A gauging of the maximum flow of the week at the 10-inch outlet, reduced to 3-inch radius, gave a depth of flow of 1.75 inches. A similar gauging in the 6-inch laundry sewer gave a maximum flow at the time of greatest use of 2.25 inches.

The stream discharged by the 10-inch sewer would fill a pipe 2.96 inches in diameter running at the same velocity. The stream discharged by the 6-inch laundry sewer would fill a pipe of 3.51 inches running at the same velocity. The total sewage discharged by both sewers—the maximum flow from a population of 659—supposing its velocity to be the same, would fill a pipe 4.58 inches in diameter. Some light is thrown on the value of this investigation by the fact that the sewer committee of Taunton seriously proposed that the State of Massachusetts should, in consideration of an outlet being furnished for this sewage, join them in constructing a main sewer several miles long, a large part of it being over 5 feet in diameter, the estimated cost being $114,000.

All of which is respectfully submitted.

GEO. E. WARING, JR.

Dr. T. J. TURNER,
Secretary National Board of Health.

APPENDIX H.

SCHEDULES OF QUESTIONS FOR A SANITARY SURVEY OF HUDSON COUNTY, NEW JERSEY, AND BAYONNE, N. J.

The following schedules of questions are printed to serve as suggestions to those engaged in inquiries relating to municipal sanitation, and to form the basis of reports to the National Board of Health upon the sanitary condition of a place:

LIST OF SCHEDULES.

A. Location, population, and climate.
B. Topography.
C. Water supply.
D. Drainage and sewerage.
E. Streets and public grounds.
F. Habitations.
G. Gas and lighting.
H. Garbage and excreta.
I. Markets.
K. Slaughter-houses and abattoirs.
L. Manufactories and trades.
M. Public school buildings.
N. Hospitals and public charities.
O. Police and prisons.
P. Fire establishments, &c.
Q. Cemeteries and burial.
R. Public health laws, regulations, municipal officials.
S. Registration and statistics of deaths and of disease.
T. Quarantine.
U. Municipal sanitary expenses.

SCHEDULE A.

Location, population, and climate of Jersey City, Hoboken, West Hoboken, Weehawken, Town of Union, Union Township.

1. Name of city, county, and State?
Cities of Jersey City and Hoboken, county of Hudson.
Townships of West Hoboken and Weehawken.
Town of Union and Union Township, State of New Jersey.
2. Latitude and longitude?
Jersey City.—Latitude, 40° 43′ north; longitude, 74° 4′ west from Greenwich.
Hoboken.—Latitude, 40° 44′ north; longitude, 70° 2′ west from Greenwich.
Weehawken.—Latitude, 40° 46′ north; longitude, 74° 1′ west from Greenwich.
West Hoboken.—Latitude, 40° 45′ north; longitude, 74° 3′ west from Greenwich.
Town of Union.—Latitude, 40° 46′ 30″ north; longitude, 74° 1′ 30″ west from Greenwich.
Township of Union.—Latitude, 40° 47′ north; longitude, 74° 1′ west from Greenwich.
3. When was the city founded?
Jersey City in 1804; Hoboken in 1804; Weehawken in 1859; West Hoboken in 1861; town of Union in 1852; township of Union in 1861.
4. When was it incorporated?
Jersey City in 1820; Hoboken in 1855; Weehawken in 1859; West Hoboken in 1861; town of Union in 1864; township of Union in 1861.

5. What was its population in 1860? In 1870?

	1860.	1870.
Jersey City	29,216	85,335
Hoboken	9,659	20,297
Weehawken	280	597
West Hoboken		4,132
Town of Union		4,640
Township of Union		2,097

6. What is its present estimated population?

	1880.
Jersey City	114,000
Hoboken	30,000
Weehawken	800
West Hoboken	5,500
Town of Union	5,000
Township of Union	1,800

Since 1875, Guttenberg has been set off from this township.

7. What is its present estimated population under 5 years of age?

Jersey City	20,000
Hoboken	5,400
Weehawken	100
West Hoboken	900
Town of Union	900
Township of Union	300

8. What is the estimated number of native and foreign?

Jersey City:	
Natives	72,000
Foreign	42,000
Hoboken:	
Natives	16,000
Foreign	14,000
Weehawken:	
Natives	500
Foreign	300
West Hoboken:	
Natives	3,000
Foreign	2,500
Town of Union:	
Natives	2,700
Foreign	2,300
Township of Union:	
Natives	1,000
Foreign	800

9. What is the estimated number of persons of European birth?

Nearly all foreigners are of European birth. Those not of European are a very small proportion of the population.

10. What is the estimated number of negroes and mulattoes? Of Asiatics?

	1875.
Negroes and mulattoes:	
Jersey City	869
Hoboken	44
Weehawken	5
West Hoboken	40
Town of Union	2
Township of Union	1

The following information is desired in the form of tables, to include the last twenty years, or so much thereof as possible, viz: mean, maximum, and minimun temperature of each month; direction and velocity of the prevailing winds in each month; amount of rainfall; mean, maximum, and minimum height of barometer for each month (corrected to freezing point but not to sea level); records of relative and absolute humidity; electricity; ozone; number of clear and cloudy days.

The only meteorological observations that have been regularly recorded and published in Hudson County, as far as could be ascertained, are those of Messrs. Spielmann & Brush, civil engineers, at Hoboken, from July 5, 1874, to date. These have been published weekly in the following newspapers: The Evening Journal, Hudson County

Democrat, and Palisade News. The following tables are compiled from these observations:

THERMOMETER (FAHRENHEIT).

Date.	Maximum.	Date.	Minimum.	Mean.
1874.		1874.		
July 15	84	July 6	73	78
August 21	84	August 27	67	73
September 3	81	September 30	61	71
October 10	67	October 31	46	58
November 23	57	November 30	13	44
December 29	46	December 1	14	33
1875.		1875.		
January 9	35	January 19	11	26
February 24	50	February 9	3	27
March 30	49	March 1	18	36
April 2	58	April 13	34	47
May 22	76	May 1	49	61
June 25	88	June 9	61	72
July 6	84	July 29	70	76
August 16	80	August 2	59	72
September 3	80	September 19	54	66
October 5	68	October 13	46	57
November 13	55	November 30	11	42
December 23	56	December 18	19	36
1876.		1876.		
January 19	54	January 13	23	37
February 12	52	February 24	19	37
March 8	56	March 4	30	41
April 28	67	April 3	42	52
May 19	75	May 3	53	65
June 26	92	June 6	69	80
July 20	91	July 25	69	83
August 7	87	August 21	70	79
September 1	81	September 22	53	66
October 6	66	October 28	44	52
November 2	64	November 27	38	51
December 13	50	December 9	16	30
1877.		1877.		
January 30	43	January 4	17	31
February 22	49	February 13	26	40
March 23	56	March 19	24	41
April 24	75	April 5	46	56
May 19	86	May 2	52	66
June 5	95	June 11	60	75
July 9	99	July 14	72	84
August 26	95	August 15	74	81
September 14	80	September 7	62	71
October 3	73	October 26	47	62
November 9	66	November 30	33	50
December 15	54	December 1	33	43
1878.		1878.		
January 14	43	January 23	19	35
February 28	52	February 19	28	38
March 7	61	March 25	26	48
April 3	65	April 11	50	60
May 3	79	May 12	53	65
June 27	84	June 10	59	71
July 30	94	July 20	57	79
August 1	95	August 12	67	78
September 2	84	September 28	62	70
October 3	75	October 24	51	65
November 12	57	November 9	38	46
December 2	55	December 24	19	34
1879.		1879.		
January 28	49	January 21	17	32
February 17	49	February 15	15	32
March 7	59	March 31	36	45
April 30	67	April 4	35	51
May 31	79	May 2	51	65
June 28	94	June 7	59	80
July 3	93	July 7	71	79
August 2	85	August 11	60	76
September 1	80	September 25	52	66
October 9	77	October 25	40	66
November 15	73	November 21	23	48
December 3	64	December 27	12	41

BAROMETER.

[Corrected to freezing point.]

Date.	Maximum.	Date.	Minimum.	Mean.
1877.		1877.		
April 13	30.38	April 20	29.62	30.12
May 12	30.45	May 22	29.70	30.08
June 12	30.33	June 6	29.87	30.13
July 23	30.37	July 10	29.87	30.09
August 28	30.33	August 10	29.88	30.09
September 24	30.35	September 1	29.93	30.20
October 8	30.40	October 22	29.76	30.12
November 21	30.69	November 2	29.62	30.26
December 21	30.75	December 31	29.67	30.29
Average for the year	30.15			
1878.		1878.		
January 8	30.77	January 11	29.50	30.16
February 19	30.42	February 22	29.81	30.10
March 9	30.63	March 4	29.66	30.18
April 25	30.92	April 5	29.42	30.03
May 20	30.30	May 27	29.84	30.05
June 28	30.26	June 10	29.76	30.09
July 11	30.29	July 22	29.78	30.11
August 31	30.30	August 9	29.81	30.04
September 23	30.56	September 13	29.86	30.24
October 26	30.42	October 19	29.73	30.11
November 15	30.64	November 22	29.26	30.05
December 20	30.50	December 4	29.61	30.05
Average for the year	30.10			
1879.		1879.		
January 11	30.50	January 25	29.56	30.10
February 28	30.86	February 12	29.51	30.19
March 1	30.70	March 31	29.35	30.21
April 22	30.36	April 3	29.45	29.91
May 10	30.56	May 21	29.76	30.07
June 20	30.21	June 16	29.50	29.94
July 2	30.23	July 12	29.60	29.95
August 21	30.17	August 8	29.74	29.97
September 26	30.41	September 4	29.82	30.13
October 25	30.63	October 28	29.63	30.15
November 5	30.50	November 20	29.50	30.15
December 1	30.48	December 15	29.75	30.21
Average for the year	30.08			

HUMIDITY.

1878.		1878.		
June 1	97	June 6	61	78
July 12	93	July 20	57	76
August 18	97	August 12	67	79
September 13	97	September 27	71	83
October 18	93	October 10	71	81
November 18	97	November 13	74	85
December 2	1.00	December 13	78	88
1879.		1879.		
January 9	96	January 25	84	91
February 11	96	February 15	88	92
March 17	96	March 12	70	86
April 18	1.00	April 23	67	85
May 20	95	May 22	72	83
June 3	91	June 13	70	80
July 26	98	July 16	63	76
August 16	93	August 6	68	84
September 3	93	September 18	62	81
October 18	89	October 29	75	84
November 28	1.00	November 1	69	83
December 6	1.00	December 12	81	91

RAINY AND CLOUDY DAYS.

Date.	Number of days during which rain fell.	Number of cloudy days but no rain.	Total.
1877.			
April	5	1	6
May	1	7	8
June	5	7	12
July	3	2	5
August	7	1	8
September	2	7	9
October	8	5	13
November	6	7	13
December	1	9	10
Total	38	46	84
1878.			
January	8	5	13
February	4	8	12
March	6	9	15
April	5	10	15
May	6	8	14
June	5	3	8
July	5	4	9
August	7	5	12
September	3	9	12
October	3	5	8
November	7	6	13
December	6	5	11
Total	65	77	142
1879.			
January	4	6	10
February	9	6	15
March	6	5	11
April	10	7	17
May	4	5	9
June	4	6	10
July	4	7	11
August	6	6	12
September	5	4	9
October	4	4	8
November	8	2	10
December	7	5	12
Total	70	63	133

INCHES OF RAINFALL.

Date.	1876.	1877.	1878.	1879.
January	1.40	2.78	4.93	2.41
February	4.93	2.73	3.47	2.35
March	9.48	5.39	3.80	3.90
April	1.55	3.27	2.08	5.16
May	3.32	1.22	2.95	2.35
June	1.96	3.12	3.16	3.36
July	4.93	5.42	4.89	4.14
August	2.27	2.75	5.89	8.20
September	5.91	1.44	3.06	1.66
October	0.60	7.89	2.52	0.35
November	2.62	5.64	4.75	1.86
December	2.08	0.77	5.43	4.47
Total	41.05	42.42	46.93	40.21

PREVAILING DIRECTION OF THE WIND.

Date.	1877.	1878.	1879.
January	.....	NE.	NW.
February	.....	W.	NW.
March	.....	W.	NE.
April	.....	SE.	NW.
May	NW.	NW.	NE.
June	S.	SW.	SW.
July	S.	NW.	SW.
August	S.	NW.	NW.
September	S.	SW.	NW.
October	SW.	NW.	NW.
November	NE.	NE.	NW.
December	NE.	NW.	NW.

SCHEDULE B.

Topography of Jersey City, Hoboken, West Hoboken, Weehawken, town of Union, Union Township.

1. Is the country surrounding the city level, hilly, or low and marshy?

Surrounding Jersey City it is low and marshy.

Surrounding Hoboken it is low and marshy on the south and hilly on the west. Same is true of Weehawken.

West Hoboken, town of Union, and Union Township, are situated on the Palisade ridge, running north and south, and are bounded on the west and to a certain extent on the east by low and marshy ground.

For further particulars see topographical map accompanying this report.

2. If there are mountains or considerable hills in the vicinity, state distance, direction and altitude above sea-level.

By reference to the topographical map it will appear that a portion of Jersey City and West Hoboken, town of Union, and township of Union, are situated on the Palisade ridge, while Hoboken and Weehawken and the balance of Jersey City are situated at the foot and to the east of it. Otherwise, there are neither mountains nor considerable hills in the vicinity.

3. If there are any marshes or low moist lands in the vicinity, state their distance, direction, extent and character, and the variations as to water which such lands undergo at different seasons.

Jersey City contains about 2,200 acres of marsh lands.

Hoboken contains about 450 acres of marsh lands.

Both the above extend generally from north to south.

Weehawken contains a narrow neck of marsh lands on river front, running also north and south. The surface of these marsh lands is from one to two feet below high water, subject to overflow by reason of high tides and heavy rains.

West Hoboken, town of Union, and township of Union, contain no marsh lands.

4. What is the altitude above sea-level of the bottom of the lowest valley or ravine near by? In what direction does such valley or ravine tend?

There are no ravines or valleys in either of the five cities and towns, except the marsh lands above referred to, and these extend generally north and south.

5. What modifications of meteorological conditions, and what other influences upon health in the city are apparently due to topographical features of its immediate vicinity?

None as regards meteorological conditions. Where the natural drainage of the marsh lands in Jersey City and Hoboken has been intercepted and no adequate system of sewerage supplied, the influence upon the health of the two cities has been very hurtful and the death-rate in those localities from zymotic diseases greatly increased.

6. In what degree and in what direction is the city bordered by grass lands, forests, market gardens, farms, or villages?

There is no forest bordering on either of the cities. To the north of Jersey City and west of West Hoboken and the town of Union there is a ridge slightly above tide-water, composed of market gardens, farms, and grass lands, and about 1.8 square miles in extent, and known as Secaucus.

7. Is the site of the city level?

Jersey City, east and west of Bergen ridge, is generally level, but that portion on top of the ridge is composed of an undulating plateau containing about 4,400 acres.

West Hoboken, town of Union, and township of Union, as also the greater portion of Weehawken, are situated upon the continuation of this ridge.

Hoboken.—Of this city 450 acres, composing the marsh lands, are level; the remainder, comprising about 270 acres, is situated on a ridge about 25 feet above high water, etween the marsh lands and the river, and rising to an elevation 100 feet at Castle Point.

8. Has the original conformation of the site been materially changed?

Jersey City has been changed only in so far as the improvement and filling in of the marsh lands is concerned. The same change applies to Hoboken.

No material change has been made in either of the other towns of West Hoboken, town of Union, township of Union, and Weehawken.

9. Have original water-courses been diverted, covered, or modified?

In Jersey City, the "Ravine water-course" has been carried to tide-water by a closed sewer, and its outlet diverted to a more southerly point.

In Weehawken, "King's water-course" has been carried to tide-water through a closed brick sewer.

No changes have been made in this respect in either Hoboken, West Hoboken, or township of Union.

10. What is the elevation above sea-level of the highest, lowest, and average level of the town?

The lowest elevation of any portion of Jersey City, Hoboken, or Weehawken is about 2 feet below high water. The highest elevation of Hoboken is about 100 feet above high water. The highest elevation above high water of Jersey City is about 170 feet; of West Hoboken, 251 feet; of town of Union, 196 feet; of township of Union, 255 feet; of Weehawken, 178 feet.

Average elevations of Jersey City above high water, upland, 100 feet; Jersey City, lowland, 10 feet; Hoboken, 12 feet; Weehawken, 150 feet; West Hoboken, 210 feet; town of Union, 170 feet; township of Union, 200 feet.

11. In what direction is the general surface slope of the city?

Of Jersey City the general surface slope is from north to south. So also for Weehawken, West Hoboken, town of Union, and township of Union. In Hoboken it is from east to west.

12. Is any part of the city what is known as "made land"; if so, how much, and in what part of the city?

In Jersey City about 1,400 acres on eastern water front are made land.

In Hoboken about 140 acres in southwesterly portion of the city. None in Weehawken, West Hoboken, or town of Union. In township of Union about 50 acres.

13. What was the character of the ground before filling?

In either Jersey City or Hoboken, where filling was done, the ground was soft and marshy.

14. Was it thoroughly drained before filling?

It was not.

15. To what depth and with what material was it filled?

The depths of the filling ranged between 10 feet and 30 feet. The material was generally earth filling. But considerable filling has been done with ashes.

16. To what extent is the made land built upon, and with what class of houses?

The made land in Jersey City and Hoboken is largely built upon, generally with cheap tenements of frame. There is no made land in the other four places.

17. What streams of water pass through or by the city?

Jersey City fronts upon the Hackensack River on the west and upon the Hudson River on the east. Hoboken and Weehawken also front upon the Hudson River. Otherwise there are no streams passing by or through the cities or towns and townships.

18. What is the average width of each?

19. What is the average depth of each, and what is their velocity; rapid, gentle, or sluggish?

20. Are the sides of these streams steep or gradually sloping; that is, when the amount of water changes, does it cover and expose any considerable width of shore?

21. Is the exposed shore hard ground or mud?

22. Are these streams, or any of them, affected by the rise and fall of the tide, and to what degree?

23. Is the water clean or foul? If foul, what is the source of the fouling?

24. Are the bed of the stream and its shores subject to the deposit of organic matter or of silt? If so, describe the deposit.

25. Is there in the course of these streams any shoal or flat which is at times laid bare or only slightly covered with water?

26. To what extent are there natural or artificial falls of water, as over dams, within or near the city, and what is the character of the fall?

27. What is the character of the stream above such water fall; deep and rapid, or sluggish with shoals?

There are no streams passing through either Jersey City, Hoboken, Weehawken, West Hoboken, town of Union, or township of Union. Therefore questions 17–27, inclusive, are inapplicable to either or these cities and towns.

28. What canal or race passes through or near an inhabited part of the city?

The Morris Canal passes through the southerly portion of Jersey City. Otherwise there is none.

29. Is the water in such canal usually clear, turbid, or muddy?

The water is usually turbid.

30. Does foul surface drainage or sewage enter any of these streams? If so, describe manner and location of such entering.

31. If tidal stream, is such sewage or drainage borne up past the town by the incoming tide?

There are no streams. See above.

32. What bodies of water and what their locality, character, and extent, within or near inhabited portions of the city?

Hudson River, Hackensack River, Newark Bay and New York Bay. Hoboken and Weehawken are bounded by the Hudson River on the east. Jersey City is bounded by the Hudson River on the east, by the Hackensack River on the west, and its southerly portion is in proximity to the Newark Bay and New York Bay.

33. For what period of time, and at what seasons of the year, and at what stage of the tide is there stagnant water in any canal, stream, pond, or other body of water within or near an inhabited part of the city?

34. Does such stagnant water at any time emit a perceptible odor, and does it deposit organic matter or mud?

There is no stagnant water in any of the above-mentioned bodies of water.

35. Furnish, if possible, a contour map of the city and immediate vicinity, on which are indicated the altitudes and the lines of main drainage and sewerage, or of natural drainage.

See large topographical map.

36. Is any part of the city, or its vicinity, subject to overflows, or saturation of soil; if so, to what degree, at what seasons, and what is the effect on health?

37. How does such saturation, whether from overflow or from rain, affect the height of water in wells, and to what extent?

The made lands of Jersey City and Hoboken, and the marsh lands of the above cities, and also of Weehawken, being filled in only to a height of from 2 to 5 feet above high water, are subject to overflow at every high tide and extraordinary rain. The marsh lands are constantly saturated with water. The effect upon health is to largely increase the death-rate from zymotic diseases. There are no wells upon these lands, and therefore no effect as to height to be recorded.

38. To what geological period or formation does the site and vicinity belong?

To the Triassic formation.

39. What are the surface rocks?

40. What are the underlying strata in order of succession from above downwards.

41. What is their relative permeability by water?

For all these places the surface rocks are trap and red sandstone. Next below there is serpentine, and lowest the gneiss. There are none of them permeable to water to any considerable amount.

42. In what direction do they dip, or slope, and at what angle?

43. What is the character of the surface soil?

44. When it is disturbed, have malarious effects been observed?

45. Are there continuous fissures in the rock or continuous gravel streaks in the earth through which soil water may flow?

46. Are any diseases considered to be due to the soil or geological formation, or has the spread of any epidemic followed the direction of the flow of underground water? If so, specify, and state reasons for so reporting.

The sandstone and trap dip towards the northwest at an angle of 10 degrees or 15 degrees. The serpentine and gneiss are nearly vertical. The salt marsh covers a large surface, and its substance, which is of very recent age, fills deep valleys or channels in the rock between the edge of the North River and Bergen Hill. Malarious effects have been observed wherever excavations, such as for streets and sewers, have been made. There are no continuous fissures in them. Glacial drift covers the rocks in Jersey City and a part of Hoboken. No diseases, as far as known, are considered due to the soil or geological formation.

SCHEDULE C.

Water supply of Jersey City, Hoboken, West Hoboken, Weehawken, town of Union, Union Township.

1. From what source is the chief water supply derived?

Jersey City and Hoboken are supplied with water from the Passaic River.

Weehawken, West Hoboken, town of Union, and township of Union have no water supply other than derived from wells and springs.

2. If from a river or stream, what towns, villages, factories, or other sources of contamination are located upon the river or stream above the point at which the water is taken?

North Belleville, Rutherford Park, Passaic, and Paterson are located above the poins at which the water is taken.

3. To what extent is the immediate gathering ground from which the water it drained manured with night-soil or other excrement?

No means of answering.

4. From what distance is the water brought?

5. In what form of conduit?

6. What is its capacity?

The water is brought to Jersey City and Hoboken from a distance of about 7 miles through three circular iron conduits, two of which are 36 inches in diameter, and one 20 inches in diameter.

7. To what extent and at what points is it accumulated in settling or other reservoirs?

8. Is any process for filtering or purifying used beyond reservoir settling?

The river is tapped at a point on the east bank of the Passaic, opposite Belleville, where the pumping station is located. From here the water is carried a distance of about 2,500 feet and raised 160 feet into reservoir No. 1. From thence it is carried through three conduits to reservoir No. 2, the distributing reservoir, the elevation of which is 130 feet above high-water, located on Jersey City Heights. There is no process for filtering or purifying in use.

9. What is the average amount of water per diem flowing into reservoirs; their highest capacity for storage?

10. What is the average amount of water per diem; the maximum, the minimum?

11. How many gallons daily to each inhabitant; the average, the maximum, the minimum?

12. How much water is on an average in storage in reservoirs and available in case of fire?

Average amount of water per diem flowing into reservoirs is 1,663,514 cubic feet for 1879. Their highest capacity for storage is 73,437,000 gallons. The average amount of water per diem for 1879 was 1,663,514 cubic feet. This would make a daily average to each inhabitant of about 87 gallons.

13. Give results of chemical analysis, if possible.

14. Has the water supply been offensive in taste or odor at any time; if so, at what time, and to what was the change due; and if it has been remedied, how?

From Professor A. R. Leeds' report to board of public works of Jersey City, 1873.

Chemical analysis of the Passaic and reservoir waters.

PASSAIC RESERVOIR.

