

RC 1: RECYCLE CONSTRUCTION WASTE

New York City Building Code

Proposal developed by the Construction Practices Committee

Summary

Issue:

While most waste from construction sites can be collected in dumpsters and then separated and recycled off-site, certain materials become damaged when commingled. They cannot be reused or recycled unless they are separated at the construction site.

Recommendation:

Require ceiling tiles, carpeting, new gypsum wallboard scrap, and large-dimension lumber to be sorted on-site and reused or recycled. Also, require construction-waste management plans for large projects.

Proposed Legislation, Rule, or Study

Amendments to the New York City Building Code:

1. Add the following definitions to Section 3302.1:

CONSTRUCTION WASTE MANAGEMENT PLAN. A plan outlining procedures for the reuse, including resale, or recycling of recoverable waste materials generated during construction and demolition.

LARGE-DIMENSION LUMBER. Any lumber with a minimum dimension of two inches by eight inches by eight feet.

NEW GYPSUM WALLBOARD SCRAP. Pieces of gypsum wallboard left over from the cutting and installation of new gypsum wallboard.

2. Add a new Section 3303.15 as follows:

3303.15 Waste recycling / reuse.

3303.15.1 Recycling carpet, ceiling tiles and gypsum wallboard scrap. Any construction, alternation, partial demolition, or demolition of a building or space greater than 20,000 square feet (1,858 m²) before July 1, 2013 or greater than 10,000 square feet (929 m²) on or after July 1, 2013 shall comply with this Section 3303.15.1. All waste ceiling tiles, carpet, carpet padding, carpet tiles, and new gypsum wallboard scrap shall be separated from other waste at the construction site, stored in a dry location, and sent to a facility for recycling or reuse. Such materials shall not be commingled with dissimilar material during onsite storage or transportation.

Exception: If the construction or demolition does not involve more than 10,000 square feet (929 m²) of ceiling tiles, 10,000 square feet (929 m²) of, collectively, carpet, carpet padding, and carpet tiles, or less than 1,000 square feet of new gypsum wallboard scrap. Beginning July 1, 2013, this exception shall only apply when there is less than 5,000 square feet (465 m²) of any such materials, except for new gypsum wallboard scrap.

Exception: When prior to commencement of demolition, materials are damaged, contaminated, or do not comply with industry recycling requirements, including foil-backed carpet tiles, wool carpet, and other carpet that cannot be recycled.

3303.15.2 Salvaging large-dimension lumber. Any construction, alternation, partial demolition, or demolition of a building or space greater than 1,000 square feet (93 m²) shall comply with this Section 3303.15.2. All large-dimension lumber shall be separated from other waste at the construction site, stored in a dry location, and sent to a facility for reuse. Such materials shall not be commingled with dissimilar material during onsite storage or transportation. Such material shall not be cut except as necessary for removal and shall be maintained in as large a piece as feasible.

Exception: Large-dimension lumber that has no reclaimed value due to damage by rot, dry rot, termites, splitting, fire, or other damage.

3303.15.3 Construction waste management plan. Any application for a permit for the following work shall include a construction waste management plan:

1. any alternation or partial demolition of a building or space greater than 50,000 square feet (4,645 m²) before July 1, 2013 and greater than 20,000 square feet (1,858 m²) after July 1, 2016; and
2. any new building or full demolition.

3303.15.3.1 Contents of construction waste management plan. The construction waste management plan shall:

1. comply with the requirements of this Section 3303.15;
2. describe how asphalt, cardboard, concrete, gypsum wallboard, masonry, office furniture and furniture systems, steel, and wood will be collected, sorted, transported, and delivered to a facility for reuse, recycling, or landfill disposal;
3. describe procedures for compliance with state or federal laws regarding disposal of any material containing mercury, lead, asbestos, or any polychlorinated biphenyl;
4. list the corporate names and addresses of any organization responsible for transportation, reuse, recycling, or landfill disposal;
5. outline the documentation each party will maintain to verify that material has been diverted from landfill in accordance with this chapter; and
6. be available at the construction site.

Supporting Information

Issue - Expanded

In 2002, waste from construction and demolition in New York City totaled 7.91 million tons.¹ Of this, nearly 70% was recycled, indicating that NYC already has rather high rates of diversion of construction and demolition wastes from landfills. However, there is still significant potential for improvement since many re-useable and/or recyclable materials are still landfilled due to improper handling and/or the comingling of materials.

Sending construction and demolition waste to landfills, rather than recycling the material, clogs our limited landfills and increases the production of new materials, generating greenhouse gas emissions. The number of construction and demolition landfills near New York is declining, which means fuel consumption and related emissions from transporting waste will increase as New York uses more distant landfills in the future.

Large dimension lumber is most commonly found in older townhouses, warehouses, and single-family homes. It is typically old growth lumber, which is a non-renewable resource. Reclaimed lumber can later be re-used as structural members in similar new construction and renovation, made into high-end designer furniture, used as lagging in excavations, cut into blocking, or used for other purposes depending on the quality.

Environmental & Health Benefits

Increasing the quantity of materials recycled will result in better resource utilization, less natural resources depleted, and the encouragement and creation of local NYC (green) jobs.

This proposal was found to have a high, positive environmental impact per building and to impact a large number of buildings. It was thus given an environmental score of 3.

This proposal was found to have no significant health impact.

Cost & Savings

As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1st draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.

This proposal is not expected to have any significant impact on capital costs.

Precedents

The City of Portland Bureau of Planning and Sustainability requires all building projects with a permit value of \$50,000 or more (including construction and demolition phases) to separate and recycle certain materials from the job site. The general contractor is responsible for ensuring recycling at the job site, including recycling by sub-contractors, and for completing a Pre-Construction Recycling Plan Form. Contractors must keep these materials out of the landfill: Rubble (concrete/asphalt); Land Clearing Debris; Corrugated Cardboard; Metals; and Wood.²

In 2006, the City of San Francisco adopted Ordinance No. 27-06 mandating the recycling of construction and demolition (C&D) debris in order to divert a minimum of 65% of the material from landfill.³ This ordinance affects all construction projects such as new construction, remodels, and partial demolitions, and requires the building permit holder or the property owner to make sure that all C&D materials removed from the project are properly recycled. This ordinance prohibits any C&D materials from being placed in trash or sent to a landfill.²

Over the last several years the following companies have had active recycling programs for these materials at de minimus cost: Tiffany, Pfizer, Merrill Lynch.

