1. NAME OF PROPERTY

Historic Name: **PORTLAND BROWNSTONE QUARRIES**

Other Name/Site Number: Shaler & Hall Quarry, Middlesex Quarry, E.& S. Brainerd Quarry, Town Quarry, A.Brazos and Sons, Inc., Quarry

2. LOCATION

Street & Number: Brownstone Avenue and Silver Street Not for publication:__

City/Town: Portland Vicinity:__

State: Connecticut County: Middlesex Code: CT007 Zip Code: 06480

3. CLASSIFICATION

Ownership of Property		Category of Property	
Private:	X	Building(s):	__
Public-Local:	X	District:	__
Public-State:	__	Site:	X
Public-Federal:	__	Structure:	__
		Object:	__

Number of Resources within Property

Contributing	Noncontributing	
__	__	buildings
1	__	sites
__	__	structures
__	__	objects
1	0	Total

Number of Contributing Resources Previously Listed in the National Register: 0

Name of Related Multiple Property Listing: N/A

Designated a
NATIONAL HISTORIC LANDMARK on

MAY 16 2000

by the Secratary of the Interior

4. STATE/FEDERAL AGENCY CERTIFICATION

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ____ meets ____ does not meet the National Register Criteria.

_____ _____
Signature of Certifying Official Date

_____
State or Federal Agency and Bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria.

_____ _____
Signature of Commenting or Other Official Date

_____
State or Federal Agency and Bureau

5. NATIONAL PARK SERVICE CERTIFICATION

I hereby certify that this property is:

___ Entered in the National Register
___ Determined eligible for the National Register
___ Determined not eligible for the National Register
___ Removed from the National Register
___ Other (explain): _____

_____ _____
Signature of Keeper Date of Action

6. FUNCTION OR USE

Historic:	INDUSTRY/PROCESSING/EXTRACTION	Sub:	Extractive facility
	EDUCATION		Research facility
Current:	LANDSCAPE	Sub:	Conservation area
	EDUCATION		Research facility

7. DESCRIPTION

ARCHITECTURAL CLASSIFICATION: N/A

MATERIALS: N/A
Foundation:
Walls:
Roof:
Other:

Describe Present and Historic Physical Appearance.

The Portland Brownstone Quarries are located on the east bank of the Connecticut River at the western edge of the town of Portland and across the river from Middletown, Connecticut. Vertical reddish-brown sandstone cliffs surround deep, tranquil lakes in the Portland Brownstone Quarries today. This mimics their appearance at times in the past once the quarries were excavated below the level of the adjacent river, as observed by Rice and Foye in 1927: "When the quarries are not being worked, and the pumps are inactive, the floors of the quarries are occupied by extensive lakes." The quarries last became flooded in 1938 when a hurricane raised the river level, and they have remained so since then. Before quarrying began, low sandstone cliffs flanked the eastern bank of the river here. Quarrying removed the tops of these cliffs and built a "foreshore" of waste rock out into the river, which still remains.[1]

There are two main Portland Brownstone Quarries, which incorporate all of the early, smaller pits. The larger, northern quarry is separated from the smaller, southern quarry by Silver Street. Natural joints used by quarrymen to divide the brownstone into large blocks are visible in the quarry walls, as are numerous geological features of research and educational value. The squared-off "peninsulas" at the top of the quarry walls show the former location of derricks used to hoist stone out of the quarries.

The Portland Brownstone Quarries can be accessed via motor vehicle along Brownstone Avenue, at the western edge of the quarries, where there is an unpaved parking pull-off. A wall of large brownstone blocks apparently constructed during the Depression ("W.P.A. 1938" is carved into one of the blocks) separates the quarries from Brownstone Avenue.

[1]Rice, William North, and Wilbur Garland Foye. 1927. AGuide to the geology of Middletown, Connecticut, and vicinity.@ *Connecticut State Geological and Natural History Survey Bulletin* No. 4, 137 p. Rice and Foye provide the most comprehensive description of the brownstone quarries at Portland.

8. STATEMENT OF SIGNIFICANCE

Certifying official has considered the significance of this property in relation to other properties:
Nationally: X Statewide:__ Locally:__

Applicable National Register Criteria: A X B X C__ D__

Criteria Considerations (Exceptions): A__ B__ C__ D__ E__ F__ G__

NHL Criteria: 1,2

NHL Theme(s): VI. Expanding Science and Technology
3. Scientific Thought and Theory

Areas of Significance: Science, Architecture

Period(s) of Significance: 1689-1938

Significant Dates:

Significant Person(s): Krynine, Paul Dimitri

Cultural Affiliation: N/A

Architect/Builder: N/A

Historic Contexts: XIII. Science
B. Earth Science
2. Geology

State Significance of Property, and Justify Criteria, Criteria Considerations, and Areas and Periods of Significance Noted Above.

