

# How Clean Is Clean?

---

**While government mandates on the handling of contaminated material may be well intended, they may also have substantial detrimental effects on the cost of urban land development. Based on information gathered in Cleveland, Ohio, this article quantifies the potential effect of proposed state Environmental Protection Agency (EPA) regulations on the conversion of lightly contaminated inner-city "brownfield" properties to residential uses. The proposed asbestos and construction debris regulations could increase overall redevelopment costs of buildable lots.**

---

**G**overnment mandates on the handling of contaminated material may protect public health and safety, but may also have substantial detrimental effects on the cost of land development. Following federal directives for managing municipal solid wastes, and with hazardous materials standards already in place, the Ohio Environmental Protection Agency (EPA) has set forth regulations regarding the handling and disposal of construction and demolition (C&D) debris. In addition to C&D debris, the proposed regulations also address the issue of asbestos handling in buried debris. The crux of the issue is: How clean is clean for redeveloping urban sites?

This article analyzes the financial effects of stringent enforcement of these regulations on the redevelopment of lightly contaminated inner-city "brownfield" properties, with a wide range of

prior land uses, that are being recycled as residential lots in Cleveland, Ohio. The lands available for redevelopment are generally vacant on the surface, with the prior structure buried underneath the ground. Much of the land was previously used for single-family detached or multifamily housing. Other parcels were previously commercial or industrial properties; in addition to having underground structures, they may also have soil contamination or underground tanks. Because of functional or economic obsolescence, location, perceived distance from labor markets, and factor inputs, residential is the highest and best use for these formerly commercial and industrial properties. Regardless of its prior land use, much of the property with redevelopment potential has fallen into government control through property tax foreclosure.

**Robert Simons, PhD**, is assistant professor of planning and development at the Levin College of Urban Affairs at Cleveland State University. He earned a PhD in planning, an MS in economics, and an MRP in regional planning from the University of North Carolina at Chapel Hill, and a BA in anthropology from Colorado State University. Mr. Simons consults and conducts research for local governments and nonprofit developers.

The land recycling issue is analyzed here in the context of a cost-minimizing study of central city residential lot redevelopment, focusing on brownfield costs (i.e., those related to cleanup of previous uses on the property). The focus is thus on the cost side rather than the risk side of the redevelopment problem.

The approach taken in this research is to conduct a case study of an inner-city neighborhood and to create a baseline cost analysis for redeveloping about 120 new residential scattered-site or clustered lots. Existing parcels are grouped into marketable building clusters. Redevelopment costs of formerly residential, multifamily, commercial, and industrial properties are analyzed separately. The baseline estimates show that even before consideration of more stringent environmental regulations, the costs of recycling previously used inner-city land in general and commercial land in particular make it very difficult to recycle as residential land. The expected cost of preparing a buildable residential lot from lands that formerly were commercial and industrial is about \$13,000, over double the cost of those lands previously used as single-family detached homes. Brownfield costs represent over 80% of overall redevelopment costs among formerly commercial and industrial properties, compared with a baseline cost of about \$6,000 and under 40% of overall redevelopment costs for formerly residential lands.

Stringent enforcement of proposed state environmental regulations regarding handling asbestos during building demolition and removal of buried debris would hit nonresidential properties hard, increasing overall redevelopment costs by about one-third, compared with a 15% rise for formerly residential properties. Thus, the redevelopment costs of nearly all formerly nonresidential lots would exceed their likely market value as land underlying residential homes. Once additional potential costs associated with the enforcement of the asbestos and C&D debris removal are considered, brownfield-related concerns dominate the cost picture to the point where lot redevelopment in its existing form (primarily advocated by the local municipality as owner of large quantities of inner-city land obtained through property tax foreclosure) is threatened. These regulations, if enacted

as shown, could have the unintended side effect of substantially deterring redevelopment of inner-city building sites for housing. The balance of this article discusses the local real estate and policy environment and the nature of the study area. It then sets forth in some detail both the environmental and the nonenvironmental cost factors used in the baseline analysis and the baseline estimates of cost by prior land use type. This is followed by a discussion of the proposed regulations and their cost implications.

### **Local real estate, development, and policy environment**

Cleveland has experienced substantial population loss over the past three decades. This has caused thousands of residential and commercial lots to fall into property tax foreclosure, and eventually into city ownership through the Land Bank program. Most of the foreclosed lots were too narrow (i.e., functionally obsolete) to be redeveloped individually as residential lots. Further, nearly all structures on lots that appear to be available for redevelopment, whether their former use is single family, multifamily, commercial, or industrial, have been demolished. Because of the volume of demolitions in Cleveland, nearly all of the demolished structures were simply plowed into the basement rather than hauled away. Therefore, the environmental liability, which now falls on the city's shoulders as property owner, brings the brownfield issue directly into the cost analysis of redeveloping homesites in the city.

The City of Cleveland and Cuyahoga County have been working together in a coordinated fashion for over five years to facilitate land availability for new development in the city. The county had been aggressively pursuing tax-delinquent property owners, with the city obtaining vacant foreclosed properties and putting them into the City Land Bank for future development. In addition to offering developers Land Bank lots for as little as \$1, the city provides a "menu" of development assistance, including help with environmental cleanup costs, infrastructure improvements, tax abatement, below-market interest rates on first mortgages, and equity-funding second mortgages.

The Comprehensive Environmental

**TABLE 1 1992 Status of Commercial and Residential Parcels in Cleveland (Wade Park)**

1992 Status	Commercial		Residential	
	Number	Percentage	Number	Percentage
<i>Land Use Status</i>				
Vacant land	131	40.1%	296	20.2%
Building present	196	59.9%	1169	79.8%
Total	327	100.0%	1465	100.0%
<i>Property Tax Status</i>				
Publicly owned or in foreclosure	53	16.2%	178	12.2%
Property tax delinquent	105	32.1%	270	18.4%
Vacant land, paying taxes	42	12.8%	75	5.1%
Building, paying taxes	127	38.8%	942	64.3%
Total	327	100.0%	1465	100.0%

SOURCE: Cuyahoga County Auditor, 1992.

Response, Compensation, and Liability Act (CERCLA) and other environmental regulations, however, cast doubt on the wisdom of municipal ownership of risks associated with fee simple ownership of land. The city is a "potentially responsible party" (i.e., "deep pocket") in the chain of title. Further, research suggests that the perceived risk of redevelopment of contaminated sites may lead to market failure, because investors overvalue the possibility of excessive expense beyond their actual cleanup costs. Hence, there may be a stigma attached to polluted properties beyond actual costs.<sup>1</sup> These issues are peripheral to the focus of this article, which is the cost rather than the risk aspects of redevelopment.<sup>2</sup> While the effects of cleanup of hazardous materials have been discussed, little attention has been devoted to the effects of low levels of contamination on vacant land in the land reuse process.<sup>3</sup>

### Study area background

The study area is the Wade Park section of Cleveland's Glenville neighborhood. Table 1 shows the land use and tax payment status breakdowns of commercial and residential properties in the study area, which is comprised of nearly 1,800 parcels on about 60 city blocks four miles east of downtown Cleveland. A main thoroughfare, Superior Avenue, formerly

had streetcars. The area generally has a "first generation" land use pattern, with most structures built on virgin land during the 1910s and 1920s.

The area is predominantly residential (81.8%). Commercially classified properties are twice as likely to be vacant (40.1% versus 20.2% for residential parcels). They are also much more likely to be under public ownership or property tax delinquency (48.3% compared with 30.6%) than residential properties. Only 38.8% of nonresidential parcels are occupied and current on property taxes; thus, over 60% of these lands have atrophied and are candidates for recycling.

Most of the residential lots and some of the commercial ones are too narrow, however, to be marketable individually. Combining 277 existing lots with adjacent properties to form more marketable residential lots yields up to 190 possible new buildable lots in the study area, in 115 contiguous "strategic" groups. These groups are the overall sample for this analysis.