	Parts in 1,000,000.	Grains per gallon.	Parts in 1,000,000.	Grains per gallon.
Total solids	67.8	3.95	70.7	4.12
Inorganic matter	50.9	2.95	54.9	3.20
Volatile and organic matter	16.9	0.99	15.8	0.92
Silica and suspended water of mineral origin	23.08	1.35	14.80	0.87
Alumina and oxide of iron	1.28	0.976	0.93	0.054
Lime	12.11	0.71	11.32	0.66
Magnesia	2.92	0.17	8.98	0.52
Potash and soda, existing as potassium and sodium combined with sulphuric acid and chlorine	8.13	0.47	8.66	0.51
Sulphuric acid as SO4	8.04	0.46	8.96	0.53
Chlorine	3.73	0.22	3.94	0.23

During midsummer of 1872, when the water as drawn from the taps of the Stevens Institute of Technology, was highly offensive both to the smell and taste, was turbid from the presence of great numbers of microscopic, vegetable, and animal organisms, when proper chemical tests revealed a shocking degree of contamination by organic matter, and when it could not be used at all for delicate chemical operations. (Professor Leeds' report.)

No remedy has been provided.

15. To what extent is the town supplied with public fountains? With fire plugs?

Jersey City has two public fountains; Hoboken has one; Weehawken, West Hoboken, town of Union, township of Union have none. Jersey City and Hoboken both have fire-plugs from 200 to 400 feet apart on the built-up portion. Other places have none.

16. To what extent is water from artesian wells used; what is the depth of such wells?

17. What is the character of the water?

18. What is the chance of organic contamination reaching the strata by which the well is supplied?

[Extract from the annual report of the State geologist of New Jersey, 1879.]

BORED WELLS IN JERSEY CITY AND VICINITY. BY L. B. WARD, C. E., OF JERSEY CITY.

Borings of considerable depth in search of water have been made within the past half century in various parts of Hudson County, and in locations differing widely as to topography and geological associations. A geological boundary, which passes through Hoboken and Jersey City, and which is in its general bearing parallel with the Hudson River, has been closely touched by the borings made in the tract east of Bergen Hill, these having in every instance entered the underlying rocks. An example of rock-boring for water is also found upon the crown of the Bergen trap ridge.

In the marshes west of the Hackensack River are a number of wells, which have been bored through alluvium and bowlder clay. Four of them, which were sunk in 1871, derive their supply from a sheet of water-bearing gravel, at a depth of nearly two hundred feet, the water rising to the surface and flowing off in moderate quantity. The water, while it is palatable, has a noticeable taste, said to be of sulphur. The wells now mentioned are upon the line of the Newark plank road. An equal number of wells are to be found on the line of the old Newark turnpike; these are now disused, and their origin and depth are unknown.

Diligent inquiry has failed to find where any rock-borings have been made in that part of Hudson County south of Jersey City. The large works established upon the shores of Kill Von Kull depend for water either upon capacious shallow wells or upon tubular (driven) wells. The need of suitable supply of water is felt here.

Upon the smaller islands in the New York harbor, geologically related to Jersey City and Hoboken, no borings of water are known to have been made. On Staten Island a successful well was obtained a number of years since at the silk mill in New Brighton by boaring to a depth of 400 feet in the underlying serpentine.

NOTES OF THE PRINCIPAL ROCK-BORINGS IN HUDSON COUNTY.

Jersey City.—At Mattheisen & Weichers' sugar refinery, on the south side of the Morris Canal, in Jersey City, a boring was begun in 1867, which was discontinued in 1872, at a total depth of 1,000 feet, inclusive of 20 feet of surface earth, the diameter of which in the upper 180 feet of the rock was 8 inches, and in the lower 800 feet 4 inches. The rocks penetrated were chiefly gneiss and quartz, with white sandstone and thin bands of slate occuring below 800 feet. Several veins of water were met with between 600 and 900 feet, of which the most important were at a depth of 720 feet. The yield was found to be 50 gallons per minute when tested by pumping. The level in the well being 12 feet below tide, and the temperature of the water 52° Fahr. The brackish quality of the water obtained has prevented its use, and the well is closed.

A boring of small diameter was made about 1842 by Mr. Andrew Clerke in the marsh at the corner of Montgomery and Henderson streets, in Jersey City. Here the red sandstone was met with 15 feet below the surface, and was penetrated to a depth of 200 feet, when a stratum of very hard rock of whitish appearance was encountered, and the work abandoned. A liberal supply of clear, bright water, but strongly impregnated with magnesia and common salt, was found at the depth of 150 feet, which overflowed at the surface. The temperature was not noted.

In the same marsh, and about 1,000 feet northeast of the last, an unsuccessful boring was made a few years later, respecting which details have not been obtained.

At Cox's brewery, on Grove street, between Seventh and Eighth streets, in Jersey City, the underlying sandstone is covered by about 70 feet of bowlder clay and earth. A small boring of 100 feet in depth was first made nearly thirty years ago, and was enlarged to 5 inches in diameter and carried down to a depth of 400 feet in 1872 and 1873. Small veins of water were met with in the rock at all depths. The water, though so hard as to form a heavy scale in a steam-boiler, was of satisfactory quality for brewing purposes. Its temperature was 54° Fahr. The well easily afforded 300 barrels of water per day, the water rising in the excavated well to the level of the tide, thence passing away through the earth to the street sewers. The boring intersected a number of streams in the sandstone, which contained fine, earthy matter, and limited the capacity of the well to deliver clear water.

At Lembeck & Betz's brewery, on Ninth, between Grove and Henderson streets, in Jersey City, and 800 feet northeast of Cox's brewery, the sandstone is covered by 40 feet of bowlder clay, with 30 feet of surface sand. A boring 8 inches in diameter was made here in 1875, penetrating the red sandstone rock 776½ feet to reach water, which was found at the bottom in a stratum of white or light-colored stone. At its completion the well, when tested by pumping, yielded 33 gallons per minute continuously for 24 hours. The water is sufficiently soft and sweet for brewing, but is ordinarily used only for cooling purposes, its temperature being 52½ degrees Fahr. The well affords 1,000 barrels of water per day without difficulty, the level of the well being 10 feet below tide, or 25 feet below the surface of the ground.

Borings made to rock at the Pavonia Ferry, distant, viz., 2,300 feet, 2,850 feet, and 3,300 feet nearly east from the last, came upon serpentine at 63 feet, 120 feet, and 179 feet below tide, respectively.

Hoboken and Union Hill.—In the marsh, and near the south end of Grand street, in Hoboken, a boring was made in 1828, which is mentioned in Mather's "Geology of New York" as 400 feet in depth, reaching rock at 40 feet, and has penetrated serpentine, sandstone, and supposed white marble. This boring probably did not come upon water, and the work was abandoned. Mr. Theodore Van Tassell recollects to have seen the boring apparatus remaining in position some years later.

"At the Palisade brewery, at the summit of the main ridge of Bergen Hill, and corner of Hudson avenue and Weehawken street, in the town of Union, a boring 7 inches in diameter was carried down in 1877 and 1878, through trap, to a depth of 297 feet from the surface, water being found in quantity, increasing with the progress of the work. The well is pumped from the bottom, and yields 250 barrels per day of very pure soft water, of a temperature of 51° Fahr. When not pumped it discharges a much smaller quantity, at a level of 161 feet above tide, into the bottom of an excavated well 28 feet under ground and 12 feet below the surface of the rock."

Analysis of water or well of Lembeck and Betz.

	Grains in 1 gallon.
Soda	39.50
Lime	6.95
Magnesia	9.36
Sulphuric acid	4.11
Chlorine	65.50
	125.42

An artesian well is being bored at the Secaucus Iron Works, and near the Hackensack River, in Hudson County. I. P. Pardee, superintendent, has favored the survey with the following account of the strata and the water: The surface of the ground is about 5 feet above tide; from surface down to red shale rock, 18 feet; red shale to 370 feet; shaly sandstone to 395 feet; red, shaly sandstone from 400 to 600 feet; total depth at date (February 7, 1880), 600 feet.

The diameter of the bore is 6 inches. When the hole was down 210 feet they commenced to pump with a 4-inch pipe down 60 feet, and with a seed bag at lower end to keep out the surface water. Pumped about 15 gallons per minute of beautifully clear water, but decidedly brackish to taste.

When the bore had reached a depth of 304 feet they pumped with a 4-inch pipe with seed bag attached, and down 100 feet. The result was a large volume of water, but it was still brackish. On evaporation it gave 110.67 grains of solid matter per gallon, which tasted strongly of common salt. When at the depth of 600 feet they pumped with a regular oil-well pump, with the seed bag attached, and having a 4-inch pipe down 250 feet, attached to the end of which was the pump barrel 3⅝ inches in diameter, making a total length of pipe down 357 feet. The result was only *one* gallon per minute. The 4-inch pipe and the pump barrel were then taken out and put down 200 feet. On pumping got 20 gallons per minute of very clear water, which, when tested with nitrate of silver, gave a slight precipitate. The water, on evaporating, gave 12.37 grains of solid matter. The difference in the volume of water at 257 feet and 200 feet appears to show that about all the water (not salt) which they have obtained so far, comes in between 200 feet and 250 feet down.

They are now putting down the well 400 feet deeper, which will make a total depth of 1,000 feet when it is done.

By way of comparison they had other waters there evaporated to dryness and weighed. The drinking water from the well near the furnace contained 108.76 grains in a gallon; that from the Hackensack River had 307.45 grains to the gallon.

19. To what extent is cistern, spring, or well water used?

Jersey City and Hoboken having a water supply, cistern, spring, or well water are very seldom used.

Weehawken, West Hoboken, town of Union, and township of Union, use it altogether, they having no other means of supply.

20. In that part of the city where well water is used what is the character of the soil?

In the places just described where well water is used, the soil is generally retentive earth overlying trap rock.

21. What is the usual depth of wells to the bottom and to the surface of the water?

The wells usually range from 10 feet to 20 feet in depth to the bottom, and from 5 to 15 feet to the surface of the water.

22. Are cisterns, springs, or wells so located and constructed as to be free from sewage and cesspool contamination?

23. If yes, state reasons for apprehending contamination.

Yes, generally. Because they are usually so located as to be as far as possible from the sinks or cesspools.

24. Has the use of well water been productive of sickness; if so, what sickness; to what extent epidemic or sporadic?

As far as we have been able to ascertain it has not. We have never heard of a case in any of the cities or towns included in this investigation.

25. Character and quality of well water, specially as to presence of organic matter and chlorides.

We submit the following extract from an analysis of a sample well water, made in 1874, by Mr. Amende, a chemist of Hoboken, for Mr. C. F. Holtz, a resident and property owner on the west side of Hudson street, between 7th and 8th streets, Hoboken. He reports it as being healthy and useful in all respects, and containing only such impurities as are usually present in almost any well water.

The solid substances in 1,000 parts were found to be only 1,670, which is extremely little.

Of these solid substances, the following were found in 600 grains analyzed:

	Grains.
Silicic acid	0.015
Lime salts below	0.000
Carbonic acid	0.235
Phosphoric magnesia	0.921
Sulphuric magnesia	0.4906

The remainder of the solid substances are found with the above named in most any sample of water, and are potash and soda compounds.

Alkalies are found mainly as chloric and sulphuric compounds. Carbonic salts are found only in very small quantities. Mr. Amende pronounced the well a very good one.

26. Has disease arisen from use of lead pipes?

None of which we have any record.

27. Are there any public baths; if so, how are they arranged, and to what extent are they used? Furnish a copy of their rules and regulations.

28. Are there public drinking fountains? If so, how generally?

There are a few public drinking fountains provided in connection with the public watering troughs for horses.

There is one public bath only in the most populated portion of Jersey City, on Mercer street near Brunswick street. It is a frame building with tank and closets to accommodate about 40 persons at one time. Fresh water is used, and the bath is open to the public from July 1 to October 1, of each year; two days for females and four days for males. It is closed on Sundays. Otherwise there are no rules or regulations.

SCHEDULE D.

Drainage and sewerage of Jersey City, Hoboken, West Hoboken, Weehawken, town of Union, Union Township.

1. What is the area included within the city limits?

Area of Jersey City is about 8,000 acres; of Hoboken, about 720 acres; of Weehawken, about 400 acres; of West Hoboken, about 520 acres; of town of Union, about 275 acres; of township of Union, about 835 acres.

2. What area is closely built up, as compared with what may be called "country or suburban area?"

In Jersey City there are closely built up about 800 acres; in Hoboken, about 230 acres; in Weehawken, about 40 acres; in West Hoboken, about 200 acres; in town of Union, about 200 acres; in township of Union, about 80 acres.

3. What is the character and sufficiency of the surface drainage?

4. Have any underground drains been constructed to act exclusively as such; if so, for what area?

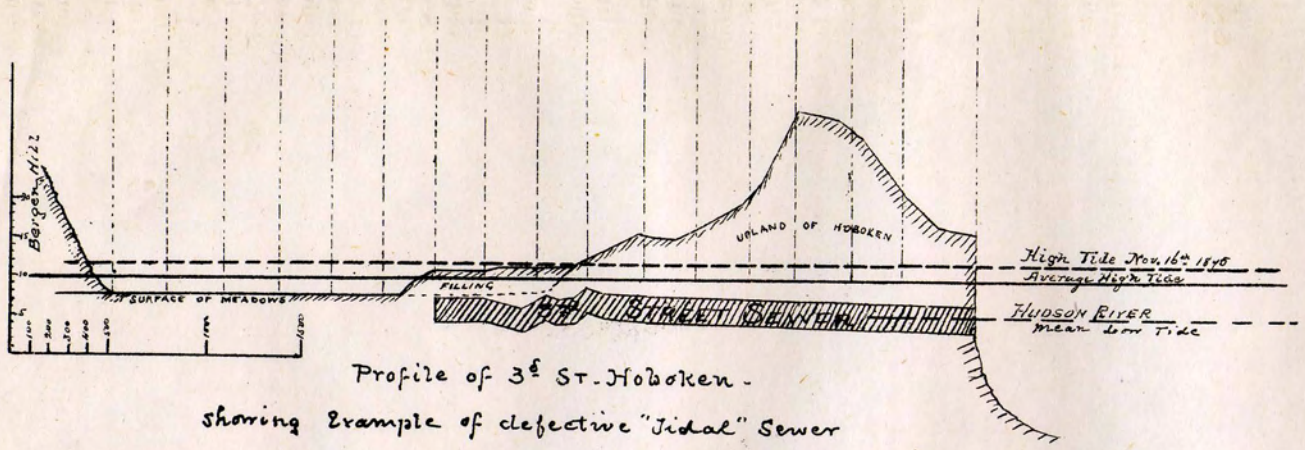
5. At what depth are they placed at the highest point? What rate of fall have they?

The surface drainage of the uplands of Jersey City, Hoboken, and West Hoboken is generally good; that of the low lands of Jersey City and Hoboken, and of certain portions of the uplands of the town and township of Union (as indicated on the map) are often very bad.

No system of underground drains have been constructed, although such a system is perfectly feasible and practicable.

5. Are there swamps, areas of made land, or places saturated with water, near or in the town, which are undrained? If so, describe.

Example of the Decay of an Extension that was built upon Piles, to drain Hoboken Back-Meadows.

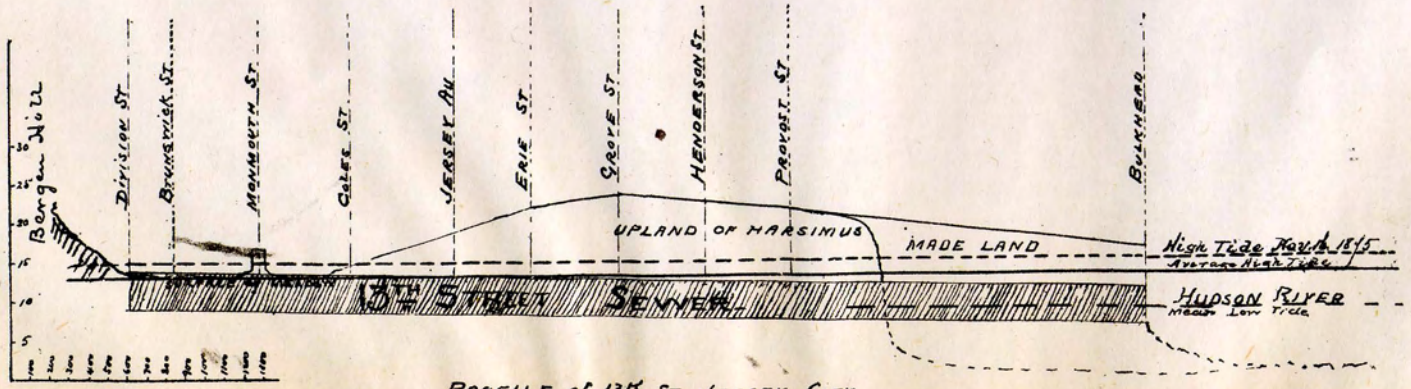


Profile of 3d St. Hoboken -

showing Example of defective "Tidal" Sewer

E.W. Harrison C.E.
Jersey City

Example of a Low-Level Sewer which receives upland Drainage and Sewerage choked with Silt and Sewerage.



PROFILE of 13th St JERSEY CITY

showing best example of "Tidal" Sewer

E.W. Harrison C.E.
Jersey City

7. Are the cellars in any part of the town liable to an overflow of water in heavy rains, or to the intrusion of soil water?

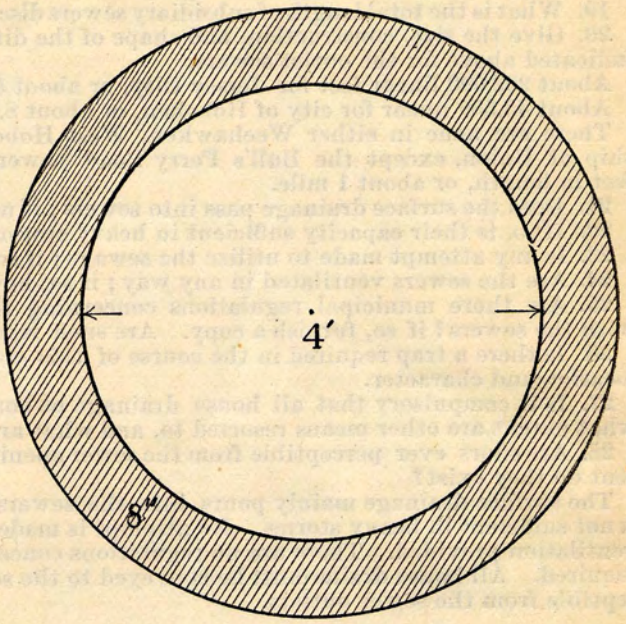
There are swamps and areas of made land in the western and eastern portions of Jersey City and in the western portion of Hoboken, which are saturated with water and undrained. They are generally about 2 feet below high water and subject to overflow at high tides and heavy rains.

The cellars of the houses on this made land are liable to an overflow of water in heavy rains, and to the intrusion of soil water.

8. Is there any system of sewerage in the town? If so, is it part of a regular plan? If so, furnish copy of plan.

There is no regular system of sewers in either Jersey City, Hoboken, Weehawken, town of Union, or township of Union. See large topographical map upon which all existing sewers have been plotted.

The following is the plan of sewers adopted for West Hoboken:



9. How many outlet sewers are there?

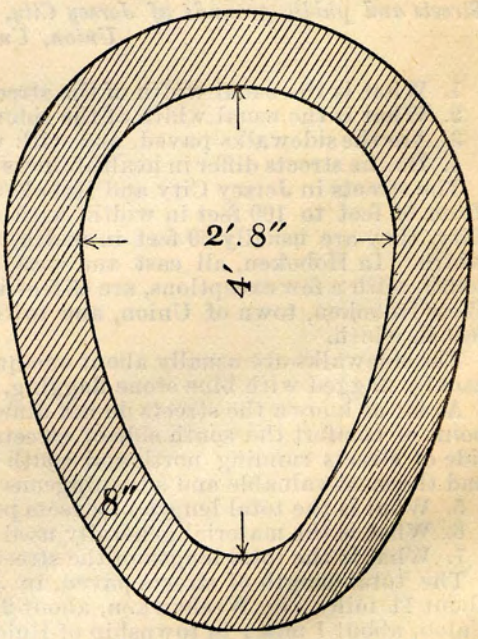
10. Where do they discharge?

11. What is their diameter at mouth?

In Jersey City, there are 14 outlet sewers; in Hoboken, there are 6 outlet sewers; and in Weehawken, there is 1 outlet sewer.

One in Jersey City discharges into the Hackensack River; three into New York Bay; two into creeks leading into the Hudson River; all the remainder discharge into the Hudson River.

They are of the following diameters at mouth: one of 6 feet, in Weehawken; one of 5 feet, in Jersey City; three of 4 feet, in Jersey City; seven of 3 feet, in Jersey City; two of 1 foot 6 inches, in Jersey City; one of 7 feet, in Jersey City; one of 4 feet, in Hoboken; two of 5 feet by 4 feet, in Hoboken; one of 4 feet by 2 feet 8 inches, in Hoboken; one of 6 feet by 4 feet 6 inches, in Hoboken; one of 8 feet by 4 feet, in Hoboken.



12. Of what material are they constructed?

13. Are they tightly cemented?

14. Give their shape in cross section.

15. Do they retain deposits, or are they kept entirely clean by their flow?

Generally of brick work laid in cement and built in rubble stone work laid in cement, tightly cemented. For shape in cross-section, see annexed drawings. Those that are laid on a very slight grade and are not connected with heavy grade sewers, so as to be thoroughly flushed from time to time, retain deposits.

Others which carry off the sewage from the highlands and are thorougly flushed out at every rain and that have a continual flow of water, are thus kept clean. There are three circular-shaped and eleven oval-shaped outlet sewers in Jersey City.

16. Are they kept free from obstruction by artificial means; if so, by what means?

When they have become clogged up with mud laborers are employed to clean them out.

17. What proportion of the area of the city is not sewered?

18. How much of this area is built upon?

Of Jersey City about 3,300 acres of the area of the city is not sewered, being a little over three-eighths.

Of Hoboken about one-half of the area of the city is not sewered.

The sewerage provided in Weehawken, West Hoboken, town of Union, and township of Union, excepting such as provides for surface drainage through the Bull's Ferry Road sewer, heretofore described, is not of sufficient consequence to be noticed.

Most of the area sewered is built upon.

19. What is the total length of subsidiary sewers discharging into these outlet sewers?

20. Give the size, construction, and shape of the different parts of these sewers, as indicated above for the outlet sewers.

About 262,000 linear feet for Jersey City, or about 50 miles.

About 45,550 linear for city of Hoboken, or about 8.50 miles.

There are none in either Weehawken, West Hoboken, town of Union, or township of Union, except the Bull's Ferry Road sewer and connections which is 5,000 feet in length, or about 1 mile.

21. Does the surface drainage pass into sewers; if not mainly, then to what degree?

22. If so, is their capacity sufficient in heavy storms?

23. Is any attempt made to utilize the sewage; if so, how and with what result?

24. Are the sewers ventilated in any way; if so, how?

25. Are there municipal regulations concerning the drains which connect houses with the sewers? if so, furnish a copy. Are such regulations strictly complied with?

26. Is there a trap required in the course of this connecting drain? If so, state its location and character.

27. Is it compulsory that all house drainage be conveyed to the sewer; if not, to what extent are other means resorted to, and what are the means?

28. Are odors ever perceptible from the sewer openings or outlets; if so, to what extent do they exist?

The surface drainage mainly pours into the sewers. Their capacity in some cases is not sufficient in heavy storms. No attempt is made to utilize the sewage nor is any ventilation provided. There are no regulations concerning house drains. No trap is required. All house drains must be conveyed to the sewer. Odors are sometimes perceptible from the sewer outlets.

SCHEDULE E.

Streets and public grounds of Jersey City, Hoboken, West Hoboken, Weehawken, town of Union, Union Township.

1. What is the usual width of the streets?

2. What is the usual width of the sidewalks?

3. Are the sidewalks paved, and with what material?

4. Do the streets differ in healthfulness or comfort owing to direction? If so, specify.

The streets in Jersey City and Hoboken, and the other town and townships, range from 50 feet to 100 feet in width, with some few only 40 feet in width. In Jersey City, they are usually 60 feet in width, with a few of the principal ones 100 feet in width. In Hoboken, all east and west are generally 50 feet wide and all north and south, with a few exceptions, are 65 feet wide. In the remaining places, Weehawken, West Hoboken, town of Union, and township of Union, they vary from 40 feet to 60 feet in width.