The Portland Brownstone Quarries were the main source of the distinctive reddish-brown sandstone called "brownstone," which was used so extensively in building construction during the latter half of the nineteenth century, especially in East Coast cities, that urban dwellings came to be known as "brownstones," regardless of the materials used in their construction. Although "brownstone" was found in limited areas elsewhere in the Connecticut River Valley, the stone at Portland was of a superior quality and, therefore, was used most frequently in construction. The brownstone rowhouses, so common in cities like New York, were erected to help house the burgeoning immigrant population of that time. Brownstone buildings were so ubiquitous from about 1850 until about 1890 that this period has been informally called the "Brownstone Era." Writings during or regarding that period commonly utilize the term "brownstone" when referring to the urban scene. Used for mansions and middle class houses alike, brownstones embodied the prosperous, progressive image of America during that period of national expansion and economic growth

The Portland Brownstone Quarries also possess national significance in the history of Geology for they role they played in research undertaken by geologist Paul Dimitri Krynine. Krynine was instrumental in introducing and promoting the field of sedimentary petrography in the United States; because of his efforts, this method of rock study came to play a critical role in petroleum exploration. In addition, Krynine used data collected from the site in a definitive study to determine the geological origin of "redbeds." Once thought to indicate only arid, desert-like environments, Krynine demonstrated that they also formed under warm, humid, tropical conditions as well. While at Yale University, Krynine wrote a classic geological work on the origin of "redbeds," relying on features in the Portland quarries.

The Portland Quarries and the "Brownstone Era"

Reddish-brown sandstone, called "brownstone," which was extracted from the Portland Brownstone Quarries was used very extensively in building many American cities in the latter half of the nineteenth century. So popular and widespread was the use of this building stone that the term "brownstone" became synonymous with typical urban dwellings. Rice and Foye remarked:

> "In the later decades of the nineteenth century, the quarrying industry in Portland was immensely prosperous. Brownstone was in fashion in those days. For a number of decades a man who wanted to build a dwelling house of high grade in New York or Boston hardly dared to build anything but a 'brownstone front,' and the brownstone came from the [Jurassic] of Connecticut or New Jersey."[2]

In 1884, Hawes observed:

[2] Rice and Foye. 1927.

> The 'Connecticut brownstone,' as it is known in the market, is extensively used for all kinds of buildings and monumental work in the principal cities of the Atlantic border, in Canada, and in Chicago. Most of the fronts on Fifth and Madison avenues, New York city, are built of this stone.[3]

The popularity and prevalence of brownstone building stone is underscored in the 1858 poem Contentment by a favorite poet of the period, Oliver Wendell Holmes:

> Little I ask; my wants are few;
> I only wish a hut of stone,
> (A very plain brown stone will do,)
> And close at hand is such a one,
> In yonder street that fronts the sun.[4]

Brownstone is an informal name for a kind of sandstone. Although "brownstone" has long been the popular term for sandstone quarried in the Mesozoic rocks of the Connecticut River Valley, a distinction is made between "brownstone and "redstone" in the quarrying and architectural trades. Uncommonly, it is referred to as "freestone" because of the ease with which blocks were "freed" from the quarry wall.[5] In 1894, Allbee stated:

> Brownstone is found in limited areas in several varieties in different states, but none yet discovered equals in quality the Portland deposits...[they produce] an article of commerce so desirable that not infrequently the vast resources and facilities of the quarries are taxed to the utmost demand for it.[6]

Altamura remarked that the "Portland quarries were the king of the brownstone quarries in Connecticut and...the country."[7]

The brownstone here occurs stratigraphically in the Portland Formation (also called Portland Sandstone or Portland Arkose) (the proper name for a specific rock unit). Although long considered Triassic in age, these rocks are now known to date from the Jurassic Period. The Portland Formation is best exposed in the Portland brownstone quarries, which is where the type section of the formation is located.[8] These sandy sediments were deposited in a subtropical rift valley at about 15° N paleolatitude

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[3] Hawes, G. W. 1884. AReport on the Building Stones of the United States and the Quarry Industry for 1880.@ Tenth Census of the United States, vol. 10. Government Printing Office, Washington, D. C., 410 p.

[4] Holmes, Oliver Wendell. 1885. AContentment@ in: *Illustrated poems of Oliver Wendell Holmes*. Houghton, Mifflin and Company, Boston: 64-67.

[5] Guinness, A. C. 1987. AThe Portland Brownstone Quarries.@ Unpublished, 142 p. [Guinness provides a comprehensive discussion of the quarry operations at Portland.]

[6] Allbee, B. H. 1894. AThe Famous Connecticut Brownstone.@ *Stone* 9(1): 1-31.

[7] Altamura,R. J. 1994. AHistoric Geologic Sites in Connecticut.@ *Connecticut Environment* 17(10-11): 1-7.