### Residential demand

To determine demand for new lots, we conducted interviews with several private and nonprofit developers active in the study area. Their past activity includes scattered-site development of 20 units per year. Plans for additional redevelopment

1. Peter J. Patchin, "Contaminated Properties—Stigma Revisited," *The Appraisal Journal* (April 1991): 168–172.

2. See Ellen JoAnne Gerber, "Industrial Property Transfer Liability: Reality versus Necessity," *Cleveland State Law Review*, v. 40, (1992): 177–208; and Tex Ann Reid, Edward M. Clar, Anthony M. Diecidue, and Mark F. Johnson, "Assessing a Municipality's Ability to Pay Superfund Cleanup Costs," *Federal Environmental Restoration Conference and Exhibitions* (Washington, D.C.: Federal Environmental Restoration Conference and Exhibitions): 1992.

3. See, for example, Bill Mundy, "The Impact of Hazardous and Toxic Material on Property Value: Revisited," *The Appraisal Journal* (October 1992): 463–471.

call for use of 50 or more additional lots over the next several years. The developers have been marketing single-family detached homes, both stick-built and modular, ranging in price from \$60,000 to \$150,000. The critical characteristic of lots is their frontage or width. Nearly all of the lots in the study area are 35 to 40 feet wide. With one exception (40-foot corner lots are acceptable), the market is calling for lots with a minimum of 50 feet of frontage. Half of the housing plans, targeting empty nesters, call for at least 62 feet of frontage. Thus existing lots must be combined to form newer, wider lots to effectively access market demand. It should be noted that the relatively long frontage of many commercial lots appears to make them attractive candidates for residential redevelopment, based on this important criterion. We assumed a sustained demand for 30 new residential lots per year in the study area, enough to provide 120 new lots—a total of four years of redevelopment. Both city and county auditor data were used in conducting this analysis.

## BASELINE REDEVELOPMENT COSTS

We estimated redevelopment costs for lots identified as part of a strategic lot assembly group (i.e., with two or more contiguous parcels). Costs were calculated for nonenvironmental cost items such as property acquisition, property maintenance, site preparation, replatting, and legal fees.<sup>4</sup> The typical cost per new lot for all of these nonenvironmental items ranges from \$2,400 to \$4,600, depending on prior land use.

### Brownfield-related redevelopment costs

Several brownfield-related costs, such as demolition of standing structures and hauling away and burying debris are considered. For properties with past commercial uses, the remediation costs of disposing of buried underground storage tanks and tainted soil are also considered. Table 2 summarizes the assumptions used for both environmental and nonenvironmental costs.

**TABLE 2 Lot Redevelopment Cost Factors**

Cost Item	Cost per Lot
<i>Nonenvironmental Costs</i>	
Property acquisition—old lot in land bank	\$ 0
Property acquisition—old lot in foreclosure	\$ 700
Property acquisition—long tax delinquency	MV-TD*
Property acquisition—short tax delinquency	MV-TD*
Property acquisition—vacant not tax delinquent	MV*
Lot maintenance/year	\$ 269
Site preparation	\$ 350
Replatting—simple/new lot	\$ 350
Replatting—multiple/new lot	\$ 700
Legal/miscellaneous	\$ 150
<i>Brownfield-Related Costs</i>	
Hauling debris—residential, old lot	\$ 675
Hauling debris—commercial, frontage foot	\$ 50
Debris burial—residential, old lot	\$ 600
Debris burial—commercial, old lot	\$ 1,800
Demolition—residential	\$ 2,000
Demolition—commercial	\$ 6,000
Underground tank removal/tank	\$ 7,500
Removal of tainted soil—petroleum	\$10,000
Removal of tainted soil—lot (chromium, lead)	\$25,000

\*MV—Lot's current market value according to the latest county auditor data.

TD—Lot's outstanding property tax delinquency, according to the latest county auditor data.

NOTE: Some factors, including property maintenance and hauling debris, were based on frontage feet proportionate to the average assumed residential frontage of 40 feet.

### Demolition expense

The demolition expense of a standing structure is based on recent experience in Cleveland. In this neighborhood, a residential demolition has been costing about \$2,000. Prior to 1992, commercial demolitions were about \$6,000, provided no asbestos or other remediation was required. These costs should rise as a result of the proposed asbestos regulations.

### Haul costs

Haul costs for debris include the expenses of hiring a dump truck or pickup

4. The source for the cost factors is Robert Simons, "Cost Minimizing and Land Acquisition Strategies for Residential Lot Redevelopment in the City of Cleveland: A Case Study of the Glenville Neighborhood," prepared for the City of Cleveland, Department of Community Development, December 1992.

truck and transporting debris to a nearby landfill. Assuming typical residential construction and demolition debris of about 100 cubic yards, this would represent 10 truckloads. At \$45 per hour and 1.5 hours per load, this averages out to \$675 per old lot with a dwelling in the ground. Because the bulk of multifamily and commercial structures is estimated to be three times that of single-family structures, the lot debris haul expense is based on proportionate frontage, at triple the residential rate, or \$50 per front foot, assuming the destination is a C&D landfill.

#### Debris burial costs

This expense represents the cost of burying common construction and demolition debris in a C&D landfill. Such material is typically present after a residential demolition where the structure has been demolished and buried onsite in the basement. The debris is assumed to be clean of garbage, which would instead have to be taken to a sanitary landfill at the additional expense of \$10 to \$12 per cubic yard.

Standard procedure had been to allow small amounts of asbestos and lead paint normally present in the vintage residential structures in the city to be simply buried along with the C&D debris. This practice may be directly affected by the new asbestos control regulations. The effect of this new policy is discussed in more detail later in this article.

A brief survey of four waste burial firms listed in the Cleveland Yellow Pages indicates that the going rate for burial of C&D material is \$5.50 to \$6.00 per cubic yard. Assuming 100 cubic yards of debris per old residential lot, burial expense, exclusive of transportation to the site, would be \$550 to \$600 per old lot. The higher figure is used in the analysis. For multifamily and commercial properties, the burial expense is estimated on a proportionate frontage while the bulk of the demolished structure is also considered. As with haul costs, we have assumed that

this line item is three times the cost for residentially zoned land.

#### Soil and tank remediation costs

For lots previously not used for single-family properties, environmental cleaning costs are potentially more volatile. The category of commercial property can be broken down into multifamily investment properties; those with former commercial uses; and those with prior or current use listed as industrial, including gas stations.

To determine the probability of the need for remediation, we conducted a site-by-site analysis of 65 parcel groupings (of a total of 115 groups in this neighborhood) considered prime for redevelopment. Initial estimates indicate that barring environmental "surprises," the average cost to redevelop these lots would be less than \$15,000 per lot; therefore, the sample is already reduced to those lots with relatively lower expected redevelopment costs. If redeveloped, these 65 groupings would yield 123 buildable lots, a four-year supply of land for this redevelopment area. The former land use of the sample is about half single-family residential. Sanborn insurance maps of prior land use from 1912 updated to 1944 and 1977 were used to discover the presence of underground storage tanks and prior industrial service land uses on a site-by-site basis.<sup>5</sup> Based on knowledge of the area, subjective probability assessments of the extent of possible soil contamination were then applied.

Table 3 provides the results of the site analysis for the 65 parcel groupings. Ten of these appeared to have potentially expensive soil remediation problems, including two sites with tanks.

With respect to remediation cost factors, we considered available published research, including general case studies on the cost of environmental cleanup.<sup>6</sup> More typical are highly technical reports of specific cleanup cost studies, often of U.S. military bases.<sup>7</sup> We also included case studies of residential cleanup costs where

5. Thanks to Bob Lacock, Planner with the City of Cleveland, Department of Community Development, who conducted the site investigations, June 1993.

6. See, for example, Deborah Cooney, Jocelyn Seitzman, Charles Bartsch, and Carol Andress, *Revival of Contaminated Industrial Sites: Case Studies* (Washington, D.C.: Northeast-Midwest Institute), 1992.

7. Samar Chatterjee and Herman H. Moore, "Remediation of Mercury-Contaminated Soils/Mixed Wastes"; David S. Naleid, "Zen and the Art of Feasibility Study Costing"; and Robert S. Pace, Mark A. Ferdman, and Catain Mike Myers, "Cost Modeling for Environmental Compliance"; all in *Federal Environmental Restoration Conference and Exhibitions* (Washington, D.C.: Federal Environmental Restoration Conference and Exhibitions): 1992.

