



A SENIOR HIGH SCHOOL  
FOR  
POTTSTOWN, PENNSYLVANIA

Submitted as required  
for the degree of  
Master of Architecture

from the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

September 1947

Signature of Author: \_\_\_\_\_

Signature of Dean: \_\_\_\_\_

1

285 Westgate West  
Cambridge, Mass.

September 10, 1947

Dean William W. Wurster  
School of Architecture and Planning  
Massachusetts Institute of Technology

Dear Dean Wurster:

I submit this report entitled "A  
SENIOR HIGH SCHOOL FOR POTTSTOWN, PENNSYLVANIA", in  
partial fulfillment of the requirements for the degree  
of Master of Architecture.

Respectfully,

James P. Storm

## ACKNOWLEDGMENTS

I wish to acknowledge with much appreciation the assistance and kind cooperation given to me by the following persons:

Dr. Frank M. Haiston, Superintendent of Schools, Pottstown, Pennsylvania

Mr. Stanley J. Davenport, Jr., Vice-Principal, Senior High School, Pottstown, Pennsylvania

Mr. Ralph H. Spare, Secretary, Pottstown Chamber of Commerce

To the entire faculty of the School of Architecture, I express my sincere appreciation, for their guidance not only during the preparation of this thesis, but throughout the entire time I have spent in the Department.

TABLE OF CONTENTS

	<u>PAGE</u>
INTRODUCTION . . . . .	1
BASIC CONSIDERATIONS . . . . .	4
FINANCIAL CONSIDERATIONS . . . . .	11
THE EXISTING SENIOR HIGH SCHOOL AND CURRICULUM . .	12
SELECTION OF A SITE . . . . .	15
PROGRAM FOR A NEW SENIOR HIGH SCHOOL PLANT . . . .	20
ANALYSIS AND SOLUTION OF THE PROBLEM . . . . .	32
BIBLIOGRAPHY . . . . .	45

## INTRODUCTION

Education is essentially a dynamic process through which individuals not only learn to adapt themselves to the socio-economic structure, but also equip themselves with the facilities to affect changes and to formulate plans. The school, or the formal educational program, may be regarded as a tool which aids in the discovery and development of human qualities and abilities, so that the individual may learn efficiently.

As modern civilization has developed into a highly specialized and complicated state, it has been necessary for schools to broaden their curricula, provide new physical facilities, and develop new ways of teaching. "The three R's do not constitute a sufficiently comprehensive education for the needs of modern life. Specific and definite provisions should be made in the formal educational program for the development of many-sided interests".<sup>1</sup>

To a great extent, educational programs have not been able to expand rapidly enough to keep pace with changing social and economic conditions. Lack of adequate planning and foresight, funds insufficient for any expansion, and lack of progressive thought among local school boards, are but a few of the reasons for the absence of needed educational facilities. The demands upon our public schools are growing;

<sup>1</sup> Fowlkes, John Guy. Planning Schools for Tomorrow - The Issues Involved. U. S. Office of Education

and, there exists a bold challenge to provide a wider and more extensive educational program, not only for children of school age, but for adults as well.

Among the broad trends and concepts which are apparent in education today, are the following:

1. The trend toward total enrollment is encouragingly steady, due to the demands of our economic structure.
2. Specialized education is becoming more widely available, with the emphasis upon the development of individual needs.
3. The use of the school building for increased evening adult education and recreation appears to be imminent.
4. Counseling and guidance services are being extended.
5. The school is being integrated to a greater extent with the civic and cultural institutions of the city.
6. Health and physical education are being emphasized to a greater degree.

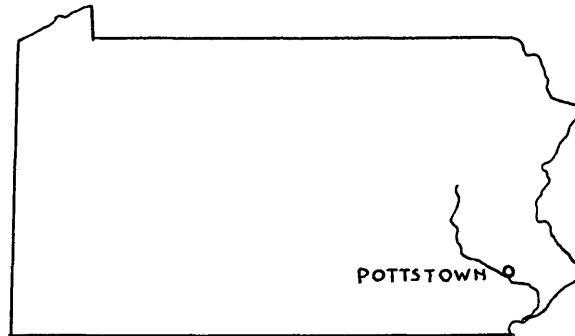
Many new school buildings will have to be built to take the place of obsolete plants which cannot be expanded, or cannot be maintained to meet accepted standards. The educational requirements of Pennsylvania are changing so rapidly that "our plants are not adequate for present needs, much

less for the future".<sup>1</sup>

The existing senior high school plant in Pottstown, Pennsylvania, is inadequate to cope with expanding programs and increased enrollments. A new building and site are needed, and it is desired by the Borough to provide these facilities as soon as funds are available. It is, therefore, my proposal in this report, and on separate drawings, to locate a desirable site for a new senior high school, and to design a plant which would fulfill the educational requirements of an expanding program.

<sup>1</sup> Ade, Lester K. The School Plant. Bulletin 86. Commonwealth of Pennsylvania, Dept. of Pub. Instruction. 1939.

BASIC CONSIDERATIONS



I. The Community

The Borough of Pottstown is located in Montgomery County, Pennsylvania, thirty-eight miles northwest of Philadelphia, on the Schuylkill River. Since its founding in 1753 by John Potts, a Colonial ironmaster, Pottstown has grown to an estimated population (1947) of 22,000<sup>1</sup>, with a total trading area population of 75,000. The latter figure includes the Borough and surrounding townships.

It is an industrial community, having fifty industries within the Borough limits, and eleven industries in the immediate outside area. At this date these fifty industries employ a total of 13,460 persons. The predominating industries manufacture metal products, textile products, and rubber tires. The larger industries are the Firestone Tire and Rubber Company, which is at present located outside the Borough limits, Bethlehem Steel Company, and the Doehler Die Casting Company, both within the Borough.

Reference to the map on page 5 will show the general

<sup>1</sup> 1940 population 20,194, U.S. Census



# MAP OF THE BOROUGH OF POTTSTOWN

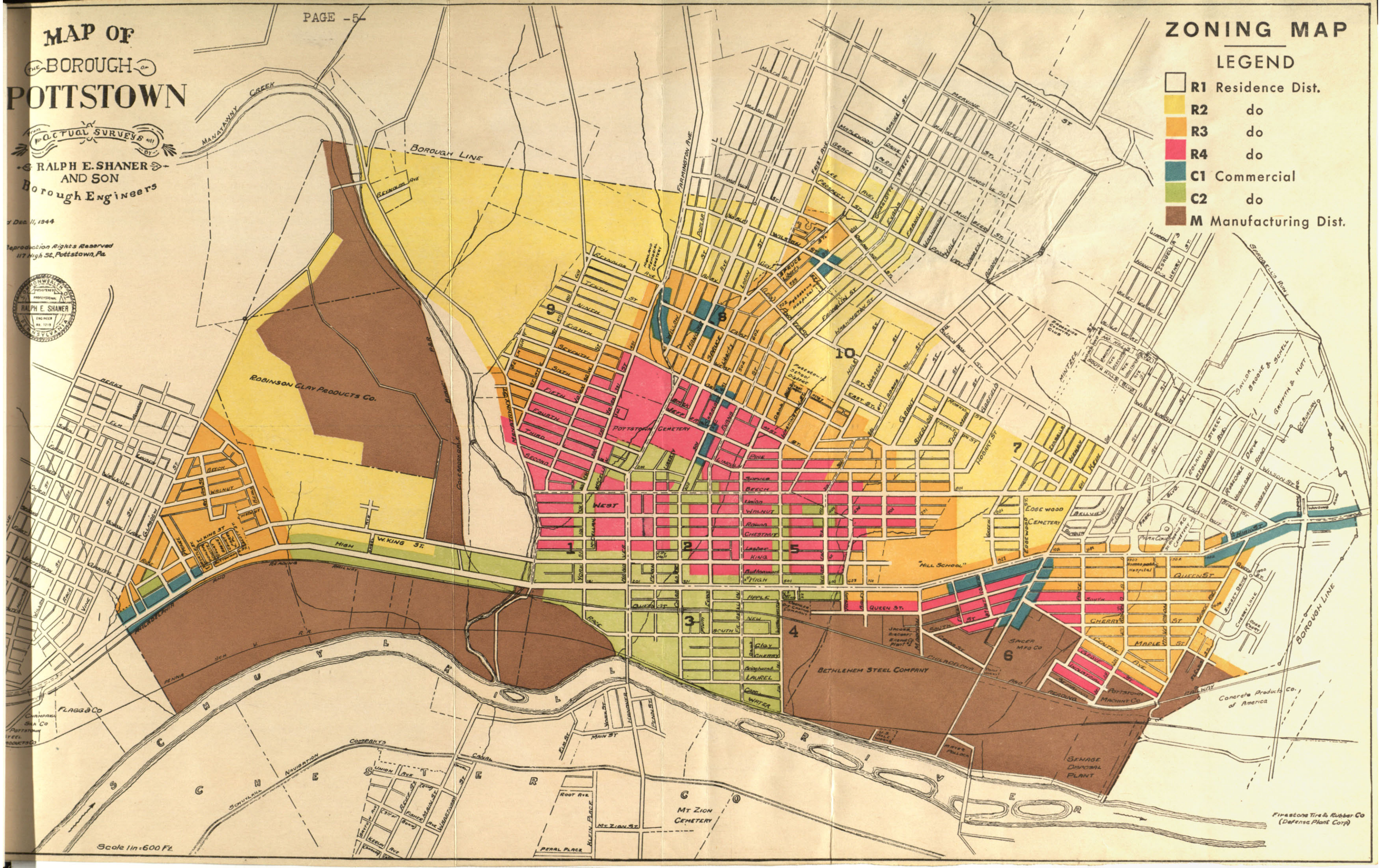
BY ACTUAL SURVEYS  
R. E. SHANER AND SON  
Borough Engineers

