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Cover Page Footnote

This article is an expanded version of an analysis done for the archaeological investigation of Site 1 of the Washington Street Urban Renewal Area, New York City, and a paper presented at the Society for Historical Archaeology Annual Meeting in Sacramento, California, in January, 1986. The author extends her thanks to Louis Berger & Associates, Inc., and Professional Services Industries (Soil Systems Division) for whom she served as Principal Investigator for the projects reported on here as well as to HRO International and the Shearson Lehman/American Express Co. (now Shearson Lehman Hutton), the clients and sponsors of these projects. In addition, she thanks the archaeologists and analysts who helped make it possible to explore yet another facet of Manhattan's unwritten history.

LANDFILL AND HEALTH, A MUNICIPAL CONCERN OR, TELLING IT LIKE IT WAS

Joan H. Geismar

Land reclamation in port cities is a worldwide phenomenon that clearly represents economic considerations and, often, intensifying urbanization. Analysis of the fill matrix of two New York City sites suggests that the imposition of municipal controls may be one facet of the urbanizing process documented in the archaeological record. Differences between the fill from the 175 Water Street site, an East River block filled in the 18th century, and Site 1 of the Washington Street Urban Renewal Area adjacent to the Hudson River, an early 19th-century fill site, are best explained by the introduction of city ordinances to regulate land reclamation activities. The historical record, which documents a growing concern with mounting health problems, provides a rationale for these controls.

Le gain sur l'eau de terrains dans les villes portuaires est un phénomène mondial qui tient nettement à des considérations d'ordre économique et, souvent, à une intensification de l'urbanisation. L'analyse des terres rapportées de deux sites new-yorkais porte à croire que l'imposition d'une réglementation municipale constituée peut-être un élément de l'urbanisation dont témoigne le document archéologique. Les différences entre les remblais du site 175, rue Water, quadrilatère de l'East River rempli au XVIII^e siècle, et le site 1 de la Zone de rénovation urbaine de la rue Washington adjacente à l'Hudson, site de terres rapportées du début du XIX^e siècle, s'expliquent le mieux par l'adoption d'ordonnances municipales destinées à réglementer les activités d'assèchement. Le dossier historique, qui fait voir des préoccupations grandissantes devant la montée des problèmes de santé, fournit la raison de cette réglementation.

Introduction

Any archaeologist who has worked in landfill knows it is mainly garbage-laden debris. As such,

it usually represents the refuse of growing populations in a developing urban situation. Analysis of fill from 18th- and early 19th-century sites in lower Manhattan, however, indicates there are variations in the fill that may reflect the imposition of city ordinances and laws; such controls were instituted to protect the health of a burgeoning population and to maintain a viable workforce. At the same time, this fill also appears to document the flouting of these controls and the inability or disinclination of the city to enforce them. In other words, as is so often the case, archaeology tells it like it is (or was) rather than as it was supposed to be.

To illustrate this, fill from two Manhattan sites was compared: the 175 Water Street site, a man-made block that once fronted on the city's bustling East River; and two blocks of Site 1 of the Washington Street Urban Renewal Area located near the Hudson River (FIG. 1). Both were investigated prior to recent development under New York City's environmental review law; the east side excavations were undertaken by Soil Systems during the winter of 1981-1982, and testing of the west side site was completed in a 5-week field investigation conducted by Louis Berger & Associates early in the summer of 1984 (Cultural Resource Group, Louis Berger & Associates, Inc. 1984).

Both sites represent land reclamation initiated by New York City's wealthy merchant property owners. These were men and women who undoubtedly were eager first to increase their dockage through wharf and pier building and then, as water lot grants were filled, to extend their negotiable land. Archaeological investigation revealed differences between the fills that may best be explained by the city's development during the 50 years or more that separated their inception.

Land reclamation on the 175 Water Street block began by the 1740s or 1750s when New York was a colonial outpost, actually little more than a small town with a bustling seaport. Site 1 of the Washington Street Urban Renewal Area, on the other hand, was filled in the early years of the 19th century when New York was evolving as an urban entity in a new republic.