**TABLE 3 Classification of Probability of Contamination Based on Prior Land Uses for Commercial and Residential Redevelopment Parcel Groupings in Cleveland (Wade Park)**

Type of Environmental Problem	Commercial		Single-Family Residential	
	Number	Percentage	Number	Percentage
Underground storage tank(s)	2	6.6%	0	0.0%
Past commercial use*	5	16.7%	0	0.0%
Past industrial use*	3	10.0%	0	0.0%
Multifamily	16	53.3%	0	0.0%
Common 1/2 family debris	4	13.3%	35	100.0%
Total	30	100.0%	35	100.0%

SOURCE: 1992 Cuyahoga County Auditor data, Sanborn Maps, City Of Cleveland, Department of Community Development.

\*This implies a probability of soil contamination.

underground tanks, industrial waste, and chromium were found on residential development sites in Cleveland.

Based on these studies, we used \$7,500 per underground tank (a weighted average of a simple \$5,000 cleanup for a non-leaking tank, with a 10% chance of a larger \$25,000 leak, which could extend offsite). We also estimated the additional expense of scraping off, handling, transporting, and disposing of 50 cubic yards of petroleum-tainted soil at a sanitary landfill to be \$10,000 per lot. We were prepared to assess a \$25,000-per-lot expense for chemically tainted soil (e.g., chromium), but did not find a reasonable likelihood of prior land uses of this type.

#### Results of baseline analysis

Total redevelopment costs to provide the required supply of residential lots, by former land use type, are presented in Table 4. Figures 1 and 2 provide additional detail on the total comparative costs and the percentage of total costs represented by line item. The parcel groupings are sorted by lowest average redevelopment cost per new lot of supply.

For the base case, average redevelopment costs per lot (and total, in parentheses) are estimated to be \$6,300 for lands formerly used as single-family detached residential (\$357,600), \$10,200 for multifamily (\$430,000), \$12,300 for commercial (\$110,800), and \$14,000 for industrial (\$209,900). Total redevelopment costs for 123 new lots are estimated to be \$1.1 million. Expected average baseline costs for

formerly commercial and industrial properties are thus about double those of lands that used to be detached housing—a substantial difference.

For the analysis of environmental cost line items, former single-family lots are dominated by nonenvironmental costs (62.0%). Haul and burial costs of common debris represented only an estimated 35.2% of redevelopment costs, a substantial amount but much lower than for other land use types. Lands that used to be multifamily had more than half (54.5%) of expected expense in brown-field-related costs, with haul and burial expense combined representing almost half of the total cost (47.2%). For commercial properties, nonenvironmental costs shrink to less than 20%, with haul, burial, and remediation each approximating one-quarter of costs. For formerly industrial properties, nonenvironmental expenses are only 17.6%, haul and burial combined reflect 34.3%, and expected remediation costs dominate with 45.3%. Further, the percentages of the last three categories reflect larger average cost amounts.

#### EFFECT OF NEW ENVIRONMENTAL REGULATIONS ON REDEVELOPMENT COSTS

A draft set of regulations pertaining to the handling of C&D debris has recently been set forth by the Ohio EPA as required by state law.<sup>8</sup> These pending rules would also interact with an Ohio state law passed in

8. As authorized by Ohio Revised Code Chapter 3714, the document was prepared by the Ohio EPA, *Construction and Demolition Debris Regulations*, OAC-3745-29, April 20, 1992.

**TABLE 4 Lot Redevelopment Costs for Strategic Groups by Former Land Use Type: Baseline**

Group Number	Remediation Tanks and Contaminated Soil										Subtotal* Non-environmental Costs	Additional Group Redevelopment Costs	Average Redevelopment Costs per Lot	Number of New Lots	Cumulative Number of New Lots
	Formerly Single-Family	Debris Haul	Debris Burial	Demolition	Contaminated Soil	Subtotal Brownfield	Subtotal* Non-environmental Costs	Additional Group Redevelopment Costs	Average Redevelopment Costs per Lot	Number of New Lots					
6	\$ 1,232	\$ 1,095	\$ 0	\$ 2,000	\$ 0	\$ 2,327	\$ 991	\$ 3,318	\$ 3,318	\$ 3,318	1	1	1		
49	\$ 1,131	\$ 1,005	\$ 0	\$ 0	\$ 0	\$ 2,136	\$ 1,326	\$ 3,461	\$ 3,461	\$ 3,461	1	2	2		
25	\$ 1,181	\$ 1,050	\$ 0	\$ 0	\$ 0	\$ 2,231	\$ 1,346	\$ 3,577	\$ 3,577	\$ 3,577	1	3	3		
7	\$ 1,350	\$ 1,200	\$ 0	\$ 0	\$ 0	\$ 2,550	\$ 1,413	\$ 3,963	\$ 3,963	\$ 3,963	1	4	4		
104	\$ 1,350	\$ 1,200	\$ 0	\$ 0	\$ 0	\$ 2,550	\$ 1,413	\$ 3,963	\$ 3,963	\$ 3,963	1	5	5		
90	\$ 2,666	\$ 2,370	\$ 2,000	\$ 0	\$ 0	\$ 7,036	\$ 5,213	\$ 12,249	\$ 4,083	\$ 4,083	3	8	8		
64	\$ 1,755	\$ 1,560	\$ 0	\$ 0	\$ 0	\$ 3,315	\$ 4,899	\$ 8,214	\$ 4,107	\$ 4,107	2	10	10		
70	\$ 1,637	\$ 1,455	\$ 0	\$ 0	\$ 0	\$ 3,092	\$ 1,152	\$ 4,244	\$ 4,244	\$ 4,244	1	11	11		
51	\$ 2,126	\$ 1,890	\$ 0	\$ 0	\$ 0	\$ 4,016	\$ 4,547	\$ 8,564	\$ 4,282	\$ 4,282	2	13	13		
102	\$ 1,350	\$ 1,200	\$ 0	\$ 0	\$ 0	\$ 2,550	\$ 1,742	\$ 4,292	\$ 4,292	\$ 4,292	1	14	14		
59	\$ 1,215	\$ 1,080	\$ 0	\$ 0	\$ 0	\$ 2,295	\$ 2,059	\$ 4,354	\$ 4,354	\$ 4,354	1	15	15		
81	\$ 1,266	\$ 1,125	\$ 0	\$ 0	\$ 0	\$ 2,391	\$ 2,079	\$ 4,470	\$ 4,470	\$ 4,470	1	16	16		
11	\$ 1,316	\$ 1,170	\$ 0	\$ 0	\$ 0	\$ 2,486	\$ 2,100	\$ 4,586	\$ 4,586	\$ 4,586	1	17	17		
40	\$ 1,013	\$ 900	\$ 0	\$ 0	\$ 0	\$ 1,913	\$ 2,679	\$ 4,591	\$ 4,591	\$ 4,591	1	18	18		
43	\$ 1,013	\$ 900	\$ 0	\$ 0	\$ 0	\$ 1,913	\$ 2,679	\$ 4,591	\$ 4,591	\$ 4,591	1	19	19		
15	\$ 1,013	\$ 900	\$ 0	\$ 0	\$ 0	\$ 1,913	\$ 2,793	\$ 4,705	\$ 4,705	\$ 4,705	1	20	20		
94	\$ 1,181	\$ 1,050	\$ 0	\$ 0	\$ 0	\$ 2,231	\$ 2,521	\$ 4,752	\$ 4,752	\$ 4,752	1	21	21		
38	\$ 1,013	\$ 900	\$ 0	\$ 0	\$ 0	\$ 1,913	\$ 2,854	\$ 4,766	\$ 4,766	\$ 4,766	1	22	22		
41	\$ 1,181	\$ 1,050	\$ 0	\$ 0	\$ 0	\$ 2,231	\$ 2,746	\$ 4,977	\$ 4,977	\$ 4,977	1	23	23		
76	\$ 1,519	\$ 1,350	\$ 0	\$ 0	\$ 0	\$ 2,869	\$ 2,180	\$ 5,049	\$ 5,049	\$ 5,049	1	24	24		
71	\$ 1,603	\$ 1,425	\$ 0	\$ 0	\$ 0	\$ 3,028	\$ 2,214	\$ 5,242	\$ 5,242	\$ 5,242	1	25	25		
42	\$ 2,531	\$ 2,250	\$ 0	\$ 0	\$ 0	\$ 4,781	\$ 11,383	\$ 16,164	\$ 5,388	\$ 5,388	3	28	28		
106	\$ 1,350	\$ 1,200	\$ 0	\$ 0	\$ 0	\$ 2,550	\$ 2,848	\$ 5,398	\$ 5,398	\$ 5,398	1	29	29		
32	\$ 1,856	\$ 1,650	\$ 0	\$ 0	\$ 0	\$ 3,506	\$ 8,102	\$ 11,608	\$ 5,804	\$ 5,804	2	31	31		
53	\$ 2,296	\$ 2,371	\$ 0	\$ 0	\$ 0	\$ 4,667	\$ 1,332	\$ 5,999	\$ 5,999	\$ 5,999	1	32	32		
74	\$ 2,025	\$ 1,800	\$ 0	\$ 0	\$ 0	\$ 3,825	\$ 8,355	\$ 12,180	\$ 6,090	\$ 6,090	2	34	34		
83	\$ 4,725	\$ 4,200	\$ 0	\$ 0	\$ 0	\$ 8,925	\$ 26,161	\$ 35,086	\$ 7,017	\$ 7,017	5	39	39		
19	\$ 7,644	\$ 6,795	\$ 0	\$ 0	\$ 0	\$ 14,439	\$ 7,265	\$ 21,705	\$ 7,235	\$ 7,235	3	42	42		
21	\$ 979	\$ 870	\$ 0	\$ 0	\$ 0	\$ 1,849	\$ 5,940	\$ 7,789	\$ 7,789	\$ 7,789	1	43	43		
84	\$ 1,215	\$ 1,080	\$ 0	\$ 0	\$ 0	\$ 2,295	\$ 6,035	\$ 8,330	\$ 8,330	\$ 8,330	1	44	44		
36	\$ 1,856	\$ 1,650	\$ 2,000	\$ 0	\$ 0	\$ 5,506	\$ 11,911	\$ 17,417	\$ 8,709	\$ 8,709	2	46	46		
9	\$ 2,616	\$ 2,325	\$ 2,000	\$ 0	\$ 0	\$ 6,941	\$ 19,329	\$ 26,270	\$ 8,757	\$ 8,757	3	49	49		
20	\$ 2,025	\$ 1,800	\$ 0	\$ 0	\$ 0	\$ 3,825	\$ 15,535	\$ 19,360	\$ 9,680	\$ 9,680	2	51	51		
92	\$ 3,156	\$ 2,805	\$ 2,000	\$ 0	\$ 0	\$ 7,961	\$ 22,108	\$ 30,068	\$ 10,023	\$ 10,023	3	54	54		
66	\$ 1,350	\$ 1,200	\$ 0	\$ 0	\$ 0	\$ 2,550	\$ 7,738	\$ 10,288	\$ 10,288	\$ 10,288	1	55	55		
82	\$ 1,772	\$ 1,575	\$ 2,000	\$ 0	\$ 0	\$ 5,347	\$ 16,621	\$ 21,968	\$ 10,984	\$ 10,984	2	57	57		
Total	\$ 66,505	\$ 59,446	\$ 10,000	\$ 0	\$ 0	\$ 135,951	\$ 221,607	\$ 357,558	\$ 6,273	\$ 6,273					