LEED

All LEED rating systems encourage the reuse or recycling of construction waste including LEED NC-MR cr. 2.1 & 2.2 (Construction Waste Management, Divert from Landfill); LEED CI-MR cr. 2.1 & 2.2 (Construction Waste Management, Divert from Landfill); LEED EB-MR cr. 1.1 & 1.2 (Construction, Demolition, and Renovation); LEED for Homes MR cr. 3.1 & 3.2 (Waste Management); and pilot programs such as LEED for Retail and LEED for Neighborhood Development.

Reporting requirements of new Section 3303.15.3 of this proposal allows for the easy collection of data for submission to the USGBC for LEED Certification or for analysis by the City.

It should be noted that LEED does not differentiate the size of the building or space under consideration, nor does LEED differentiate between types of materials to be segregated.

Implementation & Market Availability

1. The National Carpet Manufacturers (through the Carpet America Recovery Effort - CARE) are committed to increasing the recycling of carpet and carpet tile through a national network of consolidators, one of which is in the NYC New York City area. It would be beneficial to have additional consolidators in the New York City area. For single stream waste recyclers, a permit from NYSDEC is not required; although their support and cooperation would be helpful. For carpet and carpet tile, the economical breakpoint (as of 12/08) is approximately 10,000 to 20,000 sf. National carpet manufacturers participating in these recycling programs include Shaw, Interface, Mohawk, and Milliken.
2. For ceiling tile, Armstrong and US Gypsum, the two largest manufacturers, both have national programs to recycle ceiling tile, although only Armstrong's program is operational in the New York City region. For ceiling tile the economical breakpoint is approximately 20,000 to 30,000 sf.
3. Clean gypsum scrap can easily be incorporated into the manufacture of new gypsum wallboard however no collection facilities currently exist in the New York City region. Typically 100% of pre-consumer gypsum scrap is recycled, however close to 0% of post-consumer scrap is.
4. Preliminary estimates of materials to be recycled annually during the initial three years of the program are 11 million sf of ceiling tile and 57 million sf of carpet/tile. The existing consolidator projects that his company can handle 1 to 3 million sf of ceiling tile and 7 to 15 million sf of carpet tile with his present capacity (the lower end of the range). The carpet manufacturers are recycling at a rate in excess of 200 million pounds (equivalent to 300 million sf @ 6 pounds/square yard or 0.67 pounds/sf) of carpet per year. Armstrong indicates that they are only accepting a small portion of the amount that they could recycle. They produce 1 million sf of ceiling tile per day (or 300 million sf/year) at their Pennsylvania plant.
5. There are many small and medium scale lumber salvage companies in New York City. Most such companies will come to a project site during demolition and remove the lumber, paying for any quality lumber. Securing this service generally does not require more than a phone call with a few days notice before demolition.

Local salvage companies include the following:

[M. Fine Lumber](#), Brooklyn NY
Sawkill Lumber Co., Bronx
Build It Green, Queens
Big Wood, Upstate NY

Notes

Two different approaches were considered to increase diversion rates. Initially a system similar to LEED was considered. That approach mandated required a Construction Waste Management Plan to be developed for each project and mandated high diversion requirements. It was felt this approach would place an undue burden on certain types of projects and not on others. (Due to the different conditions and materials that may be present on a site, some projects would be unduly burdened with trying to reclaim and recycle wastes of no value that would eventually be landfilled anyway.)

An alternate approach the committee investigated was to require recycling of all recyclable demolition and construction waste. This was also deemed too burdensome due to NYSDEC constraints on transfer facilities that limit some of the materials to be diverted.

The final proposal represents a compromise between these two options by targeting specific materials that are often not diverted due to damage caused by handling and/or co-mingling. Requiring site sorting of these materials will likely

push diversion rates to their highest practical point. Market forces will continue to encourage off-site sorting of the other construction and demolition waste.

This proposal sets a lower project size threshold for separation of large-dimension lumber than for separation of other materials. Consultations with local salvagers indicate that there is no lower limit on project scale when it comes to large-dimension lumber: a salvager will come to a site for just a few good quality boards. In addition, arranging for the salvage of such lumber only requires a telephone call, as compared with the training that maybe required for the separation of other materials addressed in this proposal.

ENDNOTES:

¹ HENNINGSON, DURHAM, AND RICHARDSON ARCHITECTURE AND ENGINEERING, P.C., COMMERCIAL WASTE MANAGEMENT STUDY, VOL. 4., EVALUATION OF WASTE DISPOSAL CAPACITY POTENTIALLY AVAILABLE TO NEW YORK CITY, (2004) <http://www.nyc.gov/html/dsny/downloads/pdf/swmp/swmp/cwms/cwms-ces/v4-ewdc.pdf>; See also U.S. EPA, WHAT'S IN A BUILDING? COMPOSITION ANALYSIS OF C&D DEBRIS, <http://www.epa.gov/region09/waste/solid/pdf/cd1.pdf> (last visited Jan. 12, 2010); and, Tom Napier, Construction Waste Management, U.S. Army Corps of Engineers, Engineer Research and Development Center / Construction Engineering Research Laboratory (2008) <http://www.wbdg.org/resources/cwmgmt.php>.

² City of Portland Bureau of Planning and Sustainability, Construction, Remodeling and Demolition Waste, <http://www.portlandonline.com/osd/index.cfm?c=41683> (last visited Jan. 12, 2010).

³ SFENVIRONMENT, SAN FRANCISCO, CALIFORNIA ORDINANCE NO. 27-06, <http://www.sfenvironment.org/downloads/library/ondemolitionordinancefinal.pdf> (last visited Jan. 12, 2010).

⁴ SFENVIRONMENT, CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING, http://www.sfenvironment.org/our_programs/interests.html?ssi=3&ti=5&ii=125 (last visited Jan. 12, 2010).

RC 2: PROVIDE RECYCLING AREAS IN APARTMENT BUILDINGS

New York City Building Code

Proposal developed by the Materials & VOCs Committee

Summary

Issue:

In many buildings, the lack of a dedicated recycling space impedes recycling

Recommendation:

Require new multi-family residential buildings to provide adequate space to store and sort recyclable materials

Proposed Legislation, Rule or Study

Amendments to the New York City Building Code:

1. Amend Section 1213 as follows:

1213.1 General. Multiple dwellings shall comply with Section 81 of the New York State Multiple Dwelling Law and Section 27-2021 of the New York City Housing Maintenance Code. Where a room [is] or rooms are provided for the storage of refuse and/or recyclables in a building, such room or rooms shall be completely enclosed by construction that has a fire resistance rating of not less than 2 hours, with self-closing opening protectives having a fire protection rating of not less than 1 ½ hours. The location of such refuse storage room or rooms shall be identified on the construction documents.