When the 175 Water Street block was filled, few if any municipal controls were in effect to

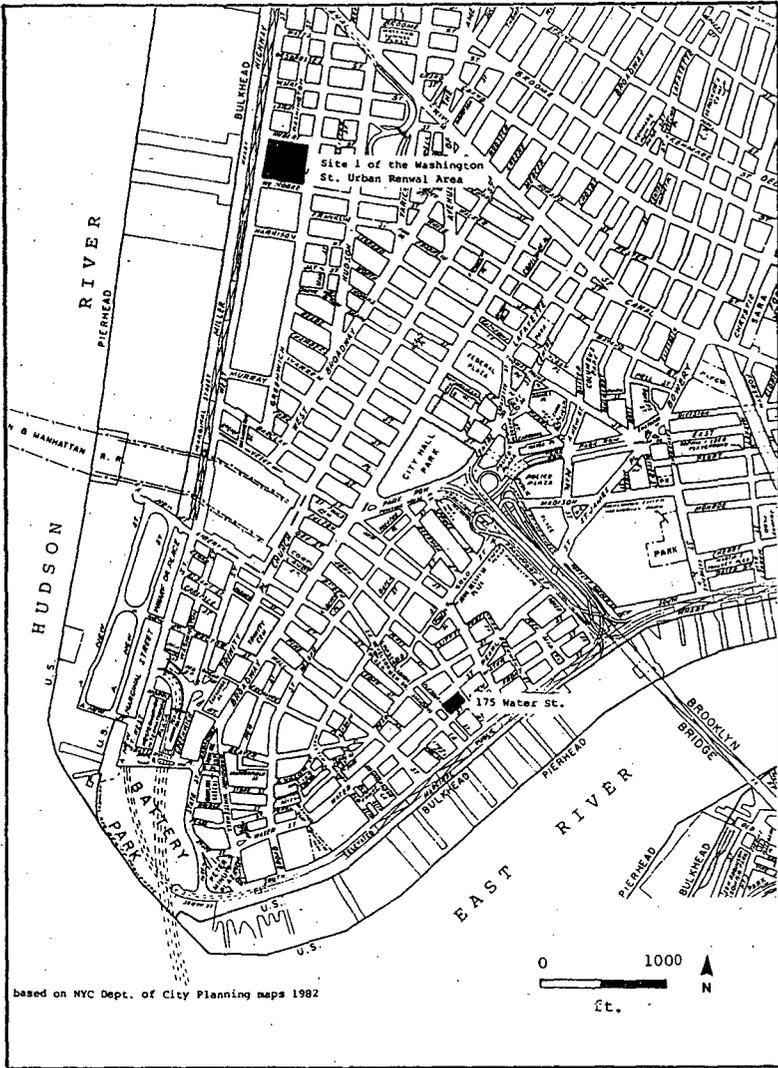


Figure 1. Lower Manhattan site locations.

regulate the materials used. In fact, it seems likely that the city as well as private individuals were delighted to have this and additional filling lots as repositories for street dirt and other refuse. Conceivably, this emerging block was where unlicensed dirt carriers—the lowest echelon of the city's carters (C. Prince, personal communication, 1986)—deposited debris. It also appears to have been a dumping area for the nearby Fly Market, one of the city's largest, best appointed, and most enduring food markets (DeVoe 1862: 125-241). By the turn of the 19th century, however, when filling beyond the low

water mark began at Site 1 of the Washington Street Urban Renewal Area, the city had instituted measures to keep newly created land from becoming a health hazard; by this time, the health of the city's inhabitants had become a municipal concern.

Undoubtedly, this was caused at least in part by the sanitation problems that accompanied an expanding population. Estimated at 8,600 in 1731 (Duffy 1968: 40), it had grown to 33,000 in 1790; only 20 years later the population increased threefold to 96,000 (Duffy 1968: 97).

In the half century that separated the initial

filling of 175 Water Street and Site 1 of the Washington Street Urban Renewal Area, a major factor that influenced attitudes toward fill had insinuated itself on New York City: a need for municipal reorganization was brought about by the Yellow Fever epidemics that began to plague the city.

Population, Disease, and Attitudes Toward Landfill

While epidemic diseases had been an intermittent problem since the late 17th century, annual Yellow or "Dock" Fever outbreaks struck the city in the late 1790s. Reaction to this onslaught included what has been called "the Great Sanitary Movement" of the 19th century. This was a movement that believed in the "miasmatic" theory that related disease to invisible but noxious gases that emanated from putrefying organic material (Duffy 1968: xv-xvi).

