



The Life and Times of the West River 1776-1896: A Study of Early Industry in Westville

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by Valerie Polino

Before the Age of Steam, industry was almost entirely dependent on natural sources of energy such as wind and water. The power of water, being the cheapest and most dependable method which could be applied to manufacturing, became the basis for almost all early industry in America. No stream, however small, was without potential power. The New England region in general and Connecticut in particular was blessed by nature with waterpower suited to industrial development. All that was needed was a dam, race, waterwheel and a watermill was born. A millsite could be any point in a stream where the fall of water could be harnessed and put to work.

Soon after an area was settled almost every stream and river was put to work driving waterwheels in grist and sawmills. Within 150 years waterpower was driving machines that made a variety of needed goods. Until the 1840's water power determined the location of most villages and towns. At one time in Connecticut there were over 200 "villes", usually established for a particular manufacturing purpose, next to a river or stream. Thirty five of these "villes" still exist today, one of them being Westville, through which the West River flows. The West River had the waterpower to attract manufacturers to the area. Men with capital to invest, men like Beecher, Blake, Parker, Bunce and Doolittle. In the years between 1776 and 1896 over fifty mills were located in Westville producing a wide range of goods for the public.

Industrial archaeology deals with the physical remains of past industries. In Westville any hope of discovering an early waterwheel, mill, race, or dam is very slim. Most, if not all of the early industrial sites have been destroyed by road building, industrial expansion, urban development and the changes in the course of the West River made by man. The only known evidence of early sites are the remains of the foundation of the Parker Paper Company, at the corner of Dayton and Whalley; part of the spillway behind Parker; and the dam behind the former Pond Lily Company on Litchfield turnpike.

Documents such as reports of factory inspectors, early writings, documents of the government of Westville, and maps are some of the most important sources of information in tracing early industrial sites. Many of the early dams and races are marked on early survey maps. In doing the research for this unit I ran into one dead end after another. Checking out all possible sources for information I came to one conclusion there are almost no written records of early Westville to be found. Although they did exist at one time no one seems to know what happened to them. The bits and pieces that are available on the early industries along the West River have conflicting information in some dates and specific locations. This unit gives a history using all the

available sources of information to date.

The unit is divided into three sections. Part I covers the West River system as the source of water power for early industries. Part II deals with the five most important facts to be considered before erecting a mill along a river. Part III covers the specific industries located in Westville that used the river as their source of power. A set of slides accompanies this unit as the illustrations for the text. The overall objective of the unit is to develop in the student the ability to make observations and draw conclusions from the available evidence. The lessons that are found at the end of the unit are designed to develop these skills. Although the materials deal with Westville the skills can be applied to any area of study.

PART ONE : THE WEST RIVER SYSTEM

The basic pattern of a river system and the water power that it provides can be compared to a tree with its trunk, limbs and branches. Every river had a trunk, or main stream, its tributaries, or limbs and its smaller tributaries or branches. Water falls to the ground as snow or rain in the highlands and flows down forming tiny riverlets that become streams. Some of the water is evaporated back into the atmosphere, the rest seeps into the ground. The water that seeps into the ground becomes underground streams that feed the lakes. The overland flow forms streams that join others forming larger streams, eventually joining a main river and finally emptying into the ocean. (slide 1)

The West River's source can be traced to both Bethany and Hamden. (slide 2) Over the years the course of the river has changed. Some of these changes were made by nature but most changes were man-made. Many of the lakes on the system were built by dam construction on the river. The purpose of this construction was to develop a surplus drinking water system for the area. Most of the West River system today is under the control of the South Central Connecticut Regional Water Authority. (slide 3)

A good example of lake construction is Lake Dawson located on Litchfield Turnpike in Woodbridge. (slide 4) When the water is low in the lake you can still see the remains of stonewalls that divided the farm land in the area. (slides 5 and 6) Other lakes, ponds and streams no longer exist. The Geologic Map of the New Haven and Woodmont Quadrangles shows the amount of land, along the West River, filled in by the City of New Haven over the years. (slide 7) A specific example would be the Hygenic Ice Ponds that at one time existed off of Fountain Street. (slides 8 and 9) LESSON ONE

In observing the West River system today and trying to picture what was, we must take all these things into consideration. By studying early maps and pictures and piecing together the information it becomes clear for example why there is less water in the river today. (slide 10) Filling, straightening, home construction and dam building all have contributed to cutting off of the water supply of the West River.