Dec. 11, 1944  
Reproduction Rights Reserved  
117 High St., Pottstown, Pa.



## ZONING MAP LEGEND

- R1 Residence Dist.
- R2 do
- R3 do
- R4 do
- C1 Commercial
- C2 do
- M Manufacturing Dist.



Scale 1 in = 600 Ft.

Pirestone Tire & Rubber Co  
(Defense Plant Corp)

land use within the Borough. The socio-economic opportunities are rather diversified for a community of this size, and its relation to other cities provides easy access to additional cultural and commercial facilities.

The population of Pottstown has been steadily increasing over the years. The population since 1920 has been as follows:

<u>Year</u>	<u>Total Population</u>
1920 .....	17,431
1930 .....	19,430
1940 .....	20,194
1947 (est.).....	22,000

A comparison with the trends in county and state population growth is shown by the graph on the following page.

The birth rate per 1,000 population has increased, as may be expected, from 23.6 in 1940 to a high of 42.8 in 1943, dropping to 40.06 in 1945.

Considering the high present birth rate, the increase in the employment of labor in industry, and the rate of increase in population during the last ten years, it is estimated that the population will be about 25,000 by 1955.

The population distribution by wards in 1940 was as follows:

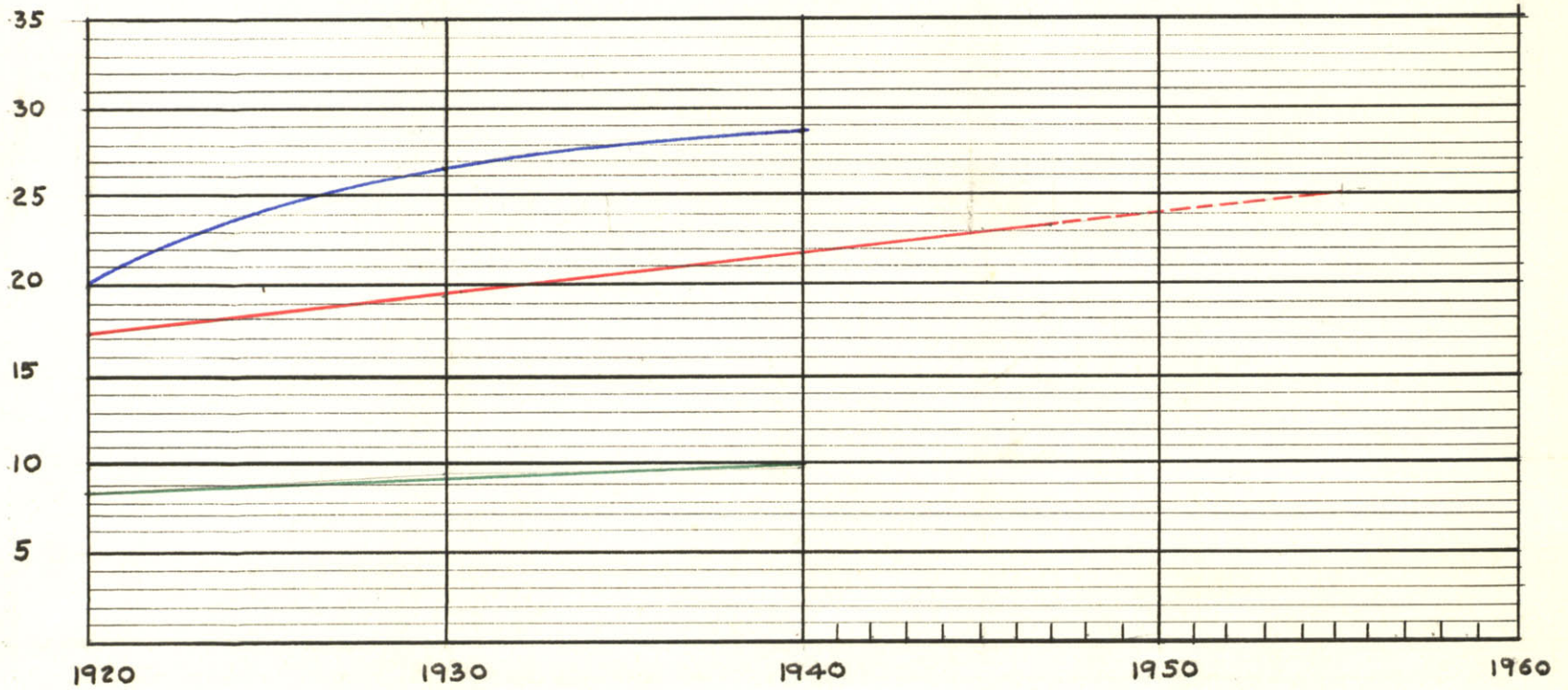
Ward 1 - 1,660	Ward 6 - 2,910
Ward 2 - 1,565	Ward 7 - 2,044
Ward 3 - 1,367	Ward 8 - 2,592
Ward 4 - 1,265	Ward 9 - 2,905
Ward 5 - 1,915	Ward 10 - 1,971

Ward numbers are noted in large black print on map,

# POPULATION

— POTTSTOWN  
— COUNTY  
— STATE

MULTIPLY POTTSTOWN FIGURES BY 1000  
" COUNTY " " 10,000  
" STATE " " 1,000,000



page 5. The direction of residential expansion is toward the Northern portions of the town, zoned as R1 residential districts.

## II. The Schools of Pottstown

The present educational system is composed of six grades of elementary school, three grades of junior high school, and three grades of senior high school. There are at present seven public schools in operation, five of which are of elementary grades, one junior high school, and one senior high school. Locations of the schools and the areas they serve are shown on the map, page 9. The location of a new elementary school site in the Northern portion of the town, is also shown.

The total enrollments of the public schools, by year and grades, are shown in the table below:

YEAR BEGINNING	GRADE									HIGH SCHOOL
	1	2	3	4	5	6	7	8	9	
1935	327	358	366	397	366	338	363	331	354	807
1940	264	241	283	265	310	292	375	344	417	1051
1941	263	254	236	287	270	293	327	349	408	1009
1942	266	254	233	234	262	266	327	301	407	908
1943	270	277	278	205	246	275	292	286	374	813
1944	292	291	214	268	215	257	302	300	346	800
1945	256	255	310	248	250	215	261	323	338	800
1946	307	249	269	287	225	243	245	285	360	844
1947 (est.)	317	339	272	284	300	236	252	226	296	1033

The percentage of the senior high school age group actually attending school is increasing steadily. In 1930 only 47.4% of persons of high school age were enrolled in schools, while

