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The Potential of Deconstruction in Buffalo, New York

Abstract

Building deconstruction is not a novel idea but represents an ancient practice reinvented for our modern era. Deconstruction is an environmentally friendly (yet fiscally remunerative) alternative to traditional building demolition. Deconstruction is: [t]he process of carefully dismantling a building in order to salvage components for reuse and recycling. Typically, a small team of skilled and licensed professionals disassemble the structure, setting aside the valuable materials for direct reuse or resale, before recycling the rest. In most instances, deconstruction is combined with an element of demolition, with the latter process plugging the gaps not covered by the former process. Deconstruction has traditionally been used successfully with decommissioned military bases and all-wood barns. Building deconstruction is simply an expansion of this practice to both commercial and residential structures. In fact, it can be argued that deconstruction is the original demolition.

Keywords

Buffalo, Housing/Neighborhoods, Environment, Recycling and Waste, Green Housing, Report, Other, PDF

The Potential of Deconstruction in Buffalo, New York

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What is Deconstruction?

Building deconstruction is not a novel idea but represents an ancient practice reinvented for our modern era. Deconstruction is an environmentally friendly (yet fiscally remunerative) alternative to traditional building demolition. Deconstruction is:

[t]he process of carefully dismantling a building in order to salvage components for reuse and recycling.¹

Typically, a small team of skilled and licensed professionals disassemble the structure, setting aside the valuable materials for direct reuse or resale, before recycling the rest. In most instances, deconstruction is combined with an element of demolition, with the latter process plugging the gaps not covered by the former process. Deconstruction has traditionally been used successfully with decommissioned military bases and all-wood barns. Building deconstruction is simply an expansion of this practice to both commercial and residential structures. In fact, it can be argued that deconstruction is the original demolition.²

Has It Been Used Elsewhere Successfully?

Deconstruction has been used by numerous municipalities, including several whose demographics approximate Buffalo. In addition to offering obvious recycling benefits, deconstruction provides other important ancillary benefits, such as job training for local residents. In Connecticut, the Hartford Housing Authority:

¹ Institute for Local Self-Reliance. (1999). 'Salvaging Yesterday's Buildings for Tomorrow's Sustainable Communities'. <http://www.ilsr.org/recycling/decon/deconreportes.html>

² National Demolition Association (1999). Demolition... The First Step of Reconstruction. <http://www.demolitionassociation.com/pdf/2006-01/The%20First%20Step%20Of%20Reconstruction.pdf>. Pp. 1

[u]ndertook the deconstruction of six public housing units at Stowe Village as an opportunity to train public housing residents in the building trades and simultaneously divert materials from disposal.³

In this situation, the Hartford Housing Authority partnered with the general contractor, a local union, and a not-for-profit group to train local residents in deconstruction techniques.⁴ Further, the trainees recovered half of the materials from the buildings, “40% through salvage and 10% through recycling”.⁵ In general, the project proved a cost-effective way to provide education in the building trades.

Although Portland is not particularly analogous to Buffalo, a project put forth by the University of Oregon demonstrates that deconstruction and materials reuse can benefit low-income individuals and the environment in other ways:

When the University of Oregon planned to demolish Bagley Downs Apartments, Saint Vincent de Paul stepped forward with the unique idea of moving the buildings to a new location and renovating them. The University of Oregon avoided the cost of demolishing the buildings and 30 affordable housing units were created for about half the cost of building new structures.⁶

Because of this project, the community saved \$1.07 million over what a comparable amount of newly-built affordable housing would have cost, while also reducing the amount of material ending up in local landfills by 112 tons.⁷

Other notable sites include Springfield (Massachusetts) and Washington, D.C. While the precise natures of the programs differ, the general theme remains the same. By opting for deconstruction, local policy makers can provide local residents and firms with quality building

³ U.S. Environmental Protection Agency. (2000). Building Savings: Strategies for Waste Reduction of Construction and Demolition Debris from Buildings. Washington, D.C.: Government Printing Office.

⁴ U.S. Environmental Protection Agency. (2000). Stowe Village, Hartford, Connecticut: 50% Reduction of Demolition Materials. Washington, D.C.: Government Printing Office.