[8] Krynine, P. D. 1950. APetrology, stratigraphy, and origin of the Triassic sedimentary rocks of Connecticut.@ *Connecticut Geological and Natural History Survey Bulletin* No. 73, 247p.

during Early Jurassic time. Rivers originating from highlands on the east flowed across alluvial fans onto the valley floor, which was dotted with intermittent lakes. The sand grains were derived from Precambrian to Middle Paleozoic metamorphic rocks in the highlands and deposited by rivers subjected to repeated flooding.[9]

This unit is composed of conglomerates, reddish-brown and purple arkoses, fine-grained micaceous siltstones, and subordinate red and dark shales. The outcrops of the brownstone quarries at Portland exhibited all the lithologic variations from micaceous siltstones to medium-sized conglomerates. The original pinkish color of the mineral feldspar composing much of these rocks, as well as staining by the mineral hematite, impart the reddish-brown color to the Portland brownstone. The color is also evidence for a warm, humid climate during the Jurassic when the sediment was deposited.[10] Hawes regarded it as a "lively and pleasing reddish brown color."[11]

The brownstones occur as laterally continuous, sheet-like bodies, which range from about three to twenty feet thick (average 6.5 ft) in the exposed quarry walls at Portland.[12] Plane-bedded sandstone, which was deposited in flat-lying layers, is the characteristic and dominant type of rock in the brownstone quarries here. Apparently, blocks of this plane-bedded rock type were typically used for building construction. Natural albite cement, which was precipitated by groundwater around the sand grains, imparts the toughness and durability which made the brownstone such a highly-prized building stone. Blocks of nearly any size for construction were available, with natural blocks as large as 100 x 50 x 20 feet having been excavated from the quarries. Allbee noted:

> The physical characteristics of the stone, distinguishing it from all others, is its uniform color, a rich, permanent brown, tinted slightly reddish, gray or bluish, according to variations in the strata, its fine even rift or reed, its easy-working qualities adapted to the finest carving and its susceptibility to being rubbed or dressed down to a perfectly smooth, even surface...Connecticut brownstone, though used to some extent for monumental purposes, is primarily a high-grade building stone, utilized in large quantities in cities, not only where stone fronts are features, but with brick and other materials with which it can be effectively combined. The result is always pleasing buildings constructed of all or part brownstone having the appearance of being capable of outlasting time itself."

Portland brownstone was used in construction for nearly three centuries, beginning in mid-1600s. Fluctuations in the fortunes of the brownstone quarrying industry reflect prominent nineteenth-century events in the history of the United States. The industry suffered decline during the Civil War and the

[9] Huber, John F., J. M. Gilchrist, and A. A. Read. 1982. AJurassic redbeds of the Connecticut Valley: (1) Brownstones of the Portland Formation; and (2) Playa-playa lake-oligomictic lake model for parts of the East Berlin, Shuttle Meadow, and Portland Formations.@ in R. Joesten and S. S. Quarrier (eds) *Guidebook for Fieldtrips in Connecticut and South Central Massachusetts.* New England Intercollegiate Geological Conference, 74th annual meeting, Guidebook No. 5: 103-141.

[10] Krynine, 195; Huber, Gilchrist and Read, 1982.

[11] Hawes, 1884.

[12] Huber, Gilchrist and Read, 1982.

financial panics of 1837, 1873, and 1893. The latter depression may have been a major factor in a demise from which the industry never recovered. Although already greatly reduced in prominence by the twentieth century, the Portland quarries closed for a time during World War I. In contrast, the quarries enjoyed considerable financial success during the time of extravagance following the Civil War and through the period of national expansion in the latter part of the nineteenth century.[13]

Although no quarry had yet been opened in the mid-seventeenth century, and only loose stone collected from talus at the base of the cliff was used, brownstone was, even then, so highly valued by citizens in the town of Middletown (which then included the towns of Portland, Cromwell, Middlefield, East Hampton, and parts of Berlin and Middle Hadam) that a 1665 law leveled an export duty on stone removed by non-residents:

At a town meeting September 4th, 1665, it was voted: 'that whosoever shall dig or raise stone at ye rocks on the East side of the Great River for any without the town, the diggers shall be none but an inhabitant of Middletown and shall be responsible to ye town 12 pence per tunn for every tunn of stone that he or they shall digg for any person whosoever without ye towne, this money to be paid in wheat or pease, to ye townsmen or their assigns, for the use of the towne, within six months after transportation of said stone.[14]

The first quarry in the Portland area was opened about 1690 by James Stancliff, a mason and stonecutter, at the site of what would later become the Middlesex quarry. Stancliff was known particularly for carving gravestones, many of which still survive in Connecticut Valley colonial cemeteries; he may have been the first person to embellish Puritan gravestones with decorative carvings of items such as skulls. From that time on, the brownstone quarries were operated nearly continuously in Portland until the 1920s. Most of that time, the quarries were operated by three companies, or combinations thereof: Shaler and Hall Quarry Company (established 1787), E. & S. Brainard Quarry Company (1812), and Middlesex Quarry Company (1841).