PART TWO : THE STEPS IN THE ESTABLISHMENT OF A MILL SITE

Let us look at the selection of a site, known as a “place” or “seat” of a mill through the eyes of an early industrialist in Westville. A number of things had to be taken into consideration. First, the stream itself; second, the type of dam to construct; third, availability of building materials; fourth, type of waterwheel; and fifth, ease of access to a method of obtaining raw materials and transporting the manufactured goods to market.

Early settlers tried to locate their mills on streams that had a reliable flow of water year round. The two best types of streams were ones with a high volume of water with either a low velocity or high velocity. A stream with a low volume of water and low velocity was not effective as a mill site because not enough power was available to turn a waterwheel. The West River, during the seventeen and eighteen hundreds had a lot more water than it has today. (slides 11 and 12) It would have therefore fallen into the high volume of water class. Since the topography of the land shows a gradual drop toward the harbor the river would have been one of high velocity. According to a 1928 map of the river behind Geometric Tool, on Valley Street, for every 40 feet in length the river dropped about one foot. (slides 13 and 14) LESSON II

The next step was to improve the water power of the river by constructing a dam. The purpose of the dam was to control the force of the water by raising the level of the water and forming a pond above the dam. This dam not only stored surplus water but also stabilized the flow of the river. The simplest dam was little more than a crude construction of logs and rocks. This type of dam was cheap and easy to build but had a tendency to fall apart during the spring floods. (slide 15 and slide 16)

For the most part dams, in the early days of manufacturing, fell into three general groups; low, from 3-5 feet; medium, from 6-8 feet; and high, from 8-12 feet. The majority of the dams along the West River fell into the 3-5 feet class. (slide 17) The only remaining dam, that is intact, is the one behind the former Pond Lily Company. (slide 18) To protect the dam against the damages caused by high water and floods a spillway or sluice was built to permit excess water to flow downstream around the dam. (slide 19)

A third important factor in considering a site for a mill was the availability of materials for construction, not only for the dam but the mill house. Westville had an abundance of the raw materials needed. The area had numerous forests of oak, chestnut, hickory, maple, ash and pine. West Rock, being composed of traprock, was an excellent source of building material for dam and mill alike. (slide 20) The mill, usually constructed of wood and stone was built next to the dam or in some cases at the end of a ditch called a flume, canal or headrace. This headrace carried the water from the stream to the wheelhouse. Unfortunately, no remains exist of these early mills along the river. (slide 21) A tailrace was constructed to carry the water from the mill back to the river.

The fourth factor was the waterwheel itself. The early waterwheels were constructed almost entirely of wood. Because wood dried out fast, causing the wheel buckets to leak and lose power, the wheel was kept turning all the time. There were four basic types of waterwheels used in the mills; undershot, breastshot, overshot, and pitchback. (slide 22) As to which ones were used in the mills along the West River one can only speculate. It is known that the following industries used waterpower, according to the 1870 United States Census Report: Blake Brothers Foundry, 1 wheel, 12 horsepower; Beecher Fruit Basket and Beecher Match Company, 1 wheel, 40 horsepower; Parker Paper Company, 1 wheel, 75 horsepower; Harrison Portable Grist Mill Company, 1 wheel, 20 horsepower; Mallory Paper Mill, 1 wheel, 25 horsepower.

The last consideration was easy access to a method of obtaining raw materials and transporting the manufactured goods. Westville had two turnpikes connecting it to Derby, Rimmon Falls Turnpike and the Derby Turnpike. The main roads into Woodbridge were the Litchfield Turnpike and the Seymore Road, now called Amity Road. Goods were brought into New Haven by way of Whalley Avenue and Chapel Street. (slide 23) LESSON III

PART THREE : EARLY INDUSTRY ALONG THE WEST RIVER

When the American War for Independence became a reality in 1775, gunpowder was needed by the Continental army under George Washington. Three local men, Isaac Doolittle, Elijah Thompson and Jeremiah Atwater, obtained permission from the Council of Safety to establish a powder mill. Since waterpower was necessary to run the mill, the West River was selected as the site. Two mills were eventually built, one on the upper section of the river and the other on the lower section. The mill on the upper section is the one referred to in the map drawn by Ezra Stiles showing the British attack on New Haven, July 5th, 1779. (slide 24) In its first year the mill turned out over 4,000 pounds of gunpowder for the army. The manufacture of gunpowder continued, at these sites, until early in the 1800's.