1213.2 Compactor. A refuse compacting system shall be provided in multiple dwellings in a Group I-1 or R-2 occupancy that are four or more stories in height and contain 12 or more dwelling units, and in buildings of any size occupied as a Group R-1 multiple dwelling. Such system shall be located within a refuse storage room constructed in accordance with Section 1213.1 or in a refuse chute termination room constructed in accordance with Section 707.13.4. The floor within such room shall be constructed of concrete and shall be sloped to a floor drain connected to the building sewer. A hose connection shall be provided within such room.

1213.3 Refuse chute. A multiple dwelling that is five or more stories in height and that contains more than 12 dwelling units shall be provided with a refuse chute, refuse chute access rooms, and refuse chute termination room constructed in accordance with Section 707.13.

1213.4 Central Refuse Storage Room. Any building classified in occupancy groups R-1 or R-2 that contains 12 or more dwelling units shall contain at least one central refuse storage room. The central refuse storage room or rooms shall contain sufficient space for the storage of both refuse and recyclables, separated in accordance with the requirements of the Department of Sanitation, and shall comply with the minimum area requirements of Table 1213.4.

Table 1213.4

<u>Number of dwelling units</u>	<u>Minimum size of refuse storage room</u>
<u>12-23</u>	<u>65 square feet</u>
<u>24-49</u>	<u>100 square feet</u>
<u>50-99</u>	<u>150 square feet</u>
<u>100 or more</u>	<u>150 square feet plus 1 square foot per dwelling unit over 99 units up to a maximum of 250 square feet.</u>

1213.5 Secondary Storage Rooms for Refuse and Recyclables. Any building classified in occupancy groups R-1 or R-2 that contains 12 or more dwelling units shall contain a secondary storage room for refuse and recyclable material on any floor with main entries to 6 or more dwelling units. Secondary storage rooms shall be a minimum of 10 square feet and shall contain separate receptacles for refuse, for recyclable paper products, and for recyclable metal, glass, and plastic.

Exceptions:

1. Floors with separate trash chutes for refuse, for recyclable paper, and for recyclable metal, glass, and plastic. Chutes for recyclable material shall be constructed in accordance with Section 707.13.
2. Where a refuse access room is provided on a floor that is constructed in accordance with Section 707.13.3 and such refuse access room is at least 8 square feet in area.

Supporting Information

Issue - Expanded

Recycling is good for the environment because it takes less energy and resources to make new products out of recycled materials than from new materials. It also has the potential to save the city money as the cost of exporting waste to out-of-state landfills continues to rise.

About 33% of New York's total waste stream (and 16% of residential waste) is recycled, putting the city just above the average national recycling rate of 32%. Other large cities have managed to vastly exceed this average. Los Angeles recycled over 60% of its total waste and Chicago over 55%; almost 70% of San Francisco's waste is recycled.

One barrier to increasing recycling rates in multi-family residential buildings is that many lack a dedicated room to store and sort recycling and waste. Without this dedicated space, it is challenging for residents or superintendents to keep recycling separated. For this reason, many other cities and Battery Park City Authority require that residential buildings provide a waste/recycling room.

Environmental & Health Benefits

By increasing the allotted space for recycling bins and thus increasing awareness and accessibility for recycling measures, this proposal will in effect increase the recycling rates for multi-family residential facilities. By increasing the recycling rates, less solid waste goes to landfills.

Cost & Savings

This proposal is not expected to have any significant impact on capital costs.

Precedents

Many municipalities including San Francisco, Santa Monica¹, and Portland require that residential buildings provide space for recyclables.² Within New York City, Battery Park City also has a space requirement for recyclables.

LEED

This recommendation is in accordance with LEED NC provided that criteria for separation of materials, size & accessibility of designated recycling storage areas, and location of collection areas are met. This issue is addressed as a prerequisite under almost all of the rating systems. Therefore, code revisions under this proposal could significantly impact a project's ability to attain LEED certification.

LEED requires that adequate space is provided for the storage of paper, corrugated cardboard, glass, plastics, and metals. Projects adhering to the code revisions outlined in this proposal will only comply with LEED if all of these materials are accommodated and if they are collected separately.

LEED 2009 also specifies a minimum size for refuse storage rooms in commercial buildings. Buildings 50,000-20,000 square feet are required to provide a room that is 225-275 square feet. The maximum room size required is 500 square feet for buildings of 200,000 square feet or greater.

Implementation and Market Availability

There are no known implementation issues for this proposal.

Notes

1. The committee initially considered requiring trash compactors in commercial buildings in order to consolidate waste and recyclable materials, thus reducing air pollution from transportation from the building. Ultimately, the committee did not include this provision because these benefits were not sufficiently understood or quantifiable.

2. The Zoning Resolution will also need to be revised to add “recycling” to all references to refuse, and to credit chutes for recycling in the same manner as chutes for refuse.

ENDNOTES:

¹ SANTA MONICA MUNICIPAL CODE ART. 9 § 4.10.02.150 (1994), available at http://www.qcode.us/codes/santamonica/view.php?topic=9-9_04-9_04_10-9_04_10_02-9_04_10_02_150.

² ASHRAE 198.1 § 9.3.4.3 (requires central collection for recycling with separate storage for paper, corrugated cardboard, glass, plastics and metals); BATTERY PARK CITY RESIDENTIAL ENVIRONMENTAL GUIDELINES (require secondary storage room on each floor; either separate bins or separate chutes for refuse and recyclables, and centralized holding areas holding a volume of 2.9CF/dwelling unit); SANTA MONICA, CA., PLANNING AND ZONING REGULATIONS, art. 9.04 (require minimum areas for recycled materials storage); ALAMEDA COUNTY, CA. (aims to divert 75% waste from landfills; ties area requirements to frequency of pick-up); CITY OF MOUNTAIN VIEW, CALIFORNIA (requires one 3-yard bin and 3 recycling carts for every 15 units); PORTLAND, OR., CITY CODE ch. 17 (requires recycling systems sized to meet the goal of achieving 75% recycling by 2015); REDMOND, WA. STANDARDS FOR GARBAGE AND RECYCLING ENCLOSURES 20D.120.40 (requires 65 square foot minimum area and stipulates 1.5 square foot/dwelling); WASHINGTON DC. DPW (has adopted a single-stream recycling. Recyclables are taken to the materials recycling facility (MRF) where they are separated and prepared for market); and (numerous other municipalities require residential recycling without stipulating space requirements for recyclable collection.).