⁵ EPA – Stowe Village

⁶ EPA – Building Savings

⁷ U.S. Environmental Protection Agency. (2000). Bagley Downs Apartments, Eugene, Oregon: 73% Reduction of Construction and Demolition Materials. Washington, D.C.: Government Printing Office.

products for construction or repairs. City residents receive valuable vocational training and employment while addressing pressing city issues, all while creating value for the city. Also, blighted and abandoned buildings can be removed, reducing crime in the area by depriving area drug dealers an area to congregate and local children an unsafe place to play.

What are the Benefits of Deconstruction for Affordable Housing in Buffalo?

The City of Buffalo has experienced a precipitous population decline over the past fifty years. Starting with a population of 580,000 in 1950, the city saw a decline to 462,000 by 1970. In 2000, the population had dropped to 292,000.⁸ This flight from the city, a product of both suburbanization and the decline of the Rust Belt, resulted in numerous vacant properties.

According to a recent report, “10% of the city’s land and 15 percent of its structures [are] vacant.”⁹ The same report goes on to note that “each known abandoned residential property may involve 20 or more city actions and cost taxpayers nearly \$12,000 over a five year period.”¹⁰ With roughly 58% of the city’s housing stock having been built prior to 1940, many of these homes are in poor shape.¹¹ Couple this with both the disinvestment in certain neighborhoods and general economic decline of the region and it is a recipe for crisis.

In the city’s 2007-2008 Action Plan, the proposed budget includes \$425,000 to fund citywide demolitions, this in addition to \$67,568 in program delivery costs and \$606,394 to seal up vacant structures in the city¹². According to Buffalo ReUse founder Michael Gainer: “The City has ambitious plans to demolish 1,000 structures a year for the next ten years at a cost to taxpayers of

⁸ U.S. Census Bureau; "Profile of General Demographic Trends: 2000, Geographic Area: Buffalo City, NY"

⁹ Blueprint Buffalo: Regional Strategies and Local Tools for Reclaiming Vacant Properties in the City and Suburbs of Buffalo. (2006). pp. 2

¹⁰ Blueprint Buffalo, pp. 3

¹¹ Queen City in the 21st Century: Buffalo's Comprehensive Plan. (2004). Pp. 23-4.

¹² Wanamaker, Timothy. (2007). City of Buffalo 2007-2008 Annual Action Plan Recommendation. pp. 6

over \$100 million.”¹³ As it stands, there is a cost of \$10,000-\$15,000 per residential demolition¹⁴ and a cost of upwards of \$30,000 per house when asbestos abatement is involved¹⁵). Whatever the exact sum eventually turns out to be, the cost of demolition will prove a costly outlay for a financially strapped city.

Despite the bleak outlook, there are signs of hope. The city is doing what it can to rehabilitate the existing housing stock and provide financial assistance to homeowners in high-risk areas.¹⁶ For many of these individuals and families, one code violation could lead to costly repairs. These repairs often exceed the market value of the property and are difficult for financially strapped people to afford. Clearly, from the perspective of affordable housing, keeping people in their homes is the best option, provided that a minimum level of safety can be maintained.

For those homes beyond reclamation, demolition has been seen as the only option, but, as described earlier, deconstruction can often be a viable alternative. The benefits to the city and its residents are both general and specific in nature.

Much of the wood in the old homes is old-growth timber. Salvaging that and other valuable materials can provide a valuable source of materials for home repairs, Furthermore, deconstruction can provide job training and employment opportunities for city residents. While there is a sadness associated with dismantling portions of the city, the fact remains that Buffalo is a city with a shrinking population. The city’s Comprehensive Plan, citing data from the Mayor’s Office of Strategic Planning, estimates the city’s population will dip to 250,000 residents, with a return to

¹³ Michael Gainer (Personal Communication, 3/27/07).

¹⁴ Tokasz, J. (2007, March 27). Expert sees value in vacant homes, calls for salvaging of materials. Buffalo News.

¹⁵ LoCurto, M. (Class discussion, 4/12/2007).