One proponent of the sanitary movement was Richard Bayley, a physician who became a commissioner when the Health Department was established in 1796, just a year after the first devastating Yellow Fever epidemic had raged through the city. Coincidentally, the first outbreak occurred in Burling Slip, very near the 175 Water Street block (Bayley 1799: 45). Formation of the Health Department was meant to help prevent a new onslaught of the dread disease.

During his tenure as a health commissioner, Bayley waged a war on the use of garbage as fill for the water lots that skirted the East River seaport and had begun to appear along the Hudson. Instead, he urged that clean and wholesome sand be used to fill sunken yards as well as to raise filling lots.

A series of letters documents Bayley's efforts and vividly describes the condition of these lots. In one, he expressed outrage at the fact that two dead horses had been buried at Whitehall on the East River and that a third was being buried as he watched. In addition, he noted that several hundred loads of street dung were spread on the unfinished wharf, making it offensive and unsafe and causing sickness aboard ships anchored alongside (Bayley 1799: 5).

In 1799, Bayley, among others, was appointed by the Common Council to determine the cause

of, and suggest a prevention for, the epidemics that continued to plague the city during the summer months (*Minutes of the Common Council* [hereafter *MCC*] II 1917: 495-499). He blamed the disease on "the accumulation of every species of filth and perishable matter on the low made grounds . . . and the abominable custom of filling up slips and docks with similar materials" (Bayley 1799: 7). It would not be until the 20th century, however, that the mosquito's role in transmitting Yellow Fever would be understood (Cartwright 1972).

Among the causes cited by the Commission were the hazards of deep, damp cellars, filthy yards, and unfinished water lots—all of them, of course, breeding grounds for the mosquito. They demanded the use of wholesome earth or other solid materials to fill these yards and lots as soon as possible. The Commission later recommended that lots not being properly filled should be filled by the city and, to cover the expense, be impounded and sold (*MCC* II 1917: 500-508).

The peak of the city's Yellow Fever outbreaks occurred between 1795 and 1805 (Duffy 1968: 101). This was a time when the City and the Trinity Church Corporation, a major land owner, were granting water lot rights on the west side, including two of the four blocks that comprise Site 1 of the Washington Street Urban Renewal Area (e.g., Windwart 1877). This was also when the city acquired the power to enforce health-related laws (Duffy 1968: 129). Included was the right to impose quarantines on incoming ships to limit the introduction of active Yellow Fever cases into the city. By 1797, the Common Council had transferred the right to pass and enforce these laws and ordinances to the Health Office (Duffy 1968: 132). The measures seemed to work, at least temporarily, and after 1805 there was a 14-year respite from epidemics. In 1822, the fever struck for the last time (Duffy 1968: 114-118).

During the 30 years that Yellow Fever periodically struck the city, sanitary conditions had become a major issue, street and health boards had been created, and commissioners had been installed; in addition, the office of City Inspectors had been set up and supplying public water had become a concern if not yet a reality. Since their

initial fill maneuvers are separated by over half a century of municipal growth and change, including an increasing awareness of health matters, some of the legislation passed to deal with sanitary requirements should be reflected in the kind of fill recovered from the two sites considered here. In other words, a shift from a garbage-filled matrix to "clean, wholesome sand" should be found in the archaeological record.

In the field, this generally appeared to be the case: the mid- to late-18th-century fill from the 175 Water Street block was obviously more artifact-laden than that from Site 1 of the Washington Street Urban Renewal Area filled in the first decades of the 19th century. But analysis indicated the difference was more a matter of degree than kind—that is, while there were some differences in artifact categories (for example, leather was ubiquitous in the 175 Water Street sample and only a minor part of that from Site 1 of the Washington Street Urban Renewal Area), the number of artifacts was the most telling variable. Moreover, subtle differences found between the later and earlier fills from Site 1 of the Washington Street Urban Renewal Area suggest a renewed trend toward a more refuse-laden fill after the first decade of the 19th century. But before discussing this comparison in greater detail, a brief outline of the sites' fill histories as well as the sampling method used in the field is warranted.

