

Hugh L. Carey Battery Park City Authority  
Residential Environmental Guidelines

May 2005



The original Hugh L. Carey Battery Park City Authority Residential Environmental Guidelines were written in 1999 and published in January 2000. They were sponsored by the Hugh L. Carey Battery Park City Authority, the New York State Energy Research and Development Authority, and the Carrier Corporation and written by Fox & Fowle Architects, Flack + Kurtz, Green October, the Rocky Mountain Institute, the Carrier Corporation, Barney Skanska USA, the Hugh L. Carey Battery Park City Authority, and the New York State Energy Research and Development Authority.

The current version incorporates what we have learned from *The Solaire*, the first building developed under these guidelines, and is a response to the evolving technology, philosophy, and feasibility of green development.



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## **Mission Statement**

The purpose of these guidelines is to establish a process for the creation of environmentally responsible residential buildings that are appreciably ahead of current standards and practices for development. The residential buildings created by this effort will become the model for healthy, ecologically responsible environments where occupants collectively enjoy the benefits of living in a “green” community.



## Introduction

### **Sustainable Design**

Sustainable design is “meeting the needs of the present without compromising the ability of future generations to meet their own needs.” In most instances, this is a “common sense” approach to development that prevents further depletion of natural resources, air pollution, and global warming. This approach decreases dependency on non-renewable resources while improving opportunities for more efficient and economical alternatives that are self-sustaining. Selecting proper materials in conjunction with providing increased mechanical ventilation and a filtered fresh air system fosters healthier living, benefiting the building’s residents and ultimately, the environment at large.

### **Market Strategy**

The following guidelines adhere to the most current thinking with respect to sustainable design strategies and are a vehicle for the development of residential buildings that are both environmentally and financially rewarding. The guidelines have been tailored specifically for the Hugh L. Carey Battery Park City Authority (BPCA), an established leader in urban development. The guidelines respond to increased public awareness of environmental conservation and increased demand for healthier, high quality living environments. Incorporating sustainable principles in the development of the residential buildings serves to enhance the current marketing strategies that continue to make Battery Park City a successful endeavor.

### **Total System Approach**

A “total system approach” is the backbone of the guidelines and the best approach to achieving the desired result in a cost effective manner over a building’s lifetime. Therefore, the guidelines are grouped into five major categories – each comprised of requirements that share a common environmental goal. One of the financial goals of a total system approach is to minimize the impact on initial costs (construction costs) by offsetting increases from some requirements with decreases from others. For example, the cost of improving the performance of the exterior envelope of the building may be offset by a reduction in the size and subsequent cost of mechanical equipment. Initial cost is further offset by the annual financial and environmental costs over the life of the building.

### **LEED™**

In creating the Residential Environmental Guidelines, the Hugh L. Carey Battery Park City Authority is indebted to the United States Green Building Council (USGBC) for its development of the Leadership in Energy and Environmental Design (LEED™) Green Building Rating System, which has provided a national standard for “green building” practices.

## Introduction (cont.)

### Execution

Successful execution of the guidelines depends on developers, design professionals, and contractors beginning their dialogue at the earliest stages of design to ensure the proper and cost effective realization of sustainable solutions. These guidelines do not represent a complete resource, but rather a framework of concepts that may be interpreted and refined by the individual design and construction teams to achieve the desired result. While some of the requirements are prescriptive, most are deliberately goal-oriented to provide for creative solutions that take advantage of rapidly changing technologies or evolving policies, regulations, and building codes.

The guidelines contain basic requirements that must be followed. Additionally, the development team is presented with a series of suggestions that they may elect to include in the project to raise the standards to a higher level [see Suggested Additional Measures]. Additional options are not limited to the suggestions and creativity is encouraged. The intent is to move technology and sustainability forward and create the most sustainable building possible for tenants and all those who look at these buildings as models that can be emulated beyond Battery Park City. Choosing additional alternates is encouraged and using more than the minimum will add points toward the green evaluation of the developer's proposal.

The developer is to employ a LEED<sup>™</sup> Accredited Professional (LEED<sup>™</sup> AP) as Green Team Leader to manage the green program, including record keeping and educational mandates set forth in these guidelines. Additionally, the design team is to employ a LEED<sup>™</sup> AP with expertise in green building materials and technologies to review all specifications and drawings for conformance with these guidelines.

The developer is required to attain a LEED NC Gold certification at minimum, and to obtain a LEED EB certification every five years post-occupancy. BPCA will attain LEED CI Gold certification for the community space in the base of the building.

### Funding Sources

Various organizations offer financial incentives to foster green buildings and sustainable energy sources, most notably the New York State Green Building Tax Credit and the New York State Energy Research and Development Authority. For more information, please refer to the List of Resources.

## 1.0 Energy Efficiency

### General Provisions

#### *Intent:*

Improve whole building energy performance, reduce operating costs, and reduce the environmental impact associated with energy consumption. Maximize energy efficiency and use available technologies to evaluate energy performance throughout the design process. Maximize opportunities for on-site power generation from high efficiency cogeneration plants and renewable sources. Purchase “green power” from energy providers whenever possible.

#### *Assumptions:*

Buildings will be designed to exceed the requirements of the 2002 Energy Conservation Construction Code of New York State (ECCCNYS).

An integrated architectural/engineering design approach to the whole building is required to meet the goals set for energy efficiency.

## 1.0 Energy Efficiency (cont.)

### 1.1 Maximizing Energy Efficiency

*Intent:*

Increase energy performance, reduce operating costs, and reduce the environmental impact associated with energy consumption.

*Requirements:*

- .1 Increase energy efficiency by 30% over the 2002 ECCCNY, measured in terms of energy cost. This percentage improvement refers to regulated energy, as defined by the New York State Green Building Tax Credit regulations. Specifically, the regulated energy excludes elevators, escalators, plug loads, appliances, kitchen equipment, other process equipment (e.g., garbage compacting), exterior lighting and tenant-installed lighting. The regulated energy specifically includes permanent lighting installed by the developer in apartments.
- .2 "Right-size" mechanical equipment for each apartment according to apartment size, layout, location within building, and occupancy needs. The methodology for right-sizing must consider both the expected peak individual loads and peak coincident loads for central systems, minimizing energy use and building total peak loads. (see § 1.2.1).
- .3 Provide motion sensors in stairwells, corridors, mechanical rooms (where operationally feasible), garages, and storage rooms to reduce lighting loads.
- .4 In all apartments, provide a "master switch," located adjacent to the front door, which controls all ambient lighting and switched outlets. Clearly identify outlets connected to the master switch.
- .5 The minimum standard for all windows and exterior glazing assemblies will be double-glazed units with Low-E glass (U-factor of 0.33 or less and solar heat-gain coefficient of 0.37 or less) with thermally broken frames and insulated spacers.
- .6 Install a double layer of insulation, backer rods, and caulking at top of masonry walls and wall/slab junctions.
- .7 Optimize insulation of cavity wall construction. Consider installing rigid or semi-rigid insulation against the winter/cold CMU surface and limiting infiltration through walls by providing an exterior air/water barrier applied to the winter/cold surface of the CMU.

## 1.0 Energy Efficiency (cont.)

### 1.1 Maximizing Energy Efficiency (cont.)

#### *Requirements (cont.):*

- .8 Conduct continuity tests for air, thermal, and water barriers. Perform pressure-assisted smoke tests to detect and remedy pathways for air leakage in exterior walls. Alternatively, perform blower door tests where portions of the exterior wall are covered/uncovered in sequence to detect and remedy the zones of excessive leakage. Other procedures may be accepted by BPCA at its discretion.
- .9 Use only “Energy Star” or equivalent equipment, appliances, lighting, and fixtures (refer to [www.energystar.gov](http://www.energystar.gov) and [www.aceee.org](http://www.aceee.org) for latest list of energy-efficient appliances).
- .10 In all apartments, provide only natural gas cook tops, ovens, and ranges in lieu of electric.
- .11 Provide thermal energy recovery systems to utilize residual heat from all building systems (i.e. from cooling tower, exhaust air vents, boiler or chiller systems, etc.)
- .12 Design the building’s electrical distribution system to allow for maximum utilization of electric demand reduction and demand response technologies and strategies.
- .13 Use alternatives to the electric resistance humidification system to increase energy efficiency. See also §2.1.7 for humidification requirements.

#### *Technologies/Strategies:*

- Use spectrally-selective glazing to minimize solar heat gain coefficients, retain high visible light transmittance, and maximize insulating qualities.
- Use window treatments (solar shades, curtains, brise-soleils, light-shelves, etc.) to maximize natural light and minimize heat gain.
- Use energy efficient heating and cooling mechanical systems, such as condensing boilers, absorption chillers, individual water-cooled heat pumps with EERs (Energy Efficient Ratings) that are 10-15% more efficient than those required by code, and cooling to ground or cooling towers with wetbulb reset control and variable speed drives on fans.
- Strongly consider variable-speed drives (VSDs) for all fans, pumps, and motors to increase energy efficiency.

## 1.0 Energy Efficiency (cont.)

### 1.1 Maximizing Energy Efficiency (cont.)

#### *Cost Implications:*

- By “right-sizing” the mechanical equipment serving the apartments and the base building, there should be some initial cost savings in equipment, piping, and wiring. This savings can be used for higher quality exterior envelope components, more efficient lighting, and advanced controls.
- Substantial energy savings.
- Decrease in life-cycle and operating costs.

## 1.0 Energy Efficiency

### 1.2 Modeling for Energy Performance

#### *Intent:*

Use the DOE-2.X, Energy Plus, or eQuest (using BPCA stated assumptions and implemented by consultant reporting directly to the Owner) computer modeling to forecast energy performance, reduce operating costs, to subsequently reduce the environmental impact associated with energy consumption, and to help “right-size” mechanical systems.