Initially, the quarries were small enterprises run by a few men. As demand for brownstone increased, however, so did the size of the quarries and the labor force required to excavate the stone. Irish immigrants, who had fled the 1845-1849 potato famine, filled many of the new quarry jobs and by 1871 Irish workers dominated the labor force. Later, Swedish immigrants made up a large part of the workforce.[15]

For the first 200 years or so of operation, quarrying was done by mostly by hand. In 1884, more than 800 men, 200 oxen (some in 40 yoke teams), and 60 horses were employed at these quarries. Large vertical cracks in the rock called joints, which are natural stress-release features, were used by the quarrymen to excavate blocks of stone; these joint systems are still visible in the quarry walls. A mural inside the Portland Middle School auditorium, which was painted in 1938 by W.P.A. artist H. S. Barbour, depicts men and oxen toiling with a large wooden sling used to haul the huge brownstone

[13] Guinness, 1987.

[14] Allbee, 1894

[15] Rice, North and Foye, 1927; Allbee, 1894 ; Guinness, 1987.

blocks out of the quarries. One of these wooden slings has been restored for display in Portland as well. The need for oxen and horses was virtually eliminated when narrow gage railroads and power derricks were erected to transport stone from the quarries. The introduction of some steam-powered equipment in the 1850s allowed quarry expansion to greater depths because water seepage could be controlled by pumping. Eventually, the depth of the quarries reached at least 200 feet below river level.[16]

In 1894, Allbee observed:

> For two miles along the Connecticut River stretches the stone, the buildings containing the machinery necessary for the operation of the quarries, the carrier cranes and travelers used in conveying the stone to the cars or vessels used in transportation, the railways upon which the freight cars are driven to any part of the great yards and quickly loaded by the locomotive trains which run upon the same tracks, and the docks where the schooners and boats are loading for distant cities. Hundreds of men hurry hither and thither; thousands of hammers multiply the anvil chorus, while here and there a dull detonation and a small cloud of dust shows the location of a blast which has probably rent thousands of tons of valuable rock from its base leaving it ready to be split, hoisted from its resting place and sent away to become a beautiful structure in some great city.[17]

Two of the Portland quarry companies merged in 1896 to form the Brainerd, Shaler and Hall Quarry Company, which operated the southern pit. In 1906, they bought out the Middlesex Quarry Company, which had operated the northern pit. The quarries were closed during World War I. In 1926, A. Brazos and Sons, Inc., a local construction company, began producing stone under the name Portland Brown Stone Quarries. This company supplied stone for the Aetna Life & Casualty Building in Hartford, Connecticut, and the Sterling Memorial Library at Yale University-the last major projects to utilize Portland brownstone. Even though its popularity had dwindled, Portland brownstone continued to be quarried, except during part of the Great Depression, until 1936, when the quarries were flooded by the Connecticut River. Before quarrying could be resumed, a hurricane in 1938 caused the quarries to be flooded once again, and they have remained that way ever since.[18]

Utilized in many architectural styles over the span of nearly three centuries, brownstone was used to construct both the palatial mansions of the wealthy and rowhouses of the middle class. Prior to the 1840s, brownstone was used mostly as building foundations, quoins, and trim. In the early 1840s, however, the Romantic movement in architecture swept the nation. This architectural movement was founded on emotion, idealism, and the wild beauty of nature. An influential writer of the period, Andrew Jackson Downing, noted, "The practical rule...is, to avoid all those colors nature avoids. In buildings we should copy those that she offers chiefly to the eye-such as those of soil, rocks, wood, and the bark of tress..."[19] The warm, rich color of the brownstone, as well as the ease with which it could be carved, made this stone perfectly suited to the Romantic architectural style. Allbee noted, "The

[16] Rice, North and Foye, 1927;Hawes, 1884; Guinness, 1987.

[17] Albee, 1894

[18] Guinness, 1987.

[19] Brown, L. 1989. AThe Story of Brownstone.@ *Connecticut Audubon*, Summer 1989: 28-31.

Connecticut or Portland brownstone is one of the most popular, if not the most sought after, of any building material used."[20] The Brownstone Era had begun.

Portland brownstone appears to have been shipped to Boston early on. One of the earliest recorded uses of this stone was in the Old Province house there, which was erected in 1679 with a flight of twenty massive brownstone steps. Constructed between 1737 and 1740 on Beacon Hill in Boston, the Thomas Hancock house had Portland brownstone trim.[21]

Portland brownstone was transported to far-flung locations across the country from New York to California and from Chicago to New Orleans by ship and, more rarely, by rail. Shipping the stone was relatively inexpensive and easy because the Portland quarries were located along the banks of the Connecticut River. Most of the stone was shipped down the river in shallow draft schooners called "brownstoners".[22]

Portland brownstone was considered of better quality than similar stone quarried elsewhere. Because it was more consistent in character than stone from elsewhere in the Connecticut River Valley, better quality material could be produced at a greater product value. In the nineteenth-century, Portland brownstone was the material employed for the "better class of stone construction"[23] in many eastern cities. An 1860s newspaper article observed:

> Houses built of stone, or having stone fronts, are the only kind which meet with favor from the moneyed portion of our community. Brick is getting too common for first-class fashionable circles, and is left to be occupied by the more humble of the people.[24]

Brownstone became the building stone of choice for the homes of many of America's wealthiest citizens. The luxurious homes (1880-1884) of William Henry Vanderbilt and kin along fashionable new York city's Fifth Avenue--the costliest residences in the U.S. at the time and those described as showing millionaires how they should live--were constructed of "...warm-colored brown freestone whose healthy surface constitutes the armor of so many American homes."[25] The choice of brownstone for the Vanderbilt homes "confirmed the material's stylish supremacy."[26] Brownstone was also used to build the New York. residences of the Rothschilds and the Astors [27] George Corliss, a wealthy industrialist inventor in Providence, Rhode Island, used brownstone accouterments on his brick mansion. In

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[20] Allbee, 1894.

[21] Hawes, 1884.

[22] Hawes, 1884; Guinness, 1987.

[23] Hawes, 1884.

[24] Brown, 1989.

[25] Allbee, 1894; Mayer, G. M. 1958. *Once Upon a City.* Macmillan, New York, 511 p.

[26] Silver, N. 1971. *Lost New York.* Schocken Books, New York, 242 p.

[27] Allbee, 1894

Chicago, the Second Empire chateau (1873) of railroad-car magnate George Pullman and the mansion of hotelier Potter Palmer were also constructed of brownstone, as was the extravagant Italianate-Baroque mansion (1885-1886) built in San Francisco by James C. Flood. The Flood mansion, whose owner had made millions from Comstock Lode silver mines, was the only mansion on Nob Hill to survive the earthquake of 1906.[28]

Among prominent public buildings known to have been built with Portland brownstone are the debtors' prison (1835), the old Masonic Temple (1853), St. Mark's Protestant Episcopal Cathedral (1849) and the Bank of North America (1850) in Philadelphia; New Catholic Cathedral, All Saints' Memorial Church, St. Stephen's Church and Central Congregational Church in Providence, Rhode Island; the St. Marc Hotel, Arlington Hotel, and the First Presbyterian Church in Washington, D.C.; the Cathedral of the Immaculate Conception (1852) in Albany, the Academy of Design in Brooklyn, and the Broadway Bank Building in New York, New York.[29] In 1889, Barnard College was housed originally in a four-story brownstone on Madison Avenue in New York, and the elegant Plaza Hotel was constructed of brick and brownstone around the same time.[30] U. S. Post Offices and Custom Houses in Rochester, New York, Bridgeport and New Haven, Connecticut, and New Bedford, Massachusetts, were also built of Portland brownstone. The Italianate-style State Bank of South Carolina (now Bankers Trust Building) was built entirely of Portland brownstone in 1853; although damaged, this building survived the Union bombardment of Charleston during the Civil War and several subsequent natural disasters.[31]
Middletown, Connecticut, across the river from Portland, contains a large number of Portland brownstone buildings. Notably, Wesleyan University constructed all of its buildings from this stone between 1824 and 1970, when the brownstone was no longer being quarried. For Wesleyan to use brownstone in its campus buildings is particularly appropriate because revenues from the town-owned quarry were originally used to attract the college to Middletown and continued to help maintain it for many years.[32]
Fire regulations in many cities which required buildings over two stories to be constructed of brick or stone expanded the market for brownstone, especially in New York City, where the greatest use of brownstone took place. But, it was the ever-increasing need to house the burgeoning urban populations as new immigrants poured into cities that created the greatest market for brownstone. For example, between 1840 and 1870, the population of New York City tripled from 313,000 to 942,000.[33]

Rowhouses were the answer to the housing shortage. A typical rowhouse consisted of three narrow stories set above a raised basement with the main doorway set atop a high stoop. Brownstone, mostly from the Portland quarries, was used so commonly in their construction that a rowhouse was called a

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[28] Guinness, 1987.

[29] Hawes, 1884; Guinness, 1987; Day, William C. 1892. ASandstone,@ in David T. Day (ed.), *Report on Mineral Industries in the United States at the Eleventh Census, 1890*: 643-658.

[30] Day, 1892; Mayer, G. M. 1958. *Once Upon a City*. Macmillan, New York, 511 p.

[31] Guinness, 1987.

[32] Guinness, 1987.

[33] Guinness, 1987; Brown, 1989.