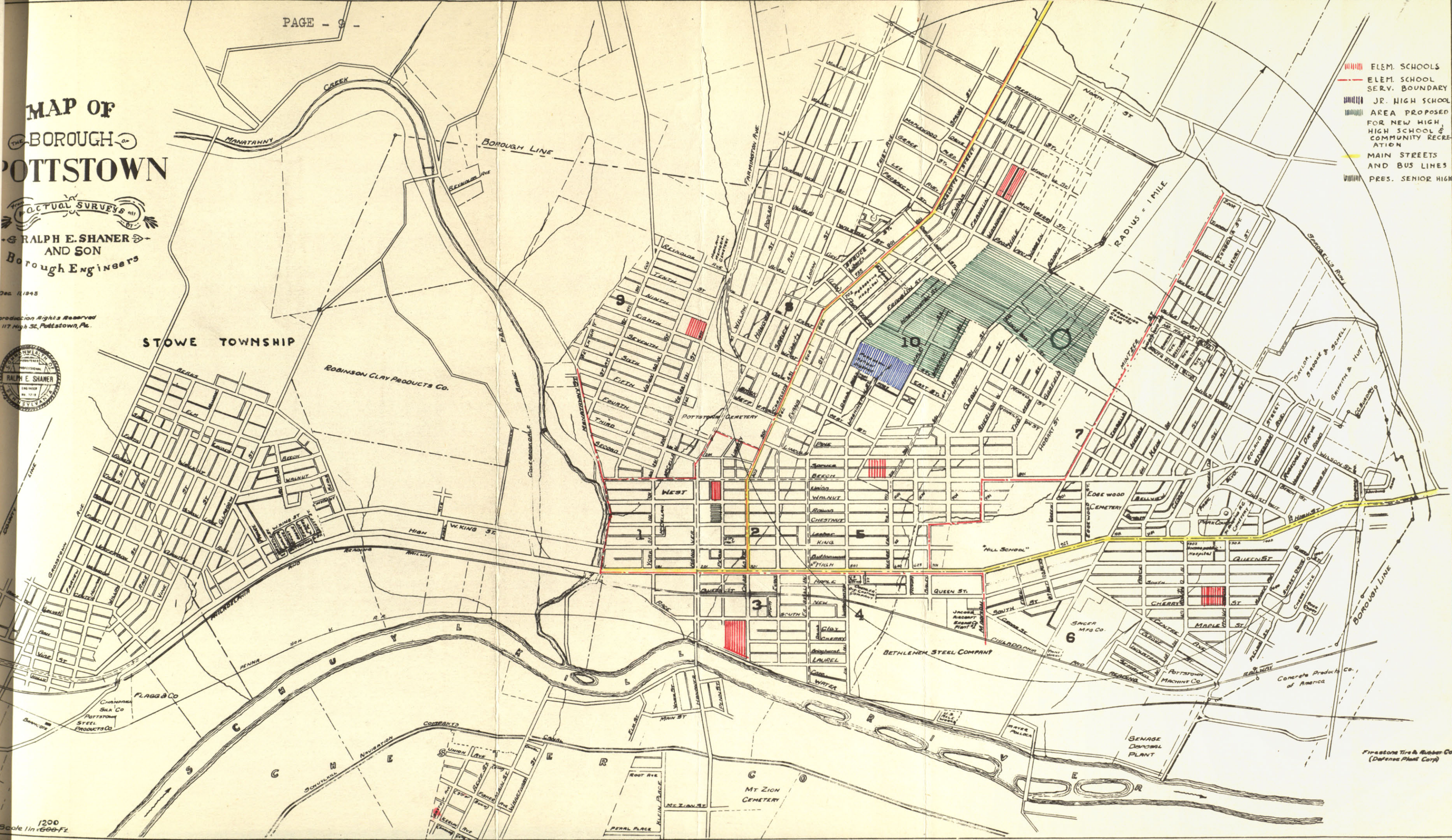
# MAP OF THE BOROUGH OF POTTSTOWN

ACTUAL SURVEYS BY RALPH E. SHANER AND SON Borough Engineers

Dec 11, 1945  
Production Rights Reserved  
117 High St, Pottstown, Pa.



- ELEM. SCHOOLS
- ELEM. SCHOOL SERV. BOUNDARY
- JR. HIGH SCHOOL
- AREA PROPOSED FOR NEW HIGH, HIGH SCHOOL & COMMUNITY RECREATION
- MAIN STREETS AND BUS LINES
- PRES. SENIOR HIGH



in 1940, 75% of the age group attended school. This increase was characteristic of the entire state, and it appears certain that the percentage of persons attending senior high school will continue to rise.

There are many factors which affect the enrollment of public schools. General population growth, increase or decrease in birth rates, economic conditions and job opportunities, are but a few. A more strict enforcement of compulsory education laws is certain to take place after a general relaxing during the war. The present age limit for compulsory education is 17 years. Social attitudes toward education in general indicate a growing increase in the number of students completing high school. The physical plant is another factor which may have more influence in holding students than is usually realized. A new school building would definitely create a more agreeable atmosphere for learning, and hence would have increased holding power over the student body.

Through examination of the above evidence, and through consultation with the Superintendent of Public Schools, it is recommended that a new senior high school plant should be designed for a minimum of 1,200 students, with adequate provision for expansion of facilities. It is not expected that a new plant could be constructed for at least eight years.

FINANCIAL CONSIDERATIONS

The Pottstown School District receives about 32.6% of its annual operating revenue from the state, or from the federal government through the state.

The assessed valuations for the school district are shown below, and reveal a steady increase from 1935 to 1947:

<u>Year</u> <u>Ending</u>	<u>Assessed</u> <u>Valuation</u>	<u>Total</u> <u>Enrollment</u>	<u>Assessed Valuation</u> <u>Per Student</u>
1935	\$11,139,420	4,007	\$ 2,780
1940	11,225,415	3,842	2,920
1945	12,786,800	3,256	3,930
1947	13,865,040	3,555	3,900

It is difficult to determine just when a new high school building could be financed. There are four outstanding bonds which will be paid in 1951, 1961, 1963 and 1965.

The possibilities of sources of revenue for a new building are briefly as follows:

1. The raising of the school tax rate from the present rate of 23 mills to the maximum rate of 25 mills.
2. The issuance of additional bonds.
3. Possible state and/or federal loan through new legislation.
4. Community gifts and subscriptions through a drive which would make the new school the center of a large community project.

## THE EXISTING SENIOR HIGH SCHOOL AND CURRICULUM

### I. The Building

The existing brick structure is composed of three portions, all of which are physically united to form one large building. The oldest portion was built in 1880, the next in 1923, and finally the addition of a vocational department was completed in 1936. The plant is located in a high density area, two blocks from the main shopping center. The building covers approximately half a block, extending to the sidewalk in three directions, and to the property line in the fourth. No additional space around the building is available to the students except that offered by the three enclosing streets. Varsity sport teams must use the athletic facilities which are available at the junior high school, one-half mile distant.

The plant has been unsatisfactory from the very beginning; poor lighting, noise and dirt from the streets, and no provision for outdoor recreation, are factors which inflict severe restrictions upon the educational program. Convenient access to transportation facilities can be deemed the only advantage to the present site.

### II. The Present Educational Program

The senior high school offers training in three elective fields; academic, commercial, and vocational (includes home economics). At the present time, about 35%



of the students are enrolled in the academic course, 27% in the commercial, and 38% in the vocational.

Subjects required under each course are as follows:

<u>Commercial</u>	<u>Academic</u>	<u>Vocational</u>
English	English	English
Social Science	Social Science	Vocational Mathematics
Shorthand	Languages	Vocational Sciences
Typing	Mathematics	Shop
Bookkeeping	Science	U. S. History

Electives which may be chosen by students of all these groups include; art, music, and practical arts. Homemaking, industrial arts, and typing are also electives for the academic group.

At the present time, the school staff includes 40 teachers plus administrators. The average class sizes are 30 students in academic classes, 30 in commercial, and 28 in vocational.

The usual pupil load is below the maximum set by state standards which is 20 periods of work per week, requiring reading and study, exclusive of health, music, and activities. Directed study and a full program of library, auditorium, gymnasium, and club work within the school day are preferable to a rigid study and recitation type of procedure.

The following general principles are followed in the program of studies:

1. All specialization belongs in the senior high school level. In this sense, college preparation is considered a specialized objective.

2. A common core of English, social studies, health, and physical education links the specialized courses together.

3. The practical and useful arts are encouraged.

4. A broad program of general education is carried as far as possible into the upper secondary levels, so that areas of instruction designed to be of highly practical value in post-school life will be placed as near the end of school experience as possible.

The trend toward evening adult educational offerings has been felt in Pottstown, and at the present time the enrollment of the evening vocational school is 102. Courses are offered in machine shop practice, drafting, electrical work, woodwork, mathematics, science, related work by trades, and regular school courses.

Additional adult classes may be expected in the subjects of home economics, child care, hygiene and home nursing. There is no prospect at this moment that community health services may be handled through the high school other than instruction groups as mentioned above.