The sidewalks are usually about one-quarter of the width of the street each and are usually flagged with blue stone flagging.

As far as known the streets do not differ in healthfulness, owing to direction, but in point of comfort the south side of streets running nearly east and west and the west side of streets running north and south are generally considered the most favorable and the most valuable and advantageous in a business aspect.

5. What is the total length of streets paved?

6. What is the material generally used?

7. What is the total length of the streets unpaved?

The total length of streets paved, in Jersey City, is about 47 miles; in Hoboken, about 11 miles; in Weehawken, about 2 miles; in West Hoboken, none; in town of Union, about 1 mile; in township of Union, about 1 mile.

The material generally used, is Belgian pavement with a few exceptions where Nicholson pavement has been used. Lately several miles have been paved with Telford macadam pavement.

The total length of streets unpaved in Jersey City is about 110 miles; in Hoboken, about 11 miles; in Weehawken, about 3 miles.

No paving has been done in either West Hoboken, town of Union, or township of Union.

8. What is the character of the soil?

9. Are the streets unduly wet in the spring of the year?

The soil generally is a tenacious clayey soil.

The streets, where not paved, are unduly wet and muddy in the spring of the year, and when the clayey nature is greatly predominating often becoming almost impass able.

10. How are the roadways constructed?

The carriage-way or roadway is generally rounded off so as to form the segment of a circle, and when simply of earth, the center is formed about 12 inches higher than the surface of the gutter on each side, but when paved it is formed only about 7 inches higher than the surface of the gutter on each side.

11. How much wooden pavement exists?

About 4 miles in Jersey City; none elsewhere.

12. How much stone pavement, cobble-stones, or blocks?

In Jersey City, total pavement about 41 miles; in Hoboken, about 11 miles; in Weekawken, none; in West Hoboken, none; in town of Union, none; in township of Union, none.

13. How much asphalt or concrete pavement; how much Macadam or graveled roadway?

Jersey City, 2 miles of Macadam; town of Union, 1 mile of Macadam; township of Weehawken, 2 miles of Macadam; township of Union, 1 mile of Macadam.

14. What are the arrangements and regulations for cleaning and watering the streets?

15. Are the results satisfactory as to cleanliness of the streets? If not, specify defects.

16. Are shade trees planted along the streets; if so, how arranged and of what kind?

An annual appropriation is made for cleaning the streets in Jersey City and Hoboken, and the contract is let out by competitive bidding.

In the other town and townships the gutters are kept clean by the street commissioner.

The results, where let out by contract, are not generally satisfactory, because it is found that contractors frequently become derelict in th efulfillment of their contract.

No shade trees are planted along the streets, unless by private parties, only excepting around the public squares. They are generally planted about 2 feet from the edge of the curb and sidewalk and about 20 feet apart. They are of various kinds, but largely of maple.

17. Does the asphalt pavement injure the trees?

18. Does gas injure the trees?

19. Do the trees have any direct effect upon health? *e. g.*, ailantus, eucalyptus?

20. Are they cared for by the corporation or by individual property-owners?

No injury has been observed as being specially due to asphalt pavement.

Injury is attributed to gas, but we have not been able to discover special cases.

The beneficial influence of the trees upon health is generally admitted, in absorbing the impurities in the air and giving out only such as are necessary to life.

They are generally cared for only by individual property-owners.

21. How many public parks belong to the city?

22, State the dimensions of each.

23. Are they within the city limits?

There are no public parks belonging to either of the cities, town, or townships.

24. How many open squares within the city limits?

25. What is the area of each?

In Jersey City there are two open squares.

In Hoboken there are two open squares.

There are none other in either of the remaining town or townships.

One of them in Hoboken contains 138,000 square feet and the other 139,500 square feet.

One of those in Jersey City contains 80,000 square feet; the other contains 230,400 square feet.

26. Are the public parks and squares kept in good condition?

27. Are public fountains placed in the parks?

The public squares are kept in fair condition. Both of those in Jersey City contain public fountains, and one of those in Hoboken contains a public fountain.

28. How many public urinals in streets and in parks?

29. Are any areas for and sources of amusement provided in the parks?

30. Furnish copies of any regulations or ordinances relating to care and management of the parks.

There are no public urinals whatever in any of the streets or squares of the cities, nor in any portion of the town or townships.

No sources of amusement are provided.

31. To what extent is life endangered by improper arrangement and management at railroad crossings within the city?

32. How many lives lost from this cause during the last five years?

With one exception, as far as known, all railroad crossings within the city are provided with gates, which are regularly raised and lowered by a flagman to avert danger. In the case of the exception there are only freight trains passing, and these only at long intervals. At those crossings where there are no gates flagmen are stationed. Therefore, as far as ascertainable, no lives were lost from the above cause.

33. What number of accidents occurred last year on street railroads?

34. What number of accidents resulted from efforts to get on or off the front platforms of street-cars?

In Jersey City there were four accidents during the past year; one occurred in Hoboken during the same time. None occurred in either Weehauken, West Hoboken, town of Union, or township of Union.

SCHEDULE F.

Habitations of Hoboken, Weehawken, West Hoboken, town of Union, township of Union.

1. How many dwelling-houses are there within the city limits?

In Hoboken there are 3,000 dwelling-houses; in Weekawken there are about 100 dwelling-houses; in West Hoboken there are 910 dwelling-houses; in town of Union there are 830 dwelling-houses; in township of Union, about 230 dwelling-houses.

2. What proportion of these are inhabited by the owners?

In Hoboken about one-third are so inhabited; in West Hoboken and town of Union about one-half are so inhabited; in Weehawken and township of Union about two-thirds are so inhabited.

3. What is the average occupancy of each dwelling? Specify, when practicable, the rate in different parts of the city.

For Hoboken, about 10; for Weehawken, about 8; for West Hoboken, about 6; for town of Union, about 6; for township of Union, about 8.

4. How many are tenement houses—that is, occupied by two or more families?

In Hoboken about 1,500 buildings are occupied by more than two families or tenements.

There are practically no tenements in either Weehawken, West Hoboken, town of Union, or township of Union.

5. How many houses are overpopulated; give details of location and effects in a special report, if possible?

There are no overpopulated houses in either town of Union, or townships of Weehawken, West Hoboken, or township of Union.

6. Are there any municipal regulations about overpopulation; if so, what are they?

There are none for Hoboken, Weehawken, West Hoboken, town of Union, or township of Union.

7. Is there any regulation as to the material of which and the manner in which houses shall be constructed within the city limits; if so, what is it, and is it practically enforced?

In Hoboken there is an ordinance regulating the limits within which no frame buildings shall be built, and when violated a fine is imposed. There is no similar restriction in either Weehawken, West Hoboken, town of Union, or township of Union.

8. Have any houses been condemned as unsafe within the last year; if so, how many?

One in the city of Hoboken within the last year. None in either of the other places.

9. Have any been condemned as unfit for habitation for other reasons; if so, how many, and for what reasons?

None have been condemned for other reasons.

10. What proportion of the dwelling-houses have connection with the sewers? Of these what proportion are connected by tight drains, with suitable traps?

In Hoboken, practically, all dwelling-houses have connection with the sewers. Even those on the lowlands are generally connected with the sewers, although in many instances such connections are little more than worthless. A few isolated dwellings, entirely without the range of any existing sewers, are not connected. There are no connections provided with traps so far as we know or can ascertain.

In the town of Union less than 5 per cent. of all the buildings are connected with the single sewer which there exists; in Weehawken, 10 per cent.

West Hoboken and township of Union have practically no sewer connections, and none of those in town of Union are provided with traps.

11. Do any houses have springs, cisterns, or wells in the basement or cellars for water supply?

In Hoboken a few houses have wells in the cellar, from which water is drawn for drinking purposes.

In Weehawken, West Hoboken, town of Union, and township of Union the inhabitants rely entirely on this mode of supply, there being no supply from water-works in these places, though the wells, springs, or cisterns are generally located in the back yards, and not in the basement or cellars.

12. What proportion of the dwelling-houses are isolated buildings with sufficient yards or clear space all around them?

In Hoboken there are only five or six isolated buildings with grounds around them. In Weehawken about one-fourth are isolated; in West Hoboken about one-half are isolated; in town of Union about one-half are isolated; in township of Union about two-thirds are isolated.

13. Do you know of any houses in which special arrangements are made for ventilation; if so, give particulars?

In a few in Hoboken separate flues have been provided, through which foul air may pass off. We know of nothing of this kind in any of the other places.

14. Are the cellars and basements in any port of the city damp or insufficiently drained? If so, specify.

The cellars of all the buildings on the low lands in the westerly portion of the city previously referred to are damp and insufficiently drained.

Their elevation, with reference to high water, lack of sewerage, &c., has been described in detail under section D., drainage and sewerage.

15. What proportion of the habitations are furnished with proper bathing facilities?

In Hoboken, about 70 per cent. are so furnished. In Weehawken, West Hoboken, town of Union, and township of Union practically none, there being no water-supply in those places.

16. Are the cellars used for storing fuel? Are ashes and other sweepings from houses deposited in cellars?

The cellars of Hoboken and of the other towns and townships are generally used for storing fuel.

Ashes and other sweepings are generally deposited in ash barrels or boxes in the city of Hoboken, from which they are regularly removed during the week by the carts of the street-cleaning contractor. No such provision exists in either of the towns or townships, and as a result the ashes and sweepings are scattered and filled in in different parts of the grounds, and sometimes of the cellars.

17. Have any diseases occurred which seem to be due to overcrowding or unfitness of dwellings or bad condition of cellars? If so, specify.

Such diseases have occurred in Hoboken, due to great overcrowding of dwellings, in a few isolated cases.

Where many persons have been crowded together in small, low, and ill-ventilated apartments the death rate, particularly among infant children, has been greatly creased.

This applies particularly to Hoboken, there being but few tenement houses in the remaining places under consideration.

18. Does the fuel used have any influence upon health? If so, specify.

It does not.

19. Is the ground under basement floors usually cemented?

No, it is not.

20. Are basements generally wainscotted?

In Hoboken basements are generally wainscotted.

In Weehawken, West Hoboken, town of Union, and township of Union there are far less buildings with basements, and such are generally of a small and inexpensive kind.

These are not always wainscotted, though the better class with basements generally are.

21. What is the height of buildings in comparison with the width of streets?

In Hoboken generally the height of buildings will range between 30 to 50 feet, or an average of about 40 feet, fronting on streets, half of which are about 50 feet in width and half 65 feet in width.

In Weehawken, West Hoboken, town of Union, and township of Union the average height of buildings will be about 25 feet and the average width of streets about 50 feet.

22. Have any ill effects been observed from arsenic paper in sleeping and living rooms?

None have been observed.

SCHEDULE H.

Garbage and excreta of Hoboken, Weehawken, West Hoboken, town of Union, township of Union.

1. What is the law as to the removal of garbage? Furnish copy of law, if possible.

For Hoboken and West Hoboken the law is such that practically the garbage shall

be removed by contract. None for Weehawken, town of Union and township of Union.

2. How exactly is the law complied with?

In Hoboken it is complied with.

None to comply with for Weehawken, town of Union, and township of Union.

In West Hoboken it is complied with.

3. Is the kitchen refuse required to be removed in covered vessels?

No such regulation in Hoboken. None for either of the other places.

4. Are the garbage, ashes, &c., removed by the corporation employés or by private contractors?

5. Is this removal at the expense of the corporation or of the householder?

In Hoboken by private contractors, at the expense of the corporation.

No provision for removal in either Weehawken, town of Union, or township of Union.

In West Hoboken by corporation employés, at the expense of the corporation.

6. Where is it taken to?

7. How often is it removed?

8. What is the ultimate disposition made of it?

In Hoboken carted away from the thickly settled portion of the city twice a week in winter and three times in summer.

Ultimately the solid and unobjectionable portion of it is used for filling.

No provision for either removal or ultimate disposition in either Weehawken, town of Union, or township of Union.

In West Hoboken it is removed out of the limits of thickly settled portion once a week and dumped in vacant ground.

9. Are the removal and ultimate disposition promptly and satisfactorily performed?

In Hoboken they are, as also in West Hoboken. No provision in either Weehawken, town of Union, or township of Union.

10. Does any nuisance or probable damage to health result from infrequent removal, improper keeping before removal, improper handling during removal, improper manner or place of deposit, or neglect during any part of the process? Specify minutely.

In Hoboken there does not. None in either of the other places, as far as we have been able to ascertain, from physicians or other public officers.

11. If the removal is at the cost of the corporation, what was its cost during the last fiscal year?

For Hoboken the cost was $940. None for either Weehawken, town of Union, or township of Union. For West Hoboken the cost was $312.

12. If at the cost of the householders, give estimated aggregate cost to them for the same period.

It was at cost of corporation for Hoboken and West Hoboken. None that could be estimated for either of these other places.

13. What disposition is made of dead animals?

In Hoboken they are removed by contract. In Weehawken, West Hoboken, town of Union and township of Union, the privilege of carting away dead animals is accorded to a single contractor without remuneration other than that derived from the carcass.

14. What number of dead animals of different kinds were so disposed of during the last year?

In Hoboken about 250. In Weehawken about 20. In West Hoboken about 14. In town of Union about 25. In township of Union about 15.

15. Is the matter of disposal satisfactory; if not, why not?

In Hoboken it is satisfactory. It is satisfactory for Weehawken, West Hoboken, town of Union, and township of Union.

16. What is the number and proportion of houses of which the kitchen and laundry waste water is delivered into cess-pools on the premises?

None in Hoboken. Practically all in Weehawken, West Hoboken, town of Union, and township of Union.

17. Are these cess-pools tight or porous, or what proportion of each?

None in Hoboken. All porous in Weehawken, West Hoboken, town of Union, and township of Union.

18. Are they furnished with overflows; if so, to what extent, and where does the overflow deliver?

None in Hoboken. Practically none in Weehawken, West Hoboken, town of Union, and township of Union.

19. To what extent is the flush tank used, and in what manner?

None in Hoboken, Weehawken, West Hoboken, town of Union, and township of Union.

20. To what extent are absorption drains under the surface of the soil used?

None in Hoboken. Practically none in Weehawken, West Hoboken, town of Union, and township of Union.

21. Where cess-pools are used, what proportion of them receive the waste of water-closets?

None in Hoboken. None in Weehawken, West Hoboken, town of Union, and township of Union.

22. What are the regulations and methods with regard to constructing and cleansing cess-pools?

None in Hoboken, with regard to constructing and cleansing cess-pools. Nor in Weehawken, West Hoboken, town of Union, or township of Union.

23. Are the methods in use satisfactory; if not, why not?

None in Hoboken. As far as their nature will permit in Weehawken, West Hoboken, town of Union, and township of Union; but the methods are defective.

24. What proportion of houses have water-closets?

In Hoboken about three-fourths have water-closets. Very few, practically none, in Weehawken, West Hoboken, town of Union, and township of Union.

25. What proportion of these deliver directly to a public sewer?

In Hoboken about nine-tenths of these deliver directly into a public sewer. A very small proportion in Weehawken, and town of Union practically none. None in West Hoboken and township of Union.

26. What proportion to cess-pools?

None to cess-pools in Hoboken. Practically none in Weehawken, West Hoboken, town of Union, and township of Union.

27. What proportion of the houses depend wholly or partly on privy vaults?

In Hoboken about one-half depend wholly or partly on privy vaults. Practically all in Weehawken, West Hoboken, town of Union, and township of Union.

28. What proportion of the privy vaults are water tight?

Practically, none in Hoboken. None in Weehawken, West Hoboken, town of Union, and township of Union.

29. What are the regulations and methods with regard to constructing and cleansing such vaults?

For Hoboken there are no regulations with regard to construction. Ordinance limits cleansing to be done by licensed scavenger, between 11 p. m. and 3 a. m.; and provides manner of doing and nature of carts, so as to avoid nuisance from smells, &c.

Ordinance for town of Union provides that no privy shall be built nearer than within 3 feet of the line of an adjoining owner, nor of 10 feet of the street line; and that they shall be cleaned between 11 p. m. and 4 a. m. Same for township of West Hoboken.

There are no ordinances for either in Weehawken or township of Union, they being incorporated under the general State law.

30. Have any cases occurred of contamination of wells or cisterns by privy or cess-pool drainage? If so, give particulars or references, especially where the matter has been carefully investigated.

None in Hoboken or Weehawken, West Hoboken, town of Union, or township of Union; although analyses are rare.

31. To what extent is the dry-earth system used?

None in Hoboken, Weehawken, West Hoboken, town of Union, and township of Union.

SCHEDULE K.

Slaughter-houses and abattoirs of Hoboken, Weehawken, West Hoboken, town of Union, township of Union.

1. From what part of the country are animals obtained for the markets?

From the West, North, and South.

2. How many are annually slaughtered for the city in which you reside?

For the city of Hoboken about 6,000 beeves are annually slaughtered and about 18,000 small stock, including hogs, calves, sheep, and lambs.

3. How are they conveyed to the place at which they are slaughtered?

By railroad transportation.

4. Are means adopted, by legislation, or otherwise, for supplying food, water, air, and exercise to animals while in transit?

There are. They are required to be so supplied every 28 hours.

5. Are animals, when sent to market, submitted to inspection before or after slaughtering?

They are not.

6. Are they washed before being killed?

They are not.

7. Can you give any observations as to the effect of terror in animals producing

changes in secretions or flesh, whereby their milk or meat is rendered injurious as food?

The following answers to questions 7, 8, 9 are the result of observations by Mr. Jas. C. Corlies, D. V. S., in answer to a communication addressed to him by General Sterling:

8. What is the effect upon their flesh for the market of depriving animals of food and drink for twenty-four hours, provided this be a day or two before they are killed; or, secondly, immediately before they are killed?

To deprive animals of food and drink for a period of twenty-four hours immediately preceding their slaughter, would not, in our opinion, produce any deleterious effect upon the meat, but, as is too often the case, animals are loaded, or rather packed, in close cars so that they cannot lie down and are required to stand without either food or water for four or five days, and are then unloaded at a place of slaughter and killed in an hour afterwards, and while laboring under an intense degree of excitement.

The same physiological and pathological phenomena would exist, as has already been described.

If the consumers of beef could witness the long trains of cars loaded with the cattle which, being brought from the West and required to stand on sidings, often a whole day at a time, and hear the lowing and moaning of the poor suffering brutes for the luxuries to them of food and water, such a hue and cry would go up as would soon create some legislative action upon the subject. So long as that state of affairs is allowed to exist, just so long must we expect to have meat wholly unfit for human consumption to go upon the market.

9. What diseases, and what stages of disease, in animals have been observed as rendering their flesh injurious as food?

All diseases that are accompanied by acute febrile symptoms in the first stages, as well as those that are characterized by prevalent collections, which are afterwards absorbed into the circulatory system, will render the flesh unfit for human consumption, to wit: An animal being required to stand in an open car for a long time without food or drink, becomes, in consequence, debilitated, which renders it susceptible to contract colds, which is a common term for catarrh, whether gastric, nasal, intestinal, or any other form, inflammation supervenes, which often assumes a gangrenous nature, strumous diseases follow, and in consequence the system will soon become loaded with effete materials which permeate the flesh. This condition may be present either in the first or acute, or in the second or chronic stage.

10. What is the mode of slaughtering?

Of two kinds: either by striking in the head or by cutting their throats.

11. Are they kept from seeing the various processes and results of butchering?

They are not.

12. What disposition is made of bodies of animals that die in transit?

They are brought to the terminus of the road and then immediately rendered.

13. Can you give any statistics of the number of animals and quantity of meat condemned yearly, and why condemned?

No; we cannot.

14. Are abattoirs erected at public or private expense?

At private expense.

15. Is the establishment of abattoirs and the business of slaughtering governed by legislative action, State, or municipal?

By both State and municipal.

16. Is the business of slaughtering concentrated in large establishments or scattered in small?

17. Are they within or beyond the city limits?

It is concentrated in large establishments lying within the city limits.

18. Do the abattoirs drain into covered sewers or open sewers flowing through a part of the city?

Into covered sewers unless they drain directly into the river.

19. Are abattoirs considered as nuisances in the neighborhood? If so, for what reasons?

They are not.

20. If a system of abattoirs is adopted in your city, what facilities are offered to butchers for slaughtering?

Very good and complete facilities.

21. How does the profit to the butcher, under the new system, compare with that under the old?

It is greater under the new system.

22. What rents are paid by them?

On an average about $50 per month by each butcher for his stall for slaughtering.

23. What disposition is made of the fats, tallow, blood, and animal refuse?

They are sent outside of the city for rendering and fertilizers.

24. Is the refuse of abattoirs given to hogs, kept for the purpose? If so, what regulations protect the public from consequent nuisance?

It is not.

35. How does the meat of these hogs compare with those which have been corn-fed?

No comparison.

26. Is the "rendering" of the animal refuse done on the day in which animals are slaughtered?

Generally it is.

27. Is any method of cooling the meat employed?

It is always cooled by being exposed to the fresh air.

28. Give such facts, pamphlets, papers, or references as may bear on these subjects.

None could be obtained other than what are included under the headings of this class.

SCHEDULE L.

Manufactories and trades of Hoboken, Weehawken, West Hoboken, town of Union, township of Union.

1. Are there any manufacturing establishments within the city limits, or in the suburbs, which are nuisances, such as distilleries, chemical works, tanneries? If so, specify.

There are not.

2. Are any restrictions imposed upon such by law?

The law provides for the abatement of any nuisance.

3. Are there any which pollute the water supply; if so, how?

There are not.

4. Have any bad results followed?

There have not.

5. Are there any which produce noxious gases or vapors? If so, specify, and state results.

The odors arising from the few scattered slaughter-houses, just south of the southerly boundary of Hoboken, are always offensive, and during the warm seasons almost unbearable.

6. Are there any which produce disease in the workmen? If so, specify.

There are not.

7. Are women employed in the manufactories? If so, are they subject to any diseases due to their occupation, as from the use of sewing-machines, &c.? If so, specify.

Women are employed, but they are not subject to any diseases due to occupation.

8. What are hours for labor and meals in factories?

Hours are from 7 a. m. to 12 m., and from 12.45 p. m. to 6.15, and close at 3 p. m. Saturdays.

9. Are children employed in factories? If so, what are their hours of labor?

No children are employed.

10. What is the age of the youngest so employed.

None employed under fourteen years.

11. Does it affect their health? If so, specify.

It does not.

12. Is there any law regulating hours for labor of children, or requiring children employed to go to school a portion of the year? If so, furnish a copy of such.

There is not.

13. Are the cubic space and ventilation in the rooms occupied by workmen generally satisfactory?

They are.

14. Have any diseases (or impaired physical condition) been observed, due to insufficient air supply to the workmen?

There have not.

15. Are the arrangements for privies and water-closets to these establishments satisfactory? If not, why not?

They are.

SCHEDULE M.

Public school buildings of Hoboken, Weehawken, West Hoboken, town of Union, township of Union.

1. How many public school buildings are in the city?

Four in Hoboken, 1 in Weehawken, 1 in West Hoboken, 1 in town of Union, 1 in township of Union.

2. Are they properly located? If not, why not?

Two are and two are not, in consequence of unhealthy locality and unfavorable

surroundings. The others in Weehawken, West Hoboken, and town of Union, and towhship of Union are properly located.

3. Give for each building the following data: Location, altitude and area of sight, nature of soil, character of drainage, material, date of erection, cost, number ot stories, and number of rooms used as school rooms.

For location and altitude of each of the buildings refer to topogrophical and sanitary map upon which the buildings have been plotted and the elevations shown. Upon this map all existing sewers have also been shown, and it will thus appear whether the drainage is by sewers or surface drainage only. For number of stories and number of rooms used as school rooms, see the ground plans under section 4. The school buildings in Hoboken and West Hoboken are brick buildings, while those in Weehawken, and town of Union, and township of Union, are frame buildings.

4. Give a floor plan for each floor, no matter how rough, if precise dimensions and height of each story is stated. Indicate all windows, doors, heating apparatus, and the number and position of scholars' desks, giving floor area and cubic space for each pupil.

5. How is the building heated?

In Hoboken they are all heated by stoves excepting one by steam, also the one in West Hoboken by steam. All the others by stoves.