"brownstone," whether it was made of that or some other material. A consistent "monumental streetscape" resulted from the prevalent use of brownstone.[34] For a time, all of Fifth Avenue was brownstone, from uptown mansions to downtown rowhouses.[35] In 1894, Allbee remarked there was a "[brownstone] frontage of several hundred miles in New York and Brooklyn." Describing the prominence of Portland brownstone in Philadelphia, Hawes remarked: "The principal use of this stone has been for fronts of private residences, three-fifths or more of the fine stone fronts of private residences on Walnut, Chestnut, Spruce, and other principal streets being of this material."[36]

As early as 1853, William Chambers noted:"Wherever any of older brick edifices have been removed, their place has been supplied by tenements [dwellings] built of brown sandstone, and it may be said that at present New York is in the process of being renewed by this species of structure..."[37]

In 1989, Lauren Brown remarked:

> "It is difficult to imagine now the overwhelming dominance of brownstone construction in New York through the middle part of the [nineteenth] century. While the brownstone-lined streets are now a pleasant contrast to the glass and steel canyons, in 1850, they were the city. Most of the area from Washington Square to Central Park were brownstones, as was much of Brooklyn."[38]

In 1880, 78.6% of the stone buildings in New York City were constructed of brownstone, which included 9,143 buildings in the city proper and 19,154 in the city and suburbs. Seventy-nine percent of these were composed entirely of brownstone, whereas the rest had stone fronts. In turn, this vast market made the term "brownstone" synonymous with a city dwelling in many parts of the country, especially along the eastern seaboard, and ensured a place in American history for Portland brownstone and the quarries that produced it. Hopkins observed:

> Brownstones are among the oldest, best known and handsomest building stones used in this country. The brownstone fronts of New York and other eastern cities are found in the most fashionable parts of the cities and in great numbers. It is true that some years ago the use of the brownstone was a fad, so much so that all the quarries running to their full capacity could not supply the demand.[39]

The use of brownstone would decline, a victim of its own huge popularity, changing architectural fashion, economic factors, and evolving technologies. But, by the time the quarries closed for good,

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[34] Lockwood, Charles. 1972. *Bricks and Brownstones: The New York rowhouses.*

[35] Guiness, 1987.

[36] Hawes, 1884.

[37] Silver, 1971.

[38] Brown, 1989.

[39] Hopkins, T. C. 1897. AGeneral Features of Brownstone.@ *Stone* 5: 147.

more than 10 million cubic feet of brownstone had been extracted from the Portland Brownstone Quarries.[40] Rice and Foye offered reasons for the decline of brownstone usage:

> Brownstone fronts are at present out of fashion. Fashions in architecture are perhaps no more dependent on rational processes than fashions in clothes or carpets; but unquestionably one cause that helped drive the brownstone fronts out of fashions was the way in which stone was treated by the builders. The builders could put a thin veneering of stone on a brick wall cheaply by selecting the fine-grained, shaley strata of the stone, which split readily along the places of lamination, but which are much less resistant to weather than the more thick-bedded and coarse-grained sandstones; and by placing these thin plates of stone on the surface of a wall with the planes of lamination vertical. An inevitable result of this procedure, in our frosty climate, was that the freezing of the moisture which penetrated into the stone split off from the front of the wall layer after layer, giving to the wall an exceedingly ragged appearance. It is also true, doubtless, that the great demand for the sandstone led to the use of stone of inferior quality, and particularly led to the use of freshly quarried stone from which the quarry-water had not had time to evaporate. The Brownstone is really a good building stone. Though its color appears to some people rather somber, its aspect is certainly majestic in a large and noble building. Its degree of porosity makes it a little less durable than the best of granites, but it possesses a fairly high degree of durability. It deserves to come back into popular favor, though we may be sure that there will never again be a time when the streets of our cities will present mile after mile of brownstone fronts."[41]

Guinness attributes a trend in architectural individualism and uniqueness in the late nineteenth century to the decline in brownstone popularity because its "gloomy sameness" was viewed as "oppressive, monotonous, and tiresome."[42]
In 1897, Hopkins observed that the "use [of brownstone] was carried to excess, not only in the use of much inferior stone, but in the monotonous architecture resulting from long blocks of gloomy brownstone houses with no mingling of colors and little variety of form." He noted that the "craze" at that time was for light-colored stone, but he predicted "...the use of brownstone will again increase, as it is a useful and valuable building stone, one of the best if properly used and not abused."[43]

Geological Significance of the Brownstone Quarries

In addition to their significance in American building history, the Brownstone Quarries are important in the history of geology because they were used to determine the depositional environment of the Jurassic sandstones of the Connecticut Valley, which were among some of the earliest-studied rocks in the United States. The depositional environment was determined as being a warm, humid, subtropical-tropical setting. Determining the depositional environment of the sandstones also helped

[40] Guinness, 1987.

[41] Rice and Foye, 1927.

[42] Guinness, 1987.