Good quality paper for legal documents, books, newspapers and letter writing was costly and scarce in the 1700's. There were a number of reasons for this. Two of the most important were the scarcity of skilled workers and the fact that the machinery had to be imported from England. With the outbreak of the war in 1776 the paper shortage was even more critical. Not only was trade suspended but large amounts of paper were now needed for official purposes, military correspondence and legislative documents.

The first paper mill erected in the New Haven area was in Westville, in 1776, by David Bunce. (slide 25) The location of the mill was on the present site of TRW, Geometric Tool, at the corner of Valley and Blake Streets. The necessity for a clean water supply for the paper making process was one reason this West River site was selected. A breast wheel of about 12 feet in diameter was probably the type used to furnish power for the mill. This site proved an excellent location for a mill. Not only was this area occupied by other paper mills but other industries as well. A total of about eight mills occupied this site between 1776 and 1896.

The West Rock Paper Mill, was established in 1840, by Joseph Parker and J.H. Herrick. The mill was located on Scots Road, Orange Street and Main Street, now Whalley and Dayton. (slide 26) This site was formally occupied by a cotton mill owned by John R. Livingston, Dixon and McIntosh. After 1846 the business of making paper was carried on by Parker under the name Frederick S. Parker and Sons. In 1869 Joseph Parker was taken into the firm and the name was changed to the F.S.&J. Parker Company. The mill continued in operation until 1969. All that is left today is the foundation and some slight evidence of the spillway. (slides 27-30) LESSON VI

The mill at first used the traditional method of making paper, that of processing cotton rags and mill sweepings into paper. The rags and sweepings were obtained from cotton mills in the New Haven area. The white rags were set aside for the making of the better grades of paper. To prepare the pulp, vats were filled with water and the rags. This mixture was then beaten to a pulp using heavy hammers that were driven by a waterwheel. The pulp was transferred from the vats into rectangular molds. Heavy weights were used to squeeze out the excess water and flatten the sheets. The sheets were then hung on poles in a loft to dry. This last might take weeks depending on the weather. (slide 31)

Parker installed a new type of machine, one of the first in Connecticut, to convert bleached pulp into rolls of paper. This was an improvement on the old method of making paper. The new method proved such a success that the Parker firm became one of the first major producers of top quality book paper in the United States. In 1856 Parker developed a blotting paper so superior to the English variety that the company, from that time on, specialized in blotting paper until it closed in 1969. By 1890 Parker was using both a waterwheel and steam power to produce over 2 1/2 tons of paper a day. The firm employed 24 men and 12 women in its operation. Other paper mills in Westville, in the late 1800's, were the James Harper Paper Mill, also known as The Pond Lily Paper Company, and the A.B. Mallory Paper Mill. (slide 32)

Abel Buell, on a trip to England to buy copper for his New Haven mint, visited a number of mills that were involved in the production of cotton cloth. He persuaded William McIntosh, skilled weaver and mechanic, to come to New Haven and help establish a cotton mill. The year was 1787. Two things a textile mill needed was land for a large building and a stream with a moderate flow of water to turn the waterwheel. A site on the West River was chosen. This mill lasted only a few years possibly because of poor financial management.

In 1796 McIntosh, David Dixon and some New York investors, including John Livingston, constructed a large building 100 feet long and four stories high at Main and Orange Streets, now Whalley and Dayton. Here they began the manufacture of cotton cloth. For a few years the mill produced cloth, yarn, wicks, etc.. The majority of the workers at the mill were pauper children brought over from Scotland. For some unknown reason the mills machinery was changed over to the production of woolen cloth. A few years later the mill closed again for an unknown reason. The site was then occupied by a paper mill owned by William Buddington. In 1837 the mill was destroyed by a fire. In 1840 this site became the location of the Parker Paper Company.

As one approached Westville by way of the Litchfield Turnpike there was a tollgate operated by Munson Sperry, this was about 1845. The area after the toll was originally called Bradley Town. Sheldon Hotchkiss had a carpenter shop with a small waterpowered wheel. This shop was located between the West River and the base of West Rock. Also in this area Fitch Sperry carried on a wagon repair business and Newell Johnson had a machine shop and axle business and foundry.