#### *Requirements:*

- .1 The developer shall prepare the initial energy model based on BPCA’s list of base case assumptions to establish a standard for the project. The developer’s engineering consultant will utilize this model as the design progresses to assess the energy efficiency of the building and evaluate systems and design alternatives at appropriate milestones (DD, CD).
- .2 In the first Annual Building Report (see § 4.4.3, Submittals), the developer shall provide a section comparing the energy performance data projected by the model during the design phase with actual building performance data collected after reaching 90% occupancy.
- .3 The developer shall install dedicated meters to provide data sufficient to evaluate individual EEMs and specialized building systems (i.e. HVAC, lighting, central plant, and green cogeneration equipment), as well as overall building performance. (Exact number of metering points and specific EEMs metered to be agreed upon with BPCA; for additional guidelines regarding performance reports, see § 4.4.3).

#### Specific monitoring requirements:

- .a Chillers (each chiller)
  - Energy input
  - Energy extracted
- .b Boilers for heating and DHW (each boiler)
  - Energy input
  - Energy supplied
- .c Heat pumps (5 apartments)
  - Electricity input
  - Heat extracted or supplied
- .d Pumps with VSD (all)
  - Electricity input
- .e Pumps for cooling towers (all)
  - Electricity input
- .f Fans with VSD (all)
  - Electricity input

## 1.0 Energy Efficiency (cont.)

### 1.2 Modeling for Energy Performance (cont.)

#### *Requirements (cont.):*

- .g Fans for cooling towers
  - Electricity input
- .h Fans actuated with CO sensors (all)
  - Electricity input or periods of operation
  - Electricity input
- .i Thermostats (5 apartments)
  - Temperature settings
- .j Combined heat & power (CHP)
  - Energy input
  - Electricity output
  - Heat recovered
- .k Heat recovery other than CHP
  - Btu
- .l Geothermal heat pumps system
  - Heat extracted from/rejected to ground
  - Electricity used by heat pumps
  - Electricity use by well & water loop pumps
- .m Corridor lighting (3 floors)
  - Lighting electric use or functioning of occupancy sensors
- .n Stair lighting (1)
  - Same as corridors
- .o Water use by cooling tower
  - Potable
  - Black or gray
  - Storm (if separated from black/gray water)
- .p Storm water use
  - All uses combined
- .q Black water
  - Recovered
  - Used (need not be separately accounted from storm)
- .r Photovoltaics (PV)
  - Electricity produced
- .s DC & AC Wind
  - Same as PV
  - Wind speed

## 1.0 Energy Efficiency (cont.)

### 1.2 Modeling for Energy Performance (cont.)

#### *Technologies/Strategies:*

- Utilize computer modeling to facilitate an interactive process by which the developer, architect, engineer, and contractor team can adequately explore opportunities for energy conservation.

#### *Cost Implications:*

- Substantial energy savings.
- Potential increase in professional fees.

## 1.0 Energy Efficiency

### 1.3 Renewable Energy & Green Power Sources

*Intent:*

Employ the use of on-site, non-polluting, green, and source-renewable technologies to reduce pollutants in the atmosphere, reduce operating costs, and reduce the environmental impact associated with energy consumption. Purchase from energy providers that utilize water, wind, solar, and fuel cell sources to generate power. The goal would be to generate in the next 10 years, 15% of the electrical energy needs of the building on-site.

*Requirements:*

- .1 Provide clean combined heat and power technologies: microturbines, fuel cell and/or bio fuel cogeneration equipment. Provide a cogeneration system that demonstrates a total energy efficiency (electric generation + recovered heat)/ (total fuel input) of at least 75% with an electrical conversion ratio of at least 25% (net) and with emissions compliant with 40CFR 60, Regulation 10, Subpart GG, and Bay Area Air Quality Management District Regulation 9-9-301.
- .2 Provide on-site renewable energy generation systems such as building integrated photovoltaics (BIPVs), and/or wind power that contribute a minimum of 0.75% of the energy (kWh) of the base building. This production usually requires the equivalent of a photovoltaic array with a rated capacity of approximately 5% of the base building's regulated equivalent peak demand.
- .3 Specify adaptable equipment that can accept multiple fuel sources when available (i.e. bio fuels versus natural gas).
- .4 Use best efforts to enter into a 5-year contract to purchase 25% of the base building's power from energy providers that utilize water, wind, solar, and/or fuel cell sources to generate power.

## 1.0 Energy Efficiency (cont.)

### 1.3 Renewable Energy & Green Power Sources (cont.)

#### *Technologies/Strategies:*

- Green energy technology is advancing rapidly. By providing space and infrastructure (natural gas supply, electrical connection to switchgear room) it will be possible to utilize this technology at a later date without increased cost.
- Where appropriate, strongly consider using BIPVs in locations that are highly visible to the public. Use best efforts to incorporate other renewable energy technologies (e.g., wind turbines).
- Negotiate power agreements with local renewable energy providers.

#### *Cost Implications:*

- Increase to initial costs with long-term payback.
- It is expected that in the future, fuel cells will be able to produce electricity at approximately 25-30% of today's cost.
- Possible increase in central-source rates due to reduced usage.



## 2.0 Enhanced Indoor Environment Quality (IEQ)

### **General Provisions**

#### *Intent:*

Employ architectural and HVAC design strategies that will provide a superior overall indoor environment that supports the health and well-being of occupants.

#### *Assumptions:*

The ideal building solution will integrate architecture and engineering to create healthy environments that engender increased comfort and productivity. Tenants will be encouraged, by means of developer-prepared documentation and instruction, to participate and strengthen the goal of achieving enhanced indoor environment quality.

## 2.0 Enhanced Indoor Environment Quality (IEQ) (cont.)

### 2.1 Indoor Air Quality (IAQ)

*Intent:*

Provide an interior environment whose air quality is superior to that of the exterior environment.

*Requirements:*

- .1 Ventilation rates: Use ASHRAE 62.2 as the reference standard for indoor air quality performance. After adoption of the International Building Code by New York City or by existing waiver, currently in place, between the Department of Buildings and the BPCA via a Memorandum of Understanding, the following ventilation rates are recommended:

Unit Type	CFM Exhaust	CFM Supply
<b>Studio</b>	80	80
<b>1br + 1bath</b>	80	80
<b>1br + 2bath</b>	100	100
<b>2br + 1bath</b>	80	80
<b>2br + 2bath</b>	100	100
<b>3br + 2bath</b>	100	100
<b>3br + 3bath</b>	120	120
* 60 cfm from each kitchen + 20 cfm from each toilet		
** add 70 CFM exhaust and supply for each dryer		

- .2 Ventilation distribution:
  - .a Provide a dedicated (24 hours-a-day/7 days-a-week) central outside air system, individually ducted to each apartment, that delivers tempered air (min. 68° F, humidified) air during heating conditions and cooled (max. 76° F, dehumidified) air during cooling conditions. The fans supplying outside air shall have variable speed drives.
  - .b Provide ducted ventilation supply air within each apartment so that fresh air is evenly distributed to each room, except the kitchen and the bathrooms.
  - .c Provide ventilation supply air to corridors as per applicable codes, with no exhaust, to maintain positive pressurization relative to apartments and thus prevent odor and smoke migration from apartments to corridors.

## 2.0 Enhanced Indoor Environment Quality (IEQ) (cont.)

### 2.1 Indoor Air Quality (IAQ) (cont.)

#### *Requirements (cont.):*

- .3 Filtration of air: Provide a filtering system to filter particle and ozone from the outdoor air. Particle filtration to be provided using filters with Minimum Efficiency Reporting Value (MERV) of at least 13 for exterior air and MERV of at least 10 for interior recirculation units; provide a separate filtration system to remove ozone from outdoor air.
- .4 Airtightness of each apartment: Air seal all six sides of each apartment to 1.25 sq. inches ELA (4 pascals) per 100 square feet of enclosure (e.g. exterior walls, walls between apartments, walls between apartment and chases, walls between apartment and corridor, floors/ceilings). Test each apartment via unguarded fan pressurization test (windows open in surrounding units). Figure to be obtained from an average of one pressurization and one depressurization test. Air seal parking garage, boiler room, trash rooms and similar spaces with dedicated ventilation from all other building spaces.
- .5 Exhaust ventilation: Provide fan powered exhaust for each apartment to equal total outdoor supply air.
  - .a Provide each bathroom with a minimum of 20 cfm continuously running exhaust.
  - .b In addition to the bathroom and general exhaust, provide exhaust hoods for all kitchens in accordance with ASHRAE 62. Use condensing dryers, or, if ducted dryers are used, include controls to limit energy usage of exhaust such as by utilizing variable volume outside air to space to provide dryer makeup only when dryer is in operation.
  - .c Duct all exhaust (toilet, kitchen, laundry) with full sheet metal linings.

## 2.0 Enhanced Indoor Environment Quality (IEQ) (cont.)

### 2.1 Indoor Air Quality (IAQ) (cont.)

#### *Requirements (cont.):*

- .6 Provide walk-off grilles, capable of being easily removed for maintenance, at the interior of all building entrances to capture potential contaminants and dirt, and to decrease maintenance requirements.
- .7 Provide humidity stabilization throughout the year to all occupied building spaces. Provide a benchmark 68° F 30% RH in winter and 76° F 50% RH in summer. Humidification during heating periods may be reduced when ambient conditions fall below ASHRAE 97.5% design conditions (i.e. below 15° F in NYC).
- .8 Thru-wall heating/cooling systems are prohibited.
- .9 Do not locate outside air intake ducts in the garage, boiler room, trash room, or similar spaces with dedicated ventilation.

#### *Technologies/Strategies:*

- Provide a thermally comfortable environment with humidity levels that are responsive to the local climate conditions and reduce health related issues for occupants.
- Advise tenants of the exterior air quality to reduce the potential introduction of pollutants from unfiltered air.
- Locate the building's outside air intakes away from loading areas, building exhaust fans, cooling towers, and other sources of contamination.
- Locate building maintenance areas away from residential floors and provide ducted exhaust to the roof.
- Use best practices for interior pest management (see § 2.5).
- Ensure proper and periodic monitoring of hazardous chemicals (VOCs, solvents, etc.) and particulate levels during regular building operation (see § 4.3.2).

#### *Cost Implications:*

- Increase in initial costs to HVAC systems.
- Increase in maintenance costs for air filter replacement.