[43] Hopkins, 1897.

geologists to understand the origin of the reddish-brown rock that made the Portland brownstone such an attractive building stone. Such "redbeds" had been a subject of controversy in the geological community, and Paul Krynine used the Portland quarries to demonstrate their origin.[44]

Paul Dimitri Krynine, "one of the truly great and controversial figures of the geological profession"[45] was born on September 19, 1902, in Siberia to Raisa Rotenberg and Dimitri P. Krynine, a civil engineer. Although persecuted by communists during the Russian Revolution, Krynine received his undergraduate degree in geology from Moscow University in 1924. After immigrating to the United States in 1927, he received another undergraduate degree from the University of California where he first became interested in arkoses and redbeds (red-colored rocks). From 1928 to 1931, Krynine was employed by Standard Oil of California to do petroleum exploration in Mexico where he observed arkoses forming in the tropical jungle. In 1931, he entered Yale University where his father was now on the engineering faculty. His doctoral dissertation at Yale was on Jurassic (then considered Triassic) arkoses of the Connecticut Valley. Although his dissertation was completed in 1936, the Connecticut Geological and Natural History Survey was unable to publish it until 1950 because of the Depression and World War II. This paper, which focused in part on the Portland brownstone quarries, "remains a classic in the fields of sedimentary petrography, in paleoclimatology, and in the redbed controversy." Of particular importance, Krynine demonstrated that redbeds, which previously had been considered the product of desert conditions, could be produced in humid, warm, tropical environments. In 1937, Krynine was hired as an instructor in the Geology-Mineralogy Department at Penn State. And, in 1944, he became head of the Mineralogy Department. Krynine died on September 12, 1964, at the age of 61, a victim of Hodgkin's disease.[46]

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[44] Krynine, 1950.

[45] Folk, R. L., and J. C. Ferm. 1966. AA Portrait of Paul D. Krynine.@ *Journal of Sedimentary Petrology* 36: 851-863.

[46] Folk and Ferm, 1966; Krynine, 1950.

Krynine's most important contribution to the study of Geology of the Unites States was his introduction of the geologic discipline of sedimentary petrography into this country when that field was almost unknown in the United States. Sedimentary petrography involves making very thin, nearly transparent slices of rocks that can be studied in detail with a special microscope to gather information about how the rocks were originally deposited. Krynine practiced these methods at the Portland brownstone quarries where he did much of his seminal work on ancient climates and the origin of "redbeds." Sedimentary petrography has since become a standard method of geological investigation. Krynine convinced the U. S. oil industry of the value of detailed petrographic work to petroleum exploration. Sedimentary petrography has thus proven to be of inestimable importance in determining the distribution of hydrocarbon deposits needed to fuel our modern society.[47]

[47] Folk and Ferm, 1966.

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Previous documentation on file (NPS):

__ Preliminary Determination of Individual Listing (36 CFR 67) has been requested.
__ Previously Listed in the National Register.
__ Previously Determined Eligible by the National Register.
__ Designated a National Historic Landmark.
__ Recorded by Historic American Buildings Survey: #
__ Recorded by Historic American Engineering Record: #

Primary Location of Additional Data:

__ State Historic Preservation Office
__ Other State Agency
__ Federal Agency
X Local Government City of Portland
__ University
__ Other (Specify Repository):

10. GEOGRAPHICAL DATA

Acreage of Property: Approximately 55 acres

UTM References:	**Zone**	**Easting**	**Northing**		**Zone**	**Easting**	**Northing**
A.	18	696590	4605510	B.	18	696770	4605350
C.	18	696640	4605000	D.	18	696330	4604650
E.	18	696260	4604870	F.	18	696370	4605330

Verbal Boundary Description:

North Quarry

All that certain place or parcel of land situate, lying and being in the town of Portland, County of Middlesex and State of Connecticut and known as "The Upper Quarry Hole" and certain lands adjoining said quarry hole bounded and described as follows, to whit:

Beginning at a point in the northerly line of Silver Street, which point is the southwest corner of land now or formerly of Henry Carson; thence proceeding northerly along said land now or formerly of Carson a distance of 186.5 feet to a point; thence proceeding easterly along said land now or formerly of Carson 96 feet to a point; thence proceeding northeasterly along said land now or formerly of Carson 95 feet to a point; thence proceeding easterly along said land now or formerly of Carson 137.2 feet to land now or formerly of Giro Rossitto, et al; thence notheasterly along land now or formerly of Giro Rossitto, et al, 103.2 feet to a point; thence easterly further along land now or formerly of Giro Rossitto, et al, 195 feet to land now or formerly of Muriel Rorshman; thence northerly along land now or formerly of said Muriel Rorshman 18.7 feet to land now or formerly of Andrew Peterson; thence westerly along said land now or formerly of Andrew Peterson to the southeast corner of other land now or formerly of Giro Rossitto, et al; thence further westerly along said land now or formerly of Giro Rossitto, et al to the southwest corner of said land now or formerly of Giro Rossitto, et al; thence northerly along said land now or formerly of Giro Rossitto, et al; to the northwest corner of said land now or formerly of Giro Rossitto, et al; thence northeasterly along land now or formerly of Giro Rossitto et al To land now or formerly of Andrew Peterson; thence northerly along land now or formerly of Andrew Peterson to land now or formerly of Paul A. Oakliff, Jr., et al, thence northwesterly along said land now or formerly of Paul Oakliff, Jr., et al, a distance of 54 feet to a point; thence northerly along land now or formerly of Paul Oakliff, Jr., et al, to land now or formerly of Joseph Griffo; thence westerly along land now or formerly of Joseph Griffo 83.5 feet, more or less, to a point; thence northwesterly along land now or formerly of Joseph Griffo 32 feet to land now or formerly of Mary Kulas; thence northwesterly along land now or formerly of Mary Kulas, 98 feet, more or less, to a point; thence northerly along said land now or formerly of Mary Kulas 110 feet to a point; thence easterly along land now or formerly of Mary Kulas to the west line of Commerce Street, thence northerly along the west line of Commerce Street to land now or formerly of Michael Logans; thence westerly along land now or formerly of Logans to the southwest corner of land now or formerly of Michael Logans; thence northerly along land now or formerly of Michael Logans, 284 feet to a point; thence easterly along land now or formerly of Michael