When Richard Sperry died he left his land, along the Litchfield Turnpike, to his son. After the American Revolution Levi Sperry, a descendent, decided the area needed a grist mill. He erected the mill in 1794, and it became a successful operation for over 40 years. The West River, was located on his property, so to supply power to the mill Sperry built a dam across the river. The mill was located at the present site of the Pond Lily Company. The dam is located behind the building and could possibly be the original. (slide 18) About 1844 the grist mill was taken down and on the site a factory was built for the manufacture of carriage springs and axles. In 1856 the factory was destroyed by fire. It was rebuilt and carried on a very successful trade with the union army during the Civil War. In the 1870's the company discontinued operations due to the depression that lasted from 1873-1879. The owners of the Pond Lily site began to look for another type of business to occupy the mill. James Harper was hired to open up a paper mill. (slide 33) The Pond Lily Paper Mill produced paper until the 1890's. In 1896 the firm became involved in textile dyeing and became known as the Pond Lily Company. (slide 34) It remained in operation until the 1970's.

Matches were not made in this country until after 1836. It is believed that the match industry in the United States had its beginnings in Westville. Between the 1850's and the 1890's five companies produced matches in Westville; A. Beecher and Sons, later Diamond Match; T. Gorman Match Factory; Tyler and Hotchkiss; and the Belden Match Company. Many of these firms were located on or near Tryon Street, now West Rock Avenue. (slide 35)

The match industry got its start through the efforts of Thomas Sanford and Anson Beecher. These men developed the machinery that made the production of matches profitable. This was done by combining the different steps in the production of matches into one machine that started with the raw lumber and ended with the boxed finished product.

In 1854 A. Beecher and Sons established their mill at Tryon and Fountain Streets. At this site they produced machine made straw baskets, the first woven straw hats produced in the United States, and matches. On April 12, 1867 Anson and his four sons acquired the mill site on the corner of Water and Pearl Streets, now Valley and Blake Streets. At this site they manufactured matches, as well as wooden boxes and baskets. In 1870 the Beecher firm was operated by waterpower. The waterwheel produced 40 horsepower. The source of the power was the West River. These facts were so noted in the 1870 United States Census. The water used to drive the wheel came through a raceway located on Valley Street. In the following years the business prospered becoming Swift, Courtney and Beecher and finally in 1881 the Diamond Match Company. (slide 36)

The production of matches was a dangerous operation and the possibility of fire and explosion was very real. In the 1860's Edwin Tyler and James Hotchkiss operated a match company on Whalley Avenue. In 1874 Tyler was killed in an explosion at the factory and Hotchkiss joined the Beecher organization. Another match company, the T. Gorman Match Factory, located on Tryon Street, burned to the ground in 1870. The fire lasted three days and the flames and smoke could be seen for miles.

One site of many industries during the early years was at the corner of Pearl and East, now Fitch and Blake. (slide 37) New Haven's reputation as a hardware center began at this location in Westville when, in 1835 the Blake brothers Eli and Philo started a factory for the manufacture of door locks, latches and other types of hardware. The shop was originally a grist mill whose power came from the Wilmont Brook. The source of this brook, Lake Wintergreen and Beaver Pond Brook. Beaver Pond Brook started at Beaver Pond. In the early 1800's the pond was nearly one mile in length and 1000 feet wide. (slide 7)

The Blake firm was the first in the United States and perhaps the world, to produce a new type of lock called the mortise lock. This new type fit inside the door and replaced the clumsy box lock. They were also one of the first companies to manufacture everyday household items that were inexpensive to purchase. Over the years the Blake factory grew in size and reputation. By the time it ceased operations in 1880 it employed 60-70 men.

Beside the Blake Foundry and Hardware Factory, the following industries were located in this area, most of them using Wilmont and Beaver Pond Brooks as their source of power: The Dexter Comb Company later the site of the Gilbert Manufacturing Company, as well as the W.& E.T. Fitch Cabinet Lock Company. The Westville Malleable Iron Company occupied a large section of the area as well. Up on Beaver Pond Brook was the site of the Harrison Portable Grist Mill Factory. Up river from Harrisons, on Beaver Pond, was the site of the first grist mill in the area.