When a new senior high school is constructed, it is possible that the present building may be devoted to a more extensive adult vocational and technical school, perhaps financed to a great degree by local manufacturers and merchants.

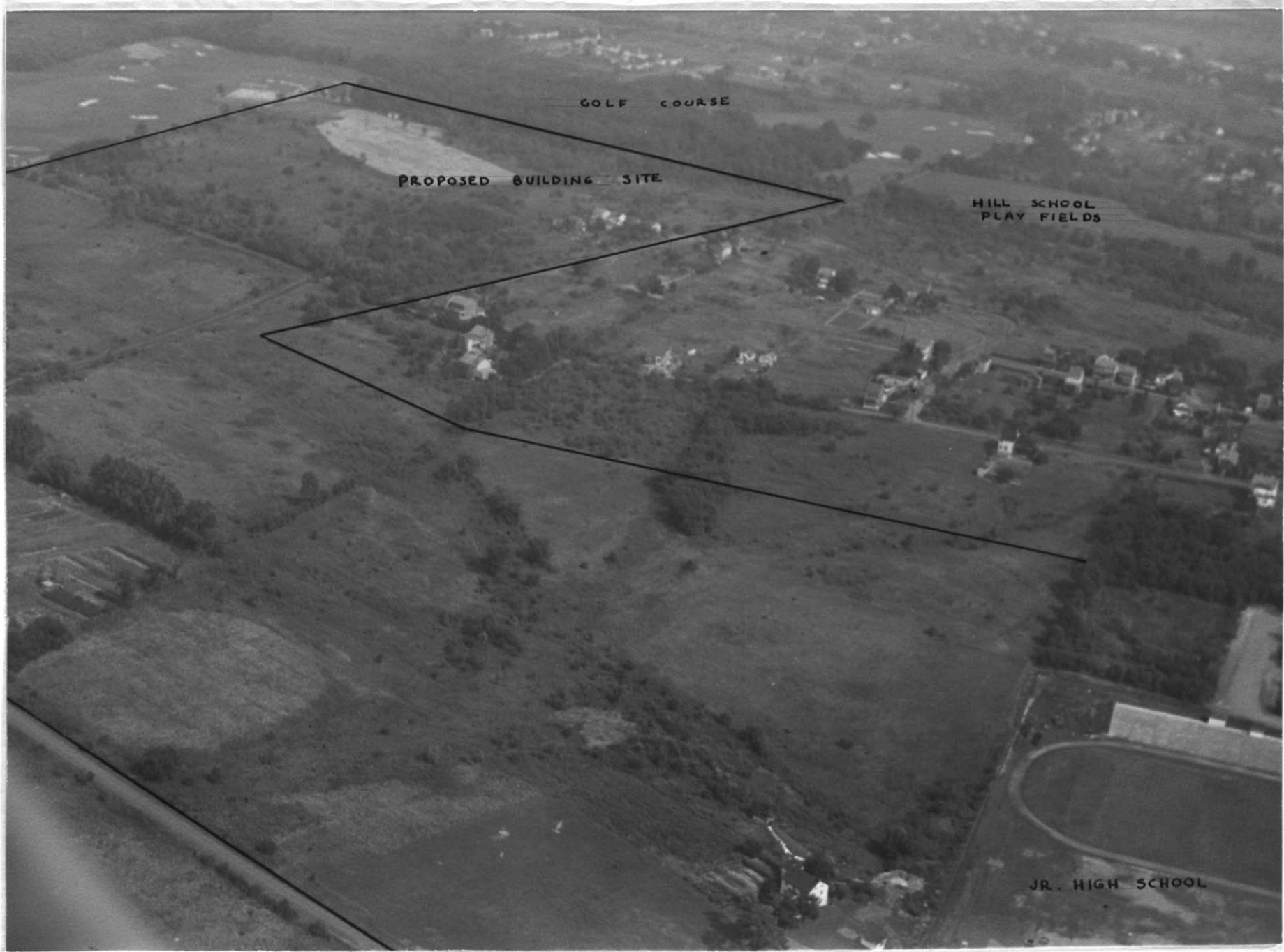
SELECTION OF A SITE

The basic criteria which were followed in the selection of a site may be listed as follows:

1. Central location is desirable, but with improved transportation facilities, it is less important than other factors.
2. Residential or rural areas are more desirable than highly industrialized or congested areas.
3. Freedom from hazards such as highways and railroads.
4. Future development of community must be considered.
5. Ample area must be allowed so that a full physical education program, future additions of the main building, parking, and service drives will all have space.
6. The site must be well drained, and slopes should be gentle for playground space.

After study of the community, there appears to be an open belt of land extending from the present junior high school northeast to Prospect Street, and then east to the golf course and country club. This land represents a large open area which will at some future date be well centralized in respect to the residential portions of the community.

(See map on page 19)



There were two portions of this large belt that were considered; one at the junction of Franklin and Wilson Streets, and the other on Jackson Street, adjacent to the golf course. The former location satisfies the first five of the basic criteria for a site, and also provides advantages by being adjacent to the junior high school. Common parking and athletic facilities could be provided, and space could be borrowed by each school as needed. However, preliminary drawings revealed the fact that serious drainage problems would have to be met in order to locate the building adjacent to the junior high school. The added expense of filling, plus possible future harm to the foundations due to ground water were considered to be serious detriments to this site.

The land finally chosen for the building is located upon a slightly convex ridge so that drainage is away from the building in two directions. It is immediately adjacent to the golf course owned by the Hill School<sup>1</sup>, but jointly used by the community country club which is located on the property. Also nearby, are the playing fields used by the Hill School.

The main entrance of the building faces on Jackson Street which, when joined to Wilson Street, will provide a logical and direct connection between the Northwest and Southeast portions of the community.

<sup>1</sup> A private boys' preparatory school of 500 enrollment.

It is proposed that such a location for a new senior high school would make it possible for the preservation of these large open spaces which still remain undeveloped, so that the Pottstown Hospital, the Junior High School, the new Senior High School, and the Hill School property would all be linked together.

The land is conveniently located for use as community athletic fields, gardens, and public parks. It is hoped that such a project would receive the backing of the entire community, and thus the financial burden would be shared with the school board.

The land is almost entirely privately owned. Only a small portion adjacent to the junior high school is now owned by the school board. The remaining land, however, is cheap, and would provide the community with the park and play space that it should have.

The new school building and general athletic fields would be located on approximately 105 acres of the land, north of the present Jackson and Wilson Streets. A varsity football field and cinder track could be located adjacent to the junior high school. Senior high school football teams will continue to play intra-scholastic games on the junior high school field where permanent bleachers are provided.

It is also proposed that a portion of Adams Street, which runs through the site, be deleted. This will in no way hinder northbound traffic since most cars run on

Charlotte and Franklin Streets.

The site for the building is semi-rural in character. There is a pleasant outlook in all directions, and an existing band of trees along the country club road adds to the attractiveness of the site.

Utilities would be available along Jackson Street, and connections to the sewerage system could be made at two points.

The slope of the land makes it necessary to terrace the athletic fields. This will involve considerable grading, which seems unavoidable, since all the available land presents the same problem.

PROGRAM FOR A NEW SENIOR HIGH SCHOOL PLANT

I. Scope of Program

Plan a new senior high school on the site chosen. Plan outdoor recreation areas, site development and parking facilities.

The building will house grades 10, 11, 12, and will be based on a minimum enrollment of 1,200 with adequate allowance made for future expansion.

Requirements are based upon present curricular offerings, with the provision for services that appear to be certain of adoption in the future. It is assumed that the public will use the school building to a greater extent than is now done. Public use of shops, classrooms, library, auditorium, gymnasium, and cafeteria may be expected.

Students will arrive at school on foot, by bus, automobile and bicycle. Out of district pupils may be brought by special bus, although no transportation is provided for these persons at the present time.

The requirements below are a result of personal interviews with school administrators, teachers, and recommendations which were compiled after a survey among the teachers by the high school principal.