Logans and Richard J. Cordeau, partly along each to land now or formerly of the Town of Portland; thence northerly along said land now or formerly of the Town of Portland to land now or formerly of John L. Scottie, thence proceeding irregularly in a generally northwest direction along land now or formerly of John L. Scottie to the easterly line of Brownstone Avenue; thence southerly along the easterly line of Brownstone Avenue to land now or formerly of Harry Brownstein, et al; thence along land now or formerly of Harry Brownstein in varying directions following a line 15 feet from the edge of the quarry hole to the southwest corner of land now or formerly of Harry Brownstein et al; thence proceeding northwest 46.65 feet along land now or formerly of Harry Brownstein et al, to land now or formerly of Sebastian Ruffino 280 feet to the easterly line of Brownstone Avenue; thence southerly along the easterly line of Brownstone Avenue to land now or formerly of American Bituminous an Asphalt Company; thence southeasterly along land now or formerly of American Bituminous and Asphalt Company 143.6 feet to a point; thence further southeasterly along land now or formerly of American Bituminous and Asphalt Company 106.3 feet to a point; thence southwesterly along land now or formerly of American Bituminous and Asphalt Company 208.28 feet to Brownstone Avenue; thence southeasterly along Brownstone Avenue to land now or formerly of William Davidge; thence southeasterly along land now or formerly of William Davidge 245 feet to the north line of Silver Street; thence easterly along the north line of Silver Street to the point or place of beginning.

South Quarry:

A certain piece or parcel of land know as the South, or Lower Quarry, situated on the southeasterly side of Brownstone Avenue, the southwesterly side of Silver Street and the northeasterly side of Quarry Lane, more particularly bounded and described as follows:

Commencing at a point in the southeasterly line of Brownstone Avenue at the northwesterly corner of land now or formerly of Wilbur Ehlers, know as "the Wagon Shed" lot and being the Eighth Piece above described; thence running northeasterly along the southeasterly line of Brownstone Avenue to the southwesterly corner of land conveyed by Wilbur F. Ehlers to Michael J. Guiliano by deed recorded in Volume 113 at P.49 of the Portland Land Records; thence running easterly along land now or formerly of said Michael J. Guiliano 536.68 feet to a point in the southwesterly line of Silver Street; thence running southeasterly along the southwesterly line of Silver Street to the northeasterly corner of land now or formerly of Jennie D. Wilk; thence running southwesterly along land now or formerly of said Wilk, land now or formerly of Olive B. Labbadis, et al, and land now or formerly of Clara M. McGetrick, partly along each, to the northeasterly line of Quarry Lane; thence running northwesterly along the northeasterly line of Quarry Lane to the Northwesterly terminus thereof; thence running southwesterly along the northwesterly terminus of Quarry Lane to a point at land now or formerly of Wilbur F. Ehlers; which parcel has been and is to be conveyed to First Portland Development Corp.; thence running northeasterly along land now or formerly of said Ehlers 91.87 feet to a point; thence running southeasterly along land now or formerly of said Ehlers 1.5 feet to an iron bar set in the top of the quarry wall; thence running northwesterly along said quarry wall and land now or formerly of said Ehlers, 53 feet, more or less, to a point; thence running westerly along the face of said quarry wall and land now or formerly of said Ehlers, 140 feet, more or less, to a point. Thence running northerly along land now or formerly of said Ehlers 20 feet to a stone marker at the southeasterly corner of the above mentioned "Wagon Shed" lot; thence northwesterly along said "Wagon Shed" lot 154 feet, more or less, to an iron

pin at the northeasterly corner thereof; thence running westerly along the northerly line of said "Wagon Shed" lot, 50 feet, more or less, to the point and place of beginning.

Boundary Justification:

The boundary encompasses both quarry pits and all the land historically associated with them that retains integrity from the period of significance.

11. FORM PREPARED BY

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