6. What is the mean temperature of the rooms when the school is opened, and half an hour before closing, in cold season?

About 68° at opening and about 75° half an hour before closing.

7. What is the mean external temperature for the same hours?

Probably varying between 30° and 45°.

8. Is any sickness traceable to variations or extremes of temperature?

Nothing more than occasionally slight disorders or headaches.

9. How much fuel is required annually to heat the building?

The four in Hoboken require about 60 tons each. One in West Hoboken about 75 tons. Town of Union about 50 tons, and Weehawken and township of Union about 30 tons each.

10. How are the school rooms ventilated in winter?

Generally by opening windows and also by ventilating flues. In school No. 4 in Hoboken, however, cold-air-flues are provided which contribute largely to the more effectual ventilation.

11. How are the school rooms ventilated in summer?

Same as in winter.

12. Is the ventilation satisfactory?

Generally it is not.

13. Give analysis of air during school hours, if possible.

Cannot be obtained.

14. What are the water-closet and privy arrangements?

They are generally in the yards in the form of privies, in all the schools connected with the sewers in the streets.

15. Are they satisfactory; if not, why not?

Generally they are not satisfactory, because the offal collects instead of being carried away.

16. Is the basement used for water-closets, earth-closets, for storing wood, or for what purpose?

Generally for storing wood and coal. In school No. 4 in Hoboken it contains steam boiler and heating apparatus, also janitor's quarters. Used now, also, for playground in stormy weather.

17. Is the basement ventilated separately from the rest of the building?

Generally it is not. In school No. 4, in Hoboken, it is.

18. What is the water supply?

In Hoboken, from water works; otherwise, from wells or pumps.

19. Is it abundant?

It is.

20. Please send results of latest analysis; if not analyzed, please state your opinion of its quality.

In Weehawken, West Hoboken, town of Union, and township of Union, generally the water derived from wells and springs is of good quality. In Hoboken, also, the water derived from the Passaic River is generally of good quality excepting occasionally during the summer months, when it becomes turbid and discolored at times.

21. What patterns of desks and seats are used?

Every style from the earliest to the latest is in use. One of the latest in use in No. 4 school in Hoboken is the "Peard desk," which is considered a good design (folding seat and desk).

22. Are they satisfactory?

The latest is satisfactory. The older, which constitutes the majority is, in many cases, extremely unsatisfactory.

23. Are the school rooms sufficiently light?

The majority are not sufficiently light. School No. 4 in Hoboken is, except in cloudy weather.

24. What is the number of square feet of surface through which light passes into each room by windows?

About 44, 66, 88, and 110 square feet, according to variable size of rooms and height of windows.

25. Distance of the pupils at recitations from the blackboard, maps, or charts on which they are expected to read letters or figures?

From 5 feet to 25 feet.

26. Do the classes stand or sit during recitation?

They usually sit during recitation, but at times they also stand.

27. Give a programme of each school day showing division of the time to the several studies, recitation, recesses, and intermissions?

PUBLIC SCHOOL NO. 4, HOBOKEN, N. J.

Order of exercises for first class—female department.

MONDAY.

	Min.		Min.
A. M.—Arithmetic, 9.15 to 10.05	50	P. M.—Spelling, 1.05 to 1.35	30
German, 10.05 to 11.00	55	Geography, 1.35 to 2.15	40
Writing, 11.00 to 11.40	40	Grammar, 2.15 to 2.50	35

TUESDAY.

A. M.—Arithmetic, 9.15 to 10.15	60	P. M.—Algebra, 1.05 to 1.40	35
Spelling, 10.15 to 10.45	30	Grammar, 1.40 to 2.15	35
Geography, 10.45 to 11.15	30	Reading, 2.15 to 2.50	35
History, 11.15 to 11.40	25		

WEDNESDAY.

A. M.—Arithmetic, 9.15 to 10.05	50	P. M.—Spelling, 1.05 to 1.35	30
German, 10.05 to 11	55	Grammar, 1.35 to 2.15	40
History, 11 to 11.40	40	Algebra, 2.15 to 3	35

THURSDAY.

A. M.—Arithmetic, 9.15 to 10.05	50	P. M.—Spelling, 1.05 to 1.35	30
German, 10.05 to 11	55	Geography, 1.35 to 2.15	40
Writing, 11 to 11.40	40	History, 2.15 to 2.50	35

FRIDAY.

A. M.—Arithmetic, 9.15 to 10	45	P. M.—Algebra, 1.05 to 1.35	30
Grammar, 10 to 10.45	45	Reading, 1.35 to 2.20	45
Geography, 10.45 to 11.45	30	History, 2.20 to 2.50	30
Spelling, 11.15 to 11.40	25		

Course of studies, seventh class, female department.

9 to 9.15 a. m.—Assembly; reading of Bible; singing.

9.15 to 10 a. m.—Roll-call; reading of answers to examples worked at home; examples worked in the class; dictation of examples for home work.

10 to 10.30.—Reading and writing of numbers; mental arithmetic; multiplication and division tables; Roman numbers.

10.30 to 10.55—Marching.

10.55 to 11.30—Spelling; dictation; object lessons.

1 to 1.45 p. m.—Reading; preparing the next day's reading.

1.45 to 2.30 p. m.—Copying from books; writing short abstracts of previous reading lessons; penmanship.

FRIDAYS.

11 to 11.30 a. m.—Speaking.

1 to 1.45 p. m.—Drawing of mathematical figures.

1.45 to 2.30—Assembly; singing; speaking.

English and German Day.

Town of Union public schools, room 1, divisions A and B.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.10 o'clock	10 minutes	Bibellesen and register.
10.00 o'clock	50 minutes	Lesen.
10.30 o'clock	30 minutes	Orthography.
11.15 o'clock	45 minutes	Recess and schreiben.
11.50 o'clock	35 minutes	Grammatik and dictation.
12.00 o'clock	10 minutes	Schluss and aufgaben.

AFTERNOON.

1.30 o'clock	10, 20, and 30 minutes.	Opening, study, reading.
2.30 o'clock	30 minutes	Geography.
3.00 o'clock	30 minutes	Arithmetic.
3.30 o'clock	20 minutes	Writing.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

FREDERICK SHAEFER and OTTO ORTEL, *Teachers.*

English Day.

Town of Union public schools, room 1, divisions A and B.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.20 o'clock	30 minutes	Writing.

AFTERNOON.

1.30 o'clock	10, 20, and 30 minutes.	Opening, study, geography.
2.30 o'clock	30 minutes	Grammar.
3.00 o'clock	30 minutes	Arithmetic.
2.30 o'clock	20 minutes	Spelling.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

OTTO ORTEL, *Teacher.*

ENGLISH DAY.

Town of Union public schools, room 2, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.15 o'clock	35 minutes	Writing.

AFTERNOON

1.30 o'clock	10, 20, and 20 minutes.	Opening, study, geography.
2.30 o'clock	30 minutes	Grammar.
3.00 o'clock	30 minutes	Arithmetic.
3.30 o'clock	30 minutes	Spelling.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

JENNIE S. CURREY, *Teacher*.

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 2, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	30 minutes	Reading.
9.40 o'clock	20 minutes	Study.
10.00 o'clock	50 minutes	Writing, recess.
10.50 o'clock	40 minutes	Geography and grammar.
11.30 o'clock	30 minutes	Arithmetic and dismissal.

AFTERNOON.

1.30 o'clock	5 minutes	Register.
1.35 o'clock	40 minutes	Lesen.
2.15 o'clock	30 minutes	Orthography.
2.45 o'clock	30 minutes	Schonschreiben.
3.15 o'clock	35 minutes	Grammatick.
3.50 o'clock	10 minutes	Schluss und Aufgaben.

Months of March and April, 1880.

J. CURREY AND F. SCHAEFER, *Teachers*.

English Day.

Town of Union public schools, room 3, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	25 minutes	Spelling.
11.15 o'clock	35 minutes	Writing.

AFTERNOON.

1.30 o'clock	10, 20, and 30 minutes	Opening, study, geography.
2.30 o'clock	40 minutes	Grammar.
3.10 o'clock	40 minutes	Arithmetic.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

JAMES E. WHITE, *Teacher.*

English and German Day.

Town of Union public schools, room 3, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.10 o'clock	10 minutes	Bibellesen and register.
10.00 o'clock	50 minutes	Lesen.
10.30 o'clock	30 minutes	Orthography.
11.15 o'clock	45 minutes	Recess and schreiben.
11.50 o'clock	35 minutes	Grammatick.
12.00 o'clock	10 minutes	Aufgaben and schluss.

AFTERNOON.

1.30 o'clock	10, 20, and 30 minutes	Opening, study, reading.
2.30 o'clock	30 minutes	Geography.
3.00 o'clock	30 minutes	Arithmetic.
3.30 o'clock	20 minutes	Writing.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

F. SCHAEFER AND J. E. WHITE, *Teachers.*

ENGLISH DAY.

Town of Union public schools, room 4, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	35 minutes	Spelling.
11.20 o'clock	30 and 10 minutes	Writing and dismissal.

AFTERNOON.

1.30 o'clock	10 minutes	Opening.
1.40 o'clock	40 minutes	Arithmetic.
2.20 o'clock	25 minutes	Study.
2.45 o'clock	30 minutes	Grammar.
3.15 o'clock	30 minutes	Geography.
3.45 o'clock	10 and 5 minutes	Giving out lessons and dismissal.

Months of March and April, 1880.

MARY A. BROWN, *Teacher.*

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 4, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 and 30 minutes	Opening and reading.
9.40 o'clock	20 minutes	Spelling.
10.00 o'clock	30 and 20 minutes	Arithmetic and recess.
10.50 o'clock	25 minutes	Geography.
11.15 o'clock	20 and 15 minutes	Grammar and writing.
11.50 o'clock	7 and 3 minutes	Giving out lessons and dismissal.

AFTERNOON.

1.30 o'clock	5 minutes	Register.
1.35 o'clock	40 minutes	Lesen.
2.15 o'clock	30 minutes	Orthography.
2.45 o'clock	30 minutes	Schonschreiben
3.15 o'clock	35 minutes	Grammatick.
3.50 o'clock	10 minutes	Schluss and Aufgaben.

Months of March and April, 1880.

M. BROWN AND FRED. SCHAEFER, *Teachers.*

ENGLISH DAY.

Town of Union public schools, room 5, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.20 o'clock	30 and 10 minutes	Writing and dismissal.

AFTERNOON.

1.30 o'clock	10, 20, and 25 minutes.	Opening, study, language.
2.25 o'clock	5 and 15 minutes	Recess.
2.45 o'clock	45 minutes	Arithmetic.
3.30 o'clock	20 minutes	Spelling.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

L. M. LYCETT, *Teacher.*

GERMAN AND ENGLISH DAY.

Town of Union public schools, room 5, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	50 minutes	Reading.
10.00 o'clock	30 minutes	Spelling.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	20 minutes	Dictation.
11.10 o'clock	40 minutes	Writing and dismissal.

AFTERNOON.

1.30 o'clock	10, 20, and 25 minutes.	Opening, study, arithmetic.
2.25 o'clock	5 and 15 minutes	Recess.
2.45 o'clock	45 minutes	Reading.
3.30 o'clock	20 minutes	Language.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

H. GOOS AND L. M. LYCETT, *Teachers.*

English and German Day.

Town of Union public schools, room, 6, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	15 minutes	Scriptures, roll-call.
9.15 o'clock	25 and 10 minutes	Reading, study.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.20 o'clock	30 and 10 minutes	Language and dismissal.

AFTERNOON.

1.30 o'clock	10 and 45 minutes	Opening, reading.
2.15 o'clock	5 and 15 minutes	Recess.
2.45 o'clock	15 minutes	Spelling.
3.30 o'clock	20 minutes	Writing.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

C. SAFT and H. M. GOOS, *Teachers.*

English Day.

Town of Union public schools, room 6, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	15 minutes	Scriptures and roll-call.
9.15 o'clock	35 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.20 o'clock	30 and 10	Arithmetic and dismissal.

AFTERNOON.

1.30 o'clock	15, 20, and 20 minutes	Roll, study, language.
2.25 o'clock	5 and 25 minutes	Recess, reading.
2.45 o'clock	45 minutes	Arithmetic.
3.30 o'clock	20 minutes	Spelling.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

CLARA L. SAFT, *Teacher.*

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 7, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	25 minutes	Devotions and roll.
9.25 o'clock	35 minutes	Reading.
10.00 o'clock	15 and 15 minutes	Language and preparation for recess.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Writing.
11.20 o'clock	20 and 20 minutes	Spelling and dismissal.

AFTERNOON.

1.30 o'clock	25 minutes	Roll and study.
1.55 o'clock	25 minutes	Arithmetic.
2.20 o'clock	10 minutes	Preparation for reces.
2.30 o'clock	15 minutes	Recess.
2.45 o'clock	55 minutes	Reading and spelling.
3.40 o'clock	20 minutes	Dismissal.

Months of March and April, 1880.

H. GOOS AND L. CURREY,
Teachers.

ENGLISH DAY.

Town of Union public schools, room 7, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	25 minutes	Devotions and roll.
9.25 o'clock	35 minutes	Reading.
10.00 o'clock	15 and 15 minutes	Arithmetic and preparation for recess.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	10 minutes	Arrangement for work.
11.00 o'clock	20 15, and 20 minutes	Spelling, language, and dismissal.

AFTERNOON.

1.30 o'clock	20 minutes	Roll and study.
1.50 o'clock	30 minutes	Arithmetic.
1.20 o'clock	10 minutes	Preparation for recess.
2.30 o'clock	15 and 30 minutes	Recess and reading.
2.15 o'clock	25 minutes	Spelling.
33.40 o'clock	20 minutes	Dismissal.

Months of March and April, 1880.

L. CURREY, *Teacher.*

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 8, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	30 minutes	Order, scriptures, and roll-call.
9.30 o'clock	20 and 5 minutes	Reading and exercise.
9.55 o'clock	25 and 10 minutes	Spelling and preparation for recess.
10.30 o'clock	20 and 5 minutes	Recess and preparation for work.
10.55 o'clock	25 and 5 minutes	Arithmetic and exercise.
11.25 o'clock	20 and 15 minutes	Reading and dismissal.

AFTERNOON.

1.30 o'clock	25 minutes	Opening and roll.
1.55 o'clock	25 and 10 minutes	Reading and preparation for recess.
2.30 o'clock	15 and 10 minutes	Recess and preparation for work.
2.55 o'clock	25 minutes	Writing.
3.20 o'clock	10, 10, and 15 minutes	Language, counting, dismissal.

Months of March and April, 1880.

HENRIETTA GOOS,
LIZZIE LYCETT,
LIZZIE CURREY, AND
CLARA SAFT,
Teachers.

ENGLISH DAY.

Town of Union public schools, room 8, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	30 minutes	Order, scripture, and roll-call.
9.30 o'clock	20 and 5 minutes	Reading and exercise.
9.55 o'clock	25 and 10 minutes	Spelling and preparation for recess.
10.30 o'clock	20 and 15 minutes	Recess and preparation for work.
10.55 o'clock	25 and 5 minutes	Arithmetic and exercise.
11.25 o'clock	20 and 15 minutes	Reading and dismissal

AFTERNOON.

1.30 o'clock	25 minutes	Opening and roll.
1.55 o'clock	25 and 10 minutes	Reading and preparation for recess.
2.30 o'clock	15 and 10 minutes	Recess and preparation for work.
2.55 o'clock	20 and 5 minutes	Spelling and exercise.
3.20 o'clock	25 and 15 minutes	Arithmetic and dismissal.

Months of March and April, 1880.

CLARA SAFT,
LIZZIE LYCETT, AND
LIZZIE F. CURREY,
Teachers.

28. How long are all the pupils under eight years old confined? 1st. In the room 2d. To the seat without change?

1st. Two hours and 30 minutes, with the privilege of going out. 2d. Change work about every 20 or 30 minutes.

29. Is your experience in favor of two sessions a day with one long intermission, or only one session with recess?

For primary, intermediate, and grammar grades, two sessions; for high school, one session.

30. Are there opportunities for pupils to exercise, sheltered from the cold, heat, or wet, and without exposure to air contaminated by privy or water-closet?

The West Hoboken school has such a room in the basement; none of the others have.

31. Are there opportunities for drying clothes when wet coming to school?

There are not.

32. If any lessons are studied outside of the school hours, mention the subject so studied, the average time required for the study of each, and the time of day usually devoted thereto?

All grades above the primary are expected to study at home. They usually have three subjects occupying one-half hour each, and to which they usually devote themselves in the evening. The time ranges generally from 30 minutes to 3 hours.

33. Give the actual length of time devoted each day to outdoor exercise and recreation, the number of holidays or half holidays in each week, the time of year at which the vacations occur, and the number of days in each vacation?

School opens at 9 a. m. and 1 p. m. Primary department dismissed at 11.30 a. m. and 2.30 p. m. Grammar department dismissed at 11.45 a. m. and 3 p. m.

The outdoor exercise it is impossible to fix, excepting that in case of boys it is ample. One regular holiday in each week, Saturday; vacation occuring in July and August, averaging about eight weeks in Hoboken and all the other places. One week at Christmas. No attendance on Saturday or Sunday and on regular legal holidays.

34. Describe the play-grounds; give the area thereof, and describe the gymnastic and calisthenic apparatus, if any used.

There are generally no play-grounds. No gymnastic and calisthenic apparatus is used.

35. Is exercise in the open air a compulsory feature of the institution?

It is not.

36. Is competition a feature in the system of instruction?

Generally it is not; in some exceptional instances it is.

37. If so, state fully to what extent it governs the award of prizes, whether different classes or both sexes may compete for the same prize; in this connection, state whether the sexes study and recite together or not.

Generally no prizes are awarded. Both sexes do not in Hoboken; in the other places they do study and recite together.

Stevens institute scholarships are awarded to the pupils gaining the highest record in the high school. In the high school they also recite together.

38. Is corporeal punishment permitted in the school?

Prohibited by State law and by the regulations governing the school.

39. What methods of correction are used?

Appeal to the feeling of honor of the pupil and detention after school hours; extra lessons are often required and reports made to parents.

40. Mention what measures are taken for the care of the grounds, the flushing or other cleaning of sewers, the removal of excreta, &c.

As previously mentioned, none of the schools have what may be called grounds around them, but merely back yards in which the privies are located. Where they have privies not connected with any sewer they are cleaned out as often as they become filled, and during warm seasons disinfectants are used. The sewers are not specially flushed other than derived from rains and the water wasted by house owners.

41. A copy of all regulations and statistics should accompany each report.

42. If statistics of the age, height, and weight of the pupils in each school or class are obtainable, they are important.

They cannot be obtained.

43. Are there any statistics respecting the illnesses and deaths of teachers and pupils?

There are not.

44. Please state the results of your observations, experiments, and records respecting the prevalence of the following-named diseases, and of any others of like character, and of the effect of the school-room furniture and building in promoting or modifying them:

a. Abnormitiis and diseases of the eye (short-sight, color blindness, &c.).

b. Diseases resulting from cerebral congestion (headache, epistaxis, goitre, &c.).

The following are the results of observations by one of our most experienced principals in Hoboken. He says:

"While I am not prepared to give figures showing the number of those affected with diseases of the eye, yet I am convinced that great injury is done to the eyes in the schools. Short-sightedness and weak eyes prevail largely. Two causes I would name: 1st. The light is not properly received upon black-boards and upon books, &c. Instead of the pupil seeing by reflected light, he is often required to receive the direct rays upon the page of his book, &c.

2d. Much of the printed matter in our books is in too small type for close and continuous reading.

3d. Our copy-books are made with red lines—these are entirely too intense. I mean intensity of red light upon the eye is weakening even to a fully developed one, but to the eye of the boy or girl under the nervous energy required for the growth of the body and for carrying on its functions, it is more damaging."

c. Diseases of the spine (scoliosis, &c.).

d. Diseases of the respiratory organs (consumption, scrofula, &c.).

e. Diseases of the digestive organs (dyspepsia, &c.).

f. Diseases of the genito-urinary organs (especially females).

g. Contagious and epidemic diseases.

h. Wounds, injuries, &c.

We have consulted the oldest practitioners in our city on the foregoing questions affecting the health of pupils and teachers of our public schools, and they express themselves as unwilling to furnish such information in a definite form, without having first made a special study of the subject under investigation, extending over a period of several years.

The prevailing opinion among them, however, appears to be that the public schools generally are not specially detrimental to the health of either pupils or instructors, and that they cannot trace any of the diseases above named as having originated in the schools.

45. Give your experience as to the effect of large schools on the propagation of disease, and as to the advisability, in a sanitary point of view, of very large school buildings of several (three or more) stories in height.

From the fact that the classes are always separate and distinct from one another, increasing the number is not considered as necessarily injurious.

46. State the frequency of heart disease among anæmic and debilitated pupils who occupy the upper floor of school buildings, and compare with the frequency among such pupils occupying the first and second stories only.

None have been observed by physicians, though many of the oldest practitioners have been consulted.

47. State facts respecting the frequency of short-sight among the pupils of the several ages and grades, and as to effect of defective light and improperly constructed desks and seats, on this disease, and on the production of spinal curvature, &c.

In the opinion of an experienced instructor and principal, the condition of light and the habits of closely applying the eyes to the book in reading, and also much slate work, particularly the white on the black, proves injurious to the sight.

48. Give your observations as to the safety of competition between pupils of both sexes; also as to the advisability of identical school hours, sessions, and lessons for both sexes.

Competition occasionally is good, but when carried to excess proves injurious. In the opinion of an experienced instructor, co-education in the above respects is both advisable and beneficial.

SCHEDULE Q.

Cemeteries and burials.

In describing the cemeteries of the towns and cities upon the Hudson River and New York Bay water front of Hudson County, I shall take them *seriatim*, beginning with the most northerly and thence proceeding successively southward. Those cities and towns lying upon the Hudson River and New York Bay contain within their limits all the cemeteries of the county, being eleven.

NORTH BERGEN TOWNSHIP.

In this township we find four cemeteries, viz, Machpelah, Grove Church, Hoboken, and Weehawken. In nearly all cases personal examinations were made regarding the cemeteries of the county.

Machpelah Cemetery.—It should be stated, that in all cases I have taken the word

decay, as applied to the body of a deceased person, to mean the total disappearance of all except the osseous portions of the body. Machpelah Cemetery contains about —— acres, of which two acres are occupied. The land was first used for burial purposes in the year 1850. It is situated upon the westerly slope, the ridge which runs through Hudson County from north to south, and which in this township rises from 220 to 260 feet above mean high-water. Trap rock underlies at varying depths all of the ridge. There are in the cemetery 2,500 graves. Interments are now made at the annual rate of about 100. Owing to a sparse population in this vicinage and to the steep descent of hill to the marshes, securing the effectual drainage of the cemetery, I do not regard it as probable that the subsoil drainage contaminates springs, wells, or water-courses. The graves average six feet in depth. The western slope of the hill is covered throughout to a considerable depth by a deposit of loose drift, consisting of gravel of foreign origin intermixed to some extent with the soil of the hill; at this particular point it is a yellowish earth, loose drift gravel, with considerable sand in pockets, the rock sloping to the west. The sand is always reached in about one-half of the cemetery before a depth of six feet has been attained. This soil, when dry, is hard and compact, and difficult to dig; it is dry at the depth at which a body is placed. There are no vaults. Four feet of earth must cover all bodies. The superintendent is unable to speak with any great degree of certainty as to the time required for bodies in graves to decay, but thinks about four years would be a sufficient length of time. No deleterious or unpleasant effects have been observed to proceed from the cemetery, and no complaints have been made. Bodies of persons who have died from contagious diseases must be inclosed in sealed cases.