The area where Main, Whalley, Broad and Tryon met, now Whalley, Fountain and West Rock, was another site of many different industries over the years. In 1867 the following firms could be found on Tryon Street; The Abel Jacox grist mill, Woodworth and Sinclair Hot Nut Factory, the Thomas Gorman Match Company, M. Isbell Blacksmith and Wagonmakers Shop and the Hotchkiss and Parker Rail, Post Sawing and Turning Company. The West River ran behind these businesses supplied the power for their operation. In the case of the grist mill the river ran through the middle of the building. (slide 35) At the bottom of Fountain Street, across from Tryon Street was the Heath Blacksmith Shop. A raceway and dam above the site furnished power for the operation. On Whalley Avenue, down from Heath, across the Whalley Avenue bridge was the Rawson Cutlery Shop. The

river gave power to turn the millstones used in the making of steel cutlery.

One of the businesses that made Westville famous in the later part of the 1800's was the Geometric Tool Company. On the present site of Geometric there originally stood a grist mill owned and operated by Joseph Munson. In 1776 David Bunce and Lemul Hotchkiss purchased some land and water rights from Munson for the purpose of constructing a paper mill. The site of the mill was just below the grist mill. The mill was powered by water from the West River. A dam was constructed across the river to control the flow of the river. Munson gave the men the right to dam the river only if it didn't interfere with the operation of his grist mill. (slides 39 and 40)

In 1827 Bunce sold the mill site to Stephen Turney and William Buddington. On December 31, 1842 the mill burned down, it was never rebuilt as a paper mill. In 1848 a mill was set up by Wales French to manufacture augers and bits. (slide 41) Before the Civil War William A. Clark manufactured expansive bits at the site. During the Civil War William Blake received a contract from the Colt Firearms firm for the manufacture of bullet molds. The next firm located here in 1867 was the match company of Swift, Courtney and Beecher, later Diamond Match.

Geometric Drill's beginnings were closely connected to the Diamond Match Company. William J. Smith work for Diamond. In 1891 he invented a tool that could bore squares and other geometric holes in metal and wood. Smith obtained a patent for his tool in 1892 and began to look for backers to help finance the production and sales of his invention. One of the backers was William H. Swift, the president of Diamond Match. In 1893 the Geometric Drill Company was established, on the site of Diamond Match which had moved its operations to Ohio. Geometric became a highly successful leader in the machine tool industry. In 1905 the company changed its name to Geometric Tool, today it is a subsidiary of TRW.

As a conclusion to this unit the following list is an overall summary of the industries that have made Westville an important part of the industrial development of the New Haven area.

EARLY INDUSTRIES ALONG THE WEST RIVER: WESTVILLE

APPROXIMATE DATE	INDUSTRY—general location OF ESTABLISHMENT by current streets
1776	Two powder mills, owned by Doolittle, Atwater and Thompson. Valley Street
1776	Munson Grist Mill, Blake and Valley Streets, present site of TRW.
1776	Bunce Paper Mill, Blake and Valley Streets, present site of TRW.
1787	Buell Cotton Mill—Woolen Mill, Blake and Valley Streets, present site of TRW.
1794	Grist Mill operated by Sperry, location of Pond Lily Company.
1796	Cotton Mill, owned by Dixon, and McIntosh, at Dayton and Whalley.
1835	Blake Brothers Hardware and Foundry, corner of Fitch and Blake Streets.
1840	West Rock Paper Mill, operated by Parker and Herrick, located Dayton and Whalley.

1843 Carpenter Shop, operated by Sheldon Hotchkiss, Litchfield Turnpike.

— Wagon Repair and Axle Shop, operated by Johnson, Litchfield Turnpike.

1846 Spring and Axle Mfg., operated by Sperry, at Pond Lily Company.

— Gilbert Spring Mfg., present site of TRW.

— Wales French Auger and Bit Mill, site of TRW.

— Dexter Comb Mfg., present site of TRW

— Westville Malleable Iron Foundry, corner of Fitch and Crescent Streets.

— Harrison Portable Grist Mill Mfg., Fitch near Crescent.

1854 A. Beecher and Sons Basket and Match Factory, Fountain and West Rock Ave.

1856 M. Merriman & Sons Blind and Window Trimming and Brass Foundry, off of Whalley, up from Parker Paper.

— Peck and Smith Paper Mill, Hard St.