II. Requirements

A. ADMINISTRATIVE SUITE:

- a. General office and public space
- b. Secretaries - 3



- c. Office for principal
  - d. Office for vice-principal
  - e. Attendance office
  - f. Conference space for principal and vice-principal
  - g. Storage room for supplies
  - h. Vault
  - i. Work space for mimeographing, filing
- B. GUIDANCE AND STUDENT COUNSELING:
- a. 2 offices for counsellors with waiting space
  - b. 1 secretary
- C. FACULTY FACILITIES - 60 MEMBERS IN FACULTY
- a. Faculty lounge and library
  - b. 2 small offices for staff members without permanent room assignments
  - c. Rest room and lounge for men
  - d. Rest room and lounge for women
- D. HEALTH CENTER
- a. Waiting room
  - b. Medical dispensary and first aid supplies - Nurse's workroom. Must be 22 ft. long for eye examinations.
  - c. Dressing rooms - 8 booths approx. 50 sq. ft. - used as rest booths and for isolation, if necessary.
  - d. Examining room - 140 sq. ft.
  - e. Dental room - 140 sq. ft. - small dark room and

work space

f. Dressing room, lavatory and washroom for nurse

E. CLASSROOMS, LABS., SHOPS FOR INSTRUCTION

a. Average of 30 pupils per class

b. English Section

(1) 9 classrooms - standard facilities

(2) 1 drama and literature room for use in conjunction with study in English classes; equipped for visual education.

(3) 1 journalism classroom, with space adjoining for school paper staff, school annual staff, dark room, and picture studio.

(4) 1 speech correction room. Facilities could be provided in a general purpose classroom for this.

c. Social Science

(1) 8 classrooms - standard

(2) 1 social science laboratory; equipped for visual education.

d. Mathematics

(1) 2 classrooms - standard facilities

e. Languages

(1) 4 classrooms - standard facilities

f. Laboratories and Special Subject Classrooms

(1) 2 general science lecture rooms, standard facilities, except storage, sink and work

space.

- (2) 1 biology laboratory
- (3) 1 chemistry laboratory
- (4) 1 physics laboratory
- (5) 1 photography laboratory - darkroom, work room

g. Art Studios - total area approx. 1,500 sq. ft.

Provide space for arts and crafts, general arts, and ceramics.

h. Commercial - approx. 25% or 300 students

- (1) 2 classrooms, standard facilities
- (2) 2 typewriting rooms
- (3) 2 stenography rooms
- (4) 1 office practice room
- (5) 2 bookkeeping rooms
- (6) 1 office and conference room
- (7) 1 storage room

i. Home Economics - Average of 25 students to the class

- (1) 1 clothing and sewing laboratory
- (2) 1 foods laboratory
- (3) 1 home planning laboratory - simulate the best home conditions in dining and living space, bedroom, bath and kitchen.

j. Music

- (1) 1 large music room, adaptable for use by

orchestra, band, and glee club - should seat 80 to 100 students with chairs, instruments, stands, platforms, and piano.

- (2) 4 individual practice and dressing rooms
- (3) 1 wardrobe for storage of band uniforms
- (4) 1 instrument storage room
- (5) 1 music library storage room
- (6) Lavatories and washrooms for both boys and girls

k. Vocational - average of 25 students to each class

- (1) 1 mechanical drawing room
  - 1 blueprint room
  - storage room
- (2) 1 machine shop
  - supply and equipment storage
  - tool and parts storage
- (3) 1 electrician's shop - add'l facilities as above
- (4) 1 wood shop - add'l facilities as above
- (5) 1 printing shop - similar add'l facilities as above
- (6) 2 classrooms for general instruction
- (7) Instructors' office space
- (8) Dressing and locker space, washroom and toilet facilities

F. PHYSICAL EDUCATION FACILITIES FOR BOYS AND GIRLS

- a. Gymnasium for boys - 565 enrollment, 5 periods daily. Main floor regulation basketball court,

divided by partition for 2 basketball courts.  
Seat 2,000 spectators in bleachers, preferably  
movable.

- (1) General locker - dressing room and showers,  
60 at one time
  - (2) Office space for 2 instructors - waiting  
space
  - (3) First-aid room; could be part of instructor's  
office
  - (4) Dressing - shower room and lavatory for  
instructors; used as officials' dressing  
room on game day
  - (5) 1 storage room for game equipment and  
supplies
  - (6) 1 receiving and repair space
  - (7) 1 team room - lockers and dressing space  
for 100 boys
  - (8) 1 visiting team room. Clothes hanging space  
for 25 boys - used as small games room other-  
wise.
  - (9) 1 corrective room for 50 boys
  - (10) 1 janitor's quarters and storeroom
- b. Facilities for girls - 635 enrollment, 5 periods  
daily - half of main floor with basketball and  
badminton courts

- (1) Locker-dressing rooms and showers - 5 or 6 individual showers and dressing rooms.  
1 gang or group shower for 60
  - (2) Office space for 2 instructors, waiting space
  - (3) Dressing, lavatory space for instructors.
  - (4) 1 first-aid room - may be part of instructor's office
  - (5) 1 corrective room
  - (6) 1 janitor's quarters and storeroom
- c. 1 double health education classroom
- d. Public entrance to gymnasium. Ticket booths - men's and women's lavatories
- e. Swimming
- (1) Regulation 5-lane swimming pool
  - (2) Seating for 200 spectators
  - (3) 1 filter equipment and power room, water to be heated
  - (4) 1 storage for pool maintenance equipment
  - (5) 1 office for swimming instructor
- f. Playfields
- (1) Boys  
2 football practice fields for senior high - used for baseball in Spring.  
1 cinder track  
Field for physical education classwork and small games.

(2) Girls

8 hockey fields - used for softball in Spring.

1 field for physical education work

1 archery course

g. Outdoor Courts

(1) Boys

Practice areas for:

2 basketball

High jump

2 volleyball

Broad jump

4 handball

Pole vaulting

Discus

Track & Hurdle events

(2) Girls

2 basketball

2 volleyball

4 badminton

(3) Boys and Girls - 6 tennis courts

G. LIBRARY

a. 1 main reading room and loan desk

b. 1 office for librarian

c. 1 workroom for filing, indexing, repair

d. Space off main reading room for card catalog and reference books

e. 3 conference rooms

f. Exhibit space - books, documents, etc. Also art display

g. Sanitary facilities

Dressing room, washroom and lavatory for staff. Provisions for students readily accessible.

- h. Audio-visual room for previewing, screening, listening to records, etc.

#### H. CAFETERIA

- a. 1 dining room for students - 400 at a time
- b. 1 faculty dining space to seat 20 at a time
- c. 1 kitchen
- d. 1 steam table space and service counter
- e. 1 dishwashing room and storage for dishes
- f. 1 food preparation work space; work table, movable and portable storage bins; food mixers. Portable bins for flour, cereals, dried fruits, beans, etc.
- g. Refrigeration: 1 walk-in for meat, 1 walk-in for vegetables and milk in large quantities. Ice cream and deep freeze cabinets.
- h. 1 provision storage room
- i. Dressing room, washroom and lavatory for kitchen help

#### I. AUDITORIUM

- a. Main assembly hall for 1200 persons
- b. Foyer
- c. Public lavatories, men and women. Wrap checking room.



- d. Ticket booth
- e. Stage
  - (1) Loft for scenery storage
  - (2) Wide proscenium. Depth of stage equal to working space and ten feet.
  - (3) Space in front of curtain for speaker
  - (4) Orchestra space in front of stage
  - (5) Stage electric panel - controls all stage and house lights on individual and master switches and dimmers.
- f. Workroom; construction of scenery. Storage of paint, miscellaneous gadgets.
- g. Property room for storage of stage properties
- h. Costume room
- i. Makeup room
- j. Dressing rooms; one for boys, one for girls
- k. Lavatories and washrooms for boys and girls
- l. Janitor's storage and workroom
- m. Storage for heating, electric service
- n. Provisions for showing motion pictures
- J. CENTRAL STOREROOM FOR GENERAL SUPPLIES AND EQUIPMENT
  - a. Storeroom, school supplies
  - b. Storage space for furniture, cabinets and other equipment temporarily out of use.
  - c. Receiving space and workroom
- K. SERVICE FACILITIES
  - a. Book lockers for 1200 students - storage for rubbers, umbrellas, rain coats.

- b. Student toilet and washrooms
  - c. Drinking fountains
  - d. Public telephones - pay stations for students use
  - e. Outdoor court for student assembly where students congregate before school and at noon
  - f. Campus and building exterior lighting system
  - g. Public address and radio, intercommunication service, clock and bell service, public telephone service; all operated on master system.
- L. BUILDING MAINTENANCE STORAGE
- a. Janitor storeroom (300 sq. ft.)
  - b. Janitor workroom
- M. GROUND UPKEEP STORAGE
- a. Gardener's equipment and supply storage (300 ft.)
  - b. Work space for gardener
- N. PROTECTED STORAGE FOR BICYCLES
- O. MECHANICAL EQUIPMENT
- a. Heating room (3600 sq. ft.)
  - b. Space for pumps, compressors, tanks
  - c. Provide ample duct and pipe space
  - d. Fuel storage and service
- P. GROUNDS DEVELOPMENT
- a. Automobile parking
    - (1) Students, day and evening
    - (2) School staff
    - (3) Public; occasional business calls and

parking for school functions, athletic  
programs

- (4) Bus loading zone
- (5) Visiting team bus parking

ANALYSIS AND SOLUTION OF THE PROBLEM

I. Spacial Relationships

Probably the most difficult problem to solve is that of providing easy access to the facilities used by the public. The auditorium, gymnasium, cafeteria, library, swimming pool, and vocational shops, will probably be all available for public use. The general classrooms must be able to be shut off from the public space, although provisions should also be made for isolating groups of classrooms.