Formerly Multifamily

103MF	\$ 2,941	\$ 3,153	\$ 0	\$ 6,094	\$ 3,006	\$ 9,100	\$ 4,550	2	2
107MF	\$ 4,091	\$ 4,107	\$ 0	\$ 8,198	\$ 3,289	\$ 11,487	\$ 5,743	2	4
72MF	\$ 1,266	\$ 1,125	\$ 2,000	\$ 4,391	\$ 1,379	\$ 5,770	\$ 5,770	1	5
4MF	\$ 2,835	\$ 2,520	\$ 0	\$ 5,355	\$ 877	\$ 6,232	\$ 6,232	1	6
58MF	\$ 5,400	\$ 5,760	\$ 0	\$ 11,160	\$ 9,026	\$ 20,186	\$ 6,729	3	9
50MF	\$ 4,176	\$ 4,504	\$ 0	\$ 8,680	\$ 6,078	\$ 14,758	\$ 7,379	2	11
61MF	\$ 2,700	\$ 2,889	\$ 0	\$ 5,589	\$ 1,813	\$ 7,402	\$ 7,402	1	12
5MF	\$ 12,403	\$ 11,025	\$ 0	\$ 23,428	\$ 6,948	\$ 30,376	\$ 7,594	4	16
63MF	\$ 2,700	\$ 2,880	\$ 0	\$ 5,580	\$ 2,813	\$ 8,393	\$ 8,393	1	17
39MF	\$ 2,700	\$ 2,880	\$ 0	\$ 5,580	\$ 2,813	\$ 8,393	\$ 8,393	1	18
8MF	\$ 3,949	\$ 3,510	\$ 0	\$ 7,459	\$ 2,100	\$ 9,558	\$ 9,558	1	19
62MF	\$ 6,328	\$ 5,625	\$ 0	\$ 11,953	\$ 9,141	\$ 21,094	\$ 10,547	2	21
93MF	\$ 4,860	\$ 4,320	\$ 0	\$ 9,180	\$ 1,846	\$ 11,026	\$ 11,026	1	22
67MF	\$ 3,679	\$ 2,658	\$ 0	\$ 6,337	\$ 16,383	\$ 22,720	\$ 11,360	2	24
110MF	\$ 18,377	\$ 8,350	\$ 2,000	\$ 28,727	\$ 54,732	\$ 83,459	\$ 11,923	7	31
37MF	\$ 7,633	\$ 7,486	\$ 2,000	\$ 17,119	\$ 19,354	\$ 36,473	\$ 12,158	3	34
24MF	\$ 5,063	\$ 4,500	\$ 0	\$ 9,563	\$ 19,773	\$ 29,335	\$ 14,668	2	36
112MF	\$ 6,581	\$ 5,850	\$ 12,000	\$ 24,431	\$ 6,202	\$ 30,634	\$ 15,317	2	38
10MF	\$ 2,728	\$ 2,963	\$ 6,000	\$ 11,691	\$ 4,149	\$ 15,840	\$ 15,840	1	39
60MF	\$ 8,206	\$ 7,905	\$ 8,000	\$ 24,111	\$ 23,722	\$ 47,833	\$ 15,944	3	42
Total	\$ 108,615	\$ 94,010	\$ 32,000	\$ 234,625	\$ 195,442	\$ 430,067	\$ 10,240		

Formerly Commercial

73C	\$ 3,106	\$ 3,366	\$ 2,000	\$ 10,972	\$ 3,773	\$ 14,745	\$ 7,373	2	2
13MF-C	\$ 4,202	\$ 3,735	\$ 0	\$ 12,937	\$ 2,151	\$ 15,088	\$ 15,088	1	3
23C	\$ 3,038	\$ 2,700	\$ 0	\$ 6,988	\$ 5,507	\$ 12,494	\$ 12,494	1	4
2MF-C	\$ 12,606	\$ 11,205	\$ 6,000	\$ 44,811	\$ 6,275	\$ 51,085	\$ 12,771	4	8
100MF-	\$ 3,898	\$ 3,465	\$ 0	\$ 13,613	\$ 3,773	\$ 17,386	\$ 17,386	1	9
Total	\$ 26,849	\$ 24,471	\$ 8,000	\$ 89,320	\$ 21,478	\$ 110,799	\$ 12,311		

