,000**

- **Tohickon Valley**
 1. n.a.
 2. Addition for misc. activities:
1,000 sf @ \$300 psf plus site @ \$100,000: **\$500,000**
 3. Renovation: general construction and mechanical systems:
30,000 sf @ \$125 psf: **\$4,500,000**
 4. Air conditioning*: **\$ 900,000**

- **Trumbauersville**
 1. n.a.
 2. n.a.
 3. Minor repairs: n.a.
 4. Air conditioning*:

* Estimated costs for air conditioning are INCLUDED in item #3 estimates.
Estimated total cost of air conditioning in all District elementary schools: **\$ 4,000,000**

Middle Schools

- **Milford**
 1. n.a.
 2. Addition to replace relocatables, library expansion, misc. activities: **\$1,000,000**
7,000 sf @ \$260 psf plus site @ \$200,000:
 3. Renovation: general construction and mechanical systems (excluding current roof work): **\$5,000,000**
70,000 sf @\$100 psf:
 4. Air conditioning*: n.a.

- **Strayer**
 1. n.a.
 2. n.a.
 3. n.a.
 4. n.a.

Secondary Schools

- **Freshman Center**
 1. n.a.
 2. n.a.
 3. n.a.
 4. n.a.

- **Quakertown High School**
 1. n.a.
 2. Additions for science labs, art, music, misc. activities: **\$ 7,000,000**
20,000 sf @\$260 psf; renovation/reconfiguration of existing administration for academic purposes:
10,000 sf @\$175 psf:
 - 3a. Renovation: general & mechanical systems: **\$38,000,000**
220,000 sf @\$140 psf:
 - 3b. Renovation **\$ 4,500,000**
 4. Air conditioning*:

see pgs 31, 32

* Estimated costs for air conditioning are INCLUDED in item #3 estimates.

Secondary Schools

- **Freshman Center**

1. n.a.
2. n.a.
3. n.a.
4. n.a.

- **Quakertown High School**

1. n.a.
2. Additions for science labs, art, music, misc. activities:
20,000 sf @\$260 psf; renovation/reconfiguration of existing
administration for academic purposes:
10,000 sf @\$175 psf: **\$ 7,000,000**
3. Renovation: general & mechanical systems:
220,000 sf @\$140 psf: **\$38,000,000**
4. Air conditioning*: **\$ 4,500,000**

100 Commerce Building (District Administration).

[Renovation costs developed in a previous study:]
40,000sf @ \$40psf (construction only) times 1.3 (*soft* costs): **\$ 2,000,000**

Facilities Building.

Minor renovation costs: n.a.

Stadium.

Minor renovation costs: n.a.

VI • Priorities & Recommendations

Note: *This final section of the Feasibility Study has deliberately been left incomplete, pending review and discussion of the entire document by the District administration, school board and others.*

Not all of the \$80,000,000 to \$90,000,000 in potential construction projects are of equal importance, some specific or conceptual items may have been omitted, other items may have been included that are not, in fact, appropriate. In the course of discussions over the coming weeks the District's priorities should be clarified, and this document revised as required. At the completion of that process, the District will have developed a plan that clearly sets forth its immediate building program priorities, those that should be addressed in the near future, and those items that should be reevaluated in the months and years to come.

The Architectural Studio appreciates the opportunity to work with the Quakertown Community School District in the process of creating and finalizing this plan.

The Architectural Studio
July 2006

Acknowledgments

As of this writing, a number of individuals and groups have had input into the structure of this report, as well as the broad scope of information and ideas it contains. We anticipate (and hope) that this circle will widen, but for now, the authors wish to express their thanks for the contributions of Dr. James R. Scanlon, Dr. James R. Newcomer, Ms. Sylvia Lenz, Ms. Debra M. Kopp, Mr. John McCabe, Mr. Mario Galante, many of the building principals and building custodians from the Quakertown Community School District; Quakertown Borough Manager David Woglom, Richlandtown Borough Secretary/Treasurer Ruth Lewis, and Richland Township Zoning Officer Richard Brittingham.

Author's Credentials

Paul Felder, AIA, APA, founded The Architectural Studio in 1974. He is a principal in the firm, a Registered Architect and a Licensed Professional Planner. He is the Principal-in-Charge and author of the Quakertown study.

Mr. Felder has prepared master plans and facilities studies for a number of school districts, including East Penn, East Stroudsburg Area, Northern Lehigh, Delaware Valley (NJ), etc. Among the several dozen Plancon projects he has designed are Jefferson Elementary School (East Penn School District), Tohickon Middle School (Central Bucks), J.T. Lambert Intermediate School (East Stroudsburg), Governor Mifflin High School (Governor Mifflin).

Mr. Felder is a graduate of Rensselaer Polytechnic Institute (B.S. in Building Science, B. Architecture) and Pennsylvania State University (M.S. Architecture). He currently serves on the Architecture Minor Advisory Board and teaches *Architectural Design and Theory* at Lafayette College, Easton, PA. His planning work has been honored by awards from the National Association of Housing and Redevelopment Officials, and his architectural design work by the American Institute of Architects and other organizations. His architectural theories were presented at the millennium convention of the American Institute of Architects under the title "*Post-Freudian Modernism: the failure of architecture in the 20th [and 21st (?) Century.*"

George Moore, AIA, is an Associate Principal of The Architectural Studio, where he has been employed since 1981. He is a Registered Architect with over thirty years experience, primarily in the field of Pennsylvania public schools. He has developed the analysis of existing facilities for the Quakertown Community School District study, and is the Project Architect for the District's administration building renovation project.

Mr. Moore studied at Pennsylvania State University and served in the U.S. Army from 1969-1972. He has been Project Architect for school projects totaling over one hundred million dollars in value, as well as for a variety of projects including housing, offices, retail, health care and institutional buildings.

Among Mr. Moore's projects are two new schools and two major renovations for the East Penn School District, new middle schools in the East Stroudsburg, Central Bucks and Pottsgrove School Districts, Navy Hall at Bloomsburg University, and an ongoing series of renovation projects at Carbon (County) Career and Technical Institute.

Lee F. Snyder, P.E., President, Snyder Hoffman Associates, Inc. Mr. Snyder is a Professional Engineer registered in Pennsylvania, New Jersey, Virginia, Delaware and Maryland. He holds a Bachelor of Architectural Engineering degree from Pennsylvania State University, and has 35 years of professional experience. He has developed the analysis of existing mechanical systems at Quakertown's facilities, and has worked with the District on a number of other projects.

Mr. Snyder's professional responsibilities have included overall administration; liaison between owner, review of mechanical and electrical design concepts, active involvement in the design process with emphasis on the HVAC system; quality control throughout the design phase; and detailed review of project construction documents prior to being released for bidding.

Mr. Snyder and his firm have collaborated with The Architectural Studio on numerous projects with a combined construction value over two hundred million dollars.