Through a process of elimination, a scheme was finally adopted which provided for one large public lobby from which the auditorium, gymnasium, library, cafeteria, swimming pool, administrative suite, and music rooms were readily accessible. Such a common lobby must, of necessity, get quite large, although the crowds to be handled at peak times may require such an ample space. It is thought that this lobby will act as a "living room" for the whole school, providing space for after-lunch hour relaxation, lounging, exhibitions, and indoor gardens.

The remaining relationships of units by which the solution was guided, are as follows:

A. ADMINISTRATIVE SUITE

- a. Centrally located in respect to other school units.
- b. Easily accessible to the public. On or near

service road and public parking space.

- c. Principal's office related to public and staff.  
Vice-principal's office related to students and counselors.
- d. Attendance office closely related to students and to vice-principal.
- e. Principal's and vice-principal's offices controlled through the outer office. Secretary to principal adjacent to his office, controlled through outer office.
- f. Conference room easily accessible to administrative offices.

B. GUIDANCE AND STUDENT COUNSELING ROOMS

- a. Convenient to general office and vice-principal's office.

C. FACULTY FACILITIES

- a. In administrative unit, but preferably secluded from student general traffic.

D. HEALTH CENTER

- a. Accessible first to pupils, both from corridor and from outside of building.
- b. Close to administrative office for access to students records.
- c. Close to public lobby.

E. CLASSROOMS, LABS., SHOPS FOR INSTRUCTION

- a. Preferably in wings - related subjects together.

- b. English and Social Science classes should be nearest the library.

F. LABORATORIES AND SPECIAL SUBJECT CLASSROOMS

- a. Group together: chemistry, physics, biology, photography.
- b. Art - near homemaking rooms, shops.

G. COMMERCIAL CLASSES

- a. All rooms in a unit

H. HOME ECONOMICS

- a. Closely related to science group, shops and art.  
It is assumed that in a school of this size, the home economics teacher would not be responsible for the functioning of the main cafeteria.

I. MUSIC

- a. Away from classrooms, but easily accessible to the auditorium

J. VOCATIONAL

- a. Mechanical Drawing - related to mathematics, science group, and shops.
- b. Rest of shops closely related, but separate units.
- c. Individual shop classrooms part of shop floor space; glass partitions to separate for supervision purposes.
- d. Shops located some distance away from classrooms and the library.

K. PHYSICAL EDUCATION FACILITIES

- a. Boys' Gymnasium

- (1) Convenient to boys' playfields, game fields and diamonds.
- (2) Dressing-shower room approach and entrance easily accessible to swimming pool.
- (3) Available to visiting teams, public parking, and students for parties.

b. Girls' Gymnasium

- (1) Convenient to girls' playfields, game fields, diamonds.
- (2) Dressing-shower room approach and entrance easily accessible to swimming pool.
- (3) On service road. Second priority to public parking.

L. SWIMMING

- a. Located in respect to gyms so that dressing rooms in gyms may be used for both day school classes and summer recreational groups.
- b. Admission to pools must be controlled.

M. PLAYFIELDS

- a. Stadium and football field furthestmost from gymnasium.
- b. Small games courts and areas close to gyms.
- c. Practice fields between physical education outdoor field and stadium.
- d. Stadium must be easily accessible to crowds and approaches should have ample parking space.

- e. Tennis courts and softball diamonds should be easily accessible to the public. Convenient public parking space essential.

N. LIBRARY

- a. Centrally located in respect to all classrooms.
- b. Convenient from all points of building.
- c. Must be in quiet spot. Controlled as to most of detracting influences, such as ballfield, swimming pool, parking and public roads.

O. CAFETERIA

- a. Good relationship to other social centers; auditorium, pool, close-in playfields.

P. AUDITORIUM

- a. In open area to accommodate large crowds. Convenient to public roads for handling automobile traffic from parking areas.
- b. Convenient from all points on campus.

Q. CENTRAL STOREROOM FOR GENERAL SUPPLIES AND EQUIPMENT

- a. Receiving entrance on service road.
- b. Dispensing service to corridor.

R. BUILDING MAINTENANCE

- a. Central storage and workroom on service road. Small locker storage each wing for daily cleaning supplies and equipment.
- b. Not to be part of gardener's storage.

S. BICYCLE STORAGE

- a. Protected from rain and snow; racks and locking



provision; convenient to public roads.

T. MECHANICAL EQUIPMENT

- a. Heating centrally located.
- b. Air distributing equipment split into zones -  
separate housing space.

II. Orientation

The prevailing winter wind direction for Pottstown is northwest, while summer winds prevail from the southwest. In the winter months, there is a predominance of cloudy weather.

I have placed the classroom wings on two floors, and have oriented the classrooms slightly south of west so that direct sunlight, when entering the room, will come from the left and rear of pupils seated in the rooms. West orientation is considered preferable to east, since the latter would cause pupils to face the glare of the sun in morning hours.

There are many differences of opinion in regard to classroom orientation, especially where unilateral lighting is employed. North orientation eliminates direct sunlight and eases brightnesses and contrasts, yet is psychologically undesirable for classroom use, and does not recognize the benefits of heat from the sun.

The orientation I have chosen will permit some sunlight to enter the classrooms at all seasons of the year. Classroom lighting is discussed more specifically in the section on

lighting.

The classroom wings will not be perpendicularly opposed to the prevailing winter breezes, but will be directly opposed to the southwest breezes in late spring and summer.

Northlight is considered desirable in the shops, drawing and art rooms. North saw-tooth lighting has also been extended over the library to give a high level of evenly distributed natural light. Direct sunlight and a view are available through lower, southern windows of these spaces.

Biology and physics laboratories are exposed to south and east light, respectively, so that experiments requiring sunlight may be conducted.

The cafeteria and swimming pool have been oriented to permit the entrance of maximum sunlight.

### III. Use of the Site

The long axis of the building has been located on a slightly convex ridge of land so that natural drainage will occur away from the building on both sides, and the minimum amount of grading will be necessary.

Ample space is provided on the land for future expansion. The building has been set well back from the roads, and wooded space has been left between the school and the country club property.

It has been attempted to preserve as much as possible the existing trees and the informal semi-rural nature of the site and surrounding land.

Playfields are terraced and extend down the slope from the building. The boys' varsity practice field has been located furthest from the building, while the fields for general physical education classes are located near the proposed school-- accessible without crossing any roads.

### IV. Structure and Materials

It has been attempted to create an inviting, informal type of school structure which will serve as a shell for learning and the broadening of personal experience. No attempt is made to create a public monument of the traditional, institutional type. It is considered much wiser to provide a simple less expensive structure which will permit expansion and flexibility, and which will have a substantially

long life to be a sound economic venture.

I have provided what are essentially loft spaces in the classroom wings, workshops, laboratories, and library. Temporary partitions divide the space, and future changes may be made at any time without altering the structural system. Additional classrooms may be added as needs demand.

Pennsylvania school law does not require the use of fire-proof construction for two-story buildings in districts of the third or fourth class.<sup>1</sup>

Steel frame construction will be used throughout the building. A light steel framing system will be used in all parts of the building except the gymnasium and the auditorium, where spans of 120' and 90' are met. Steel arch construction is used in the gymnasium, while steel trusses span the auditorium.

Exterior surfacing materials are brick, transite, and 2" asbestos cement board.

Steel window sash is used throughout.

Interiors will be finished in plaster, natural wood, and composition board. Outside walls and roofs should be adequately insulated.

The shops, laboratories and library will have light-weight steel saw-tooth trusses overhead. Trusses will be

1. Pottstown is a third class district.

exposed in all spaces except the library, where they will be boxed in plywood. Sloping ceilings will be of wood and painted, or of acoustic plaster (in library).

The auditorium interior will be finished in plaster and plywood. The proscenium wall will be of structural tile.