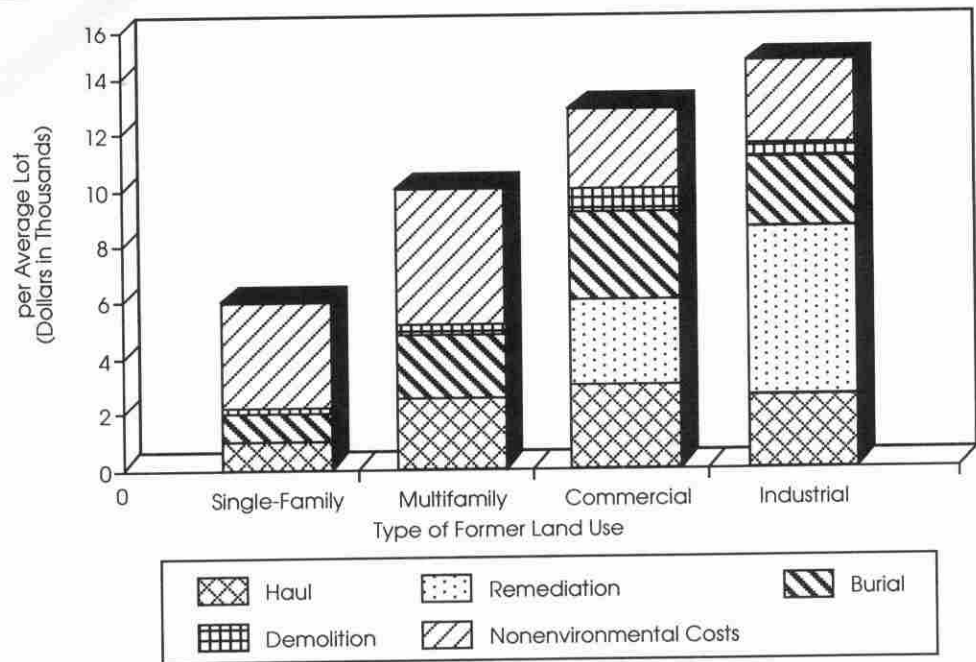
Formerly Industrial

3I	\$ 12,251	\$ 10,890	\$ 6,000	\$ 40,391	\$ 16,440	\$ 56,832	\$ 14,208	4	4
22I	\$ 2,325	\$ 2,516	\$ 0	\$ 9,841	\$ 3,354	\$ 13,195	\$ 13,195	1	5
1I	\$ 10,226	\$ 9,090	\$ 0	\$ 38,750	\$ 6,658	\$ 64,725	\$ 16,181	4	9
105C-I	\$ 9,195	\$ 9,793	\$ 0	\$ 41,988	\$ 8,437	\$ 50,425	\$ 10,085	5	14
77C-I	\$ 3,038	\$ 2,700	\$ 0	\$ 22,738	\$ 1,979	\$ 24,716	\$ 24,716	1	15
Total	\$ 37,035	\$ 34,989	\$ 6,000	\$ 173,024	\$ 36,868	\$ 209,892	\$ 13,993		
Subtotal	\$ 172,499	\$ 153,470	\$ 46,000	\$ 496,970	\$ 253,788	\$ 750,758	\$ 11,375		66

\*Includes properly acquisition, legal/replating, site preparation, and lot maintenance.  
NOTE: I = Industrial, C = Commercial, MF = Multifamily.



**FIGURE 1 Lot Redevelopment Costs by Type: Baseline**



1990 on asbestos abatement, and further rely on definitions of asbestos defined by federal regulations and other state laws.<sup>9</sup>

Stringent enforcement of these proposed rules, if enacted, could work in conjunction with existing laws to affect debris burial costs by requiring onsite segregation of asbestos and common debris, or by requiring burial of all debris in a landfill that accepts asbestos rather than a less expensive C&D landfill.<sup>10</sup> This could substantially affect demolition, haul, and debris burial costs. It should be noted that other soil and underground tank remediation costs are not directly affected by the new proposed rules. Contamination of debris by lead paint could be included, however, depending on the concentration levels of lead and whether it is classified as a hazardous material.

#### The C&D debris and asbestos regulations

As a result of the proposed regulations, C&D landfill operators would be required to refuse admission to vehicles containing

forbidden materials, including small amounts of asbestos if they are seen.<sup>11</sup> The proposed rules are unclear, however, as to exactly how clean the C&D debris must be. For example, what if there is both asbestos and lead paint seen in the rubble? As a result of this confusion, even in the interim period many commercial demolition jobs in the city have required segregation of asbestos onsite, at substantial increased expense.<sup>12</sup>

If friable asbestos is found in a standing structure, existing legislation requires an EPA permit and use of a certified asbestos contractor. Nonfriable asbestos (e.g., small amounts of duct wrapping) would not necessarily require an asbestos contractor, nor would building materials comprised of less than 1% asbestos. There are three kinds of potential asbestos problems: duct insulation, which is generally nonfriable and can be handled without a certified asbestos contractor by painting then removing, and the more problematic asbestos roof and wall shingles. The latter could be friable and there-

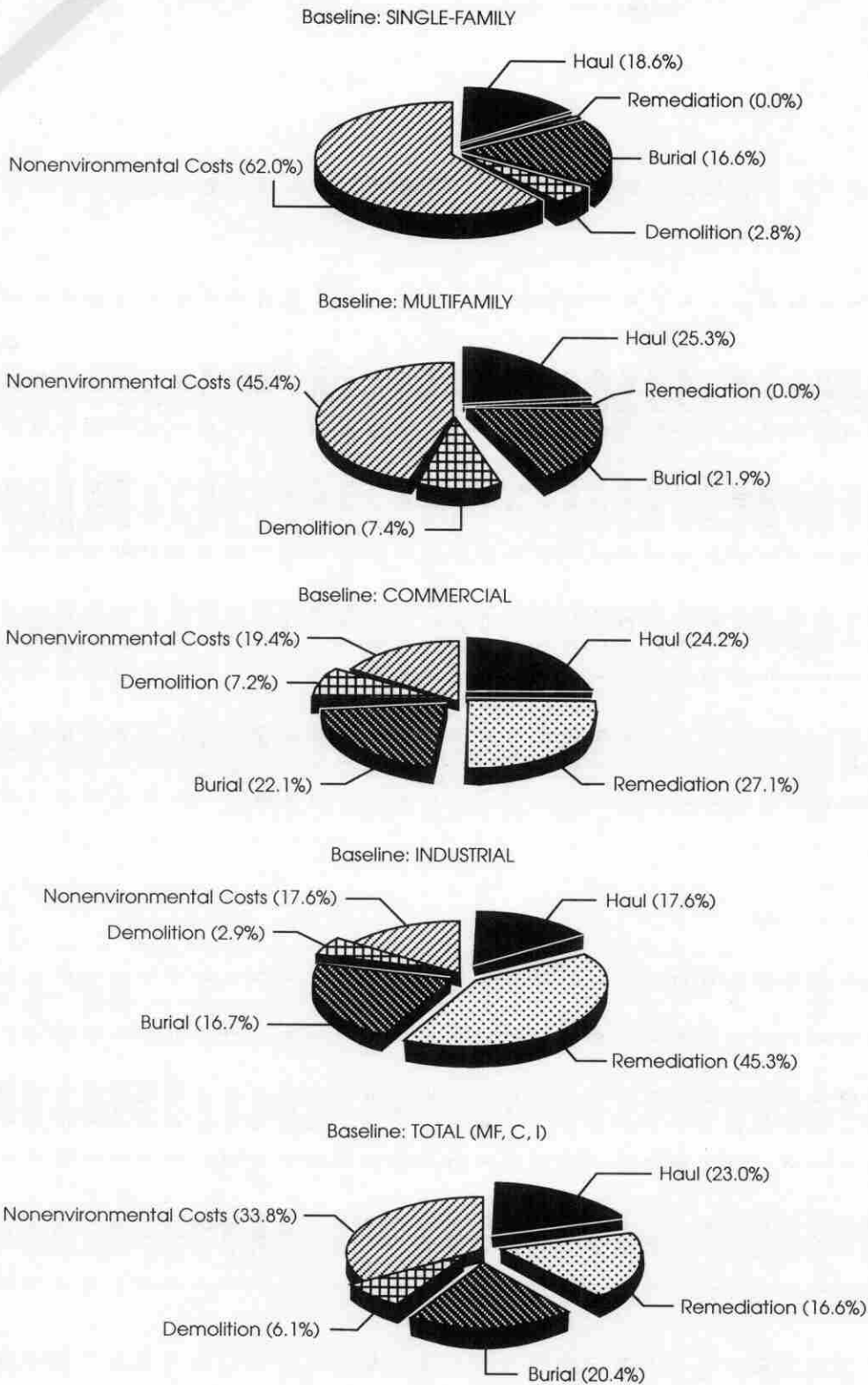
9. HB 366 is the Ohio state law regarding asbestos-handling procedures. The federal rules on asbestos are embodied in NESHAP 40 CFR Part 61 Subpart M.