## 2.0 Enhanced Indoor Environment Quality (IEQ) (cont.)

### 2.2 Low-Emitting Materials

#### *Intent:*

Specify materials and finishes (including flooring and furniture) that contain no known carcinogens, have low levels of volatile organic compounds (VOCs), and are non-toxic and chemically inert to reduce the amount of indoor air contaminants that are odorous, irritating, and unhealthy to occupants.

#### *Requirements:*

- .1 "Products applied in the field" (see Glossary definition) shall meet the VOC and chemical component limits of Green Seal ([www.greenseal.org](http://www.greenseal.org)) requirements or (if no certification criteria are available through Green Seal) the levels set forth in the *South Coast Air Quality Management District Rule #1168* ([www.aqmd.gov/rules/html/r1168.html](http://www.aqmd.gov/rules/html/r1168.html)) and the *Bay Area Air Quality Management District Regulation 8, Rule 51* ([www.baaqmd.gov/dst/regs/rg0851.pdf](http://www.baaqmd.gov/dst/regs/rg0851.pdf)).
- .2 Carpet systems installed by the developer must meet or exceed the Carpet & Rug Institute Green Label Plus Indoor Air Quality Test Program.
- .3 Prohibit the use of added urea-formaldehyde in composite and wood-based products.

#### *Technologies/Strategies:*

- Select only products and adhesive compounds with VOC levels that comply with the requirements of this section, thus providing a health benefit to construction workers and tenants.
- Strongly discourage the use of products with environmentally disruptive life-cycles and encourage their substitution with safer, less disruptive products.

#### *Cost Implications:*

- No or nominal increase in cost for all items, except composite wood. Most major manufacturers of paints, adhesives, carpets, and rugs have product lines which meet the requirements of this section.
- Some items, especially wood products, may add to initial cost.

## 2.0 Enhanced Indoor Environment Quality (IEQ) (cont.)

### 2.3 Controllability of Systems

#### *Intent:*

Increase occupant and operator control of HVAC and natural ventilation systems to support optimum health and comfort within the building.

#### *Requirements:*

- .1 Provide all apartments with programmable controls for HVAC systems based on a 7-day programmable thermostat with a copy function and four (4) separate programmable periods per day.
- .2 Provide computerized Building Management Systems (BMS) or equivalent controls for base building operation and monitoring. See §4.3 for Building Systems Monitoring Requirements.

#### *Technologies/Strategies:*

- Programmable controls will allow occupants to save energy by regulating air-conditioning/heating times of operation and temperature settings.
- Consider installing wall-mounted thermostats/controls, instead of HVAC-mounted units, to better represent room temperature and minimize exposure to factors that may have an undesirable effect, such as direct solar radiation.
- Consider thermostats that may be accessed remotely via phone or Internet.

#### *Cost Implications:*

- Increased initial costs for electronic HVAC controls.

## 2.0 Enhanced Indoor Environment Quality (IEQ) (cont.)

### 2.4 Lighting & Daylighting

#### *Intent:*

Implement design strategies to maximize access to daylight and outdoor views in a glare-free way to improve IEQ for building occupants.

#### *Requirements:*

- .1 In all apartments, increase natural light in habitable rooms by 30% over NYC Building Code requirements.
- .2 Maintain a minimum floor-to-ceiling height in habitable rooms of 8'-6".

#### *Technologies/Strategies:*

- Increase minimum size of habitable rooms
- Increase floor-to-ceiling heights and decrease distance of habitable spaces from windows.
- Design ground floor elevator lobbies to be visible from the street.
- Maximize window size as appropriate and consider incorporating light-shelves into windows to increase the amount of natural light in interior spaces.

#### *Cost Implications:*

- Increased initial costs.
- Decreased operating costs.

## 2.0 Enhanced Indoor Environment Quality (IEQ) (cont.)

### 2.5 Indoor Pest Control

#### *Intent:*

Pests (such as cockroaches, mice, and rats) and their excrement may be a source for asthma, allergies, and other health concerns for building occupants. In addition, the use of toxic chemicals to rid buildings of these pests can have an adverse affect on Indoor Environment Quality. Rather than relying on extermination practices, responsible pest management relies primarily on the proper and thorough sealing of passages, feeding areas, and breeding grounds that enable vermin to reproduce and move throughout a building.

#### *Requirements:*

- .1 The developer shall prepare and implement an Integrated Pest Management Plan (IPMP) that abides by the requirements outlined in this section and § 2.1 (IAQ).
- .2 Properly seal, caulk, and repair points of entry, habitation, and breeding areas to mitigate against pest occurrences within the building. Use metal sheeting or mesh whenever possible.
- .3 In all apartment kitchens, provide an in-sink garbage disposal unit that is compatible with the building's water reclamation system.

## 2.0 Enhanced Indoor Environment Quality (IEQ) (cont.)

### 2.5 Indoor Pest Control (cont.)

#### *Technologies/Strategies:*

- Properly seal all penetrations (i.e. around water pipes, steam risers, electrical conduits, etc.) with copper mesh, metal sheeting, or concrete. Use caulking and plaster only as a last resort.
- Properly assemble trash chute sections so that garbage bags do not catch and rip on their way down.
- Encourage tenants to properly seal and bag garbage in the Tenant Guide.
- Caulk every joint within and between cabinets, over exposed screw heads, and within the cabinet structure. Properly seal cracks and joints at tile floor/wall joints and cavities, baseboard/wall interfaces, and window frame/wall interfaces.
- Provide properly fitting door sweeps at all exterior doors and hallway doors – undercut exterior doors with less than ¼ inch clearance and provide vinyl or brush sweeps.
- Cover all ventilation portals with insect mesh (metal window screen) and ¼ inch wire mesh (hardware cloth). Ensure easy access to portals and frequent cleaning.
- Encourage prompt repair of leaky faucets, condensation on pipes, or other unwanted sources of water.
- Use boric acid powder for insect control (as opposed to using other toxic chemicals) in the base building; recommend same to tenants and include in Tenant Guide.
- Refer to the following sources when preparing the Integrated Pest Management Plan:
  - .a IPM Institute of North America, Inc.  
(<http://www.ipminstitute.org>)
  - .b EPA's Region 9 IPM in Schools guidelines  
(<http://www.epa.gov/pesticides/ipm/index.htm>)
  - .c Beyond Pesticides  
(<http://beyondpesticides.org/main.html>)
  - .d *Common Sense Pest Control* (see Publications in List of Resources)
  - .e *Ecology and Management of Food Industry Pests* (see Publications in List of Resources)

#### *Cost Implications:*

- None at this time.

## 2.0 Enhanced Indoor Environment Quality (IEQ) (cont.)

### 2.6 Construction IAQ Management

*Intent:*

Prevent indoor air quality problems stemming from the construction/renovation process in order to help sustain the health and well-being of construction workers and building occupants.

*Requirement:*

- .1 Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building that meets or exceeds the recommended *Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings Under Construction, 1995, Chapter 3*. The plan shall include the following requirements:
- .2 Protection of stored on-site or installed absorptive materials from moisture damage, pests, and other forms of contamination.
  - .a Protection of all ductwork during construction and replacement of all filtration media immediately prior to occupancy (see § 2.1.4).
  - .b Monitoring of IAQ during construction as per SMACNA criteria identified above.
  - .c Implementation of site sanitation and pest-management to be enforced from pre-construction through the end of construction.

*Technologies/Strategies:*

- Adopt an IAQ Management Plan to protect the HVAC system during construction, control pollutant sources, and interrupt contamination pathways.
- Sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile, and gypsum wall board.
- Follow appropriate protocols for waste disposal and storage during construction.

*Cost Implications:*

- Increased initial costs to HVAC systems.
- Decreased operating costs.
- Decreased emergency spending to resolve unexpected problems.

### 3.0 Conserving Materials & Resources

#### General Provisions

*Intent:*

Reduce waste, preserve natural resources and minimize the environmental impact from materials, extraction, manufacturing, and transport. Protect the environment from biodiversity loss, air quality impacts, and further depletion by seeking out renewable bio-based resources, eliminating the use of vinyl and PVC where alternatives exist, and eliminating the use of chlorofluorocarbons (CFCs).

*Assumptions:*

An integrated architectural approach will be required for the design of the base building and the tenant interiors. Tenants will be encouraged by developer-prepared documentation and instructional sessions to comply with the goals of this section and meet the BPCA mandate to protect the environment and improve the health and well-being of building occupants.

## 3.0 Conserving Materials & Resources (cont.)

### 3.1 Storage & Collection of Recyclables

*Intent:*

Facilitate the reduction of waste and the diversion of materials, congruent with markets for recycling within the community, that otherwise would be hauled and dumped into landfills.

*Requirements:*

- .1 On each residential floor, provide a centralized and easily accessible "Trash & Recycling" room dedicated to the collection, separation, and temporary storage of conventional trash, paper, cardboard, glass, plastics, and metals.
- .2 Trash & Recycling rooms shall contain either separate waste and recycling disposal chutes, or sorting bins for recycled materials to be managed by the building's recycling plan.
- .3 Centralized trash/recycling holding areas (with minimum dimensions of 5'x5' and min. volume of 2.9 CF/dwelling unit) will be air conditioned, sealed to pests (see § 2.5.2), and maintained within the building for residential and all other building uses. At ground and/or basement levels, these areas shall have convenient access to designated collection points at street.

*Technologies/Strategies:*

- The easier it is to recycle, the more people will participate.

*Cost Implications:*

- Increased space for trash/recycling operations.
- Reduced waste disposal costs.
- Potential for income from recycling.

## 3.0 Conserving Materials & Resources (cont.)

### 3.2 Construction Waste & Resource Reuse

*Intent:*

Reduce the amount of construction waste and conserve energy and resources through the recycling and reuse of existing building materials.

*Requirements:*

- .1 Before construction commences, develop a Waste Management Plan to be implemented during construction that will divert and recycle a minimum of 80% of waste material by weight.
- .2 Maintain and submit monthly a Waste Management Log accounting for recycled, diverted, and reused material quantities by weight.