— Rawson and Son Knife Mfg., Valley St.

1860 Tyler and Hotchkiss Match Company, Whalley Avenue.

— Terrill and Alling Mfg., chemical paint, Valley Street.

— W.R. Petrier Co., Valley Street.

— Kvens Patent Carriage Spring Mfg., Valley Street.

— A.B. Mallory Paper Mill, Hard Street.

1867 A.Beecher & Sons Basket and Match Factory, Blake and Valley Streets.

— T.Gorman Match Factory, West Rock Avenue.

— Hotchkiss and Parker Sawing and Turning Mill, West Rock Avenue.

— Abel Jacox Grist Mill, West Rock Avenue.

— M. Isbell Blacksmith Shop, Whalley Avenue near West Rock Avenue.

— Heath Blacksmith Shop, Whalley Avenue near West Rock Avenue.

1869 Parker Paper Company, Dayton and Whalley Avenue.

1870 Swift, Courtney and Beecher Match Co., Black and Valley Streets.

— Rawson Cutlery Co., Whalley Avenue.

1880 Belden Match Company, West Rock Ave.

1881 Diamond Match Company, Black and Valley Streets.

— Pond Lily Paper Mill, Litchfield Tpk. and Amity Road.

1893 Geometric Drill Company, Blake and Valley Streets

1896 Pond Lily Textile Company, Litchfield Turnpike and Amity Road.

LESSON I MAP OBSERVATIONS year 1911 Westville

Objective to be able to study an area map and pick out the changes that have occurred then draw conclusion as to why the changes to place.

Materials Slides 8 and 9 the Hygenis Ice Ponds.

Questions

1. Study the slides— Where is the area located? After the students have discussed the location go on to the next question.
2. Knowing what this area looks like today, look at the slides again. In your notes make two lists.

LIST I

What did you observe existed in the area in 1911?

- 1.
- 2.
- 3.
- 4.

LIST II

What exists in the area today?

- 1.
- 2.
- 3.
- 4.

LESSON II ON SITE OBSERVATION Field Trip

Time One class period, about 45 minutes.

Location West River, off of Valley Street, behind TRW.

Materials Slides 13 and 14.

Objective To locate through maps and site observations the early dam construction on the river.
Assignment

- 1 Study slide 13. Draw from the slide the map of the area. Be as accurate as possible as your drawing will be used by you to help locate the dam site.
2. Using the map drawn in class locate the site of the dam. Have the class work in small groups.
 - a. List how your group went about locating the dam site.
 - b. List all the things that you observed in the area of the dam
3. Back in the classroom discuss the procedures used, what was observed, what was found and not found.

LESSON III MAP OBSERVATION Westville 1868

Objective To be able to make map observations and draw conclusions from what is observed.

Materials Slide 23 and Map of Westville 1868

Assignment

1. Have the class study the slide— *without discussion* . Individual, quiet observation.
2. Each student will complete the following list in their notes.

Street Name 1868 Street Name today

1. Fountain Street 1. Fountain Street
2. 2.
3. 3.
4. 4.
5. 5.
6. 6.
7. 7.
8. 8.
9. 9.
10. 10.
11. 11.

12. 12.
 13. 13.
 14. 14.
 15. 15.
3. Class discussion covering the following:
- a. What street names have changed?
 - b. What streets no longer exist?
 - c. What streets are missing from the 1868 map?
 - d. Why is it important to know the names of the early streets in Westville?

LESSON IV INDUSTRIAL ARCHAEOLOGY Parker Paper Mill site

Objective to give students first hand experience in an industrial archaeological site survey.

Permission

1. South Central Regional Water Authority Engineering Department, Mr. Aldt. 624-6671
2. Parks and Recreation Department, City of New Haven Robert Sheeley, Director. 787-8027
3. Students will also need permission from their parents.

When to do the survey The best time to conduct the site survey would be in the spring before the heavy growth covers the site.