Hoboken Cemetery.—Situated in North Bergen Township, on westerly slope of ridge. First used in 1862. From that time to 1879, November 10, there have been 5,000 burials, including about 400 bodies removed from old cemetery. Yearly average, 294 burials. No probable contamination of springs, wells, or water-courses by subsoil drainage. The graves average 6 feet in depth and are dry; the surface water running off freely to the avenues, thence being conveyed by stone gutters out of the grounds, and finally reaching the creeks or river (Hackensack). All bodies must be covered by at least 3 feet of earth. The soil resembles that of the last-described cemetery, a gravelly, fairly tenacious earth. There are four vaults (ventilated), brick interiors, stone exteriors, sunk in side of hill, and dry. Floors are two cement and two flagged. As regards rapidity of decay, the superintendent, Mr. Crane, found it impossible to speak positively, but had frequent proof that bodies were preserved much longer in damp than in dry soils. The grave-diggers were also uncertain upon this point. Thought about eight years in vault and in sandy soil would have to elapse before decay would be complete. No unsanitary effect has been traced to this cemetery. Bodies of persons who have died of contagious diseases are not allowed in the vault. There is no receiving vault. Cement floor. No complaints concerning it have been made. No odor from it is perceptible unless one places himself in proximity to the ventilating shaft.

Grove Church Cemetery.—Situated in North Bergen Township, on the westerly side of ridge. It was first used in 1847. It contains about —— graves; burials take place to the number of about 150 a year. There is no evidence that springs, wells, or water-courses are contaminated by the subsoil drainage. The graves are of an average depth of about 5 feet and are dry. The soil characteristics are about like those of the former two cemeteries. There are two vaults, used occasionally, one of brick, the other of stone. No information of any account as to rapidity of decay of bodies in vaults or graves could be obtained. There has not been observed any evil effect from the cemetery. The population of township is very sparse; at this point about 123 persons to 100 acres. "Extra precautions," as to the character of which I am not informed, are taken in the case of the burial of bodies of persons who have died from contagious diseases. There is a receiving vault, against which no complaints have been heard.

Weehawken Cemetery.—Weehawken Cemetery lies in North Bergen Township near the western foot of the slope. Was first used for interment purposes in 1858, since which time there have taken place about 11,000 burials at an annual rate of about 600. There is no probability, owing to the distance of dwellings from the cemetery and to the fact of their being nearly all situated on the upper portion of the slope above the cemetery, of any contamination of springs, wells, or water-courses. All drainage flows directly into the salt meadow or marsh, and thence is conveyed by creeks to the river. The graves average about 6 feet in depth. Soil, as in the former-described cemeteries, is a yellowish earth, fairly compact, and interspersed with gravel. There are places in which I am informed at a depth of about 20 feet a quicksand is met with. Examination of several open graves revealed the fact that they were perfectly dry. There is one public and one private vault built of brick and cement. The public vault is ventilated. The superintendent thinks about four years' time would suffice for the complete decay of a body in the vault. In the graves the time required would vary with the soil according as it was dry or wet, sandy or porous, or clayey and tenacious. In the dry

and porous soils from one to three years will insure complete decay, while in the more most and heavy earths a much longer period would have to elapse. A case was mentioned of the body of a very stout man, which was exhumed after being twelve years in the moist earth, and found to be in a condition of perfect preservation. The superintendent remarked that on an average about one year in sandy and a year longer in clayey soil would result in the complete decay of a body. In heavy or rainy weather a heavy odor is perceptible about the cemetery. The only precaution taken in case of burial of bodies dead from contagious diseases is that the bodies of those who have died from small-pox are not allowed to be deposited in the vault. There is one receiving vault, ventilated. Bodies are retained as long as not off ensive. At least 4 feet of earth must cover all bodies, this including mound.

The next cemeteries are within Jersey City, which contains six, viz: The Jersey City Cemetery, Speers Cemetery, Dutch Reformed Cemetery, Methodist Cemetery, Hudson County Catholic and St. Peter's Cemetery.

Jersey City Cemetery.—First used for interment purposes in 1830. Situated on easterly slope of the hill, overlooking the densely-populated portion of Jersey City, from which it is separated by a marshy tract of about one-quarter of a mile in width, which is in process of filling up to street grade with street and house refuse, covered in part by stagnant pools, and in summer partially grown over with aquatic reeds, locally known as cat's-tail (of the genus *typha*, I believe), and by a rank marshy vegetation. The cemetery contains from 12,000 to 14,000 bodies; a more exact enumeration is difficult, if not impossible. The subsoil drainage flows to a stone receiving wall at the extreme east of the cemetery, and thence must percolate to the marshy meadow below, there to lie until absorbed by the earth or evaporated. One well, supplying a number of families, is sunk at the foot of the hill below the cemetery. The graves vary from 6 to 11 feet in depth; the latter depth is where the land has been covered by filling, to bring it up to grade. The soil varies somewhat: the greater portion being made up of loam (filling) and argillaceous sand, imposed upon trap rock very deep down in most parts of the cemetery. The graves are dry. Stone vaults are used. As to decay of bodies in the vaults, the superintendent, whose experience covers a period of forty years, informs me that generally a body has lost offensiveness in one year, while three years would not be sufficient time to insure a total disappearance of certain of the tendinous portions of the body. In the graves the rapidity of decay varies with the soil. Bodies in the more tenacious and clayey portion have been exhumed after twelve years' time had elapsed, and found to be not completely decayed. (See some experience of superintendent Weehawken Cemetery.) In the more sandy and porous soil three years would be a sufficient length of time to reduce bodies to the condition which in the closer and more impervious soil required twelve years. Bodies in loamy soils would become inoffensive to the sense of smell in about three years, while an unpleasant odor might be detected from a body which had lain twelve years in clay. Inquiries in the neighborhood failed to elicit any complaints against the cemetery. Small-pox and typhoid fever are the only contagious diseases in the case of which special precaution is taken. Bodies of persons dying from such diseases are not allowed in the public vault. No such rule is enforced with reference to the depositing of such bodies in private vaults. There are two receiving vaults, one of them full and its further use abandoned. One new vault, 50 feet square, has taken the place of the old one. At present the vault is so managed as not to become a nuisance. I should perhaps state, while upon this subject, that in the summer of 1878 much unfavorable comment was excited by a very unpleasant odor which appeared to come from the old vault. Inspection was made by President Elder, of the county board of health, who reported on October 2, 1878, as follows:

"The grounds outwardly present a good appearance. The public vault * * * lies deeply buried in the earth, its only aperture tightly closed by an iron door. It has no means of lighting or ventilation. The interior is capacious, gloomy, and wet. In this dark cavern rest the remains of many bodies. * * * The condition of the wooden coffins exemplifies every gradation from soundness to complete decay. A few have been renovated, while others have been permitted to crumble until they are disgusting to the sight; two or three exposing their dead. This is, perhaps, a fair type of the public receiving vaults of all cemeteries. The custom of retaining bodies in vaults after decomposition has taken place is deeply to be deplored."

The report goes on to suggest, as a preventive of these unpleasant sights and the deleterious effects resulting from the impregnation of the atmosphere with the gases produced by the decomposition of the bodies, that "all bodies intended to be kept in vaults should be inclosed in air-tight metallic cases"; also that "cemeteries should be removed far from human habitations". It is only fair to say that the cemetery authorities, upon the agitation alluded to above, and influenced doubtless by the foregoing expression of opinion, together with appropriate action taken by the Jersey City board of health, promptly remedied the then existing condition of the public vault, since which time no nuisance has been observed."

Speers' Cemetery.—This cemetery is situated in Jersey City, in the suburban portion,

upon the summit of the ridge, which rises to an altitude at this point of about 120 feet. The soil may be described as loam above, and red shale, retentive of moisture; trap rock, nearly level, from 15 to 18 feet below the surface, easterly trend; cemetery situated on inside slope of trap basin. The interments aggregate about 40 per annum. There are three wells situated within a radius of about 200 feet of the cemetery. The graves average 6 feet in depth. The soil is dry at the depth at which a body is placed, except in the spring and winter. There are three private vaults and one public receiving vault. Two of the private vaults are covered over with earth, excepting when opened for the reception of a body. The other private vault is closed by a tightly fitting iron door. The private vaults have about 144 square feet of floor room each, with an altitude of ceiling of 8 feet. The receiving vault is closed with an iron door, and has a floor space of 288 square feet and a height of 8 feet. The private vaults are one of stone and two of brick. The receiving vault is of brick. Three feet of earth, at least, must cover all bodies; this does not include the height of the mound. In the vaults a body would decay in about three or four years; not much odor after one or two years had elapsed. In the graves in dry and porous soil a body would not give off an unpleasant odor after a year's time. In three or four years nothing but dry bones would remain.

Mr. Speer, the owner of the cemetery, remarked that after twenty years they would be able to use the land a second time for burial purposes, as all traces of bodies would have disappeared. In heavy, wet earth the decay of a body would be prevented or retarded for an indefinite time. No complaints against this cemetery have come to my knowledge. The remains of those who have died of scarlet fever or small-pox are not allowed in the receiving vault, and must be buried at least 6 feet below the surface of the earth. The receiving vault is of brick, and sunk in the earth, which at this point is inclined to be sandy. The floor is of uncemented brick, laid loosely. The deliquium resulting from putrefaction is thus allowed to find its way through the interstices between the bricks, and is absorbed by the underlying soil. Chloride of lime is used constantly in the vault. Only three bodies have been placed in the vault in the last six months, and no complaints of its management have been made.

The superintendent, Mr. Speer, while upon the subject of vaults, remarked that vaults should, in his opinion, be built in sand or very dry and porous earth. The floor should allow of the absorption by the earth of the liquid products of decomposition; hence cement or close floors should be avoided, as, with such, the liquids would collect, and upon the doors being opened the stench would be overpowering.

Dutch Reformed Cemetery.—This cemetery is situated in that portion of Jersey City formerly Bergen, and is contiguous to the last-described (Speer's) cemetery. The population is suburban, lodged in middle and first-class dwellings, and surrounds the cemetery, which is one of the oldest in this part of the State, the church to which it belongs having been in existence for over two hundred years. There are about two and three quarter acres of land in the cemetery, only about two acres of which are now in use. There are at least four wells in the neighborhood of the cemetery, one about 50 feet south, one about 150 feet north, and two at the eastward, 100 and 250 feet respectively. The graves average 6 feet in depth, and by rule of the cemetery all bodies must be at least 4 feet from the surface of the ground. As to the soil, my own observation is that all the soil hereabouts is an earth of a pretty compact and firm consistence, slightly interspersed with small stones. The soil is dry at the depth at which a body is placed. There are thirteen vaults; nine of these are closed with earth, three are made in the manner of catacombs, and one is closed with the ordinary iron door. They are all of brick and cement; nine have gravel and four cement floors. It is difficult to obtain categorical answers to questions as to rapidity of decay. The sexton informs me that the bodies of fleshy persons decay more rapidly than those of persons of a spare habit of body. Bodies of those dying of scarlet fever and diphtheria disappear more rapidly than those of persons dying of other diseases.

No complaints have been made against the cemetery. I have seen, upon the zymotic disease maps of Mr. Edlow W. Harrison, that the rate of death per 1000 is notably high in this neighborhood. This, however, might be attributed to the fact that, until about a year ago, this section of the city has had very inadequate drainage facilities. No extra precautions are taken in the case of persons who have died of contagious diseases. There is no receiving vault.

Methodist Church Cemetery.—This cemetery is to be found in that portion of Jersey City formerly Greenville. It was first used for interment purposes in 1845. It contains about 250 graves at the present time. Interments take place to the number of about 15 per annum. It is not likely that the subsoil drainage of the land containing graves contaminates springs, wells, or water-courses. The graves average about 4½ feet in depth. The soil is an argillaceous sand, topped with loam. The rock about 20 to 30 feet below. The graves are dry. There are no vaults, all bodies must lie at least 3 feet below the surface. No exhumations have been made; hence no information as to the rate of decay of a body was obtained. No complaint of any unpleasant odor arising from the graves, or of any evil effect, has been made. Extra precautions (char-

acter of which not stated) are taken in the case of the burial of persons who have died of contagious diseases. There is no receiving vault.

New York Bay Cemetery.—This is in area the most extensive in the county, containing about 70 acres, and was first used in 1849. It contains about 20,000 graves and the average annual interments is 762. It does not appear at all likely that the subsoil drainage of this cemetery contaminates springs, wells, or water-courses, as the slope of the land is towards the New York Bay with few intervening dwellings. The average depth of a grave is about 6 feet, and the top of all coffins must lie at least 3 feet below the surface of the earth. The soil is in some parts loamy and in others it consists of argillaceous sand. In the greater part of the cemetery the soil is dry. The western half is in the spring of the year inclined to be spongy. There are three public receiving vaults and two private vaults, of brick, with stone fronts. As to rapidity of decay in the vaults I was informed by a number of grave diggers, who at my request held a convention to consider the subject, that complete decay, leaving only the osseous portions of the body, would take ten years time, but that the remains would lose odor in two years.

Touching the rate of decay in the graves I have to record two opinions, that of the superintendent that all flesh will have disappeared in two years; that of the grave diggers that in ten years nothing would remain but bones; that all odor will have disappeared in two or three years in dry and in six to seven years in wet soils. I am inclined to give weight to the opinion of the superintendent, who is a man of habits of close observation.

No complaints have been made of any deleterious effects upon the public health having been traced to this cemetery. When necessary, disinfectants are used. The three receiving vaults are swept clean once a week and fresh sand then put upon the floor. In hot weather carbolic acid is sprinkled about.

Hudson County Roman Catholic Cemetery.—Situated near the foot of western slope of ridge in Jersey City, formerly Bergen. The number of graves and annual interments I have been promised. Have written many times, but owing to the secretary of the cemetery being engaged in a legal conflict of great moment to him, I have been unable to ascertain these points. There is no likelihood of contamination of springs, wells, or water-courses. The nearest house is from 300 to 400 yards distant, and the slope of the land is towards the marsh and creeks. Seven feet is about the average depth of graves. The soil, except in the extreme western portion, is dry. The characteristic is argillaceous sand and gravel, occasional pockets of sharp sand. There is one vault of brick and cement. No information as to rapidity of decay therein. In the graves the diggers think from five to six years are required to insure complete decay. No extra precautions as to contagious diseases. One receiving vault and not complained of.

St. Peter's Cemetery.—Situated in Jersey City on western slope of hill near cuttings of Erie tunnel and Delaware, Lackawanna and Western Railroad, which make of the land a peninsula almost surrounded with deep cuttings. Cannot give number of graves or annual interments for reason stated in case of former described cemetery. No likelihood of contamination of springs, wells, &c., by subsoil drainage. The graves average 7 feet in depth. The cemetery is situated on a bank of argillaceous sand, not much gravel except at a considerable depth. The soil is of necessity very dry. There are three vaults, all of stone. No knowledge on the part of the attendants as to rate of decay therein. In the earth from five to six years would be necessary. The same men work in this as in the former described cemetery, hence the concurrence of the opinions as to rapidity of decay. There is no evil effect from the vault or cemetery, and the former has never been complained of as being in a condition deleterious to health.

Constables Hook Cemetery, situated in Bayonne City.—Constables Hook Cemetery consists of two parts, the old cemetery and the new. The former has been closed for years, and the ground is now leveled. It is said that the first white male interred in these parts was buried here. In the new cemetery there is one private vault, which has not been opened for many years. The slope of the land is to the bay, the nearest dwelling is about 500 feet distant to the landward of the cemetery, and I do not think it likely that there results from this cemetery any contamination of springs, wells, and water-courses. Six and 5 feet are the different depths of the graves. The soil is argillaceous sand. The soil at the depth at which a body is placed is perfectly dry, no springs, no top-soil, nothing but sand. No vaults. Not less than 3 feet must cover all bodies. No information obtainable as to rapidity of decay of bodies. No complaints have been made against the cemetery or the vaults.

Respectfully,

C. J. ROONEY, JR.,
Clerk Board of Health and V. S., Hudson County, N. J.

SCHEDULE R.

Public health laws, regulations, municipal officials.

NORTH BERGEN TOWNSHIP.

There is no system of sewerage. Owing to its sparse population there is not greater likelihood of contamination of public or private water supply than in the case of ordinary rural neighborhoods. The clerk of the township furnishes the information that he does not know what ultimate disposal is made of organic waste, garbage, &c. The township committee has power (under act of 1871) "to declare what shall be considered nuisances within said township, and to cause the same to be abated and removed, and to regulate the manner of abating and removing."

UNION TOWNSHIP.

No sanitary organization. The clerk complains very much of malarial diseases, due, in his opinion, to the adjacent undrained marshes.

WEEHAWKEN TOWNSHIP.

No board of health or other sanitary organization. Under the general State law, township committee can abate nuisances.

TOWN OF UNION.

There is no local health organization. The town council has by charter the right to define nuisances, and to abate, and to set forth the manner of abatement. (See act of State Legislature approved March 27, 1874.)

WEST HOBOKEN TOWNSHIP.

No sanitary board. On complaints being made, township committee has power to abate a nuisance. Can remedy defective drainage, if injurious to surrounding property. No control of contamination of public or private water supply (so clerk reports). On complaint, committee can take cognizance of the condition of cesspools and privy vaults. Committee removes all ashes and garbage. It has power of keeping the streets clean. No control over methods of burial; none over the ultimate disposal of night-soil, &c. May, on complaint made, take cognizance of the fouling of adjacent water-courses. No control over small-pox cases by law; control assumed without legal authority in case of an epidemic. No power to remove such case to hospital. Vaccination not compulsory.

HOBOKEN CITY.

No health board; board of councilmen have a committee on health. A health warden under control of committee on health, and who is also city physician, is appointed. His authority extends over the city; he is annually appointed by the city council. The powers of the health warden are defined by ordinance. Nuisances are defined by ordinance, and abatable by either the health warden or the street commissioner. The health warden and also the street commissioner are by ordinance bound to take every possible measure to ascertain every nuisance in the city, and to cause such nuisance to be removed. Defective drainage should be discovered by the health warden, and corrected by his order. Defective sewerage correction seems to be more peculiarly the province of the street commissioner and the committee on sewers. The prevention or removing the cause of contamination of the public or private water supply appears to be a power incident to the office of health warden. I have not been able to find any specific grant of such powers. The street commissioner and health warden may (in fact are bound to) take cognizance, with or without complaints being made, of the condition of cess-pools and privy vaults, and are also bound to abate any nuisance resulting from the bad condition of such places. Garbage is removed in corporation carts, subject to regulations of street commissioner, who must give notice of days of such removal, at which times ashes and filth may be placed in the streets to be taken away. The commissioner also has general supervision of street cleaning. The county board of health and vital statistics takes charge of matters pertaining to interments. The ultimate disposal of night soil and organic waste is regulated by the council. Nothing can be dumped within the city limits or at the water front. Such matters are taken away by scow. Small-pox cases are taken charge of by the county board of health. Ordinances give to health warden power to send to hospital any person sick with a contagious disease if he (the warden) deem it necessary. For the

reason that there is but one hospital for contagious diseases in the county, and that under control of the Hudson County board of health, the power of ordering persons to be taken to such hospital is only exercised by that board. Vaccination is not compulsory. The council and health warden have general powers to restrict the spread of contagious diseases. The matter of vital statistics is the particular charge of the county board. The health warden and street commissioner report to the council; the report is published in the minutes of the proceedings of the council.

JERSEY CITY.

The board of health of Jersey City is the committee on health of the board of police commissioners, which, by charter, is entitled "The Board of Health of Jersey City." The board meets once a month. The powers of the health department of Jersey City are exercised within the corporate limits of said city. The board of health was organized May 1, 1871, under the provisions of the city charter. The present ordinances are contained in "rules and regulations of the health department of Jersey City," adopted September 2, 1872. The number of members is six and their term of office one year. No salary is attached to their duties as members of the board of health. No member of the board is necessarily a physician. There is attached to the board an executive health officer who is not necessarily a physician; he is appointed annually by the board of police commissioners, and, together with six city physicians, constitutes the whole sanitary force of the board. He has no assistants, except when there are detailed police officers for that purpose. The inspector may, without complaint made, make such inspections as he may deem necessary, and I am informed that such inspections, of his own accord, are made by the inspector. An annual inspection, under the supervision of the health officer, is by ordinance directed to be annually made. The board of police are bound to detail such a number of men, not otherwise engaged, as may be necessary to effectually perform such inspection. The powers of the board are derived from the State, and are defined in the city charter. These powers are had independent of any other municipal body. The board may make ordinances forbidding the doing of such acts as are in its opinion injurious to the public health, and has power to provide rules for the sanitary government of the city generally. These rules may be enforced by the board at all times by the collection of penalties recoverable under provisions of the act organizing the local government of Jersey City, passed March 31, 1871. If, upon the annual inspection mentioned before, any street be found in a condition dangerous to health, or in an unpleasant condition, it becomes the duty of the health officer to report the facts to the street commissioner, or to the chairman of the committee on streets and sewers of the board of public works.

I do not find any specific grant of power touching the contamination of the public or private water supply to be lodged with the board of health. It is possible that cognizance would be taken of a complaint made, and that spontaneous action might be had on the occasion of the annual or other sanitary surveys.

The removal of garbage is controlled by the board of public works. The board of health, through its inspector, exercises a general supervision of the streets as to cleanliness, and if found to be in a condition of filthiness, and liable to cause disease, the inspector must report such fact to the committee on streets and sewers of the board of public works. The board of health has general powers as to interments, but this matter is usually left to the regulation of the Hudson County board of health and vital statistics.

Burial within the city limits (except in those cemeteries in existence at the time of passage of the ordinance) was forbidden in 1871. This ordinance, practically, only prevents the establishment of new cemeteries.

Night soil is taken by licensed scavengers and deposited in a scow at the public dock. When full the scow is towed to Amboy by the contractor, and the contents there converted into a fertilizing agent. The board, in its rules (see section 14), implicitly claims the right of removing to hospital persons sick with contagious or infectious diseases, provided the attendant physician considers such course necessary. Generally this matter is attended to by the members of the Hudson County board of health and vital statistics.

Vaccination is not compulsory; there are no rules concerning it. In the case of the breaking out of a contagious disease, a sign is affixed to the house where the patient is located, indicating the nature of the disease. Upon removal, recovery, or death of the person sick, the house, clothing, and bedding are fumigated and cleaned, or, if thought necessary, the clothing and bedding are destroyed. The inspector shall report to the board the value of such property so destroyed.

The keeping a registry of vital statistics is entirely the province of the Hudson County board of health. The births, deaths, and marriages become matters of record according to the rules and regulations of the same board (which follow). The Jersey

City board of health makes no report. The city physicians report quarterly to the board of health.

HUDSON COUNTY (AT LARGE).

Hudson county includes within its boundaries the cities of Jersey City, Hoboken, and Bayonne; the towns of Harrison and Union; and the townships of Kearney, Union, North Bergen, West Hoboken, Weehawken, and Guttenberg, in all, three cities, two towns, and six townships. There is a board of health known as the "Board of Health and Vital Statistics of the County of Hudson," whose authority is coextensive with the area of the county. This board was organized in 1874 by the provisions of "An act to provide for a board of health and vital statistics in the County of Hudson and to prevent the spread of disease." (Copy of ordinances herewith transmitted, marked Schedule R.) The board consists of three physicians, two of whom are known as health commissioners; the third is the county physician, who is a member *ex officio*. All are appointed triennially by the board of chosen freeholders of Hudson County. The county physician as member of the board receives no salary; the other members receive $500 each per annum. The board has no health officer of its own, but commands the services of all health officers of the cities and towns, without their being entitled to extra compensation. The board does not usually make, or order made, inspections, except upon complaint made. Meetings take place twice a month.

The powers of the board are derived from and defined by the legislature in organic act, and such powers are independent of any other board or council, except in the matter of expenditures, in which it is under control of Hudson County board of chosen freeholders, provided that the board has in time of epidemic the right to appoint inspectors for the period of ten days, who shall receive $5 per diem. The period of service may be extended by consent of the board of chosen freeholders. The authority of the board exists at all times and extends to the enactment of ordinances providing sanitary regulations, and for the abatement of nuisances. It would appear to be within the power of the board to spontaneously take cognizance of defective house drainage, of defective sewerage, and of possible contamination of public or private water supply, &c. The board has not charge of the removal of ashes or garbage, but has a general sanitary superintendence of such matters. The same thing may be said of the cleaning of streets. The board has power to control the burial of the dead, and has passed ordinances upon the subject (see sanitary code herewith). It has no control over the ultimate disposal of garbage except insomuch as the method of doing it is in conflict with its rules as published in the sanitary code. The board compels by ordinance the isolation of persons sick of a contagious disease.