*Technologies/Strategies:*

- Identify licensed haulers and processors of recyclables.
- Identify opportunities to integrate salvaged materials into the building design.
- Whenever on-site reuse is not possible, recycle cardboard, metals, concrete, brick, asphalt, clean dimensional wood, plastic, glass, gypsum board, carpet, ceiling tile, etc.
- Designate a specific area on the construction site for recycling and track recycling efforts throughout the construction process.
- Evaluate the cost-effectiveness of recycling rigid insulation, engineered wood products, and other materials.
- Require contractors to reuse pallets or return them to providers during construction.

*Cost Implications:*

- Potential income generation/decrease in material costs.
- Increased cost of construction management (overseer).

## 3.0 Conserving Materials & Resources (cont.)

### 3.3 Recycled Content

*Intent:*

Reduce the use of raw materials by replacing them with recycled materials or materials with recycled content.

*Requirements:*

- .1 Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 12% of the total value of the materials in the project, excluding mechanical, electrical, and plumbing. The value of the recycled content portion of a material or furnishing shall be determined by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item. Recycled content materials shall be defined in accordance with the *International Organization for Standardization document, ISO 14021 – Environmental labels and declarations – Self-declared environmental claims (Type II environmental labeling)*.
- .2 Sum total of recycled content is to include fly ash to replace a minimum of 15% of cement and granulated blast slag to replace a minimum of 25% of cement.

*Technologies/Strategies:*

- Use of recycled materials or materials with recycled content will reduce the burden on already over-harvested building products.

*Cost Implications:*

- None at this time.

### 3.0 Conserving Materials & Resources (cont.)

#### 3.4 Local/Regional Materials

*Intent:*

Reduce the impact of building materials transport and support the local economy.

*Requirement:*

- .1 Use a minimum of 50% of all building materials (based on cost), excluding mechanical, electrical, and plumbing, that are extracted, processed, AND manufactured within a 500-mile (air) radius of the project site or 1,000 miles of project site and shipped by rail or water.

*Technologies/Strategies:*

- Strengthening a local supply chain will reduce costs and transportation-related pollution while contributing to local building technology and infrastructure.
- Credit may be given by BPCA for creative use of rail or water transportation as an alternative.

*Cost Implications:*

- None at this time.

## 3.0 Conserving Materials & Resources (cont.)

### 3.5 Renewable & Rapidly Renewable Materials

*Intent:*

Reduce the use of finite raw materials by replacing them with rapidly renewable materials.

*Requirement:*

- .1 Use best efforts to specify products made with renewable or rapidly renewable materials.

*Technologies/Strategies:*

- Rather than using oak or mahogany flooring, which frequently originate from non-sustainable sources, consider using bamboo, cork, or recycled composite materials as alternatives for the same purpose.

*Cost Implications:*

- Increase in costs for certain materials.

## 3.0 Conserving Materials & Resources (cont.)

### 3.6 CFC Elimination

*Intent:*

Reduce ozone depletion by prohibiting the use of CFC-based refrigerants in HVAC systems, as well as solvents, insulation materials, or other building components that contain CFCs or use them during production. Ensure support of early compliance with the Montreal Protocol.

*Requirements:*

- .1 Prohibit use of CFC-based equipment.
- .2 Avoid the use of insulation materials that utilize chlorine-based gases in the production process.

*Technologies/Strategies:*

- Demonstrate zero-tolerance for CFCs and CFC-based equipment.

*Cost Implications:*

- Reduced energy efficiency.

## 3.0 Conserving Materials & Resources (cont.)

### 3.7 Alternative Transportation

*Intent:*

Limit contributions to pollution and the use of non-renewable energy sources for transportation by encouraging the use of bicycles, high-performance hybrid vehicles, and shared vehicles.

*Requirements:*

- .1 Provide enclosed bicycle storage at no additional charge to the tenant for a minimum of 0.75 bicycles per apartment.
- .2 If parking is to be provided, provide preferred parking spots for 5% of the total parking capacity for high-performance hybrid (low-emitting and fuel efficient models), electric, cars with a minimum fuel efficiency of 44 mpg (as referenced in the American Council for an Energy-Efficient Economy Report, <http://www.aceee.org/energy/cafe.htm>), and/or shared vehicles.  
*or*  
In lieu of preferred parking, provide car-sharing program, such as FlexCar, ZipCar, or equivalent within the building.
- .3 Submit plan defining the scope of proposed compliance with alternative transportation goals.

*Technologies/Strategies:*

- If bicycle storage is available and easily accessible, residents will be more likely to own and use bicycles for recreational and commuting needs.
- When bicycle storage is not adequately provided and bicycles are stored in inappropriate places, there is an increase in maintenance expenses and a negative effect on the quality of the indoor environment.

*Cost Implications:*

- Cost of storage space.
- Decrease in maintenance costs.
- Increased longevity of building finishes.

## 3.0 Conserving Materials & Resources (cont.)

### 3.8 Certified Wood

*Intent:*

Encourage responsible forest management to protect forest habitats and wood species.

*Requirements:*

- .1 For all wood-based building components installed by the developer, use a minimum of 35% of the total value of all wood-based materials and products certified in accordance with guidelines and criteria decreed by the Forest Stewardship Council (FSC), the Forest Stewardship Program (FSP), the Sustainable Forestry Initiative (FSI), or Green Tag Forestry. Components include, but are not limited to, flooring, finishes, furnishings, and non-rented temporary construction applications (concrete form-work need not be incorporated into this calculation).
- .2 Encourage tenants, by incorporation of appropriate literature into the Tenant Guide, to utilize wood and wood products certified by the above-mentioned organizations.

*Technologies/Strategies:*

- Incorporate the requirements of the Forest Stewardship Guidelines in the building construction specifications and general conditions.

*Cost Implications:*

- Increase in wood costs.

### 3.0 Conserving Materials & Resources (cont.)

#### 3.9 Low-Pollution Fuels

*Intent:*

Decrease the amount of SO<sub>x</sub>, CO, and other pollutants that are released into the atmosphere from construction vehicles.

*Requirements:*

- .1 Use ultra-low sulfur diesel fuel or compressed natural gas (CNG) for all construction vehicles with a carrying capacity in excess of 5 tons and for all portable generators, consistent with Local Law 77 for Lower Manhattan.
- .2 Equip the above vehicles with high performance engines and diesel oxidation catalyst (DOC) filters or another previously demonstrated advanced retrofit technology, consistent with NYC Local Law 77 for Lower Manhattan.

*Technologies/Strategies:*

- Incorporate the above requirement in construction specifications and general conditions.

*Cost Implications:*

- Potential for slight increase in fuel costs.

## 4.0 Education, Operations & Maintenance

### General Provisions

#### *Intent:*

Provide information to tenants, construction personnel and maintenance personnel to educate them on green building features and their role in maintaining a more sustainable environment. Provide proper construction, maintenance, and controls to ensure that building systems operate as designed in order to achieve and maintain high energy performance and IEQ standards.

#### *Assumptions:*

Tenants, construction personnel, and building management staff will be encouraged, by means of developer-prepared documentation and instructional sessions, to comply with the goals of this section and meet the BPCA mandate to protect the environment, save energy, and improve the health and well-being of building occupants.

## 4.0 Education, Operations & Maintenance (cont.)

### 4.1 Education

#### *Intent:*

Proper training and educational resources will ensure that construction and maintenance staff understand green building practices. Keeping tenants well informed about the building's features and their role with regards to its performance will help them save energy and improve their health and well-being.

#### *Requirements:*

- .1 The developer shall provide "green construction practices" training to key on-site construction management, sub-contractors, and personnel. Submit course outline to BPCA for review and provide visible recognition for those who participate, such as stickers on hard hats. If a member of personnel has been previously trained in a similar project, provide proof to BPCA of course scope and completion.
- .2 The developer shall employ a Green Team Leader to manage recordkeeping and educational mandates set forth in these guidelines.
- .3 The developer shall develop and maintain a comprehensive Tenant Guide and make it available to tenants in print form at lease signing and on-line for continuous updating. The Guide will:
  - .a Describe design features and systems utilized in the apartments.
  - .b Provide a list of efficient lighting fixtures, dimming controls, and lamps (compact fluorescents).
  - .c Provide a list of recommended Energy Star appliances with high EER ratings.
  - .d Provide information on parking, bicycle storage, and on car-sharing (if applicable).
  - .e Provide description of green maintenance practices for apartments.
  - .f Outline general protocols regarding pest management practices.
  - .g Outline emergency procedures.
  - .h Provide criteria for the proper selection and use of cleaning products.
  - .i Provide recommendations for the selection of furnishings, carpeting, paints, and sustainable wood products (see § 3.8.1).
  - .j Provide guidelines for recycling and waste disposal.

## 4.0 Education, Operations & Maintenance (cont.)

### 4.1 Education (cont.)

#### *Requirements (cont.):*

- .4 The building operations manager and other key staff responsible for operating building systems shall attend a minimum five-day training course on building systems operation such as that provided by NEEP (see below).
- .5 In the lobby area, a bulletin board or web screen (minimum 2'x3') shall be prominently located for posting energy/environmental education information, including yearly (and, if possible, monthly) building energy performance reports comparing to benchmarks/peers. This information shall also be displayed on-line.

#### *Technologies/Strategies:*

- Use Internet communication technologies to monitor systems and inform tenants about the building's features and protocols.
- The BPCA strongly encourages all staff responsible for the maintenance and operation of equipment and systems in the building to attend the Northeast Energy Efficiency Partnership's (NEEP) Building Operations & Maintenance Certification (BOC) Program (<http://www.neep.org/boc/index.html>). The BOC course provides competency-based training and certification for building operators designed to improve the energy efficiency of commercial and large residential buildings. Operators earn certification by attending training sessions and completing project assignments in their facilities. The certification provides a credential for their professional development while offering employers a way to identify skilled operators

#### *Cost Implications:*

- Increased initial costs to HVAC system.
- Minimal cost to perform Air Quality Profile.
- Decrease in occupant complaints.