¹⁶ Comprehensive Plan, pp. 26

2004 population levels not expected until 2025.¹⁷ There is a consensus on the fact that something must be done with the vacant and abandoned housing stock. The differences arise with regards to which procedures are used to remove the houses and which entities are to do the removal. Despite their skepticism of what they would consider the deconstruction craze, even the National Demolition Association's comments on deconstruction bode well for the type of residential home deconstruction advocated by groups such as Buffalo ReUse:

Only certain types of buildings are considered to be good candidates for deconstruction methods. Deconstruction advocates have identified the technique as **best suited for smaller wood or timber-framed structures; especially housing stock built before World War II**... The demolition industry's experience is in agreement that high-value materials increase potential recovery value.¹⁸ (boldface mine)

What are the Benefits of Deconstruction for the Environment in Buffalo?

In addition to the affordable housing aspect of deconstruction, there is the environmental aspect. While these two aspects are inextricably linked, it is analytically useful to parse them out. Still, affordable housing activists and environmentalists must both fight the popular perception that affordable housing is a poor person's issue while environmentalism belongs to white, upper middle-class suburbanites.

The city and county have made increased recycling by construction and demolition (C&D) contractors a priority. Since its inception in 1997, the City of Buffalo's Housing Demolition Project¹⁹ has worked toward many of the same ends as deconstruction, those being the recycling of most salvageable materials from structures slated for removal. According to a county publication, the city and its contractors prevented approximately 15,000 tons of recyclable materials from ending

¹⁷ Comprehensive Plan, pp. 9

¹⁸ National Demolition Association (1999). Demolition... The First Step of Reconstruction. <http://www.demolitionassociation.com/pdf/2006-01/The%20First%20Step%20Of%20Reconstruction.pdf>. Pp. 7-8

¹⁹ Erie County Construction and Demolition Debris Recycling Directory. (2003).

up in local landfills, saving Buffalo approximately \$200,000 in tipping fees.²⁰ The materials recovered included “brick/concrete/asphalt, metals, wood, glass, and plastic.”²¹ Deconstruction advocates are in favor of such broad-based recycling, so it is heartening to see the city already taking steps in that direction.

The difference between this city program and proposed deconstruction programs is over the primary aims. Both the city’s project and projects proposed by deconstructionists aim to recover as much recyclable materials before the remaining structure (if any) is razed. The subtle distinction is that the city’s program focuses on recycling as a beneficial side effect of pre-demolition materials recovery while deconstructionists focus on materials recovery, with demolition reserved for whatever structure remains. This distinction becomes blurred when discussing the removal of large commercial structures, though remains intact when discussing residential demolition projects.

Although not specifically a city-administered program, the Western New York Materials Exchange Program (MAT-EX) establishes a secondary market for these recycled materials. According to a county publication, MAT-EX:

[f]acilitates the exchange of almost any unwanted or unusable products that would otherwise be destined for a landfill. This program involves over 20,000 businesses, schools, nonprofit organizations, and governmental agencies.²²

This sort of exchange is a major aim of deconstructionist proponents such as Michael Gainer and David Bennink, both of whom advocate exchange or retail sale of recovered materials as part of their deconstruction programs.²³ In 2003 alone, MAT-EX diverted 79 tons of material from area landfills,

²⁰ Ibid.

²¹ Ibid.

²² Ibid., pp. 11

²³ Tokasz, J. (2007, March 27). Expert sees value in vacant homes, calls for salvaging of materials. Buffalo News.

saving \$23,000 in tipping fees.²⁴ While this may or may not represent a marginal figure, this exchange demonstrates the type of innovative initiatives necessary to make materials recycling and deconstruction economically viable and desirable for private sector contractors.

In addition to recycling of raw materials, the county's publication, citing the Illinois C&D Recycling Guidebook, advocates salvaging intact certain building components whenever possible.²⁵ This county document takes the salvage concept one step beyond traditional architectural salvage, though not quite as far as the salvage standard set forth in the Bagley Apartments example cited earlier. Granted, that is a best case scenario. Still, it points in the direction certain deconstruction projects aim with regards to reuse of recovered materials.

The C&D literature talks of having a separate third-party contractor or similar organization do the materials recycling.²⁶ It is in this role that not-for-profit entities like Buffalo ReUse come into play. In a market such as Buffalo where materials recovery occurs at a less than optimal rate, such groups can perform a bridge function, working to develop salvage techniques and strategies that are more cost-effective and achieve a higher rate of materials recovery.