10. According to B. J. Meter of the Cuyahoga County Health Department (September 1993), additional state standards on hazardous waste, including asbestos, are embodied in Ohio Revised Code 37-34. Ohio Administrative Code 37-45-27 pertains to solid waste disposal regulations.

11. See OAC 3745-29-13, subpart G.

12. Personal interview with Damian Borkowski, February 1992; and telephone interview with Charles Beckles, June 1993; both with the City of Cleveland Demolition Department.

**FIGURE 2 Lot Redevelopment Costs by Type**



fore require an EPA permit followed by onsite separation, removal, bagging, and burial in a landfill capable of handling asbestos.

If friable asbestos is found, burial expenses would be much higher: \$20 to \$35

or more per cubic yard. This would drive the overall weighted average burial cost up from \$6 per cubic yard to \$18 to \$20 per cubic yard, including the possibility of debris segregation onsite. The new regulation is estimated to add about \$1,000

**TABLE 5 Lot Redevelopment Costs for Strategic Groups by Former Land Use Type After Enactment of Environmental Regulations**

Group Number	Remediation				Subtotal* Non-environmental Costs	Additional Group Redevelopment Costs	Average Redevelopment Costs per Lot	Number of New Lots	Cumulative Number of New Lots
	Formerly Single-Family	Debris Haul	Debris Burial	Demolition					
6	\$ 1,638	\$ 1,643	\$ 0	\$ 0	\$ 3,281	\$ 991	\$ 4,272	1	1
49	\$ 1,504	\$ 1,508	\$ 0	\$ 0	\$ 3,011	\$ 1,326	\$ 4,337	1	2
25	\$ 1,571	\$ 1,575	\$ 0	\$ 0	\$ 3,146	\$ 1,346	\$ 4,492	1	3
7	\$ 1,796	\$ 1,800	\$ 0	\$ 0	\$ 3,596	\$ 1,413	\$ 5,009	1	4
104	\$ 1,796	\$ 1,800	\$ 0	\$ 0	\$ 3,596	\$ 1,413	\$ 5,009	1	5
90	\$ 3,546	\$ 3,555	\$ 3,000	\$ 0	\$ 10,101	\$ 5,213	\$ 15,314	3	8
64	\$ 2,334	\$ 2,340	\$ 0	\$ 0	\$ 4,674	\$ 4,899	\$ 9,574	2	10
70	\$ 2,177	\$ 2,183	\$ 0	\$ 0	\$ 4,360	\$ 1,152	\$ 5,512	1	11
51	\$ 2,828	\$ 2,835	\$ 0	\$ 0	\$ 5,663	\$ 4,547	\$ 10,210	2	13
102	\$ 1,796	\$ 1,800	\$ 0	\$ 0	\$ 3,596	\$ 1,742	\$ 5,338	1	14
59	\$ 1,616	\$ 1,620	\$ 0	\$ 0	\$ 3,236	\$ 2,059	\$ 5,295	1	15
81	\$ 1,683	\$ 1,688	\$ 0	\$ 0	\$ 3,371	\$ 2,079	\$ 5,450	1	16
11	\$ 1,751	\$ 1,755	\$ 0	\$ 0	\$ 3,506	\$ 2,100	\$ 5,605	1	17
40	\$ 1,347	\$ 1,350	\$ 0	\$ 0	\$ 2,697	\$ 2,679	\$ 5,375	1	18
43	\$ 1,347	\$ 1,350	\$ 0	\$ 0	\$ 2,697	\$ 2,679	\$ 5,375	1	19
15	\$ 1,347	\$ 1,350	\$ 0	\$ 0	\$ 2,697	\$ 2,793	\$ 5,489	1	20
94	\$ 1,571	\$ 1,575	\$ 0	\$ 0	\$ 3,146	\$ 2,521	\$ 5,667	1	21
38	\$ 1,347	\$ 1,350	\$ 0	\$ 0	\$ 2,697	\$ 2,854	\$ 5,550	1	22
41	\$ 1,571	\$ 1,575	\$ 0	\$ 0	\$ 3,146	\$ 2,746	\$ 5,892	1	23
76	\$ 2,020	\$ 2,025	\$ 0	\$ 0	\$ 4,045	\$ 2,180	\$ 6,225	1	24
71	\$ 2,132	\$ 2,138	\$ 0	\$ 0	\$ 4,270	\$ 2,214	\$ 6,484	1	25
42	\$ 3,367	\$ 3,375	\$ 0	\$ 0	\$ 6,742	\$ 11,383	\$ 18,124	3	28
106	\$ 1,796	\$ 1,800	\$ 0	\$ 0	\$ 3,596	\$ 2,848	\$ 6,444	1	29
32	\$ 2,469	\$ 2,475	\$ 0	\$ 0	\$ 4,944	\$ 8,102	\$ 13,046	2	31
53	\$ 3,054	\$ 3,557	\$ 0	\$ 0	\$ 6,610	\$ 1,332	\$ 7,942	1	32
74	\$ 2,693	\$ 2,700	\$ 0	\$ 0	\$ 5,393	\$ 8,355	\$ 13,748	2	34
83	\$ 6,284	\$ 6,300	\$ 0	\$ 0	\$ 12,584	\$ 26,161	\$ 38,745	5	39
19	\$ 10,167	\$ 10,193	\$ 0	\$ 0	\$ 20,360	\$ 7,265	\$ 27,625	3	42
21	\$ 1,302	\$ 1,305	\$ 0	\$ 0	\$ 2,607	\$ 5,940	\$ 8,547	1	43
84	\$ 1,616	\$ 1,620	\$ 0	\$ 0	\$ 3,236	\$ 6,035	\$ 9,271	1	44
36	\$ 2,469	\$ 2,475	\$ 3,000	\$ 0	\$ 7,944	\$ 11,911	\$ 19,855	2	46
9	\$ 3,479	\$ 3,488	\$ 3,000	\$ 0	\$ 9,966	\$ 19,329	\$ 29,296	3	49
20	\$ 2,693	\$ 2,700	\$ 0	\$ 0	\$ 5,393	\$ 15,535	\$ 20,928	2	51
92	\$ 4,197	\$ 4,208	\$ 3,000	\$ 0	\$ 11,404	\$ 22,108	\$ 33,512	3	54
66	\$ 1,796	\$ 1,800	\$ 0	\$ 0	\$ 3,596	\$ 7,738	\$ 11,334	1	55
82	\$ 2,357	\$ 2,363	\$ 3,000	\$ 0	\$ 7,719	\$ 16,621	\$ 24,340	2	57
Total	\$ 88,452	\$ 89,169	\$ 15,000	\$ 0	\$ 192,621	\$ 221,607	\$ 414,228		