## 4.0 Education, Operations & Maintenance (cont.)

### 4.2 Commissioning

#### *Intent:*

Test and calibrate building systems to be certain they can be operated as designed in order to achieve and maintain energy performance and IEQ requirements. Typically, fans, pumps, motors, and other equipment are installed that do not meet design specifications. The result is inferior performance, reduced IAQ, and increased energy consumption.

#### *Requirements:*

- .1 Engage a commissioning team that does not include individuals directly responsible for project design or construction management. This team shall include a commissioning authority independent of the design team (the Independent Commissioning Authority, or ICA).
- .2 Develop and utilize a Commissioning Plan for all operating equipment, including HVAC equipment and systems including base building heating, cooling, and ventilation systems, apartment HVAC systems, heat recovery, building management system (BMS), plumbing systems including waste water reclamation system and storm water systems, electrical systems including lighting controls and occupancy sensors, photovoltaics, supply and exhaust air, and any other green system or equipment.
- .3 Incorporate commissioning requirements into the construction documents.
- .4 The ICA shall:
  - a. Conduct a review of the design prior to the Construction Documents phase, including review of the design intent and the basis of design documentation.
  - b. Conduct a review of the construction documents near completion of the construction document development and prior to issuing the contract documents for bidding.
  - c. Review the contractor submittals relative to systems being commissioned and verify installation, functional performance, training, operation, and maintenance documentation.
  - d. Complete and provide the developer with a Commissioning Report, including a single manual that contains the information required for re-commissioning building systems.
  - e. Review building operation with O&M staff, including a plan for resolution of outstanding commissioning-related issues within one year after construction completion or 90% rent-up date.

## 4.0 Education, Operations & Maintenance (cont.)

### 4.2 Commissioning (cont.)

#### *Technologies/Strategies:*

- Introduce standards and design strategies early in the design process.
- Incorporate and clearly state design intentions and requirements in the project construction documents.
- Tie contractor final payments to documented system performance.
- Engage the ICA early in the design stage.

#### *Cost Implications:*

- Increase in professional fees.
- Substantial energy savings.
- Decrease in life-cycle and operating costs.
- Increase in equipment costs (Energy Management System).
- Decrease in change orders.
- Decrease in project delays.
- Decrease in equipment callback.

## 4.0 Education, Operations & Maintenance (cont.)

### 4.3 Building Systems Monitoring

#### *Intent:*

Design and specify equipment to be installed in the base building and individual apartment systems to provide feedback for comparison, management, and optimization of actual vs. estimated energy performance and Indoor Environment Quality.

#### *Requirements:*

- .1 Install and maintain a permanent monitoring system or equivalent regular testing protocol that tracks IEQ, measures energy performance of the base building systems and total building energy consumption, and allows operators to make adjustments to maintain targets and confirm the energy model conclusions. See §1.2.3 for details. Provide capacity for ventilation system monitoring to help sustain long-term occupant comfort and well-being. .
- .2 Submit an air quality testing protocol. Provide an Air Quality Profile, prepared by a licensed engineer or certified industrial hygienist, for a sample of 10% of evenly distributed units at time of initial occupancy that meets the following criteria:
  - .a < 50 ppb of Formaldehyde
  - .b < 200  $\mu\text{g}/\text{m}^3$  total Volatile Organic Compounds

#### *Technologies/Strategies:*

- Use Internet communication technologies to monitor building systems.

#### *Cost Implications:*

- Increased initial costs to HVAC system.
- Increased maintenance costs for periodic testing.
- Decrease in occupant complaints.

## 4.0 Education, Operations & Maintenance (cont.)

### 4.4 Maintenance Accountability

#### *Intent:*

Provide for maintenance and operational continuity by establishing an ownership system that guarantees accountability for maintaining performance standards.

#### *Requirements:*

- .1 The developer shall prepare, submit and maintain a written and online Maintenance Manual to the BPCA for review, which will be made available to all maintenance staff for all long- and short-term maintenance of the building, prior to the first TCO and linked to the BMS system. This manual will be used as research data for future building standards and will also serve as a valuable resource for building design teams on future development projects. The Maintenance Manual shall:
  - .a Provide descriptions, details, and schedules of installed building services, plants, systems, and controls.
  - .b Provide specific manuals and additional manufacturer's literature, model numbers, methods of operation, and maintenance practices (including preventative maintenance) for installed building equipment, plants, systems, and controls.
  - .c Provide details on the various metering systems and mechanisms that collectively enable energy consumption to be monitored and controlled.
  - .d Outline best practices for maintenance and housekeeping.
  - .e Outline best practices for pest management and mold prevention/control.
  - .f Incorporate materials substitutions and method variations.
  - .g Compile field data, contractor's affidavits, and construction log information.
  - .h Include a complete As-Built Drawing Set.
- .2 Persons responsible for maintaining building systems, including the expected building superintendent and boiler/chiller plant operators from other buildings in the developer's portfolio, should participate in project team meetings that involve the design, selection, and commissioning of all building systems and equipment.

## 4.0 Education, Operations & Maintenance (cont.)

### 4.4 Maintenance Accountability (cont.)

#### *Requirements (cont.):*

- .3 The developer shall prepare an Annual Building Performance Report, including actual energy consumption with comparisons to benchmarks, and any changes to O&M arrangements/procedures or major energy consuming equipment. (Specific systems metered and Report structure to be determined by the developer and BPCA on a case-by-case basis. See § 1.2.3).
- .4 The building must achieve LEED-EB certification every five years.

#### *Technologies/Strategies:*

- Maintain rigorous standards for the upkeep of building equipment and infrastructure, interior and exterior finishes, public spaces, and structural systems.
- Educate maintenance personnel.

#### *Cost Implications:*

- Decreased maintenance labor costs.
- Increased product life.

## 5.0 Water Conservation & Site Management

### General Provisions

#### *Intent:*

Minimize water consumption by simultaneously reducing the inflow of city-supplied potable water and the outflow of waste water. Conserve potable water by reducing demands for water use including domestic water, landscaping, irrigation, cooling tower, laundry, maintenance and other non-potable uses.

#### *Assumptions:*

Projects developed in Battery Park City are responding to land-use and water consumption concerns by incorporating high efficiency water management technologies into new buildings, and by participating in a conscious and managed plan for sustainable landscaping practices (i.e. organic maintenance practices, use of native and adaptive plantings, etc.) and irrigation systems that employ recycled water.

## 5.0 Water Conservation & Site Management (cont.)

### 5.1 Storm Water Management

#### *Intent:*

Minimize the impact of storm water on New York City's sewer system and minimize the use of potable water for maintenance and landscaping purposes by treating and recycling water on-site.

#### *Requirements:*

- .1 Provide for 2.4 in. of rainwater falling on all building roofs and setbacks to be collected, treated, and stored on-site for reuse. Uses for this water must include cooling tower, irrigation, and building and sidewalk maintenance, and laundry, if allowed by municipal codes. Due to its lower treatment requirements, storm water is to be used before reclaimed water. Other uses may be proposed by developer. Non-summer uses must be accounted for as well.
- .2 Adopt Best Management Practices (BMP, as published by the Office of Wastewater, Environmental Protection Agency (EPA) and available at ([www.epa.gov/owm/mtb/runoff.pdf](http://www.epa.gov/owm/mtb/runoff.pdf)) for harvesting rain water and using it on-site.
- .3 Provide clearly labeled "Reclaimed Water" taps at the exterior of the building for building maintenance, sidewalk washing, and landscaping needs (reclaimed water shall be appropriately filtered and treated for these and other types of uses).
- .4 Design a site-specific Sediment and Erosion Control Plan that conforms to the United States Environmental Protection Agency (EPA) Document No. EPA 832/R-92-005 (September 1992), Storm Water Management for Construction Activities, Chapter 3, or local erosion and sedimentation control standards and codes (whichever is more stringent). The plan shall meet the following objectives:
  - .a Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
  - .b Prevent sedimentation of storm sewer or receiving streams and/or air pollution with dust and particulate matter.
  - .c Prevent construction contaminants from entering the storm sewers, including but not limited to high-pH concrete slurry and chemicals associated with machinery operations

## 5.0 Water Conservation & Site Management (cont.)

### 5.1 Storm Water Management (cont)

#### *Technologies/Strategies:*

- By collecting and reusing rainwater on-site and runoff during construction, less water will be consumed and less waste water will need to be treated.
- Enforce conservation methods.

#### *Cost Implications:*

- Increased initial costs to plumbing infrastructure.
- Savings on water and sewage costs.
- Future water cost avoidance.
- Decreased demand on city infrastructure.
- Water available during drought conditions.

## 5.0 Water Conservation & Site Management (cont.)

### 5.2 Water Use Reduction

#### *Intent:*

Minimize the use of potable water by reducing water needs.

#### *Requirements:*

- .1 Install fixtures that in aggregate use 10% less potable water than the water usage requirements in the Energy Policy Act of 1992, including dishwashers and clothes washers. When performing the calculation, do not include fixtures which are using reclaimed water.
- .2 Specify low water volume/conserving fixtures and dishwashers, dual flush or 1.6 gallon toilets, and only front-loading laundry facilities with a water factor of 7.5 or less.
- .3 Utilize non-potable drip irrigation systems (if applicable).

#### *Technologies/Strategies:*

- Horizontal axis or “front loading” clothes washers are more efficient than conventional top loading machines.
- Install timers on irrigation systems.
- Consider individual apartment water metering.
- In non-apartment uses, consider installing waterless urinals.

#### *Cost Implications:*

- Nominal increase in initial costs.
- Savings on water and sewage costs.
- Savings on water heating and pumping.
- Increased energy savings (pumping).

## 5.0 Water Conservation & Site Management (cont.)

### 5.3 Innovative Water Technologies

#### *Intent:*

Minimize the impact on New York City's sewer system and reduce the use of potable water by treating and reclaiming water from lavatories, toilets, showers, sinks, laundry, and dishwashing facilities.