Drawbacks and Limitations

While deconstruction and advanced materials recovery techniques can prove beneficial to the city, several issues must be addressed. First, buildings slated for deconstruction or demolition must be sealed and secured properly until action can be taken. In Buffalo, there is often a lag time of several years between when a vacant house is scheduled for demolition and when the demolition takes place²⁷. In the meantime, the houses are often unsecured, allowing anyone to enter and strip

²⁴ Also see their website at www.mat-ex.org

²⁵ Erie County Construction and Demolition Debris Recycling Directory. (2003). Pp. 10.

²⁶ Ibid.

²⁷ LoCurto, M. (Class discussion, 4/12/2007).

items of value. According to Michael LoCurto, Buffalo Common Council member, by the time demolition crews actually arrive at a site, the only remaining item of value may be the old-growth timber.²⁸ While such timber is a precious and valuable commodity, the city cannot afford to let the other materials ‘walk’. Otherwise, efforts to achieve maximum materials recovery will be hampered.

Second, recovered timber is typically not graded and thus cannot be used for the structural aspects of new building construction. According to Bob Falk, a timber expert, the federal government and other organizations are developing easily applied grading criteria for recovered wood products.²⁹ Recognizing the large market and pent up demand for such materials, it is conceivable that some system will be implemented in the near future. In the meantime, pieces of recovered lumber have to be graded individually, a process both time-consuming and expensive. In contrast, virgin lumber can be graded in batches.

Policy Ideas and Proposed Outcomes

There are several ways Buffalo could encourage increased construction and demolition recycling. One would be to pass a municipal ordinance mandating project recycling on city construction contracts. According to the EPA publication “Building Savings”, Portland [Oregon] passed a resolution requiring “job-site recycling on all construction projects with a value exceeding \$25,000.”³⁰ While such an ordinance would certainly be useful for general environmental ends, it would also be a policy change that would shift cost incentives and encourage recycling and materials reclamation. Although many contractors actively recycle, imposing legal regulations would help codify the practice, especially if such an ordinance were

²⁸ Ibid.

²⁹ Falk, B. “Wood-Framed Building Deconstruction: A Source of Lumber for Construction?” *Forest Products Journal*. Vol. 52, No. 3.

³⁰ EPA – [Building Savings](#)

applied to demolitions. A simpler ordinance could mandate on-site recycling for all demolition projects. This is more palatable politically, though using voluntary compliance as a method of enforcement may render hollow such an ordinance.

A second way to increase materials recycling is to raise tipping fees per ton. Tipping fees are the amount paid by contractors or other materials professionals to dispose of solid waste at area landfills. The fees typically differ depending on the type of material being discarded and the nature of the facility, though the fees tend to follow certain regional patterns. In Buffalo and Western New York, tipping fees are low, representing the relative abundance of landfill space. While landfill space is still an abundant resource in Western and Upstate New York, cheap dumping decreases the incentive contractors and demolition experts have to reuse or recycle material, some of which can be valuable. Traditionally, professionals engaged in demolition have worked with organizations interested in architectural salvage, where ornamental and decorative elements of high value were removed before the structure is razed. Unfortunately, other materials like high-quality lumber were often lost in the process. Considering the quality of lumber used in the older housing stock, this is a vast untapped asset for the city. Compared with the building stock of many Sun Belt and West Coast cities, Rust Belt cities such as Buffalo consist largely of older buildings, many dating back to the turn-of-the-century.

According to a document put together by Erie County, tipping fees for landfills in the Buffalo area range from between \$30-\$50.³¹ For contractors who take their waste to a C&D waste processing facility³², the tipping fees range between \$20-\$30. Wood disposal is \$0-\$10 per ton³³, while concrete tends to work out at around \$0. Someone disposing of metals can

³¹ Erie County Construction & Demolition Debris Recycling Directory.

³² Such a facility combines aspects of a landfill and recycling center.

³³ Erie County Construction & Demolition Debris Recycling Directory.

expect to receive \$30-\$40 per ton. For cardboard, the amount received is typically in the \$24-\$40 range.

These varied figures make it difficult to compare tipping fees across regions, other than at a superficial level. Certainly, certain locales have fees that fall well outside the median, such as Seattle.³⁴ Further, each locale has in place a complicated regulatory regime. To consider the Seattle example, a document commissioned by their city council was 336 pages plus appendices.³⁵ Recycling and landfill policy have gone beyond the traditional ‘city dump’ days to become a complex regulatory regime.