First floor construction is mainly of concrete slabs, with finish surfaces laid on the concrete.

The boiler room is enclosed by fireproof walls and ceiling. Doors must be fireproof also.

#### V. Heating and Ventilating

A central boiler plant in the basement under the cafeteria will supply steam to the various parts of the building where the heat will be transferred to air or water.

A system of direct heating with forced unit ventilation air supply and corridor fan exhaust will be used in the classrooms, library, administration, and health suites. Direct radiation is supplied under the windows to warm the rooms quickly in the morning and to help carry the load in very cold weather. Normally, the capacity of the heating coils in the unit ventilator is sufficient to carry the load throughout the day. Unit ventilators are of the silent fan type, and will discharge air upwards. The units are centrally located along the outside wall of each room. Exhaust grills are spaced close to the floor along the corridor wall.

Unit heaters supplemented by direct radiation will be used in the shops, home economics laboratories, and art room.

The auditorium will have a separate warm air system with fan exhaust.

The gymnasium will be heated by unit heaters.

The swimming pool will be heated by steam radiant heat coils under the pool and in the ceiling.

The cafeteria, lobby, and kitchen are heated from one warm air system.

Separate exhaust systems will be provided in the kitchen, toilet rooms, locker rooms, projection booth, and chemistry laboratory hoods.

The stage is equipped with a required automatic (fusible link) ventilator house.

## VI. Lighting

Orientation for light of the various units has been briefly discussed elsewhere. The main problem of securing adequate, controlled illumination occurred in the classroom wings where a two-story scheme dictates unilateral lighting on at least the lower floor, unless a rather complicated structure is used. I have used unilateral light on the first floor, and bilateral light on the second, giving an even distribution of natural light in at least half the rooms.

On the lower floor, a 12-foot ceiling height is used, giving a window to floor ratio of approximately 38%. Ceilings are as close as possible to the tops of the windows to aid in reflecting the light, and to eliminate an excessive

contrast at the junction with the window. Fluorescent lighting will be used in all classrooms with automatic control installed on the first floor to insure ample light along the inner rows of seats. Indirect fluorescent fixtures will be spaced in two rows running in the long direction of the room. The underside of the fixtures will be painted white.

Excessive brightness from the open sky render much discomfort for those pupils sitting near the windows. Prismatic glass blocks which redirect outside light to the interior ceiling have been considered in solving this problem, but are thought to be psychologically poor, as well as having excessive weight.

Perhaps a thin prismatic pane which would redirect light to the ceiling would be much more satisfactory. However, such thin glass is not known to be made in this country.

Horizontal sheet steel louvers are used to direct sunlight to the ceiling from the east side of the second floor classrooms.

Vertical sheet steel louvers 4" wide, and spaced 3-1/2" apart are used along the western exposure of the classrooms. A complete cut-off of the sky is obtained from a forward line of sight to a line 45° from it.<sup>1.</sup>

1. Allphin, Willard. "Brightness Control in a Model School-room". Illuminating Engineering, January, 1946.

Natural lighting in the other units of the building has been discussed under the subject of orientation. Artificial light will be mainly fluorescent, due to its longer life and less expensive operation. The color of the fluorescent light will simulate that of daylight. Incandescent lighting will be used in combination with fluorescent in spaces used for larger assembly; such as the library, lobby, auditorium, cafeteria, gymnasium, and swimming pool. Illumination will be indirect and semi-indirect.



BIBLIOGRAPHY

- Ade, Lester K. The School Plant. Also, Secondary School Manual for Pennsylvania. Commonwealth of Pennsylvania Dept. of Public Instruction, 1939.
- American Educational Research Association. Review of Educational Research. School Plant and Equipment, February 1945.
- "Building Types - Neighborhood Schools", Architectural Record, July 1945.
- Brown, Leland H. The Design of Classrooms for High Level Daylight Illumination. Illuminating Engineering, Vol. 36, pages 411-22, 422-24, March 1941.
- Caudill, William Wayne. Space for Teaching. Bulletin of the Agricultural and Mechanical College of Texas, August, 1941.
- Connecticut State Department of Public Instruction. School Building Code, 1941.
- Fowlkes, John Guy. Planning Schools for Tomorrow - The Issues Involved. U. S. Office of Education.
- Harvard Committee. General Education in a Free Society. Harvard University Press, Cambridge, Mass., 1945.
- Lighting Committee of the Building Research Board of the Dept. of Scientific and Industrial Research. The Lighting of Buildings. Post-war Building Studies No. 12, London, 1944.
- National Education Association of the United States. Education for All American Youth, 1944.
- National Recreation Association. Standards - Playgrounds, Playfields, Recreation Buildings, Indoor Recreation Centers, 1943.
- Putnam, Rex. A Manual for School Building Construction. Superintendent of Public Instruction, Salem, Oregon, 1947.
- Sherer, F. R. Community Planning for Schools. Indiana Univ. School of Education. Bul. 22: 21-4, July, 1946.

Stiles, Dan. High Schools for Tomorrow. Harper, 1946.

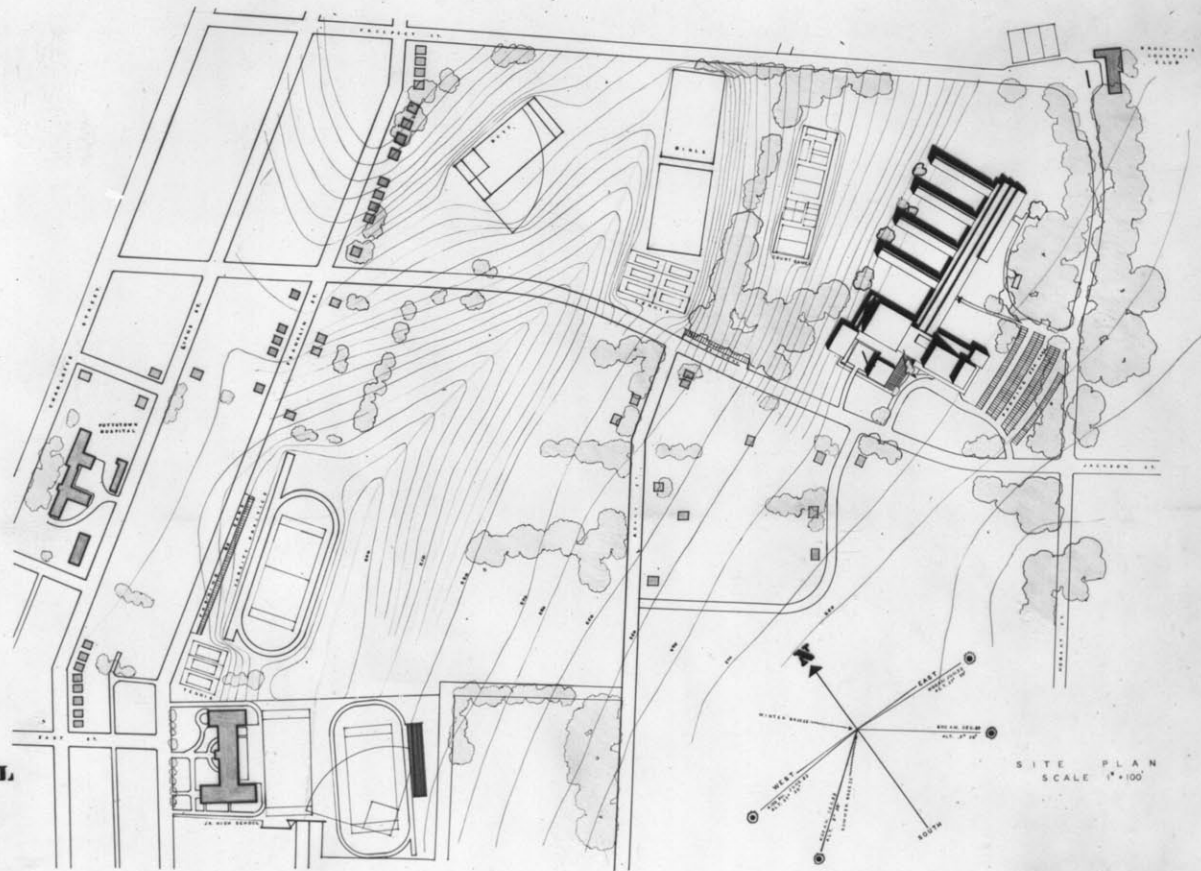
Strayer and Engelhardt. Standards for Senior High School Buildings. Bureau of Publications, Teachers' College, Columbia University, N. Y., 1924.