RC 3: USE RECYCLED AGGREGATE IN CONCRETE

NYC Building Code and Administrative Code
Proposal developed by the Materials & VOCs Committee

Summary

Issue:

Waste concrete, asphalt, and glass can be reused as bedding material or as aggregate in new concrete, reducing construction waste and the need for virgin materials.

Recommendation:

Require a minimum amount of recycled concrete, asphalt, or glass as bedding material and within new concrete.

Proposed Legislation, Rule or Study

Amendments to the New York City Building Code:

1. Amend Section 1905 as follows:

1905.2 Selection of concrete proportions. Concrete proportions shall be determined in accordance with the provisions of Sections 1905.2.1 through [1905.2.3] 1905.2.5.

2. Add a new Section 1905.2.5 as follows:

1905.2.5 Minimum Recycled Content. In all concrete mixes for cast-in-place concrete, requiring a compressive strength of 4,000 psi or less, a minimum of 10% of the aggregate, as measured by weight, shall be recycled concrete. After July 1, 2013, this minimum shall be raised to 15% of the aggregate, as measured by weight. Concrete aggregate shall not exceed .75 inches in diameter, with no more than 1% deleterious material. The provisions of Section 1905.2.5 shall not apply to structures designed for the containment, storage, or conveyance of water, sewage, or other liquids.

3. Add a new Section 1911.2 as follows:

1911.2 Minimum Recycled Content in Base Course Materials. A minimum of 15% of all base course materials, measured by weight, shall consist of recycled concrete, recycled asphalt, or glass cullet. The recycled concrete materials shall have a maximum diameter of .75 inches, with no more than 5% deleterious material, and any glass shall have a maximum diameter of .375 inches. After July 1, 2013, this minimum shall increase to 25% of the base course, as measured by weight. Recycled asphalt shall not exceed 5% of the total weight.

4. Amend Tables 720.1(1), 720.1(2), 720.1(3), 721.2.1.1, 721.2.1.2(1), 721.2.1.4(1), 721.2.2.1, 721.2.3(1), 721.2.3(2), 721.2.3(3), 721.2.3(4), 721.2.3(5), 721.2.4 and 721.3.2, and Figures 721.2.2.2, 721.2.2.3(1) and 721.2.2.3(2) by adding a footnote as follows:

For the purposes of fire resistance, recycled concrete shall be considered siliceous aggregate, unless the aggregate in question can be documented, to the satisfaction of the building commissioner, to be of another type.

Amendments to the Administrative Code of the city of New York:

1. Add a new Section 6-308.1 as follows:

§ 6-308.1 Minimum recycled content in concrete and base course materials. a. No concrete mixes purchased by any agency that require a compressive strength of 4,000 psi or less shall contain concrete aggregate that is composed of no less than 10% recycled concrete, as measured by weight. After July 1, 2013, no such concrete mixes shall contain concrete aggregate that is composed of less than 15% recycled concrete, as measured by weight. All concrete aggregate shall not exceed .75 inches in diameter, with no more than 1% deleterious material. Notwithstanding the foregoing, the provisions of this subdivision (a) shall not apply to any concrete mixes intended to be used in structures

designed for the containment, storage or conveyance of water, sewage or other liquids.

b. No base course materials purchased by any agency shall contain less than 15% recycled concrete, recycled asphalt or glass cullet, as measured by weight. All such recycled concrete materials shall be a maximum of .75 inches, with no more than 5% deleterious material. All such glass cullet shall be a maximum of .375 inches in diameter. Recycled asphalt shall not exceed 5% of the total weight. After July 1, 2013, no such base course materials shall contain less than 25% recycled concrete, recycled asphalt or glass cullet, as measured by weight.

c. The department of transportation shall promulgate rules no later than July 1, 2011 that incorporate the standards for base course materials as set forth in subdivisions (a) and (b) in all specifications for sidewalk construction.

Supporting Information

Issue - Expanded

Each year in New York City, miles of concrete sidewalks and roadways are built or replaced, using thousands of tons of concrete. Much of the aggregate in this concrete is quarried gravel, as are much of the base courses below the streets and sidewalks, and the process of quarrying and shipping the gravel and shipping causes environmental degradation.

The need to quarry and transport gravel could be reduced by utilizing waste materials, which are plentiful in New York City, for some of the aggregate or in the base courses. This process could also save money by reducing the costs of disposing of these waste materials. Due to a lack of sufficient demand, the city's construction waste transfer stations generate excess concrete from demolition of buildings and infrastructure, which they pay to get rid of, driving up demolition costs. Similarly, the City is saddled with excess asphalt from resurfacing the roads and glass from the residential recycling program; disposing of the excess costs taxpayers money. Therefore, New Yorkers will experience multiple benefits by reusing waste concrete, asphalt, and glass as aggregate in new concrete or in base courses.

The use of recycled concrete as an aggregate and in base courses is well established technically. It is accepted by ASTM and AASHTO as a source of aggregate in new concrete and can meet or exceed all applicable state and federal specifications. It is currently being used in concrete and asphalt products with better performance over comparable virgin aggregates and it provides for superior compaction and constructability.

Recycled concrete also has the benefit of weighing 10%-15% less than quarry products, reducing material and hauling costs.

Environmental & Health Benefits

This proposal will reduce the use of virgin materials, the impacts of land disturbance from quarrying and the quantity of material sent to landfills. Because recycled concrete usually originates and is consumed in the same geographical area, fuel consumption for transporting quarried aggregate will also decrease.ⁱ

This proposal was found to have a low, positive environmental impact per building and to impact a small number of buildings. It was thus given an environmental score of 1.

This proposal was found to have no significant positive health impact.

Cost & Savings

This proposal is not expected to have any significant impact on capital costs.

While exact savings are difficult to quantify, savings will be realized in the feedstock costs for concrete and material costs for base courses, which should be distributed to some degree from the concrete and stone suppliers up the supply chain to the customers/residents of the facility, or, in the case of civil works, the taxpayer. Additional savings will come from the reduction in transportation costs and landfill fees due to the reduced disposal of old concrete.