The ordinances of the board assume the right of the board to send to hospital a person sick of a contagious disease. Section 4 of organic act says, in effect, "that persons sick of a contagious disease may be removed to the hospital provided for the reception of such patients." The board has always urged such removal, but never hitherto exercised undue pressure.

The necessity of vaccination is inculcated by ordinance, but vaccination is not compulsory; such power to insist on it is not specifically delegated. In the spring of 1876 the board offered vaccination with bovine virus free of expense to such as desired it. The schools were used as the points at which the vaccinating was done; about 5,000 persons, chiefly school children, availed themselves of this opportunity.

All contagious diseases (which are defined in section 4 of the sanitary code) must be reported within twenty-four hours, when the case is usually seen by one of the members of the board and provision made for removal or isolation.

The board records all the marriages, births, and deaths of the county, and issues monthly and annual statements of vital statistics. The number of the house and of the ward or district are some of the points of information necessary on a death return made to this board. Births must be reported on the proper blank in thirty days, by the physician or other attendant, under penalty of $30, recoverable by an action at common law. Marriages are to be reported by the person officiating, within thirty days, under a penalty of $10. Deaths must be reported within 36 hours under a penalty of $10. In all cases proper blanks for reporting the foregoing events are provided by the State.

The board of health reports to the board of chosen freeholders. The reports of the board are exchanged with about thirty corresponding boards.

The Hudson County board of health has on two or more occasions profited by the labors and assistance of citizens interested in sanitary subjects.

Respectfully,

C. J. ROONEY, JR.,
Clerk Board of Health, Hudson County, New Jersey.

SCHEDULE S.

Registration and statistics of deaths and of disease in Hudson County, New Jersey.

In treating the subject of the registration and statistics of deaths and of disease, it is necessary to say that the plan followed in the cases of the other schedules upon which I have reported, viz, that of taking up the townships and cities in their order and treating of each *seriatim*, beginning with the most northerly and proceeding thence southerly until having completed the schedule, must in this case be discarded, as none of the cities or towns of Hudson County keep a registry of vital statistics with the exception of the city of Bayonne.

The board of health and vital statistics of Hudson County was incorporated on March 27, 1874. Among the duties imposed upon it was that of maintaining a registry of vital statistics for the entire county of Hudson. From this registry are drawn all the facts which follow, and unless otherwise stated reference is had in each case to the county at large. No interment in or removal from Hudson County can take place except upon a permit issued by the board of health and vital statistics. This permit is granted upon a certificate of death made by the physician who attended during last illness. In case of an accidental death, or of a death taking place without the patient having been seen by a physician, the matter is investigated by the county physician, who certifies as to the cause. No physician's certificate is recognized by the board of health and vital statistics until it is satisfied of his holding either a diploma from some regularly chartered medical college, or a State license duly authenticated. A registry of such physicians, practicing in Hudson County, is kept at the office of the board. This rule has, to my personal knowledge, led to irregular practitioners to avoid settling in this county. Certificates of death are recorded at the office of the board in books arranged for the purpose and alphabetically indexed. The same mode of procedure is followed in the case of births and marriages. In case of the deaths, the requirements of the law and the rules of the board insure a complete registration. Births and marriages not being easily susceptible of such complete and effectual supervision are not completely returned. Many physicians do not report through negligence, others take advantage of the difficulty of detection to deliberately evade the requirements of the law, and the majority are inclined to be dilatory. Midwives, as a class, make more complete and painstaking reports than do the physicians as a class. This probably arises from their more lively dread of the penalties of the law.

The marriage returns show carelessness on the part of some clergymen, they regarding the duty imposed upon them as an unjustifiable interference by our lawgivers with certain vested rights. That the State has no right to exact from them any labor, or to cause them to incur any expense, without reimbursing them, is an argument occasionally advanced. However, I think that there is a general improvement in the matter of making returns; an improvement that would be made more marked and permanent, by the rigid enforcement, in a few cases, of the plainly set forth penalties of the law for the non-observance of its provisions.

Statistics of mortality and of the marriages and births have annually been published since the organization of the board of health and vital statistics. (See reports for the years 1875, 1876, 1877, and 1878.) By the provision of section 57 of its "sanitary code," the board of health requires, under a penalty of $50 for non-compliance, the reporting within 24 hours by the attendant all cases of contagious disease. The report must contain the name of the person, state of the disease, and condition of dwelling. The phrase "contagious disease" by the terms of section 4 of the sanitary code is held to mean diseases of "an infectious, contagious, or pestilential nature"; it is, however, stated to refer "more especially to cholera, yellow fever, small-pox, diphtheria, ship or typhus, typhoid, spotted, relapsing, and scarlet fevers, and also to include any other disease publicly declared by this board to be dangerous to the public health."

As to interrogatory No. 10 of this schedule, touching the relative ratio of crime and ratio of disease and death in the different wards and sections of the place, I have to say: That the statistics of crime are not accessible, if to be reached at all, without an immense deal of labor, which I am unable to give to the task. That the ratios of disease cannot be given, as the reporting of any diseases except those of a contagious character is not required by the board. That the ratios of disease and death in the different wards and sections cannot be reached, as the forms of returns of deaths to this board do not call for this discrimination.

It has, however, been customary to compare the mortality and death rate of the county, divided for the purpose of such contrast, into three parts, to wit: 1st, Jersey City; 2d, Hoboken; and, 3d, all other parts of the county. I have endeavored to make such a comparison in the subjoined table.

It may be well to remark that Jersey City's limits comprehend, in all, about 8,000 acres, 4,400 of which is a ridge elevated from 60 to 160 feet above mean high-water,

2,200 acres are marsh, and 1,400 natural and made ground upon the Hudson River and New York Bay. Of the population, speaking roughly, about three-fifths dwell upon the lowlands, and the remaining two-fifths upon the rocky ridge. That on the lowlands is a pretty dense city population, while on the upland it is of a suburban character.

Hoboken has an area of 720 acres, being an upland district of 270 acres and a marsh to the westward of 450 acres, which, to a large extent, is but little else than a stagnant pond emitting, during the warm season, an exceedingly unpleasant odor. A city population covers the larger part of the inhabited portion of the city.

The division marked in the annexed table as "rest of county" consists for the greater part of townships situated upon the high ridge which runs through the county from north to south. The exceptions are Bayonne City, the town of Harrison, and the township of Kearney, whose respective populations dwell upon uplands of an elevation of from 20 to 150 feet in height, having contiguous peaty marshes. The population of this division is either very sparse or of a suburban character.

A paper on the soil, contour, and drainage of Hudson County, contributed by L. B. Ward, C. E., to the annual report of the board of health and vital statistic for 1877, is the source whence are derived all the figures and most of the descriptive portions of the foregoing paragraphs as to areas, soil, population, &c.

Estimated population and deaths per 1,000 *inhabitants in Jersey City, Hoboken, and "rest of county," for the years* 1875, 1876, 1877, 1878, *and* 1879.

Year ending December 31.	Population.				Deaths in—				Deaths per 1,000 inhabitants.			
	Hudson County at large.	Jersey City.	Hoboken.	The "rest of county."	Hudson County at large.	Jersey City.	Hoboken.	The rest of the county.	Hudson County at large.	Jersey City.	Hoboken.	"The rest of county."
*1875	163,000	109,227	24,766	29,007	4,230	2,836	743	651	25.95	26.01	29.72	22.45
1876	171,336	115,136	25,828	30,372	4,520	2,988	800	732	26.43	26.00	30.77	24.40
1877	180,186	121,364	26,940	31,802	3,937	2,548	719	670	21.83	21.06	26.62	20.94
1878	189,210	127,812	28,098	33,300	3,796	2,409	712	675	20.08	18.97	25.42	20.42
1879	198,989	134,812	29,303	34,868	3,826	2,408	666	752	19.23	18.06	22.97	21.48

*State census.

Cholera has not caused any great mortality during the period covered by the records of the board of health. The deaths reported during the last five years are as follows: 1875, 18; 1876, 25; 1877, 13; 1878, 14; 1879, 15.

Cholera infantum in 1875 and in 1876 assumed the proportions of an epidemic, causing 379 deaths in 1875, and 485 in 1876. In 1877 the mortality from this cause fell to 257 deaths, and in 1878 rose to 270; in 1879 it reached the lowest point in five years, 173 deaths.

Yellow fever caused one death in 1876.

Scarlet fever is charged with a mortality as follows: in 1875, 114 deaths; in 1876, 183; 1877, 213; 1878, 113; 1879, 232. In 1879, therefore, the deaths from scarlatina reached the maximum number for five years. In 1877 and in 1879 it may be said to have been epidemic to a slight degree.

Diphtheria was quite formidable in 1875 by its virulence and tendency to spread. Since that year, at which time it caused the largest mortality for any of the past five years, it has gradually decreased in the number of its victims, reaching the lowest point in five years in 1879. The deaths for the quinquennial period were as follows: 1875, 533; 1876, 327; 1877, 231; 1878, 177; 1879, 120.

Cerebro-spinal fever caused in five years the following deaths: 1875, 55; 1876, 17; 1877, 13; 1878, 4; 1879, 20. The newspapers, by some sensational reports, caused an alarm as to this disease in the latter part of 1879.

It is impossible to obtain information relative to the following points:

1. Number of inhabitants under one year.
2. Number of inhabitants aged one to five years.
3. Number of inhabitants aged five to fifteen years.

As to the questions, "what diseases are less prevalent now than formerly" and "what diseases are more prevalent now than formerly," I have been unable to obtain any authentic and reliable data except for the period since the establishment of the board of health and vital statistics.

Diseases less prevalent than formerly.—Typhoid fever: the deaths from this disease in 1878 and in 1879 aggregated less than in the preceding three years. The deaths in the five years under consideration were as follows: 1875, 52; 1876, 56; 1877, 46; 1878, 31; 1879, 36. The death rates per 1,000 for typhoid fever were: 1875, .319; 1876, .327; 1877, .255; 1878, .164; 1879, .181.

Dysentery has exhibited an annual decrease in the number of its victims since 1875 excepting in 1876–'77. The deaths were, in 1875, 73; 1876, 80; 1877, 77; 1878, 67; 1879, 34. It will be noted that in 1879 the decrease was about 50 per cent. of the mortality of any of the previous years mentioned. Rates per 1,000 for dysentery: 1875, .447; 1876, .468; 1877, .428; 1878, .354; 1879, .171.

Diarrhœa: Another gradual decrease of mortality for the term of years since and including 1875 is to be observed in the case of diarrhœa, excepting the year 1879, which shows a slight increase over preceding year. Deaths in 1875, 110; 1876, 69; 1877, 58; 1878, 30; 1879, 39. Rates per 1,000: 1875, .674; 1876, .403; 1877, .322; 1878, .158; 1879, .196.

Diphtheria exhibits a well.marked gradual annual decrease in its mortality since 1875. The deaths in 1875, 533, were nearly 13 per cent. of the total mortality for that year; in 1876 there were 327 deaths; 1877, 231; 1878, 177; 1879, 120. Rates per 1,000 for diphtheria: 1875, 3.27; 1876, 1.91; 1877, 1.28; 1878, .93; 1879, .60.

Croup: the number of deaths from this disease was lower than in any year of the five. Mortality in 1875, 149 deaths; 1876, 110; 1877, 98; 1878, 114; 1879, 97.

Measles exhibited the following fluctuations in its mortality: 1875, 3 deaths; 1876, 51; 1877, 1; 1878, 20; 1879, 4. The number of deaths from pneumonia has annually decreased in 1877, 1878, and 1879.

Diseases more prevalent now than formerly.—Malarial fevers: the deaths from this class of fevers appear to have been on the increase during the past three years, 1879, however, showing a falling off from the number in 1878, in which year the highest point was touched. Mortality in 1875, 47; 1876, 45; 1877, 66; 1878, 84; 1879, 79. Rates per 1,000: 1875, .288; 1876, .263; 1877, .366; 1878, .444; 1879, .400,

Whooping-cough caused more deaths in 1879 than in any year of the past five, excepting 1877. The cases of death were as follows: 1875, 27; 1876, 34; 1877, 51; 1878, 24; 1879, 49. The rates per 1,000 were: 1875, .165; 1876, .198; 1877, .285; 1878, .127; 1879, .247.

Cerebro-spinal fever in 1879 showed an increase of mortality chargeable to it as compared with 1878. The figures for 1875 were 55; 1876, 17; 1877, 13; 1878, 4; 1879, 20.

Heart diseases have increased annually in number and death rate since 1876. The number of deaths was, in 1875, 136; 1876, 174; 1877, 124; 1878, 161; 1879, 188. The death rates per 1,000 for the same period were: 1875, .834; 1876, 1.017; 1877, .688; 1878, .851; 1879, .950.

Diseases of the urinary organs have caused an annually increasing mortality for the past three years, viz: 1877, 1878, 1879. The deaths were, in 1875, 82; 1876, 88; 1877, 88; 1878, 96; 1879, 127. The rates per 1,000 for these years were: 1875, .503; 1876, 514; 1877, .488; 1878, .508; 1879, .641.

Puerperal diseases exhibit a gradual increase in the number of deaths chargeable thereto in the last four years ending December 31, 1879. The deaths for five years were, in 1875, 27; 1876, 21; 1877, 28; 1878, 30; 1879, 37. The death rates per 1,000 were, for 1875, .165; 1876, .123; 1877, .155; 1878, .158; 1879, .186.

As to whether or not immigrants from abroad or from other parts of this country suffer from the effect of the climate, &c., it would be useless to hazard an opinion, which would be founded only upon mere conjecture, there being no authentic information upon the topic now within my reach. The same may be said of the query as to the relationship existing between density of population and death ratio in the various sections of the cities or of the county. No official information or authentic data are to be obtained.

Diseases.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Malarial fever:													
1875	4	3	2	7	5	5	3	1	7	4	3	3	47
1876	2	2	1	3	4	5	6	9	4	5	1	3	45
1877	7	....	8	3	2	6	6	9	5	9	5	6	66
1878	5	6	1	7	5	5	9	8	16	9	8	5	84
1879	3	7	3	6	1	9	7	10	15	7	3	7	79
Typhoid fever:													
1875	1	2	5	1	3	5	5	6	5	7	5	7	52
1876	5	2	5	1	3	1	6	10	6	8	8	1	56
1877	2	....	4	1	3	2	4	12	8	2	6	2	46
1878	8	2	....	2	2	....	3	3	5	1	3	2	31
1879	3	3	4	2	5	1	2	1	6	4	4	1	36

Diseases.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Cerebro-spinal fever:													
1875	5	4	10	6	3	3	1	4	10	6	3	....	55
1876	2	2	2	1	2	2	3	....	1	....	1	1	17
1877	1	....	1	3	1	1	3	....	1	2	....	....	13
1878	1	....	....	1	....	....	....	1	....	....	1	....	4
1879	1	2	1	3	....	1	2	....	3	3	....	4	20
Erysipelas:													
1875	4	5	1	....	1	4	2	....	2	....	2	1	22
1876	1	....	1	....	3	1	1	1	....	2	1	2	13
1877	....	3	6	1	4	....	....	1	2	4	2	1	24
1878	5	....	1	2	2	3	2	2	1	2	3	2	25
1879	3	2	2	1	2	2	1	2	2	....	2	2	21
Dysentery:													
1875	2	1	2	3	5	6	27	19	6	....	....	2	73
1876	....	2	1	2	2	5	24	22	17	4	1	....	80
1877	1	2	1	4	....	4	15	17	15	8	7	3	77
1878	2	1	2	....	1	8	16	8	18	9	1	1	67
1879	2	1	1	1	2	2	10	7	3	2	....	3	34
Diarrhœa:													
1875	4	3	2	3	....	....	29	34	28	5	1	1	110
1876	7	5	4	1	2	2	22	11	9	4	....	2	69
1877	....	....	....	1	1	4	14	14	13	6	2	3	58
1878	3	....	1	....	....	6	8	9	1	2	....	....	30
1879	1	3	....	1	1	2	8	7	5	1	4	1	39
Scarlatina:													
1875	13	4	11	5	9	7	7	6	5	21	11	15	114
1876	24	21	12	26	9	12	11	5	7	8	19	29	183
1877	26	18	21	12	21	20	22	15	16	21	16	5	213
1878	14	13	23	10	6	11	2	6	3	5	12	8	113
1879	11	16	24	29	30	15	13	7	17	20	24	26	232
Diphtheria:													
1875	42	35	24	19	35	63	37	34	50	82	60	52	533
1876	47	47	36	26	27	21	18	17	21	17	28	22	327
1877	25	13	29	18	22	17	19	24	27	16	9	12	231
1878	10	10	7	8	14	16	12	20	18	22	25	15	177
1879	9	11	10	9	9	7	9	8	6	20	16	6	120
Croup:													
1875	9	12	11	11	11	7	6	9	13	19	18	23	149
1876	22	16	14	11	3	3	3	4	9	9	7	9	110
1877	11	9	10	9	7	6	9	4	5	8	13	7	98
1878	13	9	11	11	5	2	5	2	12	20	17	7	114
1879	10	10	12	4	1	5	5	3	11	14	17	5	97
Measles:													
1875	2	1	....	....	....	....	....	1	....	....	....	....	3
1876	1	1	1	3	21	6	12	2	2	....	2	....	51
1877	....	....	....	....	....	....	1	....	....	....	....	....	1
1878	....	1	2	4	1	5	6	1	....	....	....	....	20
1879	....	....	....	1	3	....	....	....	....	....	....	....	4
Whooping-cough:													
1875	8	3	4	....	2	3	....	4	3	1	....	1	27
1876	4	1	2	1	4	6	5	5	....	....	1	5	34
1877	6	3	6	6	1	5	6	6	3	4	1	4	51
1878	....	1	1	....	....	2	1	9	2	1	2	5	24
1879	9	2	11	6	4	4	2	5	2	....	3	1	49
Pneumonia:													
1875	41	34	36	22	39	17	7	18	14	24	28	35	315
1876	26	38	50	54	42	22	12	8	13	26	36	41	368
1877	62	36	85	28	27	17	8	9	15	17	19	24	347
1878	42	38	36	41	32	26	14	6	9	13	29	36	322
1879	58	39	38	31	17	16	6	7	6	21	36	27	302
Pleurisy:													
1875	....	....	....	....	....	....	....	....	....	....	....	....	.....
1876	....	....	....	....	....	....	1	....	....	....	....	....	1
1877	....	....	....	....	....	....	1	1	....	....	1	....	3
1878	1	....	....	....	1	....	....	....	....	1	....	....	3
1879	....	1	1	....	....	....	....	1	....	....	....	1	4
Phthisis:													
1875	12	30	33	37	34	43	40	39	37	52	36	30	453
1876	25	32	34	38	33	32	46	27	36	42	28	37	410
1877	48	39	55	40	38	35	38	36	30	34	39	40	492
1878	48	39	43	38	37	27	41	47	26	49	39	59	493
1879	45	41	42	31	39	33	28	42	40	34	60	39	474
All other diseases of the lungs:													
1875	19	24	20	18	13	7	9	10	16	14	19	31	200
1876	23	26	31	29	16	12	15	12	12	13	18	21	219
1877	21	16	7	19	12	8	8	5	5	17	19	12	149
1878	24	18	15	8	16	15	9	14	17	14	20	20	190
1879	26	17	20	15	11	6	6	11	7	15	18	19	171

Diseases.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Diseases of the heart:													
1875	19	13	13	4	20	10	8	4	8	11	10	16	136
1876	15	13	20	9	13	16	15	11	14	13	18	17	174
1877	10	11	12	9	12	15	8	10	7	9	10	11	124
1878	11	16	20	22	16	13	9	4	16	5	16	13	161
1879	12	17	20	22	15	11	15	16	16	10	13	21	188
Diseases of the urinary organs:													
1875	6	7	6	2	5	7	7	6	12	5	6	14	82
1876	11	6	14	5	10	2	11	4	4	4	9	9	88
1877	6	8	9	12	7	10	7	10	5	4	6	4	88
1878	9	7	9	11	7	5	9	7	8	7	9	8	96
1879	8	10	13	10	8	11	8	2	18	17	14	8	127
Apoplexy:													
1875	8	1	9	3	2	4	2	5	11	7	5	7	64
1876	5	4	5	5	4	2	9	3	5	7	8	6	63
1877	4	4	4	7	7	3	5	2	4	4	5	8	57
1878	8	5	8	5	7	3	6	5	9	9	3	7	75
1879	3	4	7	5	7	4	9	5	6	2	5	2	59
Tetanus:													
1875	....	....	....	....	....	....	....	1	3	2	....	....	6
1876	....	....	....	....	1	....	6	....	2	2	....	2	13
1877	....	1	1	1	1	1	1	....	....	3	....	1	10
1878	3	1	2	1	5	2	1	....	1	2	1	....	21
1879	2	1	....	1	1	1	1	2	1	1	2	....	11
Hydrophobia:													
1875	....	....	....	....	....	....	....	....	....	....	....	....	.....
1876	....	....	....	....	....	....	1	....	....	1	....	1	3
1877	....	....	....	....	....	....	....	....	....	....	....	....	.....
1878	....	....	....	....	....	....	....	....	....	....	1	....	1
1879	....	....	....	....	....	....	....	....	....	....	....	....	.....
Puerperal fever:													
1875	2	6	3	2	4	3	1	2	2	1	....	1	27
1876	1	2	2	....	3	1	4	2	3	2	1	....	21
1877	....	3	8	3	....	1	....	3	2	2	3	3	28
1878	3	2	5	5	....	3	1	2	3	1	2	3	30
1879	2	3	9	3	2	2	1	2	4	....	7	2	37
Trichina: (None in any of the five years.)													
Deaths under one year of age:													
1875	....	....	....	....	....	....	....	....	....	....	....	....	.....
1876	....	....	....	....	....	....	....	....	....	....	....	....	.....
1877	71	59	95	59	61	66	174	161	100	85	64	67	962
1878	80	63	64	57	62	94	226	113	90	69	59	76	1053
1879	97	67	65	54	69	60	174	111	70	68	65	65	965
*Deaths under five years of age:													
1875	169	130	134	121	125	168	286	321	221	196	154	166	2189
1876	172	170	171	163	151	199	507	289	168	122	150	151	2413
1877	152	119	195	142	128	138	277	270	195	161	121	110	2008
1878	134	118	126	99	108	170	341	200	169	134	135	122	1856
1879	159	129	139	121	120	118	232	170	135	155	144	130	1752
† From five to twenty:													
1875	....	....	....	....	....	....	....	....	....	....	....	....	.....
1876	....	....	....	....	....	....	....	....	....	....	....	....	.....
1877	34	38	47	24	29	34	53	36	34	26	33	20	408
1878	23	20	28	28	29	21	34	25	17	29	34	29	317
1879	31	31	28	30	25	36	44	25	34	32	34	34	384
Still-births:													
1875	27	22	20	22	18	25	18	19	21	24	22	25	263
1876	30	21	30	26	28	34	26	21	21	36	32	19	324
1877	18	31	27	20	23	17	32	20	12	19	20	22	261
1878	22	16	16	19	20	21	22	25	28	22	23	24	258
1879	24	20	27	18	18	16	21	26	16	26	24	19	255
Reports of births in 1875, 1876, and 1877. were made bi-monthly:													
1875	903		640		398		587		897		607		4032
1876	158		425		332		1503		762		420		3600
1877	594		364		468		489		1224		551		3656
1878	432	198	299	110	364	276	342	273	369	283	329	260	3528
1879	229	313	294	277	165	130	303	318	285	203	232	852	3601

* Cannot give deaths of children aged from one to five years.
† Cannot give deaths of persons aged from 5 to 15 years.

Respectfully,

C. J. ROONEY, JR.,
Clerk Hudson County Board of Health and Vital Statistics.

SCHEDULE A.

Location, population, and climate of Bayonne City.

1. Name of city, county, and State?
City of Bayonne, Hudson County, New Jersey.
2. Latitude and longitude?
40° 40′ N.; 74° 6′ W.
3. When was the city founded?
1861.
4. When was it incorporated?
1869.
5. What was its population in 1870?
3,835.
6. What is its present estimated population?
8,000.
7. What is its present estimated population under 5 years of age?
700.
8. What is the estimated number of native and foreign?
About 4,000 each.
9. What is the estimated number of persons of European birth?
About one-half.
10. What is the estimated number of negroes and mulattoes?
100; of Asiatics, none.
11. Have meteorological observations been regularly recorded in the city?
Only partially.
12. If so, by whom and for how long?
By Ayres, druggist, for two years.
13. Have they been published; if so, where?
Partially in Bayonne Herald.