#### *Requirements:*

- .1 Treat all wastewater and reuse to maximum extent possible with an on-site Reclaimed Water Treatment System.
- .2 Use ecology-based treatment processes (i.e., ultrafiltration), as opposed to a chemical treatment system, for reclaimed water treatment.
- .3 Use reclaimed water for toilet flushing, cooling tower make-up, irrigation, laundry (to the extent allowed), building and sidewalk maintenance management uses (in all cases, if applicable and properly treated). Provide clearly labeled "Reclaimed Water" taps wherever treated water is made available to tenants and/or staff. Address the issue of excessive chloride build-up in cooling tower system.
- .4 Use best efforts to minimize use of chemicals in the maintenance of cooling towers.

#### *Technologies/Strategies:*

- Provide appropriate water recovery, treatment, and delivery infrastructure.

#### *Cost Implications:*

- Increased initial costs to plumbing infrastructure.
- Savings on water and sewage costs.
- Decreased demand on infrastructure.
- Water available during drought conditions.

## 5.0 Water Conservation & Site Management (cont.)

### 5.4 Water Efficient & Responsible Landscaping Practices

*Intent:*

Minimize the use of potable water for building and grounds maintenance, and avoid using pesticides, herbicides, or fertilizers that may pollute the environment.

*Requirements:*

- .1 Specify 100% of plantings to be those that are native/indigenous/adapted and that require low amounts of water and are pest- and disease-resistant. Plant material subject to review and approval by the Battery Park City Authority (BPCA) and Battery Park City Parks Conservancy (BPCPC).
- .2 Use proper topsoil medium that allows for the implementation of organic maintenance practices (i.e., non-toxic pesticides, herbicides, and fertilizers) as per BPCA/BPCPC requirements.
- .3 Develop a landscape maintenance plan of sustainable landscape practices for all landscaped areas.

*Technologies/Strategies:*

- Employ sustainable landscape development practices by selecting only plantings suitable to the microclimate that require minimal water and maintenance, and using topsoil's able to support organic fertilization and integrated pest management practices as per BPCPC requirements.

*Cost Implications:*

- No initial cost implications.
- Decrease in maintenance and operating costs.
- Future water cost avoidance.
- Extended life of plantings.

## 5.0 Water Conservation & Site Management (cont.)

### 5.5 Landscape and Roof Design to Reduce “Heat Islands”

#### *Intent:*

Minimize contribution to “heat islands” and reduce the amount of heat gain/loss through the roof(s).

#### *Requirements:*

- .1 75% of all roof area, over conditioned space, including terraces, not used for mechanical equipment or skylights) to be planted as a “green” roof garden and, except for private terraces, open to all residents.
- .2 Remaining roof areas to use light-colored/high-albedo materials with an SRI (solar reflectance index) of 78 for roofs less than 2:12.
- .3 Provide street trees as per BPCA/BPCPC requirements.

#### *Technologies/Strategies:*

- Provide vegetated surfaces such as green roofs and/or grass paving systems that are water efficient.
- Provide trees to shade exposed surfaces.

#### *Cost Implications:*

- Increased initial cost to structure, drainage, and waterproofing systems.
- Reduced energy consumption due to reduced heat gains/losses.
- Potential for longer roof life due to diminished wear from thermal expansion and contraction.

## 5.0 Water Conservation & Site Management (cont.)

### 5.6 Light Pollution Reduction

*Intent:*

Eliminate light trespass from the building and site, improve night sky access and reduce development impact on nocturnal environments.

*Requirements:*

- .1 Design interior lighting so that the angle of maximum candela from each interior luminaire as located in the building shall intersect opaque building interior surfaces and not exit out through the windows.
- .2 Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value of no greater than 0.60 horizontal and vertical footcandles at the site boundary and must drop off to 0.01 footcandles within 15 feet beyond the site. Document that no more than 10% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from the nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary. Use daylight sensors in combination with astronomical time clocks to minimize exterior light usage.

## 5.0 Water Conservation & Site Management (cont.)

### 5.6 Light Pollution Reduction (cont.)

#### *Technologies/Strategies:*

- Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution.
- Consider using daylight sensors to regulate developer-installed outdoor luminaires as an energy-conserving strategy.
- Minimize site lighting where possible and configure the site lighting using a computer model.
- Technologies to reduce light pollution include full cutoff luminaires, low-reflectance surfaces and low-angle spotlights.

#### *Cost Implications:*

- No or nominal initial cost implication. Requirements can be incorporated into design.
- Decreased running costs, both in energy and replacement costs, as this requirement essentially eliminates extravagant external lighting of the building.



## **Suggested Additional Measures**

The development team is presented with a series of suggestions that they may elect to include in the project to raise the standards to a higher level. Additional options are not limited to the suggestions and creativity is encouraged. The intent is to move technology and sustainability forward and create the most sustainable building possible, for tenants and all those who look at these buildings as models that can be emulated beyond Battery Park City.

## Suggested Additional Measures (cont.)

<b>EE Add 1.1</b>	<b>Additional Energy Efficiency</b>	<i>Requirement:</i> Increase energy efficiency by 35% over 2002 ECCCNY, measured in terms of energy cost.
<b>EE Add 1.2</b>	<b>Enthalpy Wheel</b>	<i>Requirement:</i> Use enthalpy heat wheel technology for year-round conditioning of air for 75% of apartments. (Measure results in significant energy savings and will greatly aid in achieving EE Alt 1.)
<b>EE Add 1.3</b>	<b>Geothermal</b>	<i>Requirement:</i> Provide a minimum of 30 tons cooling and heating using geothermal technology.
<b>EE Add 1.4</b>	<b>Additional Metering</b>	<i>Requirement:</i> If not using a heat pump system, meter and bill each apartment for heating and cooling use. Heating and cooling can be aggregated with other uses in the apartment (e.g., cooling electricity use can be aggregated with other electricity uses in the apartment).
<b>MR Add 3.1</b>	<b>Composting</b>	<i>Requirement:</i> <ul style="list-style-type: none"><li>.1 Provide area for composting collection on each apartment floor or provide separate waste line for garbage disposals to a central point for composting. Provide additional area on site for storage.</li><li>.2 Provide proof of 5-year agreement within building or via outside party showing use of compost produced.</li></ul>
<b>MR Add 3.2</b>	<b>Additional Recycled Content</b>	<i>Requirement:</i> <ul style="list-style-type: none"><li>.1 Use recycled content materials for 20% of the total value of the materials in the project, as defined in § 3.3.</li></ul>
<b>MR Add 3.3</b>	<b>Renewable Materials</b>	<i>Requirement:</i> <ul style="list-style-type: none"><li>.1 Utilize 2% renewable bio-based materials as defined in the Glossary, for example wheat board, straw board, wool carpet, and bamboo.</li></ul>

## Suggested Additional Measures (cont.)

**OP  
Add  
4.1**      **Life Cycle  
Analysis**

*Requirement:*

Conduct a full Environmental Impact Assessment of the proposed building, showing the overall life cycle analysis of the building. The analysis/assessment should be done using the Athena Institute's Environmental Impact Estimator system, or an equivalent methodology approved in advance by BPCA.

**WC  
Add  
5.1**      **Intensive  
Green Roof**

*Requirement:*

Intensive green roof to cover 75% of all roof area, over conditioned space and including terraces, not used for mechanical equipment or skylights. Remaining roof areas as per credit 5.5.

**WC  
Add  
5.2**      **Additional  
Green Roof**

*Requirement:*

Provide additional green roofing to cover 90% of all roof area, over conditioned space and including terraces, not used for mechanical equipment or skylights. System to be intensive for at least 50% of green roof.



## List of Resources

### Publications:

American Institute of Architects. *AIA Environmental Resource Guide*. New York: McGraw-Hill, 1999.

American Society of Heating Refrigeration and Air-Conditioning Engineers. *ANSI/ASHRAE/IESNA Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings; Standard 62-99: Ventilation for Acceptable Indoor Air Quality; ASHRAE Green Guide, 2003*

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Illuminating Engineering Society of North America (IESNA). *Recommended Practice Manual: Lighting for Exterior Environments* (IESNA RP-33-99); *IESNA Lighting Handbook (Ninth Edition, 2000)*. New York: IESNA.

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## List of Resources (cont.)

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- New Buildings Institute, *Advanced Buildings Reference Guide; Benchmark, Energy Benchmark for High Performance Buildings; Benefits Guide*; White Salmon, Washington, 2004-2005.
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- State of New York. *Executive Order No. 111 - "Green and Clean" State Buildings and Vehicles*. July 2003.
- The City of New York and The Department of Buildings. *New York City Building Code*. 2003.
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<http://www.aceee.org/>

ASHRAE: American Society of Heating Refrigeration and Air-  
Conditioning Engineers  
<http://www.ashrae.org>

Bay Area Air Quality Management District Regulation 8, Rule 51.  
<http://www.baaqmd.gov/dst/regs/rg0851.pdf>

National Coalition Against the Misuse of Pesticides  
<http://www.beyondpesticides.org>

Energy Efficiency and Renewable Energy Network (EREN)  
<http://www.eere.energy.gov/>

Energy Star Program (U.S. EPA)  
<http://www.energystar.gov/>

Environmental Building News  
<http://www.buildinggreen.com/>

Environmental Defense  
<http://www.environmentaldefense.org>

Environmental Protection Agency Region 9 IPM Manual  
<http://www.epa.gov/pesticides/ipm/schoolipm/index.html>

Environmental Protection Agency Office of Wastewater Best  
Management Practices  
[www.epa.gov/owm/mtb/runoff.pdf](http://www.epa.gov/owm/mtb/runoff.pdf)

Forest Stewardship Council  
<http://www.fscus.org/>

Greener Buildings.com  
<http://www.greenerbuildings.com>

Green Tag Forestry  
<http://www.woodlandowners.org/>

IBEAM – EPA Guidance on Design and Operations for IAQ  
[http://www.epa.gov/iaq/largebldgs/ibeam\\_page.htm](http://www.epa.gov/iaq/largebldgs/ibeam_page.htm)

Integrated Pest Management Institute of North America  
<http://www.ipminstitute.org/>

## List of Resources (cont.)

Iris Communications – Resource for Environmental Design Index  
<http://www.oikos.com/>

Lawrence Berkeley National Laboratory, Environmental Energy  
Technologies Division  
<http://eetd.lbl.gov/>