Precedents

Although no known precedents exist requiring the use of recycled concrete as an aggregate, this is allowed by several municipalities and required by many federal agencies. For example, California includes the use of both recycled concrete and blast furnace slag as recycled aggregates in concrete mixtures.ⁱⁱ

LEED

LEED credits are available for the use of recycled Concrete Aggregate.

These credits include:

- LEED NC- MR cr.4.1 & 4.2 Recycled Content;

- LEED CI-MR cr. 4.1 & 4.2 Recycled content;
- LEED EB-MR cr.2 Optimize use of Alternative Materials;
- LEED for Schools MR cr.4.1 & 4.2 Recycled Content;
- LEED for Homes MR cr. 2 Environmentally Preferable Products; and
- credits under the various pilot programs.

Additionally, for concrete recycled on site, LEED MR credits relating to Construction Waste Management are available for diverting waste from disposal.

Implementation & Market Availability

There are no known implementation issues for this proposal. Recycled concrete from demolition waste is readily available

Some smaller concrete batch plants may need to create new mix designs to document their successful use of recycled aggregates, but the American Concrete Institute will provide technical assistance in to such companies. Technology does not impose any upper limit on the percent recycled concrete used in bedding material.

Notes

Concrete standards may be specified in tables or figures other than those identified in the fourth proposed amendment to the Building Code above and should be amended likewise.

ENDNOTES:

ⁱ Construction Materials Recycling Ass'n, Materials Website, <http://www.cdrecycling.org/materials> (last visited July 21, 2009).

ⁱ Fed. Highway Admin., Summary of Texas Recycled Concrete Aggregate Review, <http://www.fhwa.dot.gov/pavement/recycling/rcatx.cfm> (last visited Jan. 19, 2010).

ⁱⁱ CAL. CODE, Tit. 24 § pt. 11 § 706, 36 (2008), available at <http://www.documents.dgs.ca.gov>.

RC 4: USE RECYCLED ASPHALT

New York City Building Code and Administrative Code
Proposal developed by the Materials & VOCs Committee

Summary

Issue:

Asphalt pavement diverted from the construction waste stream can be reused as aggregate in new asphalt, greatly reducing construction waste and the need for virgin materials.

Recommendation:

Require a minimum amount of recycled asphalt as the base material for new asphalt aggregate.

Proposed Legislation, Rule or Study

Amendments to the New York City Building Code:

1. Add a new Section 3403.1 as follows:

SECTION BC 3403
PAVED AREAS

3403 Recycled content in asphalt. Beginning July 1, 2010, a minimum of 20% of all asphalt mixtures shall be recycled asphalt pavement (RAP), measured by weight. That minimum shall increase to 25% beginning July 1, 2014, and to 30% beginning July 1, 2018.

Amendments to the Administrative Code of the City of New York:

1. Add a new Section 6-308.1 as follows:

§ 6-308.1 Minimum recycled content in asphalt. No asphalt mixtures purchased by any agency shall contain less than 20% of recycled asphalt pavement, measured by weight. After July 1, 2014, no such asphalt mixtures shall contain less than 25% of recycled asphalt pavement measured by weight. After July 1, 2018, no such asphalt mixtures shall contain less than 30% of recycled asphalt pavement measured by weight. Notwithstanding the foregoing, the provisions of this section shall not apply to any asphalt intended to be used in aeronautical uses, highway projects funded by the federal government, or where asphalt content is otherwise prescribed by federal or state laws, regulations or guidelines.

Supporting Information

Issue - Expanded

Each year roughly 5% of New York City's streets are resurfaced. In the process, the top layers of asphalt are removed, and new layers are applied. About one million tons of asphalt is removed each year, and another one million tons is reapplied. If properly run, asphalt plants can reuse a considerable amount of recycled asphalt pavement (RAP) in creating new pavement material. The New York City Department of Transportation (DOT) has been an industry leader in using a high percentage of RAP; after having gradually increased its rates over many years, its current mix includes roughly 40% RAP. New York's private sector asphalt plants, however, lag behind, achieving an average recycling rate of roughly 15%, according to DOT. These rates can be increased, and this proposal gives the industry 8 years to gradually improve its techniques and increase its recycling rate to a minimum of 30%.¹

Environmental & Health Benefits

The primary environmental advantage to using recycled asphalt pavement (RAP) is that it prevents asphalt from entering landfills. Secondary advantages from this also include decreasing carbons emitted from using and transporting virgin materials as well as removing and transporting existing asphalt.

The chart below shows the impact of this proposal under two scenarios. In the first scenario, DOT does not increase its plant capacity - it remains at 45% of the market. In the second scenario, DOT increases its capacity to 75% of the market.

MVOC13 - Use Recycled Asphalt						
	milled asphalt (thousands of tons)	% currently recycled	current recycled asphalt (thousands of tons)	2010 recycled asphalt - 20% recycled (thousands of tons)	2018 recycled asphalt - 30% recycled (thousands of tons)	Impact: additional recycled asphalt 2018 (thousands of tons)
Scenario 1 (One DOT plant, 45% of city capacity)						
DOT	450	40%	180	180	180	
Private Plants	550	15%	82.5	110	165	82.5
Scenario 2 (Additional DOT plants, 75% of city capacity)						
DOT	750	40%	300	300	300	
Private Plants	250	15%	37.5	50	75	37.5

In the first scenario, this proposal would increase the use of recycled asphalt by 82,500 tons annually. To put this in perspective, the Dept. of Sanitation collects 13,000 tons of waste and recyclables daily, with another 13,000 tons collected from the commercial sector by private haulers. Therefore, the first scenario would result in the recycling of an amount of waste that is equivalent to over three day’s worth of residential and commercial collections from the entire city, on an annual basis.

This proposal was found to have a low, positive environmental impact per building and to impact a large number of buildings. It was thus given an environmental score of 2.

This proposal was found to have no significant positive health impact.

Cost & Savings

This proposal is not expected to have any significant impact on capital costs.

Precedents

The use of recycled asphalt pavement (RAP) has been widely utilized since the 1970s. Many municipalities across the country allow for the use of RAP and even dictate its use, including Utah,¹ California² and Colorado³. The Colorado Department of Transportation (CDOT) developed a specification in 1999 allowing 25% RAP in asphalt mixes.⁴ In addition, Chattanooga, TN implemented a new process in 2007 incorporating up to 50% RAP.⁵

LEED

LEED credits are available for the use of recycled asphalt aggregate feedstock.