175 Water Street Block

As mentioned earlier, the water lots at 175 Water Street were granted by the city to a group of merchant land owners. The block to the west had already been filled when the grants were given in 1737, and yet another block to the east would ultimately be created. Field testing indicated that prior to filling, these lots were under at least 14-23 ft (4.3-7.0 m) of water.

By 1754, after building wharves and piers that supported warehouses and other buildings on the west side of the block, several of the grantees had apparently sunken a derelict ship and cooperatively incorporated it into a pier and bulkhead system to contain the landfill and to define the block's eastern boundary. This maneuver was graphically illustrated when excavations beneath 19th-century basements disclosed that the

ship had been positioned across five individually-owned water lots (FIG. 2).

Once the block was defined, artifact analysis revealed that decades had elapsed before filling was finally completed (see Friedlander 1983 and Geismar 1983 for details of the site history and landfill, respectively). The deposition of artifacts indicated the classic distribution of older to more recent materials throughout the landfill rather than a single fill episode; in fact, it may have taken 40 years to fill between the wharves to the west and the ship bulkhead to the east (FIG. 2). This is suggested by artifacts associated with building footings that indicate the filled area of the block, as opposed to the wharves, was not built upon until the mid 1790s, or approximately four decades after the ship and bulkhead were in place.

Landfill on the block was sampled in various ways; one method employed a backhoe to dig monitored trenches, or deeptests, to river bottom and included collecting approximately 35-gallon (132.6-liter) samples at 10-12 in (25-31 cm) intervals. Since most of the testing extended below the current water table, pumping was required. This is a method that had been used at other Manhattan fill sites and was the procedure later planned for sampling fill at Site 1 of the Washington Street Urban Renewal Area (incidentally, it was one of these deeptests that exposed the port side of the ship on the 175 Water Street block [FIG. 2]). While not ideal, it provides a unit of analysis in a water-logged situation where more controlled sampling is prohibitively expensive.

As expected, analysis of two deeptests, which with the fill within the ship comprised the most intensively analyzed fill samples from the site, indicated that fill on this block mainly contained household and market refuse. However, major components also included shoe and scrap leather and oyster and clamshell—all typical of harbor debris (a third deeptest revealed discarded coral-sand ballast, another element of harbor refuse). In addition to fragmentary ceramic and bone material from these deeptests, a cache of uncut but butchered cattle bones and another of nearly whole ceramics were noted but, because of time constraints, not sampled in the fill surrounding the ship. These were inter-