Natural Resources Defense Council  
<http://www.nrdc.org/>

New York State Department of Environmental Protection  
[www.nyc.gov/dep](http://www.nyc.gov/dep)

New York State Energy Research and Development Authority  
<http://www.nyserda.org/>

Northeast Energy Efficiency Partnerships  
<http://www.neep.org/>

Rocky Mountain Institute  
<http://www.rmi.org/>

Scientific Certification Systems  
<http://www.scs1.com/>

Southface Energy Institute  
<http://www.southface.org/>

South Coast Air Quality Management District Rule #1168  
<http://www.aqmd.gov/rules/html/r1168.html>

US Department of Energy  
<http://www.doe.gov/>

US DOE Whole Building Design Guide  
<http://www.wbdg.org/>

US Environmental Protection Agency  
<http://www.epa.gov/>

US Green Building Council  
<http://www.usgbc.org/>

USDA Forest Stewardship Program  
<http://www.fs.fed.us/spf/coop/programs/loa/fsp.shtml>

## Funding Sources

### **New York State Green Building Tax Credit**

#### [New York State Department of Taxation and Finance](#)

(tax related questions)

Business Tax Hotline:

1-800-972-1233

General Tax Information Hotline:

1-800-225-5829

### **New York State Energy Research and Development Authority**

For more information about NYSERDA's building programs, contact:

#### [New York State Energy Research and Development Authority](#)

(building-related questions)

Craig Kneeland, Project Manager

(518) 862-1090, ext. 3311

e-mail: [cek@nyserdera.org](mailto:cek@nyserdera.org)

Technical Communications Unit  
Corporate Plaza West  
286 Washington Avenue Extension  
Albany, New York 12203-6399  
Phone: (518) 862-1090, ext. 3250

[<http://www.nyserdera.org/>]

#### [New York State Department of Environmental Conservation](#)

(all other questions)

James Austin, Assistant Commissioner

Phone: (518) 485-8437

e-mail: [jdaustin@gw.dec.state.ny.us](mailto:jdaustin@gw.dec.state.ny.us)

[<http://www.dec.state.ny.us/>]

### **United States Department of Energy**

For more information about USDOE building programs, contact:

#### [United States Department of Energy](#)

Dru Crawley

1000 Independence Ave. SW

Washington, DC. 20585

Phone: (202) 586-2344

Fax: (202) 586-1628

e-mail: [drury.crawley@ee.doe.gov](mailto:drury.crawley@ee.doe.gov)

[<http://www.doe.gov/>]

## Glossary

The following is a partial glossary of terms from the City of New York Department of Design And Construction's (DDC) *High Performance Building Guidelines*.

**Albedo:** The ratio of reflected light to the total amount falling on a surface. A high albedo indicates high reflectance properties.

**Bio-Based Fuels:** Cellulosic plant matter (biomass) used as a source of renewable carbon and as a raw material for fuel.

**Bio-Based Material:** An engineering material made from substances derived from living tissues. Qualifying materials must be either residues from the processing of renewable, bio-based materials or grown or harvested under a recognized sustainable management system. Excluded from the calculation are materials such as formwork, shoring, temporary partitions and other elements that are not a permanent part of the finished building. Examples of management systems meeting the credit requirements include the Canadian Standards Association (<http://www.csa.ca>), the Sustainable Forestry Initiative (<http://www.aboutsfi.org/>), and the Sustainable Agricultural Program.

**Building Commissioning:** A systematic process beginning in the design phase, lasting at least one year after construction, and including the preparation of operating staff to ensure, through documented verification, that all building systems perform interactively according to the documented design intent and the developer's operational needs.

**Chlorofluorocarbons (CFCs):** CFCs are a family of chemicals used in refrigeration, air conditioning, packaging, insulation, or as solvents and aerosol propellants. Because CFCs are not destroyed in the lower atmosphere, they drift into the upper atmosphere where their chlorine molecules destroy the earth's protective ozone layer.

**Combined Heat and Power Plants:** Energy plants able to convert waste heat from electricity generation into steam, which is then used to produce chilled water or additional electricity.

**Fuel Cell:** A technology that uses an electromagnetic process to convert natural gas into electrical power. Fuel cell power is cleaner than grid-connected power sources. In addition, hot water is produced as a byproduct that can be utilized as a thermal resource for the building.

**Blackwater:** Waste water from toilets and kitchen sinks that contains organic materials.

## Glossary (cont.)

**Hydrochlorofluorocarbons (HCFCs):** HCFCs are generally less detrimental to depletion of stratospheric ozone than related chlorofluorocarbons. HCFCs are generally used to replace CFCs where mandates require CFCs to be eliminated. A total ban on CFCs and HCFCs is scheduled effective 2030.

**Integrated Pest Management:** A coordinated approach to pest control that is intended to prevent unacceptable levels of pests by the most cost-effective means with the least possible hazard to building occupants, workers, and the environment.

**Life-Cycle Cost:** The amortized annual cost of a product, including capital costs, installation costs, operating costs, maintenance costs, and disposal costs discounted over the lifetime of the product.

**Low-E Glass:** “Low-E” (low-emissivity) Significantly reduces heat loss in winter and, to a small degree, also reduces heat gain in summer. Spectrally-selective low-e glass significantly reduces both heat loss in winter and heat gain in summer, while retaining a high visible transmittance. Most low-e glass has  $U=0.29$  to  $0.33$ . Low-e glass that does not have a spectrally-selective coating has a ratio (visible transmittance) / (shading coefficient) = approx 1.0 Spectrally-selective low-e glass has the ratio (visible transmittance) / (shading coefficient) = approx 1.3 to 1.8. Thus, spectrally-selective low-e glass admits more solar light than solar heat

**Operations & Maintenance:** Operations refer to how equipment or systems are run (e.g. when a system should be turned on, temperature ranges, set points for boiler pressures and temperatures, thermostat set points, etc.). Maintenance refers to servicing or repair of equipment and systems. “Preventive maintenance” performed on a periodic basis to ensure optimum life and performance is designed to prevent breakdown and unanticipated loss of production or performance. “Corrective” or “unscheduled” maintenance refers to repairs on a system to bring it back “on-line.” “Predictive” maintenance is performed on equipment monitored for signs of wear or degradation (e.g., through thermography, oil analysis, vibration analysis, and maintenance history evaluation).

**Photovoltaic Panels (PVs):** PV devices use silicone semiconductor material to directly convert sunlight into electricity. Power is produced when sunlight strikes the semiconductor material and creates an electric current.

**Products Applied in the Field:** All adhesives, sealants (used as “filler” as opposed to a “coating”), paints, solvents, finishes, coatings, flooring and fabrics installed by the developer in the interior and exterior of the building.

## Glossary (cont.)

**Rapidly-Renewable Resources:** Building materials and products made from plants that are typically harvested within a ten year cycle or shorter.

**Recycling:** The series of activities, including collection, separation, and processing, by which products or other materials are recovered from the solid waste stream for use in the manufacture of new products.

**Renewable Energy:** Energy resources such as wind power or solar energy that can keep producing indefinitely without being depleted.

**Shading Coefficient (SC):** The ratio of solar heat gain through a specific type of glass that is relative to the solar heat gain through an 18" (3 mm) pane of clear glass under identical conditions. As the shading coefficient decreases, heat gain is reduced, which enhances the performance of a product.

**Solar Heat Gain Coefficient: (SHGC):** An increasingly utilized measure of the solar heat gain through glass.  $SHGC = \text{approx } SC * 0.86$ .

**Urban Heat Island Effect:** The additional heating of air over a city as the result of the replacement of vegetated surfaces with those composed of asphalt, concrete, rooftops, and other man-made materials. These materials store much of the sun's energy, producing a dome of elevated air temperatures up to 10°F greater over city compared to air temperatures over adjacent rural areas. Light colored rooftops and lighter colored pavement can help to dissipate heat by reflecting sunlight, and tree planting can further help modify the city's temperature through shading and evapotranspiration.

**U-Factor:** A measure of heat gain or heat loss through glass due to the differences between indoor and outdoor air temperatures. The U-factor is the inverse of R-value. A lower U-factor indicates lower heat loss during winter.

**Volatile Organic Compounds:** VOCs are chemicals that contain carbon molecules and are volatile enough to evaporate from materials' surfaces into indoor air at normal room temperatures (a process otherwise referred to as off-gassing). Examples of building materials that may contain VOCs include, but are not limited to: solvents, paints, adhesives, carpeting, and particleboard. Signs and symptoms of VOC exposure may include eye and upper respiratory system irritation, nasal congestion, headache, and dizziness.

## List of Acronyms

ASHRAE	American Society of Heating, Refrigerating & Air-conditioning Engineers
BIPVs	Building integrated photovoltaics
BMP	Best Management Practices
BMS	Building Management System
BOC	Building Operator Certification
CFCs	Chlorofluorocarbons
CFM	Cubic feet per minute
CO	Carbon Monoxide
CD	Construction Documents
CMU	Concrete Masonry Unit
CNG	Compressed natural gas
DD	Design Documents
DDC	Department of Design & Construction (NY City)
DOE	Department of Energy
ECCCNYS	Energy Conservation Construction Code of New York State
EEMs	Energy Efficient Measures
EPA	Environmental Protection Agency
FSC	Forest Stewardship Council
FSP	Forest Stewardship Program
HLCBPCA	Hugh L. Carey Battery Park City Authority
HLCBPCPC	Hugh L. Carey Battery Park City Parks Conservancy
HVAC	Heating, Ventilating & Air-conditioning
IAQ	Indoor Air Quality
ICA	Independent Commissioning Authority
IEQ	Indoor Environment Quality
IESNA	Illuminating Engineering Society of North America
IPMP	Integrated Pest Management Plan
LEED	Leadership in Energy and Environmental Design
MERV	Minimum Efficiency Reporting Value
NEEP	Northeast Energy Efficiency Partnerships
NYSERDA	New York State Energy Research & Development Authority
O&M	Operations & Maintenance
PIR	Passive Infrared
PV	Photovoltaics
RH	Relative Humidity
SFI	Sustainable Forestry Initiative
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SOx	Sulfur Oxides
TCO	Temporary Certificate of Occupancy
USGBC	United States Green Building Council
VSDs	Variable-speed drives
VOCs	Volatile Organic Compounds

## Submittals

### Cost Analysis

The developer will be required to prepare and submit a cost analysis of all green features as part of the proposal, Schematic Design, Design Development, Construction Document submissions, and upon building completion or buy-out. Format shall be as per the Residential Environmental Guidelines Independent Cost Impact Study of 2003, prepared by Skanska USA Building Inc.