These credits include:

- LEED NC- MR cr.4.1 & 4.2 Recycled Content;
- LEED CI-MR cr. 4.1 & 4.2 Recycled content;
- LEED EB-MR cr.2 Optimize use of Alternative Materials;
- LEED for Schools MR cr.4.1 & 4.2 Recycled Content;
- LEED for Homes MR cr. 2 Environmentally Preferable Products; and
- credits under the various pilot programs.

Additionally, for asphalt recycled on site, LEED MR credits relating to Construction Waste Management are available for diverting waste from disposal.

Implementation & Market Availability

There are no known implementation issues for this proposal. Recycled asphalt is readily available.

Notes

Some form of pavement recycling has been documented back to 1915.⁶ Nevada and Texas conducted the first sustained

efforts starting in 1974.⁷ Between 1976 and 1982, over 40 states documented RAP projects, and currently nearly all 50 states routinely use RAP as an aggregate substitute and binder.⁸ “Substitution rates of 10 to 50 percent or more, depending on state specifications, are normally introduced in pavements, and recently developed technology has even made it possible to recycle 90 to 100 percent RAP in hot mix.”⁹

“Recycling asphalt pavements is currently the largest single recycling practice in the United States. In 2002, 30,000,000 tons of RAP was used in hot mix asphalt (HMA) with a savings of over \$300 million, accomplished by lowering material costs for the newly placed asphalt and eliminating the disposal cost of the RAP.”¹⁰

ENDNOTES:

¹ UTAH CODE ANN. § 72-6-106 (1998), available at http://law.justia.com/utah/codes/title72/72_06007.html.

² CAL. PUB. RES. § 42700-42703 (2009), available at <http://lawyers.wizards.pro/california/codes/prc/42700-42703.php>.

³ Colorado Asphalt Pavement Association, *The Benefit of Using Recycled Asphalt Pavement*, 1, http://www.co-asphalt.com/documents/RAP_Brochure_all.pdf

⁴ *Ibid.*, 4.

⁵ International Council for Local Environmental Initiatives, *Chattanooga, Tenn., Uses Recycled Asphalt on Streets*, <http://www.icleiusa.org/success-stories/cool-infrastructure/roads-and-pavement/chattanooga-tenn-uses-recycled-asphalt-on-streets> (last visited Apr. 7, 2009).

⁶ Turner-Fairbank Highway Resource Center, *Reclaimed Asphalt Pavement*, FEDERAL HIGHWAY ADMINISTRATION, <http://www.tfhr.gov/hnr20/recycle/waste/rap132.htm> (last visited Jan. 19, 2010).

⁷ *Ibid.*

⁸ *Ibid.*

⁹ *Ibid.*

¹⁰ Bradley J. Putnam, et al., *Recycled Asphalt Pavement used in Superpave Mixes Made with Rubberized Asphalt*, 1 (2002), <http://www.ces.clemson.edu/arts/Mairepav4%20-%20RAP%20in%20Rubberized%20Asphalt2.pdf>. (last visited Jan. 19, 2010).

RC 5: PROTECT FORESTS BY USING SUSTAINABLE WOOD

New York City Building Code & New York City Administrative Code
Proposal developed by the Materials & VOCs Committee

Summary

Issue:

Forests store carbon, and tropical forests provide a habitat for half of the world's animal and plant species. Conventional forestry practices degrade forests and are unsustainable.

Recommendation:

Require that a portion of wood used in construction be sustainably harvested or come from reclaimed sources. Require that all tropical wood used in construction be sustainably harvested.

Proposed Legislation, Rule or Study

Amendments to the New York City Building Code:

1. Amend 2302.1 to include the following definitions:

CERTIFIED WOOD PRODUCT. A wood product that achieves the standards of a qualified forest certification program.

CHAIN OF CUSTODY CERTIFICATION. A process that provides documentary evidence verifying that a given wood product is derived from a certified forest of origin.

FOREST CERTIFIER. An independent, third-party organization that conducts comprehensive assessments of environmentally and socially responsible forest management practices and that is accredited by an independent, third-party accreditation body.

NON-TROPICAL WOOD SPECIES. Any wood species that is not listed in Table 2309.3.1.1 or rule promulgated by the department pursuant to such section.

QUALIFIED FOREST CERTIFICATION PROGRAM. An independent, third-party initiative that is deemed qualified by the department and provides, through one or more organizations, formal affiliates or contracted agents, an integrated package of services including, but not limited to: development and application of standards to assess and certify forest management; accreditation of certifiers; chain of custody certification; and awarding of certification by the program's accredited forest certifiers.

RECLAIMED WOOD PRODUCT. Wood that has been salvaged for reuse from an existing building or structure by a licensed wood reclamation business.

THIRD PARTY. Not having an ownership interest in the land or the management of the forests or chain of custody operation being evaluated, and independent from any forest trade association.

TROPICAL HARDWOOD SPECIES. A hardwood tree species typically found in tropical rainforests and listed in Table 2309.3.1.1 or rule promulgated by the department.

TROPICAL RAINFOREST. Forests that are usually found near the equator and typically characterized by high rainfall and biodiversity. Tropical rainforests are common in Asia, Australia, Africa, South America and Central America.

2. Add a new Section 2309 as follows:

2309.1 Non-tropical wood.

2309.1.1 Applicability. This section shall apply to any construction projects with a work area greater than five thousand (5,000) square feet.

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2309.1.2 Certified Wood Products and Reclaimed Wood Products. A portion of any non-tropical wood used for dimensional lumber, construction-grade plywood or flooring, or used for any other purpose designated by the commissioner, shall be certified wood products or reclaimed wood products in accordance with the dates and percentages listed in Table 2309.1.1. Compliance with such percentages may be demonstrated in terms of the total weight, volume or cost of such non-tropical wood. Calculations may include wood products purchased for temporary use on the project, such as formwork, bracing, scaffolding, sidewalk protection and guard rails. If any such materials are included, all such materials must be included in the calculations.

Table 2309.1.1

<u>Date</u>	<u>Percentage Certified Or Reclaimed Wood Products</u>
<u>2010</u>	<u>10%</u>
<u>2013</u>	<u>15%</u>
<u>2016</u>	<u>20%</u>
<u>2019</u>	<u>25%</u>

2309.2 Qualified Forest Certification Programs.

2309.2.1 Standards. The mayor’s office of long-term planning and sustainability shall determine, through rulemaking, standards for the qualification of forest certification programs.