Nevertheless, regional trends are visible. A chart from Chartwell Information Publishers, a collector of various waste management data and publisher of industry standard *Solid Waste Digest*³⁶, examined six regions over the period from June of 1998 through December of 2001. The Northeast had the highest average tipping fees.

[INSERT TABLE 1]

However, Table 2 shows that the within-region variance is not inconsequential. Even more telling is the within-state variance not detailed in the charts. For example, the average tipping fee for landfills in New York State for 2001 was \$67.74³⁷. However, the tipping fees in the Western New York area were roughly \$30 lower.

[INSERT TABLE 2]

³⁴ See pp. 215 of Seattle study

³⁵ Seattle Solid Waste Recycling, Waste Reduction, and Facilities Opportunities, Vol. 2, (2007). http://seattle.gov/util/stellent/groups/public/@spu/@usm/documents/webcontent/spu01_002547.pdf

³⁶ More recent tipping fees can be obtained from their website, though accessing them requires a \$498 yearly subscription to *Solid Waste Digest*. Data accessed at <http://www.oznet.ksu.edu/swr/Module4/Introduction.htm>.

³⁷ Ibid.

In addition to the perverse incentive for upstate New York to accept exported garbage, there exists upstate an additional incentive to direct recyclable materials to landfills. While it is county policy to steer all recyclables (including those from C&D) away from landfills, the amount of savings to the C&D business is still reduced. If upstate New York tipping fees were at New York City levels (approximately \$67-\$70+ per ton), the incentive to recycle would skyrocket, along with the incentive to simply export the solid waste elsewhere. Perhaps an economist can find an intermediate tipping fee point where the incentive to recycle is greater than the incentive to export solid waste *en mass*.

A third potential policy would be to alter the city building codes to allow residents to use reclaimed lumber to make structural repairs to their homes. Perhaps the city can hire (either directly or through a subcontractor) someone to grade reclaimed lumber. This role would be a temporary one, until market forces or public policy changes allow this role to be either privatized or phased out. An issue here is finding a distribution mechanism for this material, but fortunately there are examples of this, whether it is Habitat For Humanity's ReStore or similar bulk dealers in recycled materials – a Home Depot of reclaimed material, if you will, such as the retail store run in Bellingham, WA by David Bennink.³⁸

A fourth option would be for the city to partner with non-profit organizations or sympathetic C&D firms to steer CDBG money in their direction. For example, if houses on Buffalo's East Side need to be deconstructed, a nominal sum could be filtered to that Council district. This fits within the paradigm of neighborhood redevelopment. If houses absolutely need to be removed, the removal should provide job training to those in that distressed area, in

³⁸ Tokasz, J. (2007, March 27). Expert sees value in vacant homes, calls for salvaging of materials. Buffalo News.

addition to a living wage and the economic benefits these confer. Partnering with local unions could be a part of this strategy.

Finally, the city could Encourage C&D (Construction & Demolition) companies to integrate deconstruction into their repertoire, with HOPE VI funds as the proverbial carrot.³⁹ While such subsidies cannot provide permanent inducement absent shifts in incentive structure, they can prove useful in that interim incubation period, when deconstruction becomes increasingly viable.

Some of the previous policy proposals are more likely to occur than others. Nevertheless, Buffalo needs to be at the forefront of both recycling and materials reclamation theory and practice.

Conclusion

Deconstruction is not a novel idea but one that has existed for many years. It is also an offshoot of the Construction and Demolition (C&D) field, though one that places reuse and reclamation at the forefront. It has been practiced in numerous locales and scenarios, whether it is recycling wood from an old World War II-era army barracks or disassembling part of a dormitory to be reassembled elsewhere.

Deconstruction offers numerous benefits to the City of Buffalo, including job training for low-income residents, low-cost material to repair homes, and reduced waste winding up in area landfills. Although deconstruction is not a panacea for all that ails the city, deconstruction can be part of an overall strategy to revitalize Buffalo for the 21st century.