Formerly Multifamily

103MF	\$ 3,912	\$ 4,730	\$ 0	\$ 8,641	\$ 3,006	\$ 11,647	\$ 5,824	2	2
107MF	\$ 5,441	\$ 6,161	\$ 0	\$ 11,602	\$ 3,289	\$ 14,890	\$ 7,445	2	4
72MF	\$ 1,683	\$ 1,688	\$ 3,000	\$ 6,371	\$ 1,379	\$ 7,750	\$ 7,750	1	5
4MF	\$ 3,771	\$ 3,780	\$ 0	\$ 7,551	\$ 877	\$ 8,427	\$ 8,427	1	6
58MF	\$ 7,182	\$ 8,640	\$ 0	\$ 15,822	\$ 9,026	\$ 24,848	\$ 8,283	3	9
50MF	\$ 5,554	\$ 6,756	\$ 0	\$ 12,310	\$ 6,078	\$ 18,388	\$ 9,194	2	11
61MF	\$ 3,591	\$ 4,334	\$ 0	\$ 7,925	\$ 1,813	\$ 9,738	\$ 9,738	1	12
5MF	\$ 16,496	\$ 16,538	\$ 0	\$ 33,034	\$ 6,948	\$ 39,981	\$ 9,995	4	16
63MF	\$ 3,591	\$ 4,320	\$ 0	\$ 7,911	\$ 2,813	\$ 10,724	\$ 10,724	1	17
39MF	\$ 3,591	\$ 4,320	\$ 0	\$ 7,911	\$ 2,813	\$ 10,724	\$ 10,724	1	18
8MF	\$ 5,252	\$ 5,265	\$ 0	\$ 10,517	\$ 2,100	\$ 12,616	\$ 12,616	1	19
62MF	\$ 8,416	\$ 8,438	\$ 0	\$ 16,854	\$ 9,141	\$ 25,995	\$ 12,997	2	21
93MF	\$ 6,464	\$ 6,480	\$ 0	\$ 12,944	\$ 1,846	\$ 14,789	\$ 14,789	1	22
67MF	\$ 4,893	\$ 3,987	\$ 0	\$ 8,880	\$ 16,383	\$ 25,263	\$ 12,632	2	24
110MF	\$ 24,441	\$ 12,525	\$ 3,000	\$ 39,967	\$ 54,732	\$ 94,699	\$ 13,528	7	31
37MF	\$ 10,152	\$ 11,229	\$ 3,000	\$ 24,381	\$ 19,354	\$ 43,735	\$ 14,578	3	34
24MF	\$ 6,733	\$ 6,750	\$ 0	\$ 13,483	\$ 19,773	\$ 33,256	\$ 16,628	2	36
112MF	\$ 8,753	\$ 8,775	\$ 24,000	\$ 41,528	\$ 6,202	\$ 47,730	\$ 23,865	2	38
10MF	\$ 3,628	\$ 4,445	\$ 12,000	\$ 20,073	\$ 4,149	\$ 24,222	\$ 24,222	1	39
60MF	\$ 10,914	\$ 11,858	\$ 12,000	\$ 34,771	\$ 23,722	\$ 58,493	\$ 19,498	3	42
Total	\$ 144,458	\$ 141,016	\$ 57,000	\$ 342,474	\$ 195,442	\$ 537,915	\$ 12,808		

Formerly Commercial

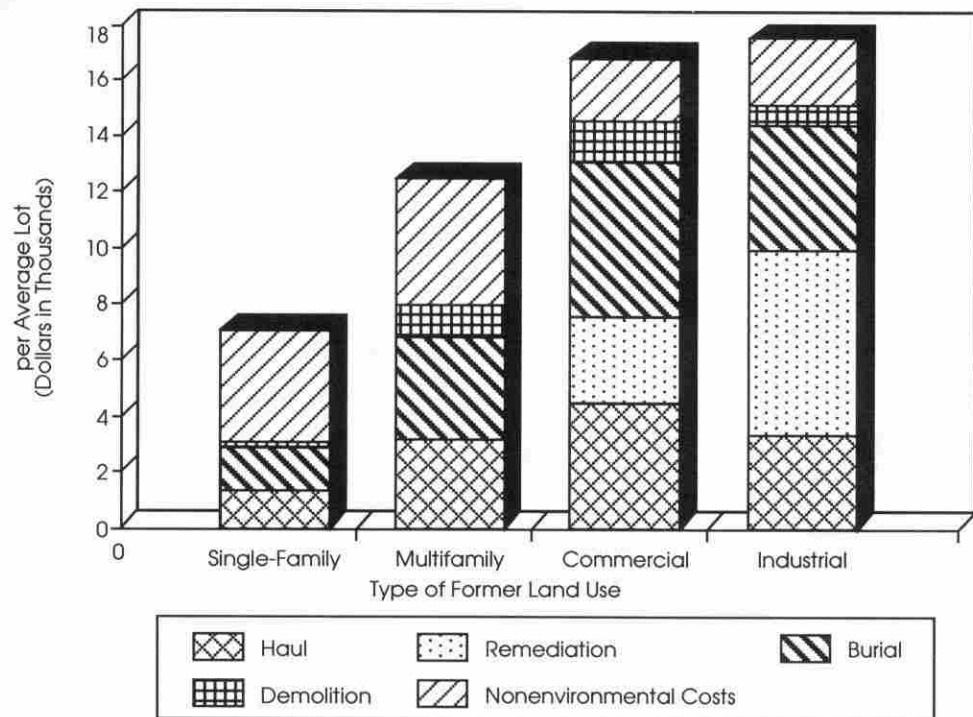
73C	\$ 4,659	\$ 6,732	\$ 3,000	\$ 16,891	\$ 3,773	\$ 20,664	\$ 10,332	2	2
13MF	\$ 6,303	\$ 7,470	\$ 0	\$ 18,773	\$ 2,151	\$ 20,924	\$ 20,924	1	3
23C	\$ 4,556	\$ 5,400	\$ 0	\$ 11,206	\$ 5,507	\$ 16,713	\$ 16,713	1	4
2MF-C	\$ 18,908	\$ 22,410	\$ 12,000	\$ 68,318	\$ 6,275	\$ 74,593	\$ 18,648	4	8
100MF-C	\$ 5,847	\$ 6,930	\$ 0	\$ 19,027	\$ 3,773	\$ 22,800	\$ 22,800	1	9
Total	\$ 40,274	\$ 48,942	\$ 15,000	\$ 134,216	\$ 21,478	\$ 155,694	\$ 17,299		

Formerly Industrial

3I	\$ 18,377	\$ 21,780	\$ 12,000	\$ 63,407	\$ 16,440	\$ 79,847	\$ 19,962	4	4
22I	\$ 3,488	\$ 5,032	\$ 0	\$ 13,520	\$ 3,354	\$ 16,873	\$ 16,873	1	5
1I	\$ 15,339	\$ 18,180	\$ 0	\$ 72,269	\$ 6,658	\$ 78,928	\$ 19,732	4	9
105C-I	\$ 13,793	\$ 19,586	\$ 0	\$ 56,379	\$ 8,437	\$ 64,815	\$ 12,963	5	14
77C-I	\$ 4,556	\$ 5,400	\$ 0	\$ 26,956	\$ 1,979	\$ 28,935	\$ 28,935	1	15
Total	\$ 55,553	\$ 69,978	\$ 12,000	\$ 232,531	\$ 36,868	\$ 269,399	\$ 17,960		
Subtotal	\$ 240,284	\$ 259,936	\$ 84,000	\$ 709,220	\$ 253,788	\$ 963,008	\$ 14,591		66

\*Includes property acquisition, legal/replating, site preparation, and lot maintenance.  
NOTE: I = Industrial, C = Commercial, MF = Multifamily.

**FIGURE 3 Lot Redevelopment Costs by Type: (after environmental regulations)**



to the cost of a residential demolition, an increase of about 50%. For commercial demolitions, the expense is expected to be far greater: We have assumed a two-thirds increase.

For removal of rubble already in the ground where friable asbestos is found, the entire rubble heap would generally be transported several hours away to a landfill capable of handling asbestos. However, not all parcels would experience this problem. We assumed a 33% increase in residential haul costs and a 50% jump in debris burial. For all other former land use types, we assumed a 50% increase in haul costs and a doubling of debris burial expense.<sup>13</sup>

#### Cost implications of the new regulations

Total redevelopment costs assuming enactment of the proposed C&D debris and asbestos regulations are presented in Table 5 by former land use type. Figures 3 and 4 provide additional detail on the total comparative costs and percentages of total costs represented by line item. The parcel groupings are sorted by lowest av-