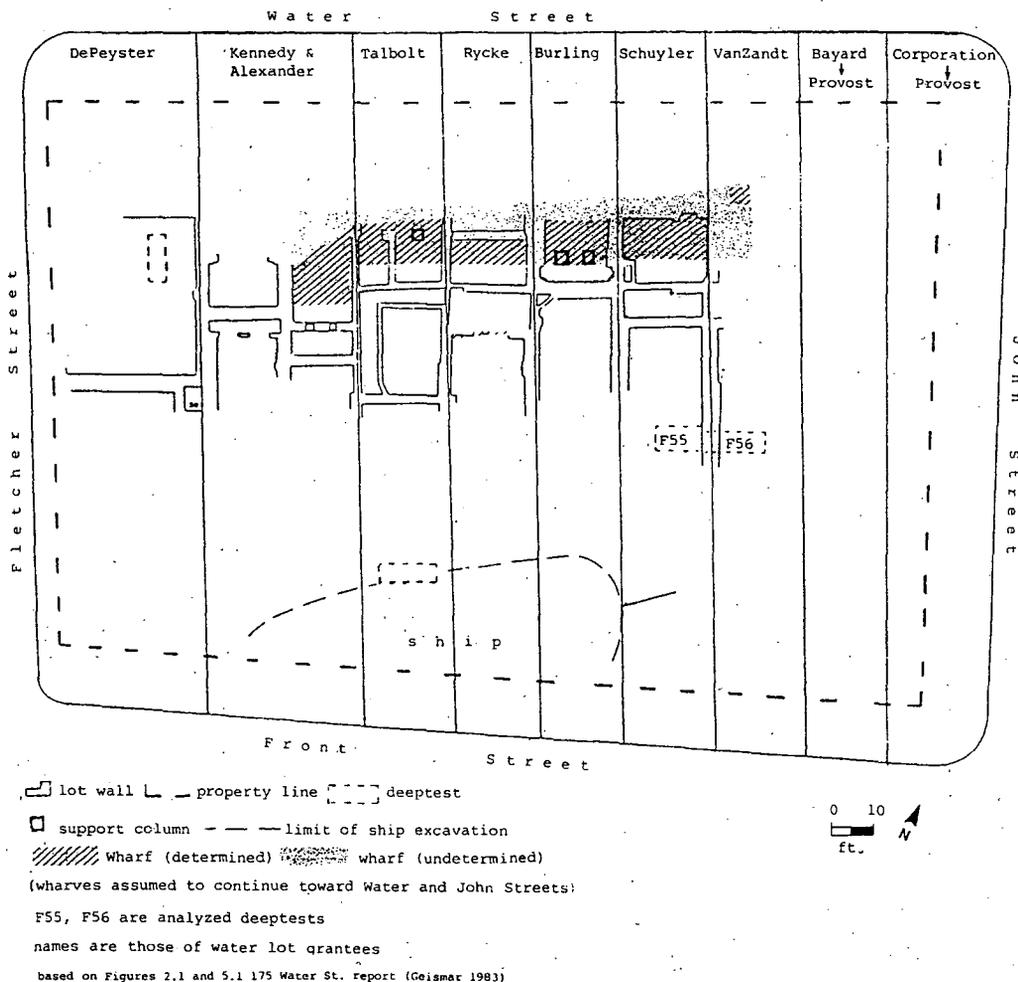


Figure 2. The 175 Water Street block showing deeptests, wharves, and the ship.

interpreted as trash from butchers' stalls located at the nearby Fly Market mentioned above and perhaps damaged shipments or breakage from neighboring china shops and warehouses. In general, the fill material was similar to that of other east side fill sites, such as the contemporaneous Telco block just to the north (Rockman et al. 1983).

Site 1, Washington Street Urban Renewal Area

Research and testing of the landfill from two of the four blocks comprising Site 1 of the Washington Street Urban Renewal Area, combined

with testing for remnants of an early 19th-century foundry, focused on the north and south sides of Beach Street between Washington and West streets (FIG. 3). Like the 175 Water Street block, the blocks between Washington and West streets were under water prior to filling, and, as mentioned above, 35-gallon (132.6-liter) fill samples were to have been collected at 10-12 in (25-31 cm) intervals from backhoe-dug deeptests taken to river bottom. On the south side of the street, this procedure was followed except that sample sizes varied: while most comprised 35 gallons (132.6 liters) per level, the samples ranged from 25 to 43½ gallons (94.7 to 164.8