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<http://www.hud.gov/offices/pih/programs/ph/hope6/grants/demolition/03/dem2003grantagree.pdf>

Deconstruction is about preserving the integrity of city neighborhoods even in the face of exodus and decay. While this concept is counterintuitive⁴⁰, deconstruction or traditional C&D is required. Despite the shrinking of the city, there are other uses for such vacant lots, such as community gardens, neighborhood parks, and sale to adjacent residents looking to expand their current lot size. New home construction may be an option where large parcels can be assembled, though new builds come with their own environmental issues. Nevertheless, open spaces are a valuable resource. Deconstruction proponents are working with the local community to free up such spaces when appropriate. In “right-sizing” the city, they are providing a valuable service, one that the city can use to revitalize itself.

Appendix

Region	Jun-98	Dec-98	Jun-99	Dec-99	Jun-00	Dec-00	Jun-01	Dec-01
Northeast	56.76	57.68	58.04	55.65	57.92	58.16	56.77	56.28
Southern	33.70	34.33	34.38	33.91	34.55	35.45	35.25	35.19
Midwest	30.98	31.94	32.89	32.22	33.92	34.08	33.70	33.89
Western	21.88	21.84	20.76	19.88	20.87	22.05	22.36	22.41
Pacific	33.55	36.15	35.83	36.15	38.33	39.42	39.48	38.98
The Nation	34.63	36.30	36.33	35.25	36.70	37.36	36.98	36.91

Notes. **Northeast:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. **Southern:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. **Midwest:** Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. **Western:** Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Oklahoma, Texas, Utah, and Wyoming. **Pacific:** Alaska, California, Hawaii, Oregon, and Washington.

Table 2. Solid Waste Tipping Fees of Landfills, Incinerators and Waste-to-Energy (W-T-E) Plants, and Processing Facilities (December, 2001)

⁴⁰ One thinks here of the classic Vietnam-era statement, “We had to destroy the village to save it.” (my paraphrase).

	Landfills	Incinerators & Waste-to-Energy (W- T-E) Plants	Processing Facilities
Northeast			
Connecticut	51.40	59.26	67.51
Delaware	48.57	28.26	53.74
Maine	54.30	54.19	35.73
Maryland	52.20	56.28	38.34
Massachusetts	69.25	64.95	67.92
New Hampshire	68.57	79.22	49.37
New Jersey	57.47	54.96	68.25
New York	67.74	66.72	49.90
Pennsylvania	50.84	52.32	59.23
Rhode Island	57.75	-	73.54
Vermont	54.61	42.83	58.00
Average Northeast	55.35	60.15	58.19
Southern			
Alabama	30.94	39.90	34.20
Arkansas	24.52	18.28	25.55
District of Columbia	-	-	48.56
Florida	37.80	58.51	43.12
Georgia	31.69	60.00	33.68
Kentucky	31.02	-	38.26
Louisiana	25.39	-	28.12
Mississippi	26.52	30.00	31.56
North Carolina	31.30	32.00	39.27
South Carolina	32.50	59.50	28.66
Tennessee	29.99	28.00	26.30
Virginia	39.95	45.59	45.50
West Virginia	35.17	-	49.14
Average Southern	32.77	53.48	39.01

Midwest			
Illinois	33.88	63.82	39.32
Indiana	30.17	27.00	38.09
Iowa	33.46	45.00	36.85
Kansas	28.86	-	27.92
Michigan	33.53	54.76	37.89
Minnesota	43.53	59.61	57.26
Missouri	32.87	-	33.42
Nebraska	24.91	-	34.70
North Dakota	26.28	-	34.55
Ohio	28.39	-	37.90
South Dakota	27.49	-	51.30
Wisconsin	33.75	50.36	35.28
Average Midwest	31.92	52.79	38.73
Western			
Arizona	25.54	-	27.70
Colorado	19.89	18.25	25.58
Idaho	21.22	-	47.74
Montana	23.51	65.00	41.39
Nevada	10.54	-	18.21
New Mexico	16.60	-	24.12
Oklahoma	24.31	42.00	22.40
Texas	22.16	57.07	31.48
Utah	25.52	25.00	23.71
Wyoming	19.04	-	39.21
Average Western	21.32	40.06	26.65
Pacific			
Alaska	46.80	140.91	93.59
California	33.22	36.93	40.72
Hawaii	52.26	72.25	71.17
Oregon	28.26	63.84	43.23

Washington	41.17	71.68	77.36
Average Pacific	33.84	57.15	47.10

Source: Solid waste digest: National edition (2001, 11(12)), Alexandria, VA: Chartwell Information Publishers.