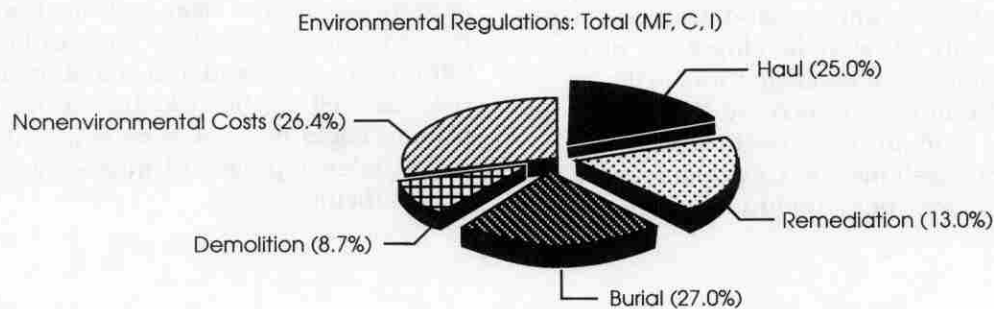
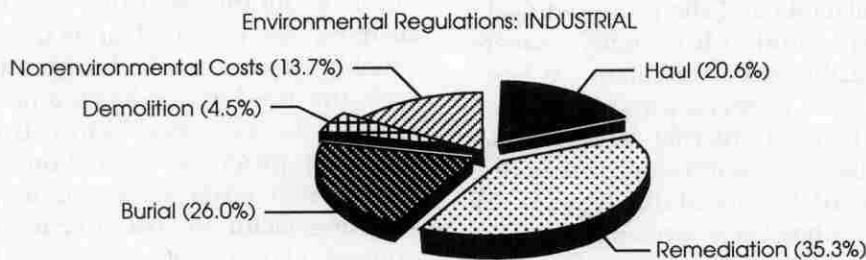
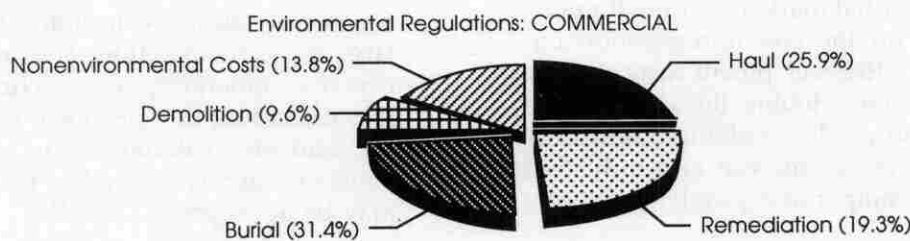
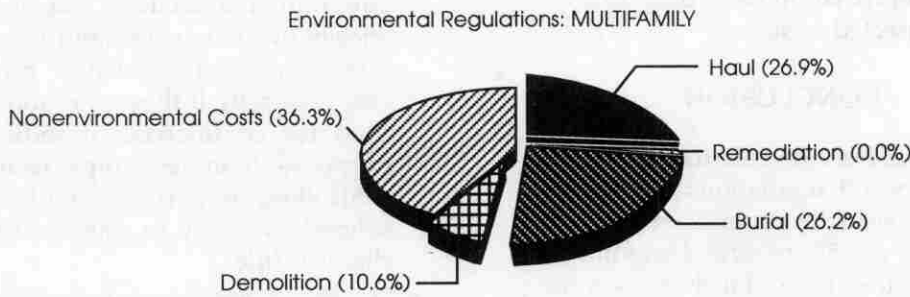
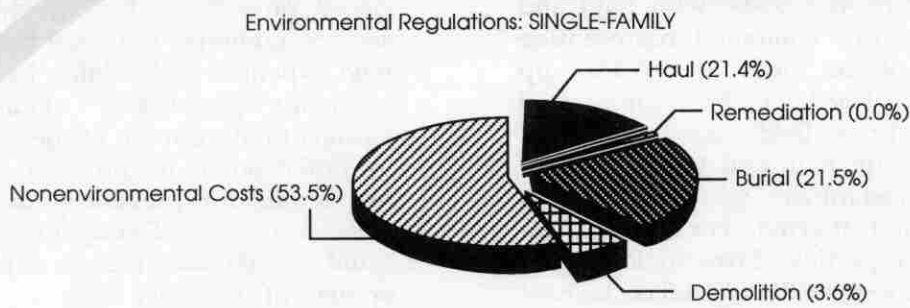
erage redevelopment cost per new lot of supply.

After the change in the environmental regulations, average total redevelopment costs per lot (and total percentage increases over the baseline, in parentheses) were estimated to be \$7,300 (15.8%) for lands formerly used as single-family detached residential, \$12,800 (25.1%) for multifamily, \$17,300 (40.5%) for commercial, and \$18,000 (28.3%) for industrial.

The cost increases attributable to these proposed regulations are especially onerous for lands formerly used for nonresidential purposes. For example, average costs for redeveloping formerly commercial and industrial properties are more than double those of lands that were formerly detached housing. In addition, only two parcel groupings of formerly commercial and industrial lands, with a total of seven new lots (about 10% of the sample), have redevelopment costs that are close to or less expensive than available land that was formerly single-family residential. Almost 60% of formerly multifamily properties met this cost-minimizing test. This implies that recycling commercial and industrial par-

13. According to Bob Lacock, of ten recent demolitions of typical small two-story commercial/multifamily buildings, only two cost less than \$10,000, with two others in excess of \$60,000. If this is representative of buildings with buried rubble, these assumptions may be conservative.

**FIGURE 4 Lot Redevelopment Costs by Type Environmental Regulations: SINGLE-FAMILY**



cels as residential land is difficult to justify purely on cost grounds.

For the analysis of environmental cost line items, formerly single-family lots are still dominated by nonenvironmental costs

(53.5%). Haul and burial costs of common debris represent only an estimated 42.9% of redevelopment costs, an increase of 21.9% over the baseline. Formerly multifamily lots have almost two-

thirds (63.7%) of expected expense in brownfield-related costs, with haul and burial expenses combined representing over half of the total cost (53.1%), up 12.5% over the base. For commercial properties, brownfield-related costs swell to 86.2%, with haul and burial both increasing substantially, while remediation costs are not affected. For formerly industrial properties, brownfield-related costs increase to 86.3% of total costs, haul and burial combined reflect 46.6%, and expected remediation costs drop to 35.3% of total expected costs.

### CONCLUSION

This cost analysis reveals that the effects of the proposed regulations on development costs are substantial—on the order of increases of 15% to 40% depending on prior land use type. Further, recycling formerly commercial and industrial lands in the residential market is difficult to justify based on the cost-minimization criterion alone. Redevelopment costs of these lands are about double those of parcels that were formerly residential, and only about 10% of commercial and industrial lands are competitive purely on a cost basis.

The combined effect of existing asbestos regulations and the proposed C&D regulations would substantially exacerbate an already difficult situation. At best, the additional redevelopment costs of commercial and industrial lands would serve to delay their redevelopment as residential until the available supply of cheaper land has been consumed; in this case, a delay of two to three years or more. At worst, implementation of these proposed government mandates could substantially slow redevelopment of even moderately contaminated inner-city lands, and significantly increase the redevelopment costs in tight fiscal times.

Suggestions for City Land Bank urban developers include the following steps.

- As primary landowner of tax-foreclosed properties, the city should seek to minimize potential brownfield expenses and liability by lobbying for "grandfather" status on stringent enforcement of the asbestos prohibition in the proposed C&D regulations for previously demolished structures. Failing to do so could substantially reduce redevelopment of inner-city land.
- The city should conduct a Phase 1 environmental analysis and systematically evaluate prior land uses before taking control of new properties, especially if they were formerly used for commercial or industrial purposes. Non-fee-simple forms of controlling property should be considered as a way to stay out of the chain of title.
- The city should search for more cost-effective, onsite soil and debris remediation solutions. In light of the large haul, remediation, and burial expense, emerging new technologies (including European soil-washing and electrokinetics for treatment of mercury and other metals) may be appropriate soon.<sup>14</sup>

The more general issue is the importance of finding workable standards for cleaning contaminated lands that can reasonably balance public health and safety with the need for redevelopment of inner-city lands. Even before this latest round of proposed regulations, brownfield-related costs were the major constraining factor in cost-effective redevelopment of inner-city property. What is needed is a workable and precise set of definitions on how clean soil must be before it is considered fit for reuse or burial. Otherwise, perceived and actual financial risks as well as the risk that future regulations could be even more stringent will make redevelopment of inner-city lands very difficult.

14. Consider Michael J. Mann, "European Soil Washing for United States Applications"; and Sibel Pamukcu, J. Kenneth Wittle, and Charles H. Titus, "Electrokinetics: Emerging Technology for In Situ Soil Remediation"; both from the *Federal Environmental Restoration Conference and Exhibitions*, 1992.