University of State of New York, State Education Dept.  
Planning the Outdoor Physical Education Facilities for Central Schools.  
Planning the Indoor Physical Education Facilities for Central Schools.  
Heating and Ventilating Recommendations for New York State Schools.



THE BOROUGH OF POTTSTOWN

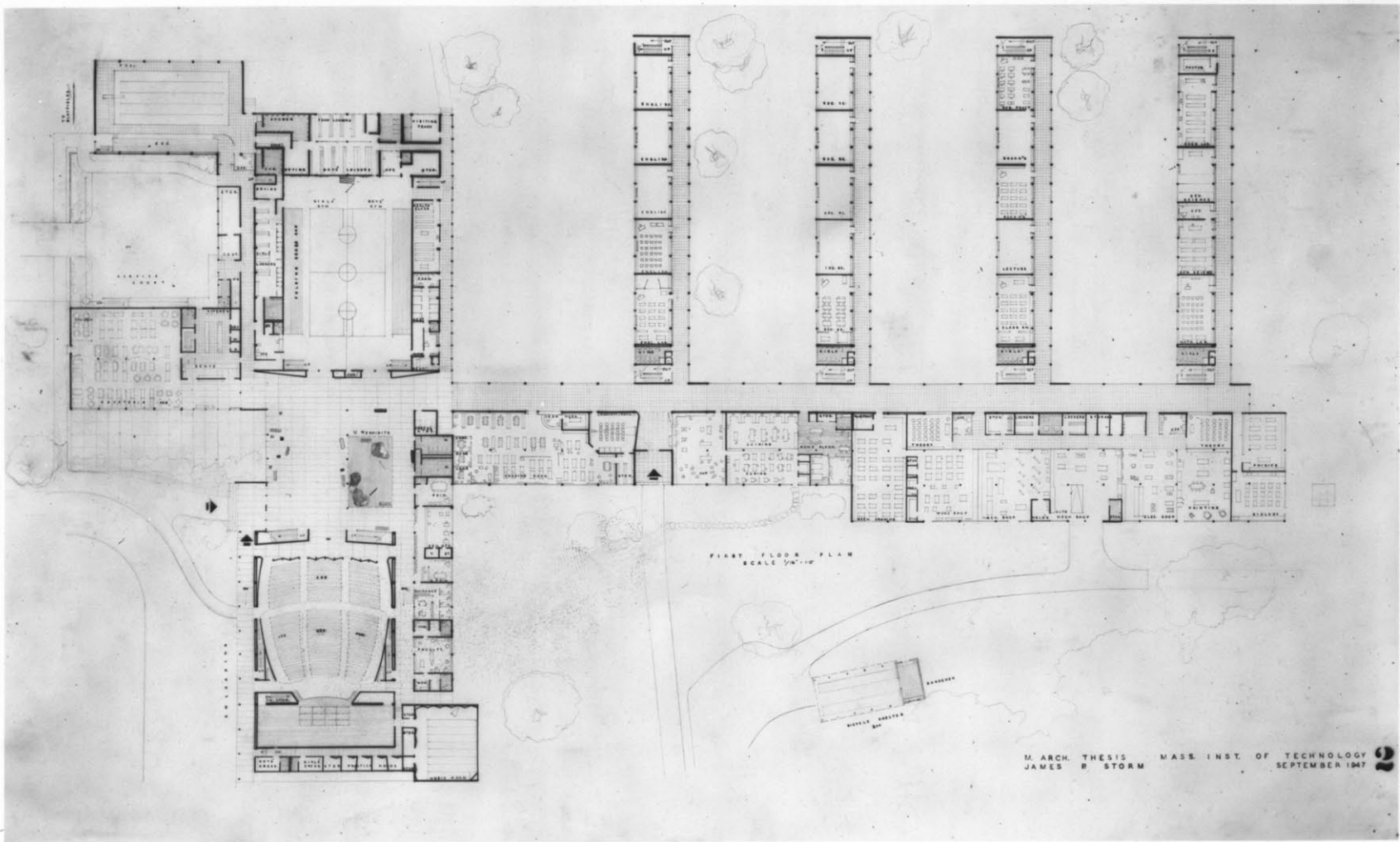
**A SENIOR HIGH SCHOOL  
FOR POTTSTOWN PA**



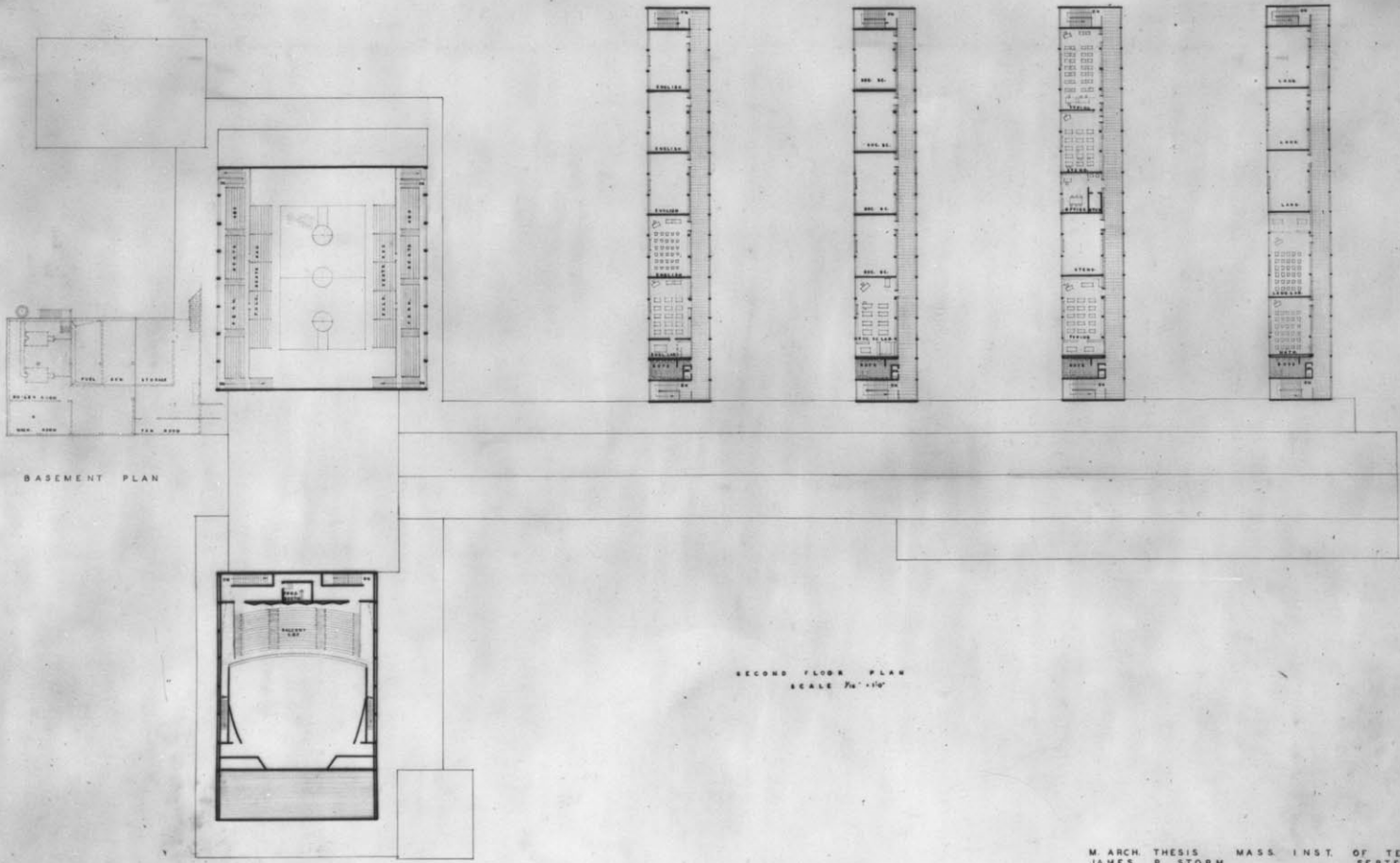
SITE PLAN  
SCALE 1" = 100'

M. ARCH. THESIS  
JAMES P. STORM

MASS. INST. OF TECHNOLOGY  
SEPTEMBER 1947



M. ARCH. THESIS MASS. INST. OF TECHNOLOGY  
JAMES P. STORM SEPTEMBER 1947



BASEMENT PLAN

SECOND FLOOR PLAN  
SCALE 1/8"