The following information is desired in the form of tables, to include the last 20 years, or so much thereof as possible, viz, mean, maximum, and minimum temperature of each month; direction and velocity of the prevailing winds in each month; amount of rainfall; mean, maximum, and minimum height of barometer for each month (corrected to freezing-point, but not to sea-level); records of relative and absolute humidity; electricity; ozone; number of clear and cloudy days.

SCHEDULE B.

Topography of Bayonne City.

1. Is the country surrounding the city level, hilly, or low and marshy?
Surrounded by tidal waters.
2. If there are mountains or considerable hills in the vicinity, state distance, direction, and altitude above the sea-level?
Staten Island, to the south, hilly, one-half mile distant; altitude about 240 feet.
3. If there are any marshes or low moist lands in the vicinity, state their distance, direction, extent, and character, and the variations as to water which such lands undergo at different seasons.
Salt marsh to the west, 1½ miles distant.
4. What is the altitude above sea-level of the bottom of the lowest valley or ravine near by? In what direction does such valley or ravine trend?
No valley or ravine.
5. What modifications of meteorological conditions and what other influences upon health in the city are apparently due to topographical features of its immediate vicinity?
Nothing observable.
6. In what degree and in what direction is the city bordered by grass lands, forests, market gardens, farms, or villages?
7. Is the site of the city level?
Nearly.
8. Has the original conformation of the site been materially changed?
Not materially.
9. Have original water-courses been diverted, covered, or modified?
They have to some extent.

MAP OF PART OF THE
NORTHERN PORTION OF HUDSON CO., N. J.

Showing the City of Hoboken, the Town of Union, the Townships of West Hoboken and Weehawken, and vicinity.

COMPILED AND PUBLISHED BY

SPIELMANN & BRUSH, CIVIL ENGINEERS,

HOBOKEN, N. J.

SCALE 500 FEET TO ONE INCH.

DECEMBER 1874.

Note: Large figures indicate elevations from high water.

SKETCH SHOWING
EXISTING SEWERS
WITH THEIR
DRAINAGE AREAS

Presented to
ELISHA HARRIS, M. D.
WITH THE COMPLIMENTS OF
SPIELMANN & BRUSH.
AUG. 25th 1879.

TOWNSHIP OF NORTH BERGEN

HOMESTEAD STA.

NEW DURHAM STA.

TYLER STA.

JERSEY CITY HEIGHTS

WEST HOBOKEN

TOWN OF UNION

HOBOKEN

HUDSON RIVER

NEW DURHAM

HOMESTEAD

ELYSIAN FIELDS

CASTLE POINT

DEAS POINT

MONASTERY

RESERVOIR No. 1

RESERVOIR No. 2

RESERVOIR No. 3

PARK

CHURCH SQUARE

HUDSON SQUARE

VENANGO YARD

DELAWARE & HUDSON COAL CO.S DOCKS

SEWER OUTLET

SEWER OUTLET

SEWER OUTLET

SEWER OUTLET

SEWER OUTLET

SEWER OUTLET

155

124

150

160

120

215

200

182

135

165

173

150

40

150

150

178

100

15

25

15

25

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-2

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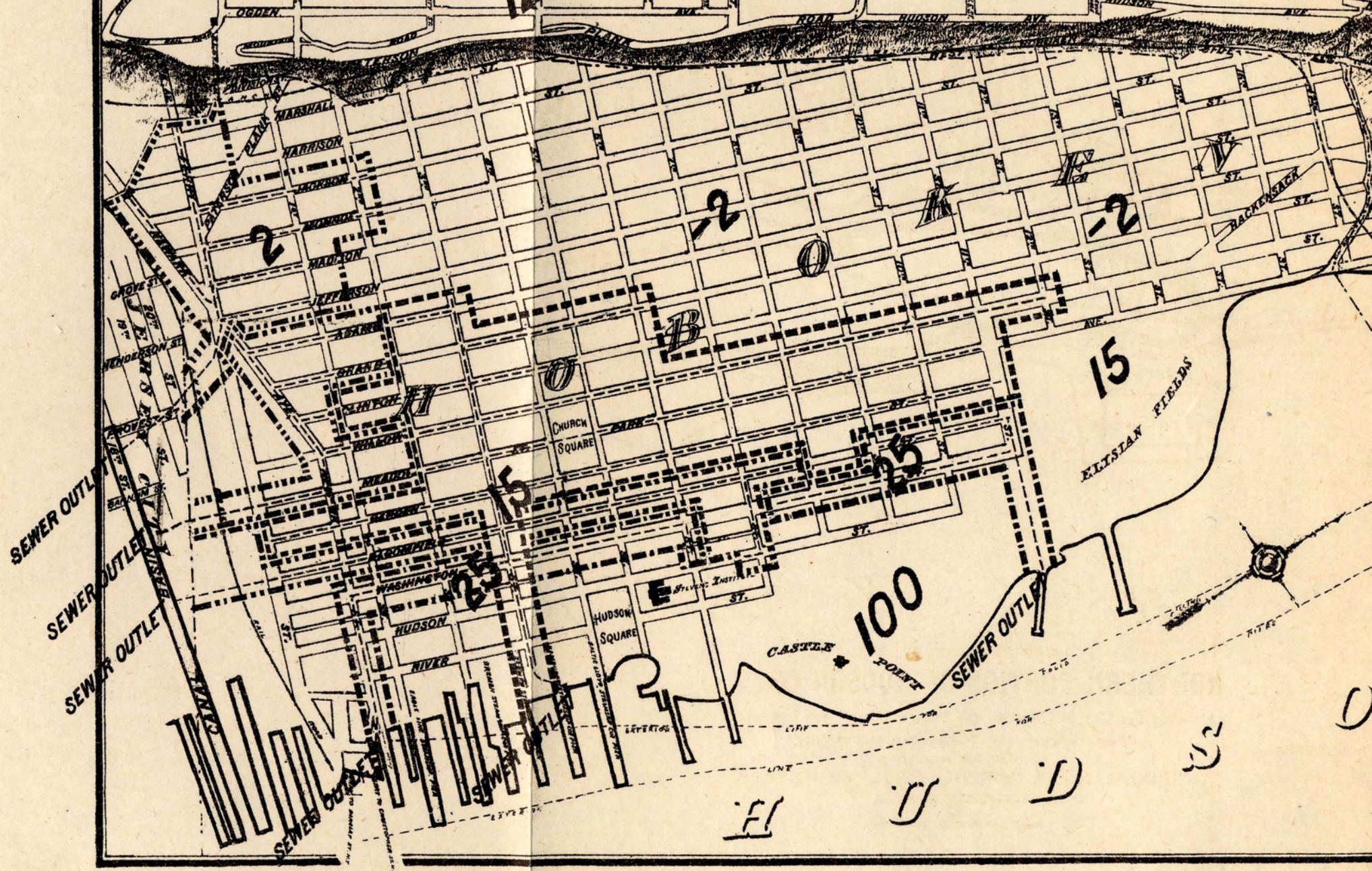
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PLANK
ROAD
HUDSON
AVE.
MARSHALL
HARRISON
JACKSON
MADISON
JEFFERSON
ADAMS
GROVE ST.
HENDERSON ST.
GRAND
CLINTON
MAIDEN
LANE
WASHINGTON
HUDSON
RIVER
CHURCH
SQUARE
PARK
HUDSON
SQUARE
STEVENS INSTITUTE
CASTLE
POINT
ELYSIAN FIELDS
BACKENSACK
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SEWER OUTLET
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R I V E R

MAP OF PART OF THE

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SKETCH SHOWING

EXISTING SEWERS

WITH THEIR

DRAINAGE AREAS

Presented to

ELISHA HARRIS, M. D.

WITH THE COMPLIMENTS OF

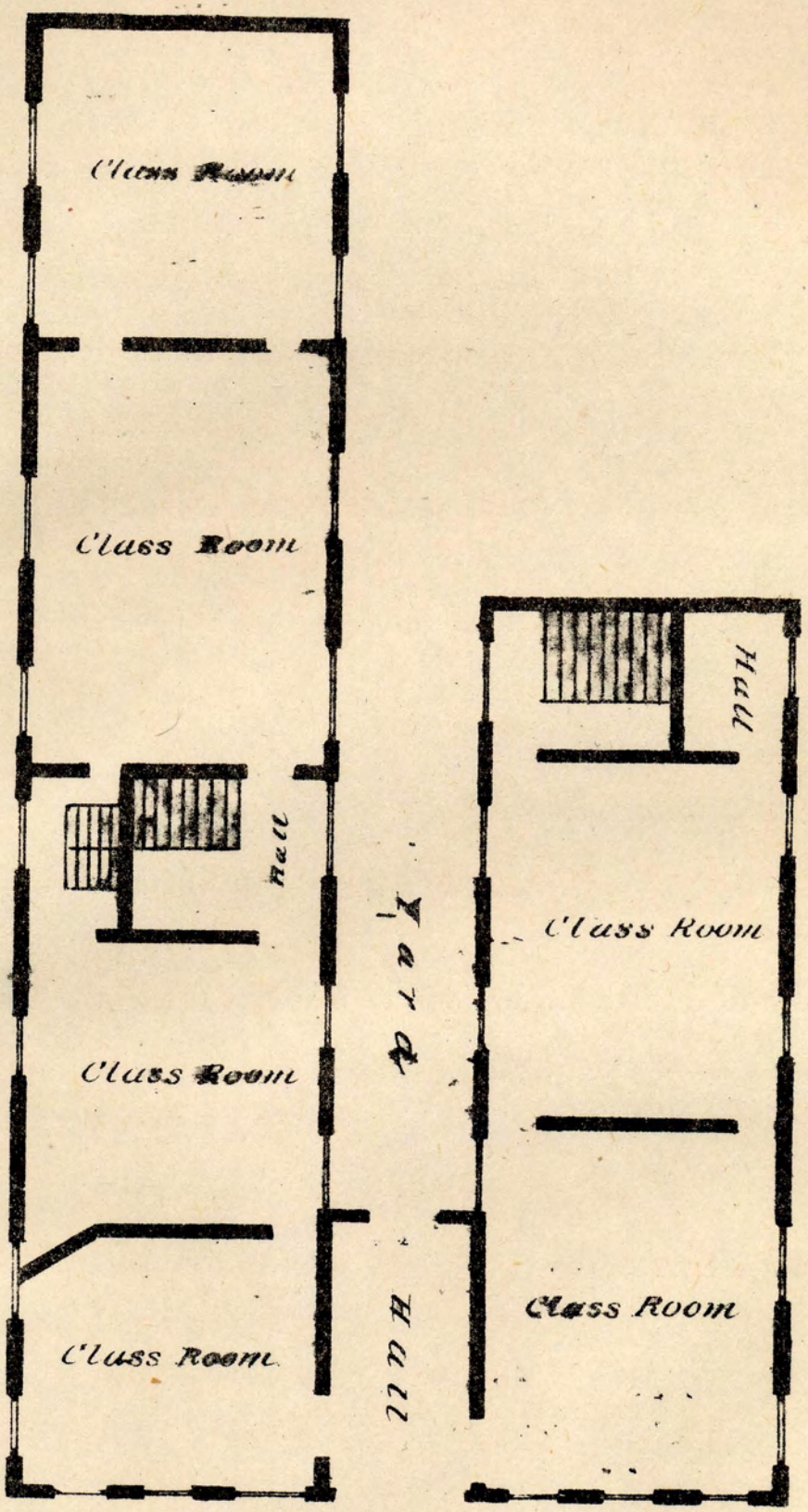
SPIELMANN & BRUSH.

AUG. 28TH 1879.

PUBLIC SCHOOL No 1.

HOBOKEN, N.J

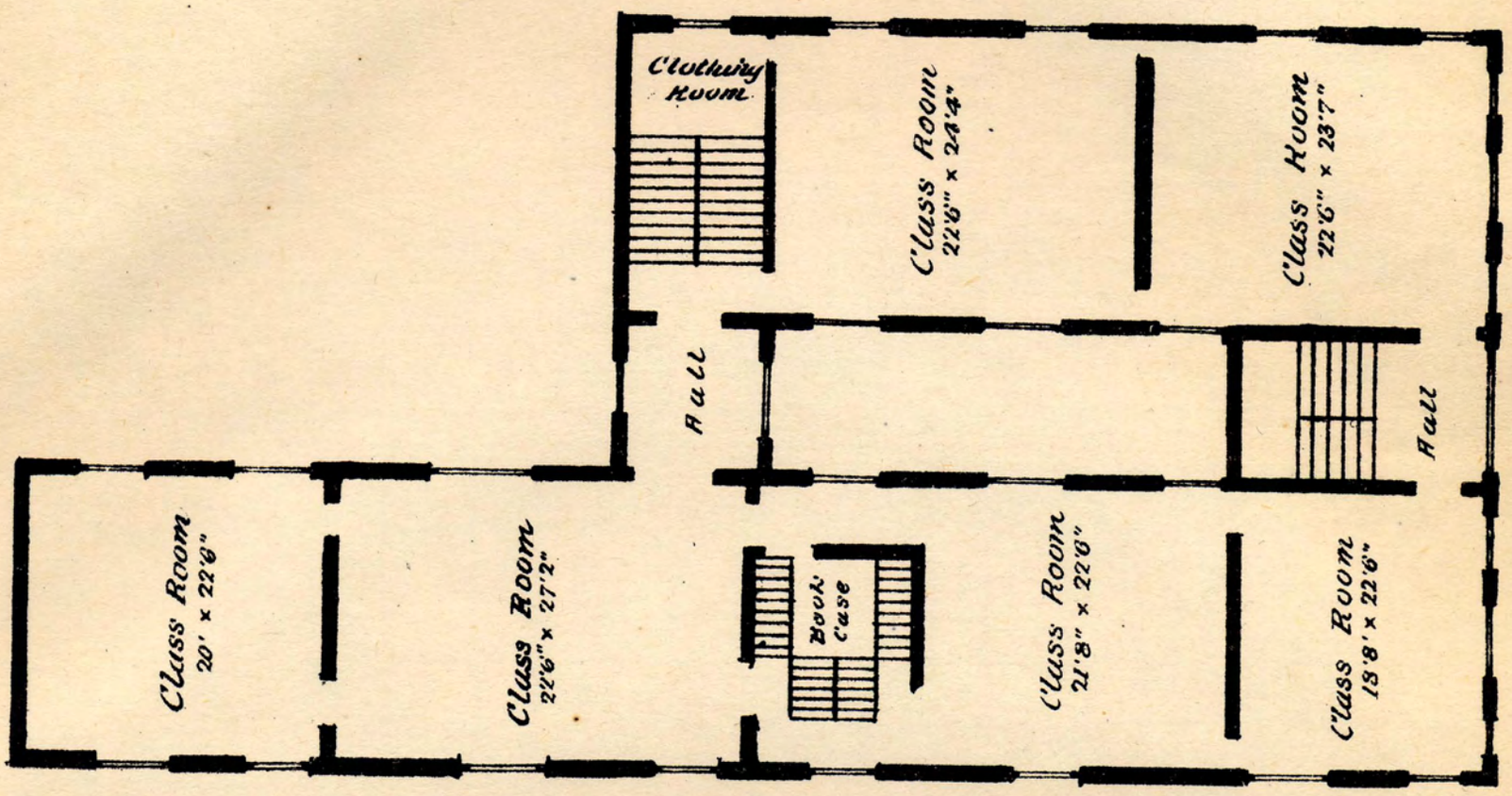
Erected 1855
Cost $ 10.000



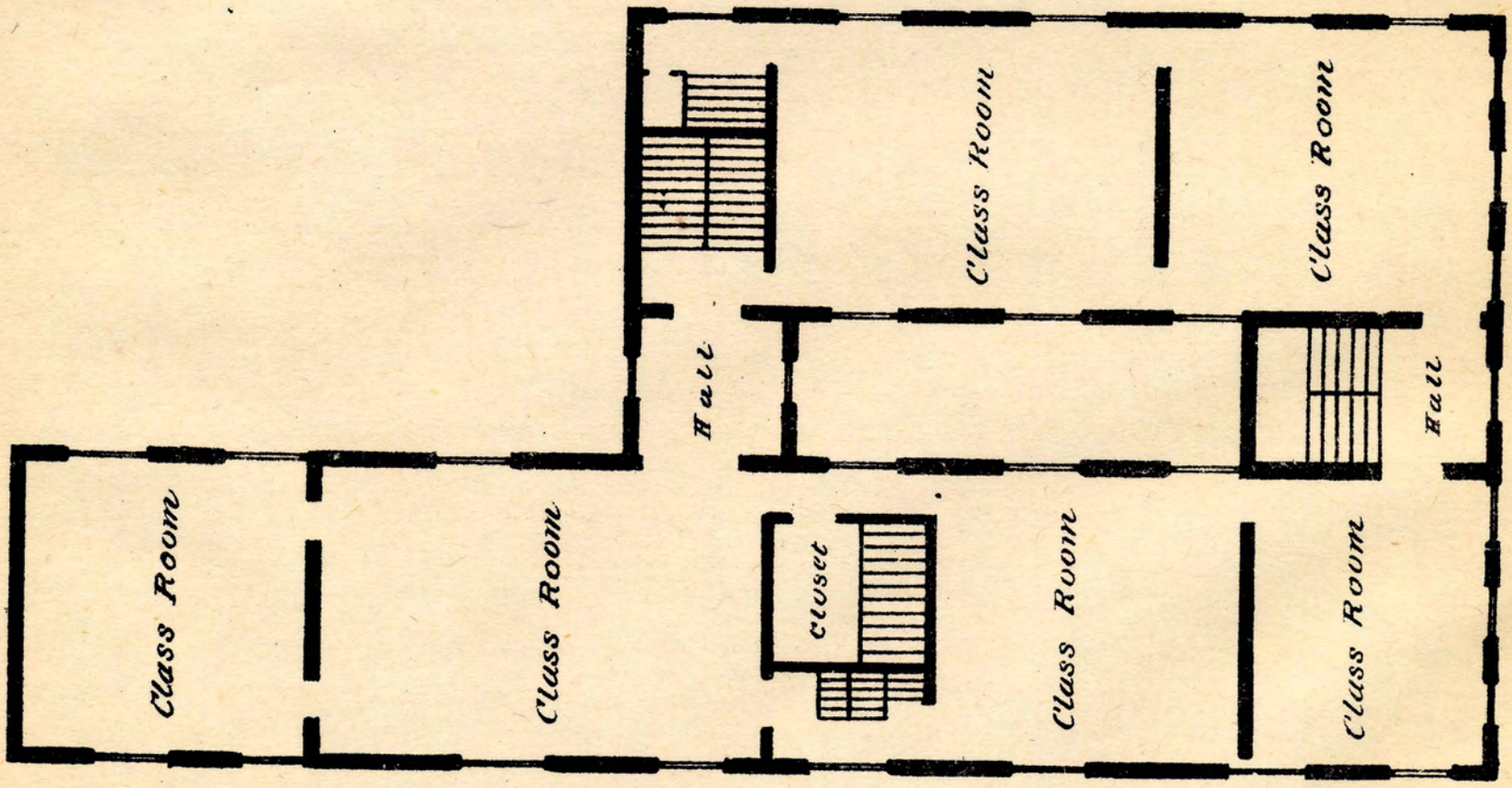
FIRST FLOOR

PUBLIC SCHOOL Nº 1.

HOBOKEN, N.J.



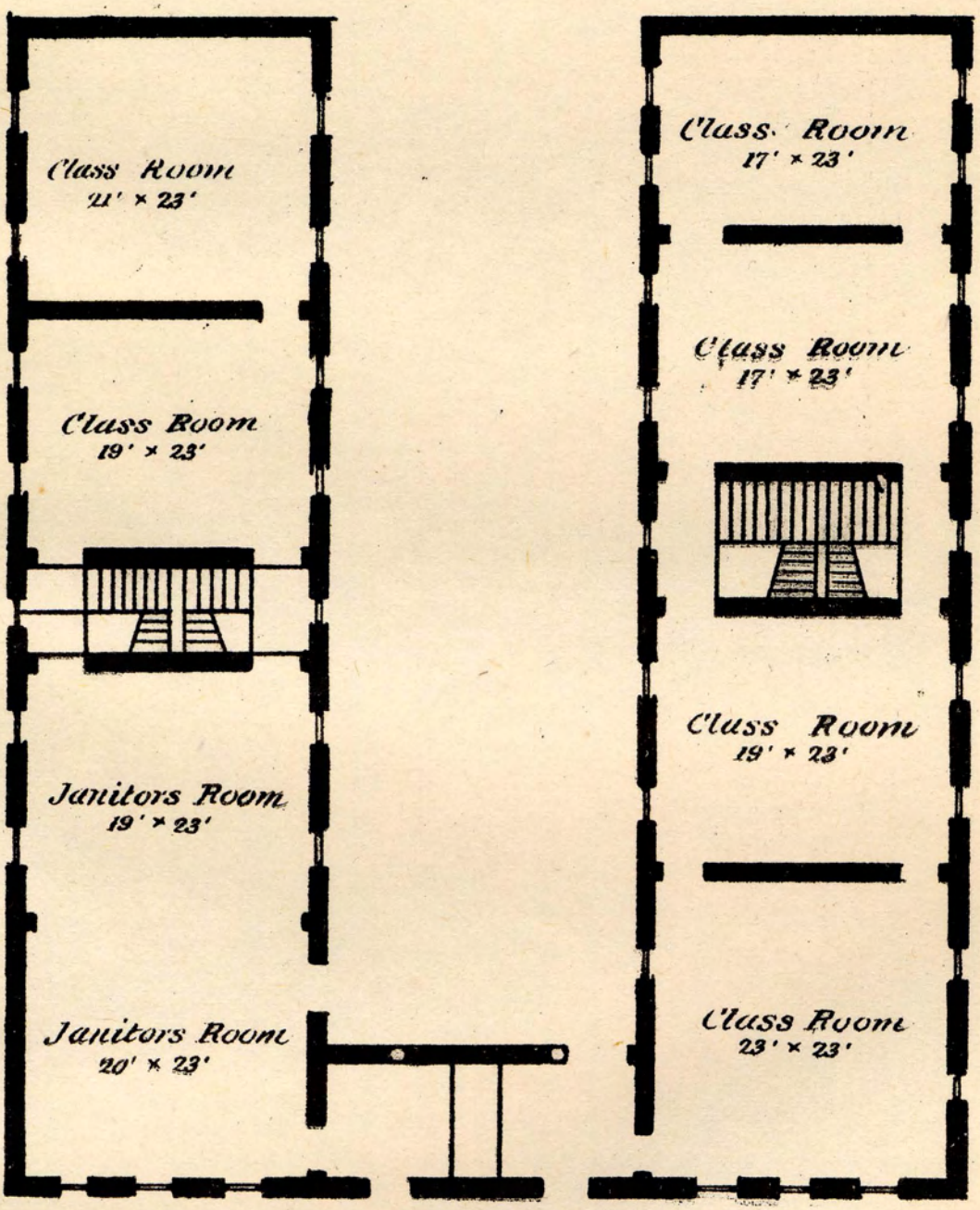
TOP FLOOR



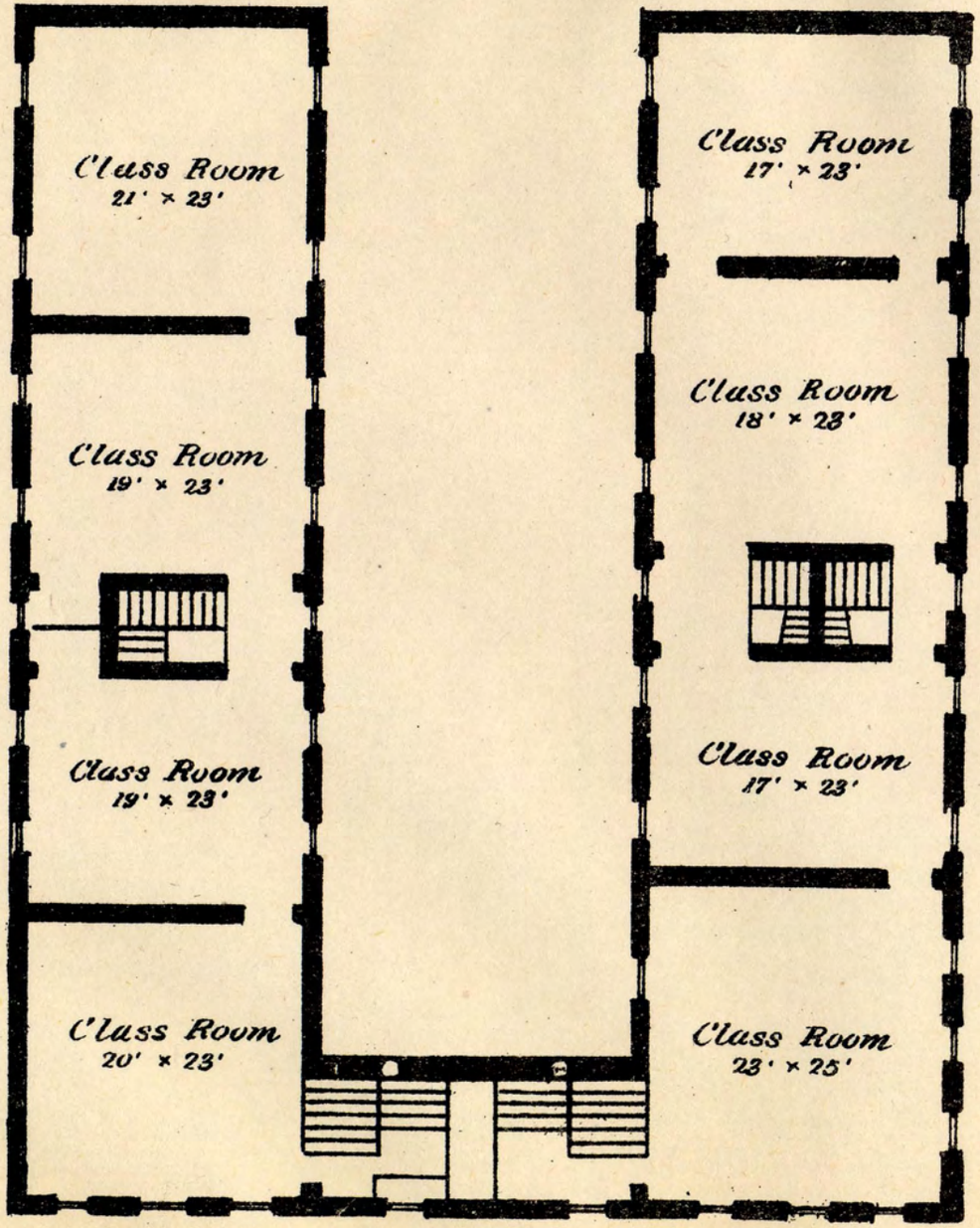
SECOND FLOOR

PUBLIC SCHOOL Nº 2.