2309.2.2 Qualifying Programs. The mayor’s office of long-term planning and sustainability shall determine, through rulemaking, and list those forest certification programs that meet the standards of Section 2309.2.1.

2309.3 Tropical hardwood.

2309.3.1 Generally. At least once every two years, the commissioner shall review and, if necessary, update or revise Table 2309.3.1.1 to ensure it contains a complete list of tropical hardwood species used in New York city construction.

Table 2309.3.1.1
Tropical Hardwood Species

<u>Common Name</u>	<u>Scientific Name</u>
<u>African Mahogany</u>	<u>Kyaya ivorensis</u>
<u>African Padauk</u>	<u>Pterocarpus soyauxii</u>
<u>Afromosia</u>	<u>Pericopsis elata</u>

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<u>Almon</u>	<u>Shorea almon</u>
<u>Amaranth</u>	<u>Peltogyne spp.</u>
<u>Amazaque</u>	<u>Guibourtis ehie</u>
<u>Amer. Mahogany</u>	<u>Sweletenia macrophylla</u>
<u>Andiroba</u>	<u>Carapa guianensis</u>
<u>Angola Padauk</u>	<u>Pterocarpus angolensis</u>
<u>Aningeria</u>	<u>Aningeris spp.</u>
<u>Apilong</u>	<u>Dipterocarpus grandifloris</u>
<u>Balsa</u>	<u>Ochroma lagopus</u>
<u>Banak</u>	<u>Viola spp.</u>
<u>Bella Rose</u>	<u>Anisoptera thurifera</u>
<u>Benge</u>	<u>Guibourtis arnoldiana</u>
<u>Boire</u>	<u>Deterium senegalese</u>
<u>Cativo</u>	<u>Prioria copifera</u>
<u>Chenchen</u>	<u>Antiaris africana</u>
<u>Concobola</u>	<u>Dalbergis retusa</u>
<u>Corida</u>	<u>Cordia spp.</u>
<u>Cumaru</u>	<u>Dipteryx odorata</u>

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<u>Ebony</u>	<u>Diospyros spp.</u>
<u>Gaboon</u>	<u>Aucoumes kleineana</u>
<u>Greenheart</u>	<u>Chlorocardium rodiei</u>
<u>Ipe</u>	<u>Tabebuia</u>
<u>Iroko</u>	<u>Chlorophors excelsa</u>
<u>Koa</u>	<u>Acacia koa</u>
<u>Koto</u>	<u>Pterygota macrocarpa</u>
<u>Limba</u>	<u>Terminalia superba</u>
<u>Louro</u>	<u>Aniba duckei</u>
<u>Makora</u>	<u>Tieghemella leckellii</u>
<u>Merbau</u>	<u>Intsia</u>
<u>Movinqui</u>	<u>Distemonanthus benthamianis</u>
<u>Peroba</u>	<u>Aspidosperma spp.</u>
<u>Purpleheart</u>	<u>Peltogyne spp.</u>
<u>Ramin</u>	<u>Gonystylus spp.</u>
<u>Red Lauan</u>	<u>Shorea negrosensis</u>
<u>Rosewood</u>	<u>Dalbergia spp.</u>
<u>Sapela</u>	<u>Entandrophragma cylindricum</u>

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<u>Sonora</u>	<u>Shores philippinensis</u>
<u>Spanish Cedar (cedro)</u>	<u>Cedrela odorata</u>
<u>Tanguile</u>	<u>Shores polysperma</u>
<u>Teak</u>	<u>Tectona grandis</u>
<u>Tigerwood</u>	<u>Lovoa trichilloides</u>
<u>Wenge</u>	<u>Milletia laurentii</u>
<u>White Lauan</u>	<u>Pentacme contorta</u>
<u>Zebrawood</u>	<u>Microberlinia brazzavillensis</u>

2309.3.2 Certification requirement. Any wood product consisting of or containing any tropical hardwood species listed in Table 2309.3.1.1 may only be utilized if such material or product is a certified wood product.

Amendments to the New York City Administrative Code:

1. Amend Section 20-698 to include the following definition:

“Tropical hardwood species” shall mean a hardwood tree species found in tropical rainforests and listed in Table 2309.3.1.1 of the New York City Building Code or rule promulgated by the department of buildings pursuant to Section 2309.3.1 of such code.

2. Add a new subchapter to Chapter 4 of Title 20 that is similar in substance and structure to Subchapter 12 (Endangered or Threatened Species) but contains the following prohibition language:

Tropical hardwoods. Any new building material or furniture composed of or containing any tropical hardwood species that is purchased, sold or offered for purchase or sale after July 1, 2010 shall be a certified wood product or reclaimed wood product pursuant to section BC 2309 of the New York city building code.

Supporting Information

Issue - Expanded

Forests stabilize the global climate, create oxygen, and provide critical habitat for plants and animals. In the 1990s, forests were estimated to remove 2.6 billion tons of carbon from the atmosphere annually, an amount equivalent to about 33% of current emissions from human activities.¹

While healthy forests store and sequester carbon,² deforestation releases massive amounts of carbon dioxide into the atmosphere through burning vegetation, decomposing trees,³ and cultivating cleared land.⁴ Combined, deforestation is responsible for about 20% of the world’s greenhouse gas emissions.⁵ Conventional forestry practices also typically involve large-scale clearcutting and cause water and air pollution, soil erosion, stream sedimentation, habitat destruction, and waste generation. While many deforested areas are later reforested through replanting or natural regrowth, those forests are often ecologically poorer than the ones they replaced with lower soil depth and reduced species diversity.