Material for the classroom Slides 26-29

Materials for the site survey:

1. Notebook—Journal with ditto sheets for each student. Master copies follow this lesson.
2. Tools needed:
trowels paint brushes stakes
small shovels string rulers hammers plastic buckets
picks plastic sheets

plastic baggies box sifter
tags

3. Optional tools:

camera metal detector

Organization for site survey

1. Director—teacher plus 2 adults
2. Assistant director—2 students to help with overall project.
3. Photographer—1 student to take site pictures.
4. Recorder—3 students whose responsibility it will be to tag any objects found and record the information on the Object Identification Sheet.
5. Crew Supervisor—1 student for each group.
6. Working crew—divide the class into crews of no more than 5 students each.

Time Frame This lesson should cover about two weeks. It could take longer depending upon time and schedules. The object of this lesson is to identify, record and analyze the presence of the site and any physical remains.

DAY ONE AND TWO: Site survey

1. Have the class observe the site and record their findings on the General on Site Observation Sheet.
2. They are not to remove anything from the site, just observe and record.

DAYS THREE—FIVE : Classroom discussion

1. Have the class discuss their observations using slides 26-29 to help pinpoint what they observed.
2. Organize the class for the site survey.
3. Go over the tools they will need.

4. Explain the following method of site excavation.

a. *Laying out the grid* :

Individual squares must be laid out on the ground. Use the stakes and string to mark each five foot square grid. Each grid is to be given a number that corresponds to a work crew. The grid will be theirs to work on for the entire time.

b. *Mapping* :

Each work crew is to draw a detailed map of their grid, mapping features of landscape for reference purposes. Use General On Site Observation Sheet.

c. *Surface Level finds*:

These finds are to be recorded first on the Daily Journal Sheet. All physical evidence will be tagged and numbered by the recorders on the spot.

d. *Clearing of Levels* :

A small amount of earth is loosened by pick, trowel or other tool. The earth is cleared away in buckets, sifted for any remains and the information is recorded. When the first level has been removed the same process is followed for the succeeding levels.

DAY SIX AND SEVEN: On site

1. Laying out of the grids.
2. Mapping of each grid.

DAY EIGHT—? On site excavation

The length of this part of the lesson will depend on the amount of time the class will be able to spend in the field.

FINAL DAY: Class discussion

Summary of their observations and evidence—what they have learned from this experience.

GENERAL ON SITE OBSERVATION SHEET

DATA ON _____ DATE _____

STUDENT _____

GENERAL, OVERALL DESCRIPTION OF THE AREA

FACTS OBSERVED:

BUILDINGS:

ROADS, PATHS ETC:

WATER FEATURES:

LANDSCAPE FEATURES:

MATERIAL OBJECTS:

OTHER:

MAP OUT WHAT YOU OBSERVED ON THE BACK OF THIS DITTO USING THE FOLLOWING KEY.

(figure available in print form)

DAILY JOURNAL NOTES

DATA ON _____ DATE _____

STUDENT _____

GRID NUMBER _____

LEVEL NUMBER _____

GENERAL PROGRESS:

NEW EVIDENCE:

DRAWINGS:

OTHER INFORMATION:

OBJECT IDENTIFICATION SHEET

DATA ON _____ DATE _____

STUDENT _____

GRID NUMBER _____ LEVEL _____

TYPE OF OBJECT:

DESCRIPTION:

MATERIAL:

MEASUREMENT:

DRAWING:

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STUDENTS

Fisher, Leonard E., *The Factories* , New York, Holiday House, 1974. Covers 19th century industry in America.

Mills, Lewis S., *The Story of Connecticut* , New Hampshire, Charles Day Company, 1943. Chapter XIX covers woolen and cotton mills.

Tunis, Edwin, *Colonial Craftsmen and the Beginning of American Industry*, New York, The World Publishing Company, 1963.

Good section on grain and fulling mills, well illustrated.

WESTVILLE

(figure available in print form)

SLIDE COMMENTARY

PART I THE WEST RIVER SYSTEM

slide 1 Water Cycle, point out that there is no new water on the earth. What is here is just recycled. Go over diagram; precipitation, evaporation, overflow, interflow, infiltration.

slide 2 Map of West River System, Have students compare the river system to a tree with its branches. Go over the source and the mouth of the river. Colors; blue—water, orange—dams, green—man-made lakes, purple—no longer in existence, yellow—Westville industrial area 1776-1896.

slide 3 West River System land use plan, trace the river to Lake Dawson, point out West Rock.

slide 4 Map of Lake Dawson, road along side is the Litchfield Turnpike. Point out the dam and the depth of the lake at the dam, 159 feet.