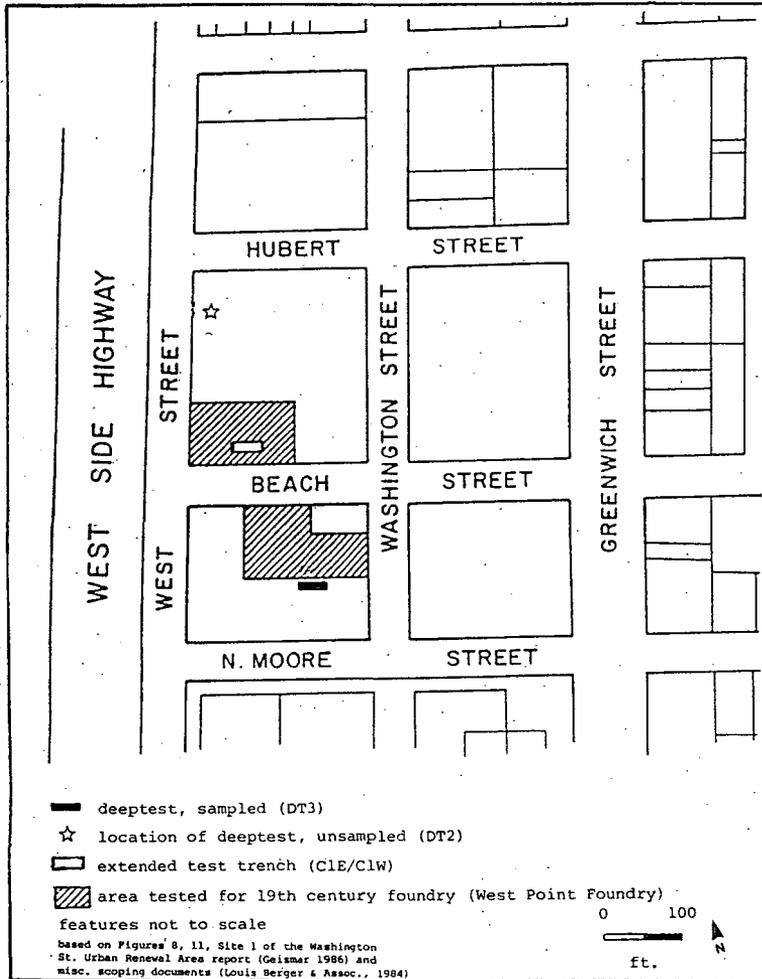


Figure 3. Site 1 of the Washington Street Urban Renewal Area showing tested area and deepest test locations.

liters) (the average was 39 gallons [147.7 liters] per level). This discrepancy was at least partially because of site conditions, and the overall result was a total sample larger than that from the 175 Water Street deepest tests (TAB. 1). On the north side, a planned deepest test was contaminated by modern raw sewage, precluding sampling. Instead, an attempt was made to sample a shallow test trench deepened to provide the sample (unfortunately, limitations of the backhoe prevented reaching river bottom and sampling was less extensive than desired).

Documentation indicated that Beach Street

separates two consecutively filled water lots (Geismar 1986). The first fill episode defining the street apparently occurred around 1797 on the south side between the Hudson River's high and low water marks. By 1801, this water lot was apparently filled and rented to Nicholas J. Roosevelt who operated a sawmill on the site (this same Nicholas Roosevelt was instrumental in the development of the steam engine). The Rhinelanders, however, a family of wealthy merchants who were the lot's grantees, never paid for this grant; in 1807, they successfully petitioned the city to reissue it and rent them the

Table 1. Comparison of selected artifact categories from landfill samples.

Site	Feature	Total # of Levels*	Total # of Artifacts	Average Gallons Fill in Sample	Average # of Artifacts per Level	Average # of Artifacts per Gallon of Fill
175 Water St.	F55	12	2,400	420	200.0	5.7
	F56	13	2,396	455	184.3	5.3
Site 1, Washington St. Urban Renewal Area	DT3	11	350	477 $\frac{1}{2}$	31.8	0.7
	C1E/C1W	6	185	185	30.8	1.0

*Approximately 10-12 in (25-28 cm) each.

Sources: Geismar 1986: appendix C, tables 2 and 3; 175 Water St. data on file, South Street Seaport Museum, New York.

rights to adjacent land under water extending 190-200 ft (57.8-60.8 m) into the Hudson River (MCC IV 1917: 585). Tax records indicate this new water lot, which defined the south side of Beach Street between Washington and West streets, was filled by about 1810.

The water lot on the north side of the street was not granted until 1809 (Grants of Land Under Water [hereafter GLUW] Liber F: 7); filling was probably completed by 1817 when this water lot, originally granted to John Ogden and William Murray, was acquired by a New York bank at a forfeiture sale (Liber of Deeds [hereafter LD] 156: 210). Perhaps it should be noted that both the extended Rhinelander water lot grant and that of Ogden and Murray were filled during the period of British embargoes and the War of 1812, a time of great commercial and political turbulence.

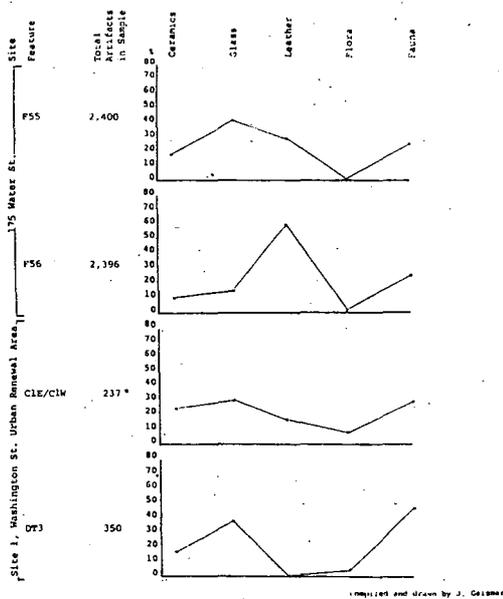
Historical documentation, combined with subsequent artifact analysis, indicates these west side blocks were filled more quickly than 175 Water Street. But what does analysis tell us about the fill itself? Did it reflect a growing awareness of the need for improved sanitary conditions and the laws imposed to achieve them? Was it any cleaner at the later site?