A large share of carbon dioxide emissions from forestry originates in tropical regions, which suffer from higher deforestation rates than other parts of the world. Tropical forests store approximately 25% of the world’s carbon and their deforestation contributes approximately 1.5 billion tons of carbon to the atmosphere each year.⁶ Tropical

deforestation is also a concern because these forests provide habitat for half of the world's animal and plant species. New York City utilizes these tropical hardwoods because of their strength and durability for outdoor use. They can be found in boardwalks, benches, ferry piers, marine transfer stations and even in the Brooklyn Bridge promenade.⁷

Wood that is certified through organizations such as the Forest Stewardship Council provides the same strength and durability as conventional products, but certification ensures the wood has been harvested sustainably. Depending on the specific certification, the forester may: limit clear cuts, consider aquatic and sensitive sites, protect endangered species, preserve critical habitat, prevent soil erosion, incorporate community and stakeholder input, address regeneration and reforestation, prohibit certain chemicals, employ pest management techniques and carefully plan for the future condition of forests.⁸

According to contractors, concern about delays – not about materials costs – is the major barrier to more widespread use of certified and reclaimed wood in construction. Builders are reluctant to specify any product that is not readily available from major building suppliers and that could potentially hold up a project. Since wood is only used in small quantities in most New York City buildings, the cost premium for certified or reclaimed wood is of much smaller concern. A code requirement for certified or reclaimed wood will remove the supply barrier, as all building supply companies will stock these environmentally superior materials (see Implementation and Market Availability for a discussion of the market availability of certified wood).

Environmental & Health Benefits

This proposal will reduce greenhouse gas emissions and the range of negative environmental affects from conventional forestry practices. The proposal will also improve the market for certified wood and increase the range of available certified wood products.

This proposal was found to have a high, positive environmental impact per building and to impact a large number of buildings. It was thus given an environmental score of 3.

This proposal was found to have no significant positive health impact.

Cost / Savings

As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1st draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.

This proposal was estimated to increase first capital costs by 0.0% to 0.2%, depending on building type. It was thus categorized as incurring no to a medium capital cost increment.

Precedents

There are no known precedents for this proposal.

LEED

Currently only wood products certified by the Forest Stewardship Council (FSC) meet the qualifications under LEED for certified wood. To the extent FSC wood is used to comply with this proposal in New York, such wood this proposal will assist in achieving the following LEED credits (including pilot programs under development):

- LEED NC-MR cr.7 Certified Wood
- LEED CI-MR cr.7 Certified Wood
- LEED EB-MR cr.2 Optimize Use of Alternative Materials
- LEED for Schools MR cr.7 Certified Wood
- LEED for Homes MR cr.2.1 FSC Certified Tropical Wood

Implementation and Market Availability

There are no known implementation issues for this proposal, as certified wood products are readily available. The most widely recognized wood certification body is the Forest Stewardship Council (FSC), the only such organization whose standards are recognized by LEED and endorsed by major environmental organizations. While other certification systems exist in North America, they are considered to be less protective of forests and influenced by industry concerns.

All 308,741 hectares (762,898 acres) of New York State-owned forest are FSC-certified,⁹ and there are over 11,751,598 hectares of FSC-certified forests in the United States.^{10 11} Marjam Supply Company and Green Depot, major local suppliers of building materials, report no difficulty in sourcing FSC wood products in New York City and that lumber companies quickly responded to changes in demand.¹² In particular, Marjam / Green Depot identified dimensional lumber, construction-grade plywood and flooring as the categories of wood products most easily available as FSC. Many other wood products are available as FSC, but are less readily available, including architectural grade plywood, veneers, particleboard, fiber board, windows and doors.

Notes

The committee limited the types of wood products covered by the certified / reclaimed requirement to dimensional lumber, construction-grade plywood and flooring. As discussed in Implementation and Market Availability, these are the categories of FSC-certified wood products most readily available from suppliers in New York City. It is probable that if the city required a wider list of wood products to be FSC-certified the market would respond to ensure availability. However, given this proposal may represent the first mandate for certified wood products by a major city, the committee opted for a conservative approach while granting the Commissioner of the Department of Buildings the authority to expand the scope of covered wood products in the future.

Table 2309.3.1.1 contains a list of tropical hardwood species known to be used in NYC construction at this time. However, fashions change quickly and new tropical hardwood species regularly enter the market. As required in Section 2309.3.1, it will be important for the city to keep Table 2309.3.1.1 up to date.

ENDNOTES:

¹ ENVIRONMENTAL DEFENSE FUND, REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION IN DEVELOPING COUNTRIES (REDD): IMPLICATIONS FOR THE CARBON MARKET 1 (2008) http://www.edf.org/documents/7975_REDDandCarbonMarketAnalysisReport_EDF_0508.pdf.

² Ibid.

³ PERVAZE A. SHEIKH, ET AL., CONGRESSIONAL RESEARCH SERVICE, CLIMATE CHANGE AND INTERNATIONAL DEFORESTATION: LEGISLATIVE ANALYSIS 1 (2008) <http://www.nationalaglawcenter.org/assets/crs/RL34634.pdf>.

⁴ Ibid.

⁵ ENVIRONMENTAL DEFENSE FUND, REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION IN DEVELOPING COUNTRIES (REDD): IMPLICATIONS FOR THE CARBON MARKET 3 (2008) http://www.edf.org/documents/7975_REDDandCarbonMarketAnalysisReport_EDF_0508.pdf.

⁶ Ibid. at 1.

⁷ MEMORANDUM FROM ROHIT T. AGGARWALA, DIRECTOR OF LONG-TERM PLANNING AND SUSTAINABILITY TO MAYOR MICHAEL R. BLOOMBERG ON THE TROPICAL HARDWOOD REDUCTION PLAN (February 11, 2008), http://www.nyc.gov/html/om/pdf/tropical_hardwoods_report.pdf.

⁸ DEANNA NEWSOM AND DAPHNE HEWITT, THE RAINFOREST ALLIANCE, THE GLOBAL IMPACTS OF SMARTWOOD CERTIFICATION (2005), http://www.rainforest-alliance.org/forestry/documents/sw_impacts.pdf.

⁹ New York Joins Elite Company with Certified "Green" Forests, NY DEP 2008 PRESS RELEASES, Mar. 10, 2008, <http://www.dec.ny.gov/press/42552.html>.

¹⁰ FOREST STEWARDSHIP COUNCIL, GLOBAL FSC CERTIFICATES: TYPE AND DISTRIBUTION 2-3 (2009), http://www.fsc.org/fileadmin/web-data/public/document_center/powerpoints_graphs/facts_figures/09-03-16_Global_FSC_certificates_-_type_and_distribution_-_FINAL.pdf.

¹¹ N.Y. Department of Environmental Conservation Achieves FSC Certification, INTERIORS & SOURCES, May 2008, available at <http://www.buildings.com/Magazine/ArticleDetails/tabid/3413/ArticleID/6048/Default.aspx>.

¹² Email from Jim Holiber, General Manager & Corporate Counsel, Green Depot, LLC (Feb. 13, 2009).