slide 5 Lake Dawson (a) showing dam, relate dam to map. (b) end of lake away from dam showing new water treatment plant. The total size of the lake is 67.5 acres. Remind students this is a man made lake whose purpose is public drinking water storage.

slide 6 Lake Dawson empty showing the stone walls. This slide will be placed into the collection next time the lake is drained.

slide 7 Geologic Map of the New Haven and Woodmont Quadrangles; Surficial Geology by Richard Flint, 1960-1963. Color Key; brown area artificial fill, dark purple bedrock, yellow alluvium sand, silt and gravel occurring as the cover on valley floor, green till composed of compound nonsorted sediment deposited by glacial ice, pink ice contact stratified drift—sand, gravel, silt and clay. (a) Land area go over color key. (b) closeup of West River through Westville go over geology of area point out the amount of fill along the river.

slide 8 Hygenic Ice Pond between Fountain, Ramsdell and Whalley from Atlas of New Haven 1911. Trace pond and brook to the West River.

slide 9 Hygenic Ice Pond off of Fountain Street, Cooper Place is located here today, all that is left is a little stream.

slide 10 West River today showing amount of water in the river at West Rock Park off of Valley Street.

PART II STEPS IN ESTABLISHING A MILL SITE

slide 11 West River off of Valley Street, West Rock is to the right. *City of New Haven Year Book* , 1900.

slide 12 West River today same area as slide 11.

slide 13 Map of area behind Geometric Tool on Valley Street, 1919 Bureau of Engineering City of New Haven , showing location of dam and bridge.

slide 14 Blue print of West River behind Geometric Tool. (a) dam and pond, (b) close-up, (c) area today, possible location of dam, (d) same area other side of bank. The dam was destroyed in the 1938 hurricane flood.

slide 15 (a) dam for rock bottom river, (b) West River showing rock bottom.

slide 16 West River falls, from a 1900 postcard, possibly one of the dams on the river.

slide 16 Wooden plank dam

slide 18 Pond Lily Dam today, (a) height about 4 ft., (b) length about 150 feet, constructed of trap

rock.

slide 19 Timber and rock dam

slide 20 West Rock showing trap rock

slide 21 Typical water mill constructed of stone and timber, waterwheel constructed of wood.

slide 22 Types of waterwheels

slide 23 Map of Westville, 1868

PART III INDUSTRIES ALONG THE WEST RIVER

slide 24 Stiles map of the British attack on New Haven in 1779 showing the location of the Powder mill in Westville.

slide 25 David Bunce Paper Mill, 1835. The long low building with the stack, from Barber print, NHCHS

slide 26 Map of Dayton, Whalley and Valley in 1868 showing Parker Paper, note the headrace where the water entered the mill and the tailrace where the water left the mill.

slide 27 Parker Paper Mill 1800's from Dana collection NHCHS

slide 28 Parker Paper today (a) Scots Road, now only a dirt path, (b) most recent foundation of cement, (c) early part of foundation of brick, (d) early part of foundation of stone.

slide 29 Map of Parker site, 1978. New Haven Water Company map note the falls (spillway), road way down from Whalley Avenue and the outlines of the buildings. Refer back to slide 28 a-d.

slide 30 Map New Haven Water Company, 1961 showing spillway elevation at 26' and the water level behind the dam. (b) what is left of the spillway, (c) same, (d) culvert.

slide 31 Typical paper mill showing drying lift.

slide 32 West River Industrial Area 1867 showing location of some of the paper mills.

slide 33 The Pond Lily Paper Mill

slide 34 The Pond Lily Textile Mill, 1900

slide 35 Map of Tryon, Fountain and Whalley area about 1868, note river running through grist mill.

slide 36 1881 map and picture of Swift, Courtney and Beecher, note the headrace and tailrace. The building with the smokestack housed the waterwheel. The water to drive the wheel came

through a headrace just to the west of the building on Valley Street.

slide 37 Map of Fitch and Pearl showing Blake Brothers Foundry on both sides of the street. Two headraces and one tailrace are shown.

slide 38 Old Mill dam and pond, this area was filled in in 1913-1914 to build new section of mill.

slide 39 Old Mill dam in winter, above dam.

slide 40 Wales French Bit and Auger Mill, 1852, note waterwheel and dam, West Rock in the background, from an old print.

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