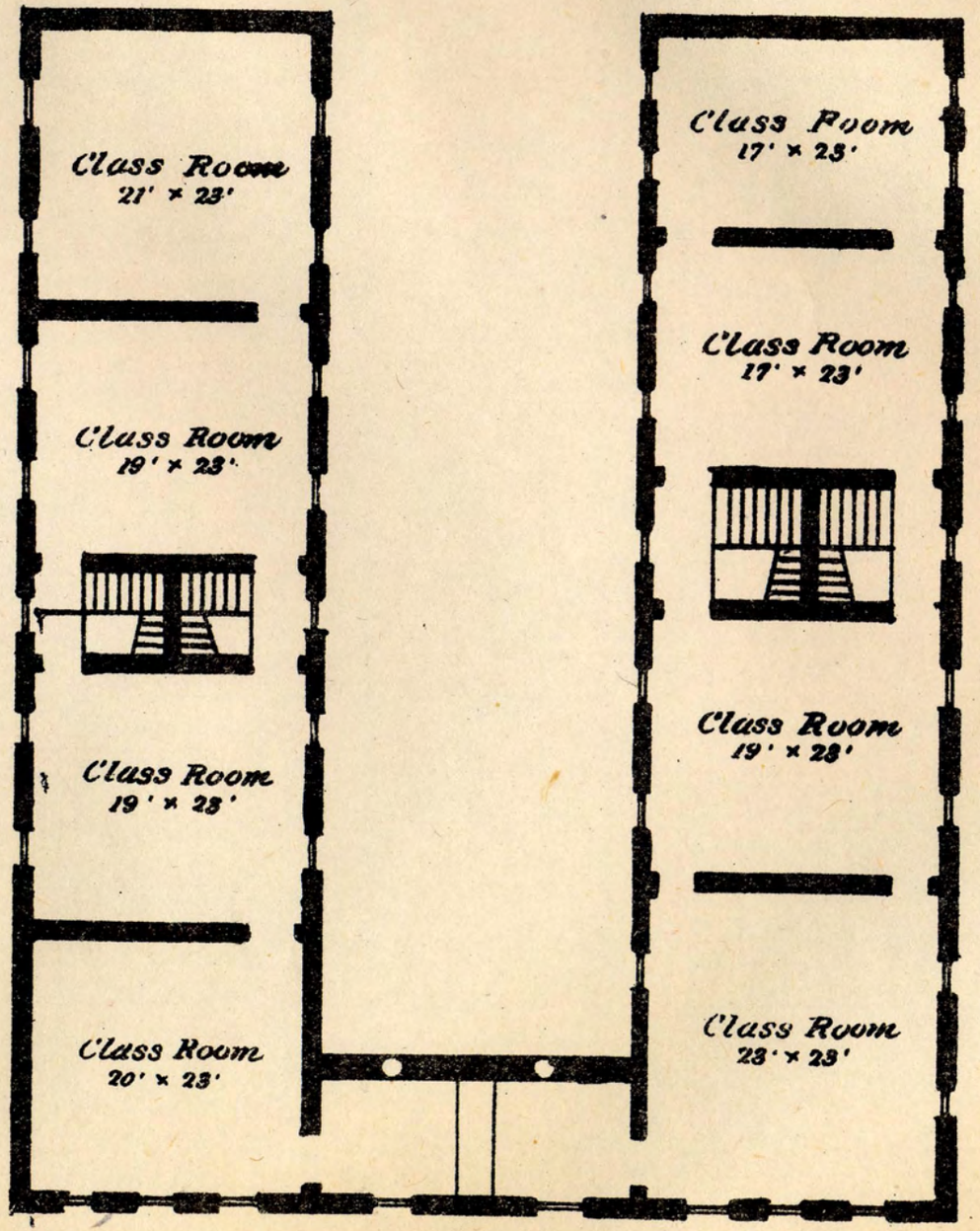
HOBOKEN, N.J.



FIRST FLOOR



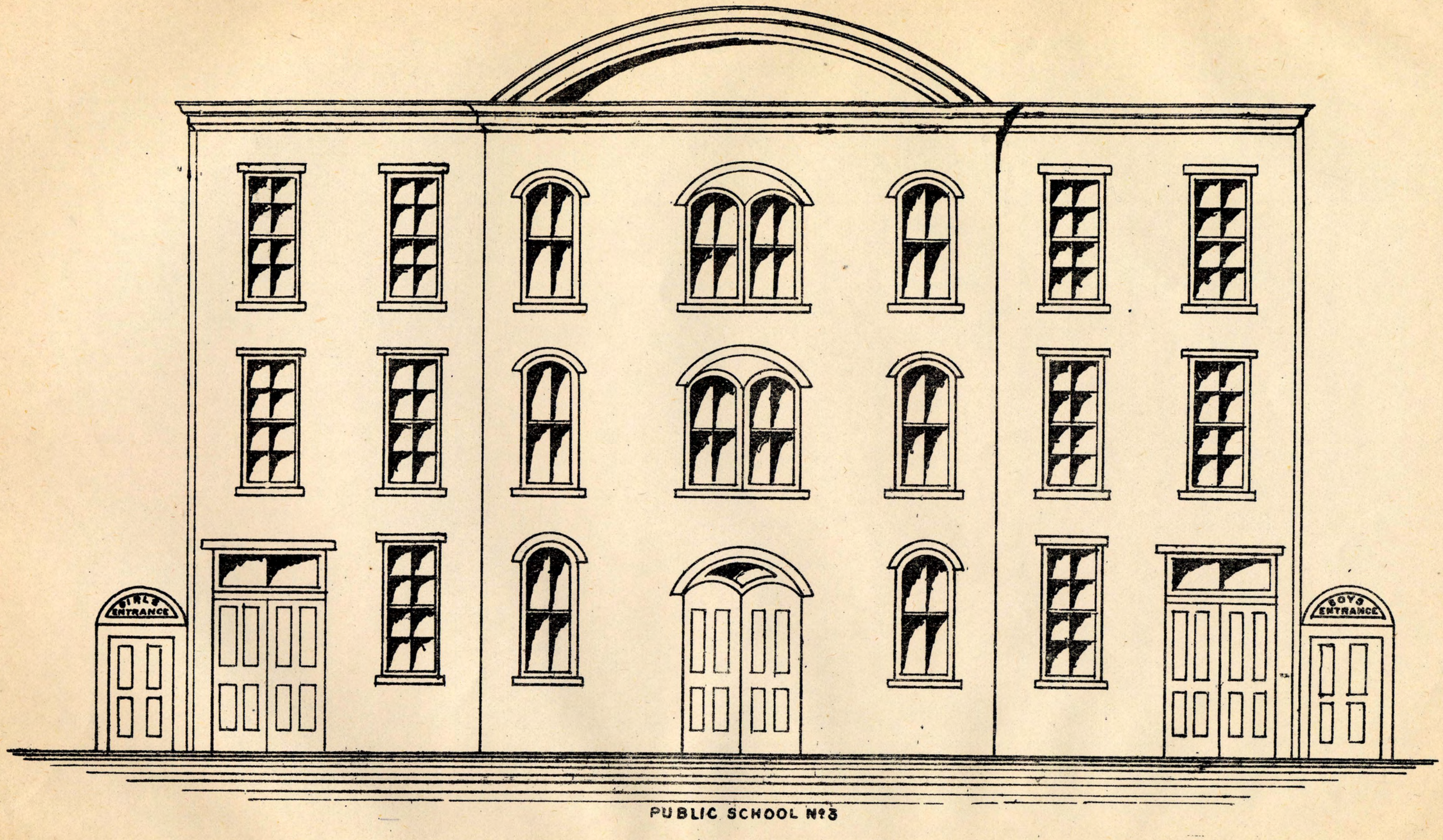
TOP FLOOR



SECOND FLOOR

PUBLIC SCHOOL N°2.

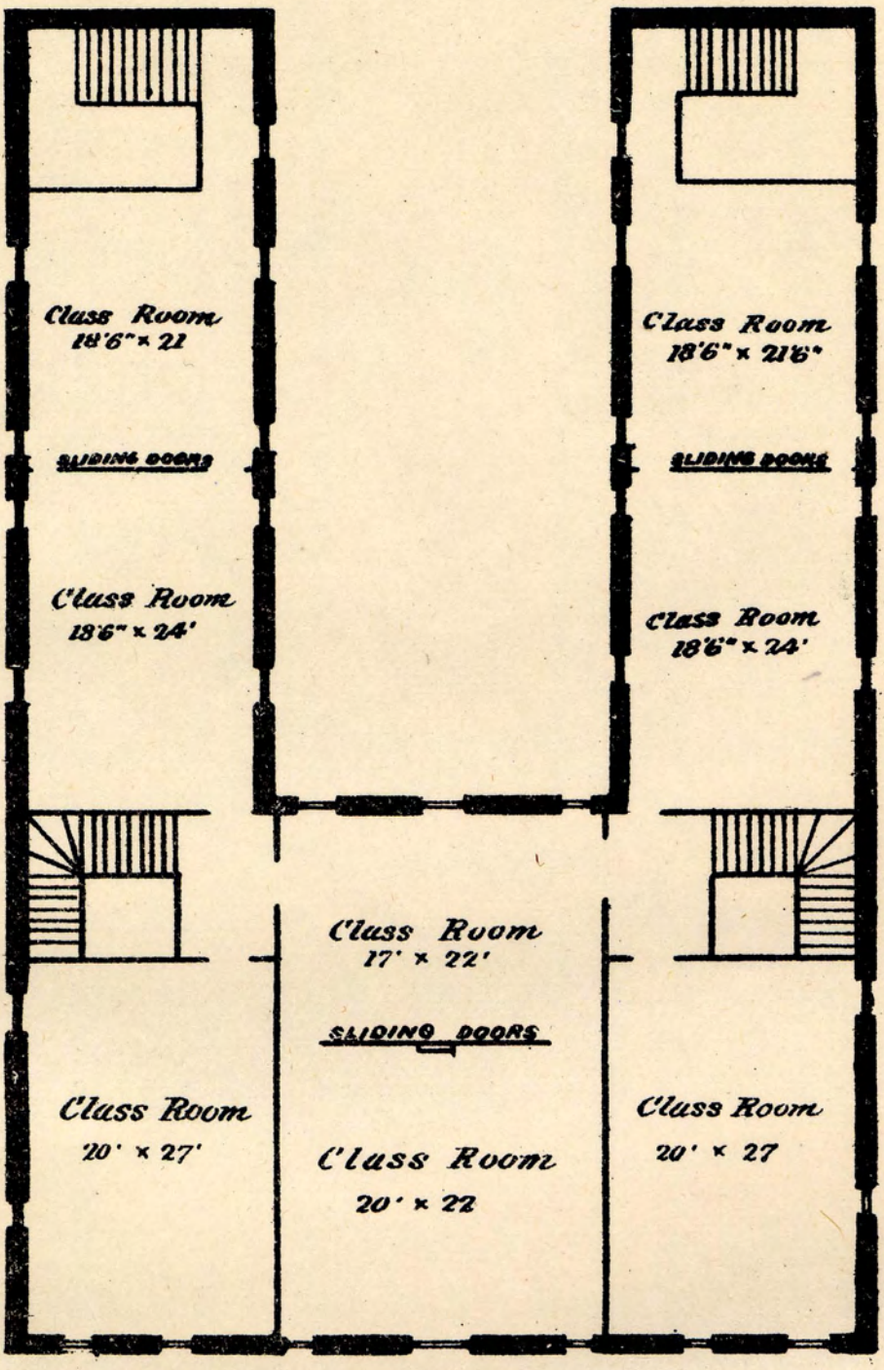
HOBOKEN, N.J.



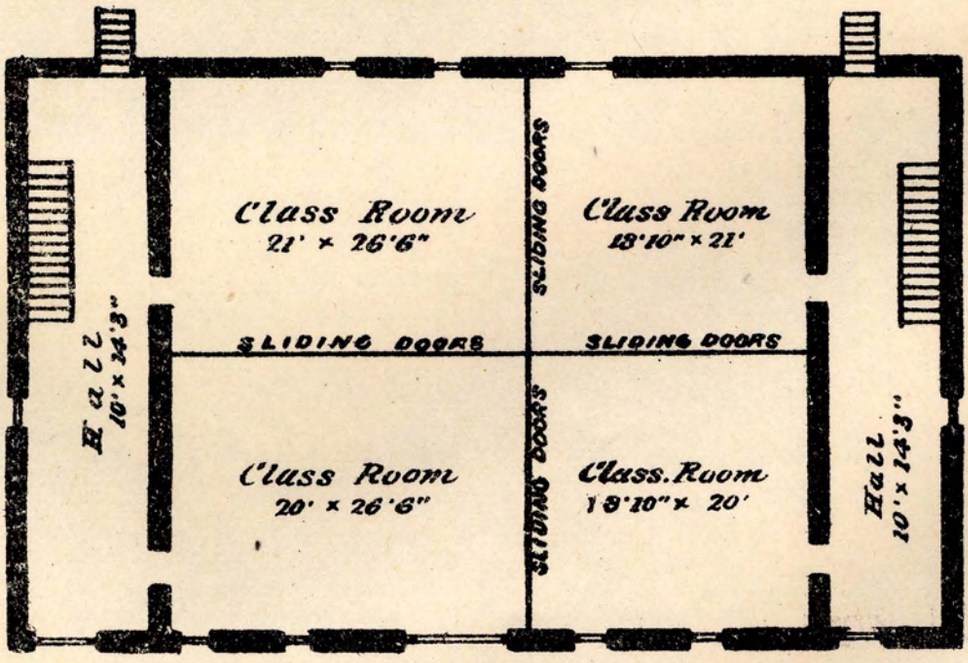
PUBLIC SCHOOL Nº3

PUBLIC SCHOOL Nº 3.

HOBOKEN, N. J.



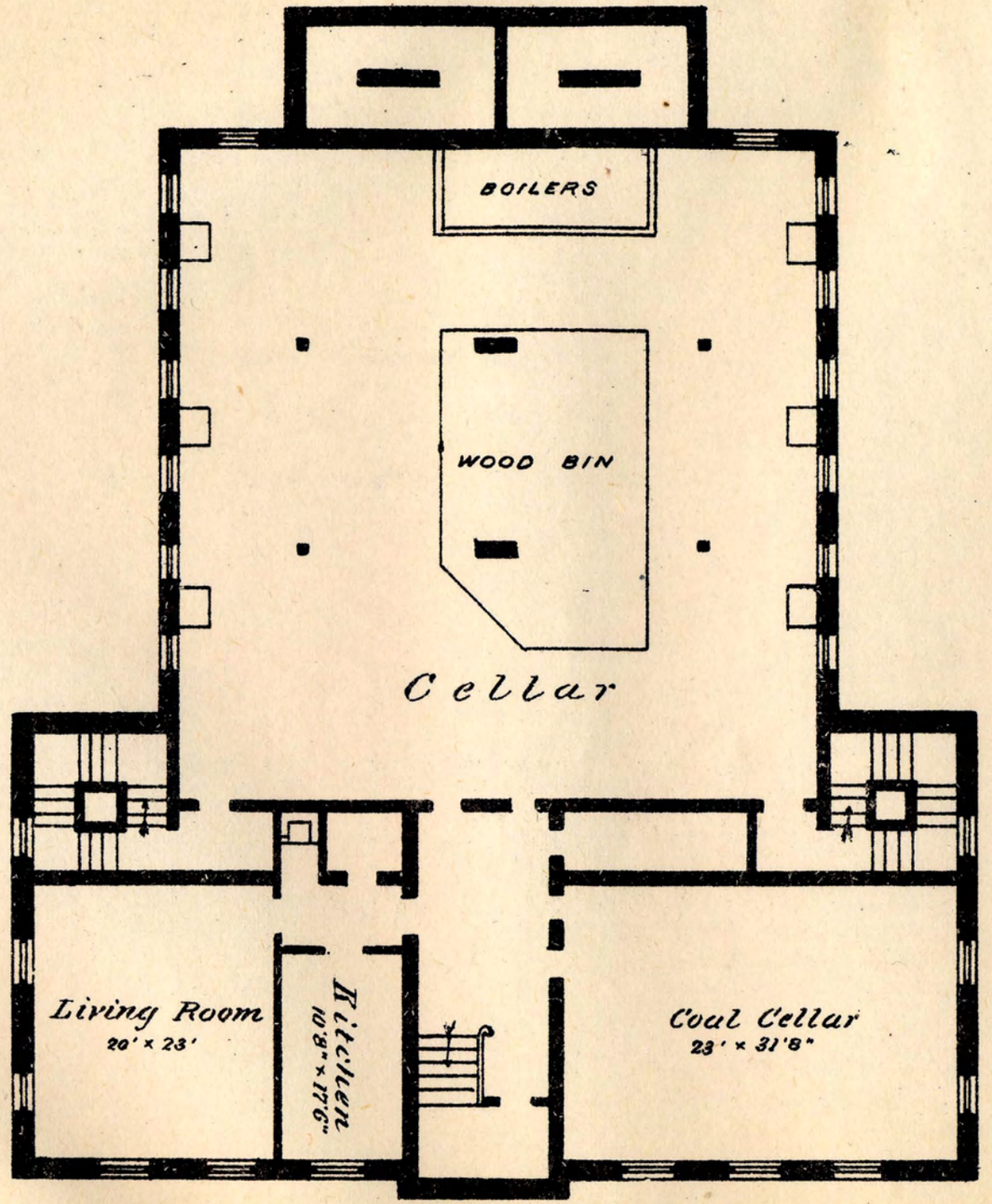
FIRST FLOOR



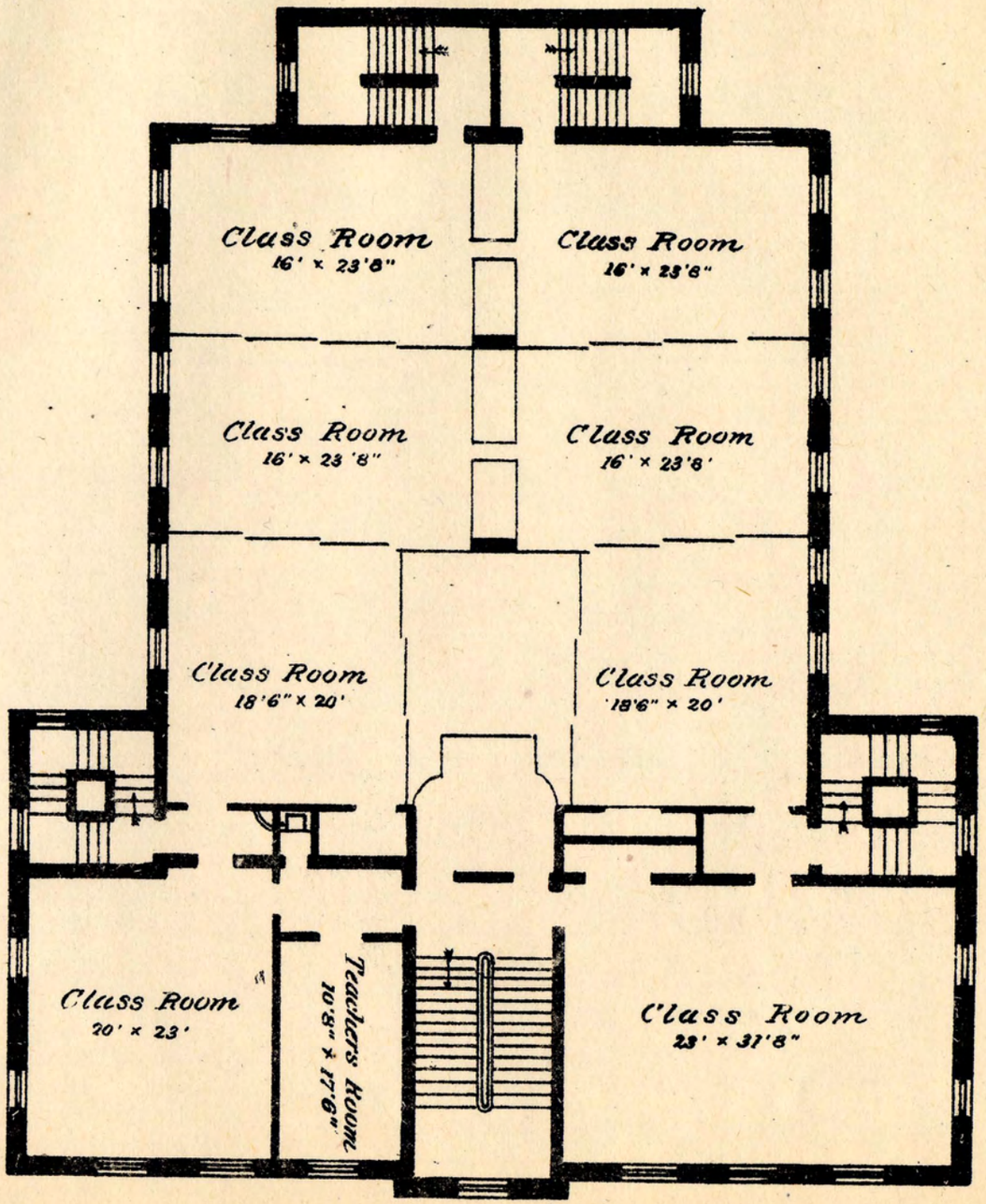
SECOND FLOOR

PUBLIC SCHOOL N°4

HOBOKEN, N.J.



BASEMENT FLOOR



UPPER FLOORS