Based on the artifact assemblage, it appears that fill from both sides of Beach Street was relatively clean and not typical of either domestic or commercial refuse or harbor fill, particularly when compared with fill from 175 Water Street.

The slightly later fill on the north side of the street, however, did include shoe leather, shell, and other organic material missing from the fill south of Beach Street. Here again, a cache of large cattle bones, mainly crania and mandibles, appears to be butchers' waste (Russell and Amorosi 1986), perhaps from the Duane Street Market located five blocks south of the site at the time it was being filled (DeVoe 1862: 390-393).

Discussion

Fill samples from 175 Water Street and Site 1 of the Washington Street Urban Renewal Area indicate that both contained refuse showing little if any ordered pattern of distribution (FIG. 4); that is, percentages of five artifact categories selected for this analysis (ceramics, glass, flora, fauna, and leather) varied. But while variation within categories seems to be the norm, the amount of debris recovered is consistently higher at the earlier site. For example, there are almost seven times as many selected artifacts from each of two 175 Water Street deepest (F55 and F56) as there are from the deepest located on the south side of Beach Street at Site 1 of the Washington Street Urban Renewal Area (DT3). This was true even though, as mentioned above, a larger total sample was recovered from DT3 (TAB. 1). A comparison of average numbers of artifacts per level and per gallon of fill also illustrates the discrepancy in artifact density (TAB. 1).



* this count includes 49 animal bones (mainly *Bos* crania and mandibles), 1 ceramic, and 2 shoe leather parts recovered from a grab sample

Figure 4. Comparison of selected fill artifacts from 175 Water Street and Site 1 of the Washington Street Urban Renewal Area.

The sample from the north side of Beach Street (C1E/C1W) comprised many fewer levels (with samples ranging from 10 to 35 gallons [37.8 to 132.6 liters]) than the other tests and was therefore less comparable; it too, however, suggests a generally cleaner fill than the 175 Water Street sample. In addition, fill from the south side of Beach Street lacked the shoe leather component ubiquitous at east side sites. This might reflect the presence of tanneries and a shoemaking district on the east side, but port fill throughout the world has been found to contain this material (e.g., Baart et al. 1977), and fill from the north side of Beach Street did include a small quantity of shoe leather. (It should be noted that the only fill-retaining features found here were pier segments uncovered on the north side of Beach Street during foundation excavations; undoubtedly, cribbing or other fill constructions lie west of the site, perhaps along the line of West Street.)

Analysis of the 1797-1801 fill from the south

side of Beach Street suggests that markedly cleaner fill, although not "clean and wholesome sand," was indeed used when the municipality first introduced sanitary measures at the end of the 18th century. Laxity in enforcing these controls, however, may have occurred as a result of the temporary disappearance of Yellow Fever from the city. This is suggested by the somewhat more organic nature of fill deposited on the north side of Beach Street between 1810 and 1817. Or perhaps growing populations and concomitant municipal responsibilities made regulations increasingly difficult to implement or enforce. Whatever the reason, archaeology suggests that refuse may have been limited but never eliminated as an element of fill, and health reports indicate that problems of dirt and filth, which had been controlled in the first decade of the 19th century, began to reappear; when Yellow Fever again plagued the city from 1819 to 1822, conditions were apparently as bad as or worse than they had been 30 years before (Duffy 1968: 213).

In summary, analysis of fill from two Manhattan sites has revealed differences that appear to reflect attitudes toward fill and health. It tends to verify an increasing concern with sanitation in the late 18th century and the implementation of municipal controls to protect the well-being and economic productivity of a rapidly-growing population. At the same time, it may reflect the city's inability or unwillingness to enforce these controls. But beyond this, it appears to document the flouting of protective legislation by at least some of the city's inhabitants, a situation that might have gone unrecorded without archaeological investigation.

Acknowledgments

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