### Submittal Requirements

The following schedule is a summary of the guidelines' requirements with specific compliance submissions for each requirement. The developer shall assemble this information into a complete, single resource to be submitted following project completion, and submit (3) copies of a progress submission as part of the Schematic Design, Design Development, Construction Documents, and As-Built submissions to the BPCA as follows:

- Bound 8½ x 11 formats (11 x 17 fan fold inserts acceptable).
- Include a table of contents and a list of all applicable team participants and consultants.
- Each of the five environmental categories from the guidelines will be a separate section (i.e. Energy Efficiency).
- Within each of these sections, the requirements are to be referenced by section number (i.e. §1.3.2).
- For each requirement, include a narrative that describes the developer's actions and strategies for compliance with the guidelines followed by the requested information from the compliance requirements. The Schematic Design submission must include the DOE-2.1E analysis, but may only include the written narratives for all other requirements.
- Developer may submit a half-size set of drawings and a set of specifications in lieu of including individual drawings that respond to individual requirements. However, reference must be very specific - page and detail number and specification section and page(s) must be clearly identified.
- Required "guides" (Tenant Guide and Maintenance Manual) are to be separately bound and included as appendix items. Finished tenant guides will be required before initial occupancy. Maintenance guides will be required as part of the As-Built or final submission.
- The final version of both the As-Built submission and the Maintenance Manual shall be submitted in an electronic format (i.e. CD-ROM; CAD and text file formats to be determined) and as a hard copy.
- For each submission, statement of any requested variation from guidelines, both above and below requirements, along with back-up and substantiation, where necessary must be included.

## Submittals (cont.)

- The following is a list of documents required at the completion of the project as part of the As-built submission:
  - Copies of all agency approvals
  - As-built drawings and specifications
  - USGBC LEED NC submission and any CIR or follow-up information
  - Outline of Annual Building Report and submittal after one year of occupancy
  - Format for LEED EB submission with subsequent full document submission at 5 year intervals.
  - Commissioning Report
  - Maintenance Manual
  - Tenants Manual
  - Submission to GBTC if applicable

The intent is to demonstrate compliance with these guidelines. Therefore, for each and every submission, a written narrative must be included for each requirement.

The BPCA will review all submissions in a prompt and timely manner. Furthermore, the BPCA will maintain field personnel to observe construction methods and technologies and to verify that construction is proceeding in accordance with the official documents.

SCHEDULE OF SUBMISSION REQUIREMENTS		1						
<u>Project:</u> <u>Submission Phase:</u> <u>Date:</u>								
DD Design Development CD Construction Documentation C Construction PO Pre-Occupancy PC Post Construction ALL All Submissions								
Section	Requirements	BPCA Comments	Submission Completed					
			DD	CD	C	PO	PC	ALL
<b>1.0 Energy Efficiency</b>								
1.1	Maximize Energy Efficiency							
1.1.1	Increase Energy Efficiency by 30%	DD - Submit list of EE measures to be employed and confirm they result in 30% overall reduction in regulated energy cost. After project is completed, perform on-site measurement (see § 4.3.1).  CD - Submit finalized list of EE measures and confirmation of overall reduction in regulated energy cost.  PC - Confirmation of EE overall. Annual submission of confirmation of EEs as part of Annual Building Performance Report (see § 4.4.3).						
1.1.2	Right-Size Equipment	DD - Submit, in concert with the ICA, design calculations and building loads.  CD - Update DD submission. Submit Equipment Schedule with plan layouts.						
1.1.3	Provide Motion Sensors	DD - Submit schematic of Motion Sensor Schedule.  CD - Update DD submission. Submit plan layouts highlighting motion sensor/PIR switches.						
1.1.4	Provide Master Switches and Identify Outlets	DD - Submit schematic of Master Switch Schedule, typical apartment schematics, and details.  CD - Update DD submission. Submit typical apartment schematics and details.						

SCHEDULE OF SUBMISSION REQUIREMENTS (cont.)							2	
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL
1.1.5	Use High-Performance Glazing	DD - Submit Glass and Window Schedules. CD - Update DD Submission. Submit window assembly details and specifications.						
1.1.6	Install Double Insulation, Backer Rods, and Caulking at Key Junctures	CD - Submit two-dimensional sections (where two elements of the enclosure meet) and three-dimensional sections (where three or more elements of the enclosure meet) through wall/slab junctions and masonry walls. Show continuity of rainwater control materials (water impermeable materials or air gaps), continuity of thermal barrier, and continuity of air barrier. C - Submit photographs of a representative sample of the above-mentioned wall conditions during construction to demonstrate that design sections were followed properly.						
1.1.7	Optimize Insulation of Cavity Wall Construction	CD - Submit sections indicating details of placement of insulation. C - Submit photographs of a representative sample of the above-mentioned wall conditions during construction to demonstrate that design sections were followed properly.						
1.1.8	Conduct Continuity Tests for Air, Thermal, and Water Barriers	C - Submit Test Results certifying the continuity of air, thermal, and water barriers.						
1.1.9	Use only Energy-Star or Equivalent Equipment, Appliances, Lighting, and Fixtures	DD - Submit Schedules that include energy efficiency ratings for the Energy Star equipment, appliances, lighting, and fixtures to be installed in the base building. CD - Update DD Submission. Submit typical plan(s) indicating use of Energy Star equipment.						
1.1.10	Provide only Natural Gas Cook Tops, Ovens, and Ranges	DD - Submit Equipment Schedule. CD - Update DD Submission.						
1.1.11	Provide Thermal Energy Recovery Systems	DD - Submit calculations of thermal recovery realized and reuse. CD - Update DD Submission. Submit Equipment Schedule and schematics showing heat recovery systems as part of building ventilation.						
1.1.12	Design Building's Electrical Distribution System for Maximum Utilization of Electric Demand Reduction.	DD - Submit schematics and description of demand reduction measures. CD - Update DD Submission. Submit Equipment Schedule.						

SCHEDULE OF SUBMISSION REQUIREMENTS (cont.)							3	
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL
1.1.13 Electric Resistance Humidification Alternatives	DD - Submit schematics and description of humidification measures.							
	CD - Update DD Submission. Submit Equipment Schedule.							
1.2 Modeling for Energy Performance								
1.2.1 Provide Initial Energy Model	DD - Submit initial energy model results prior to beginning design, using BPCA stated assumptions. Place special emphasis on base case and provide descriptions of any assumptions made beyond those of the BPCA and how they vary from NYC and NYS codes.							
	CD - Update DD Submission.							
1.2.2 Provide Comparative Energy Analysis in Annual Building Report	CD - Submit outline to indicate data to be included and structure of Annual Energy Report.							
1.2.3 Install Dedicated Meters	PC - Submit a data comparison between the energy model results projected during the design process and actual building performance data collected after reaching 90% occupancy (see Annual Building Report).							
	DD - Submit list of meters to be installed plan layout and schematics, showing incorporation of specific monitoring requirements.							
1.3.1 Green Energy Equipment Incorporation and Feasibility Studies	CD - Update DD Submission. Submit Metering Equipment Schedule							
	DD - Submit description of clean combined heat and power technologies and/or cogeneration technologies incorporated with load calculations							
1.3.2 Provide Renewable Energy Generation Systems	CD - Submit Equipment Schedule, schematics and specifications.							
	DD - Submit elevation layout, schematics, and load calculations. Submit additional drawings describing layout of PVs on façade and/or bulkhead.							
1.3.3 Adaptable Equipment	CD - Update DD Submission.							
	PC - Submit confirmation of actual electricity provided.							
1.3.4 Renewable Energy from Green Power Providers	DD - Submit Equipment Schedule and schematics with description of acceptance with multiple fuel sources utilized.							
	CD - Update DD Submission.							
	CD - If renewable energy power provider contracted, submit agreement from energy provider(s) or letter describing efforts prior to beginning construction.							

SCHEDULE OF SUBMISSION REQUIREMENTS (cont.)							4			
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL		
1.3.4	Renewable Energy from Green Power Providers (cont.)	PO - Submit confirmation of agreement								
<b>2.0 Enhanced Indoor Environment Quality (IEQ)</b>										
2.1 Indoor Air Quality (IAQ)										
2.1.1	Ventilation Rates	DD - Use ASHRAE 62.2 as IAQ performance standard. Submit schematics and design calculations, using accepted ventilation rates.								
		CD - Update DD Submission. Submit Equipment Schedule								
		PO - Update CD Submission. Submit confirmation of achievement of rates.								
		PC - Update PO Submission.								
2.1.2	Ventilation Distribution									
2.1.2.a	Central Outside Air System Requirements	PO - Submit analysis, performed by the ICA or a certified third party, confirming target air temperature and humidification rates upon reaching 50% and 100% occupancy.								
2.1.2.b	Ventilation in Apartments	DD - Submit schematics and design calculations								
		CD - Update DD Submission. Submit Equipment Schedule								
		PC - Submit analysis, performed by the ICA or a certified third party, confirming distribution of outside air (cfm).								
2.1.2.c	Ventilation in Corridors	DD - Submit schematics and design calculations.								
		CD - Update DD Submission. Submit Equipment Schedule								
		C - Submit analysis, performed by the ICA or a certified third party, confirming positive pressurization of corridors relative to apartments.								
		PO - Update C submission.								
2.1.3	Filtration of Air	DD - Submit design calculations. Include maintenance schedule in Maintenance Manual.								



SCHEDULE OF SUBMISSION REQUIREMENTS (cont.)							6	
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL
2.2.2	Requirements for Carpeting	DD - Submit a Carpeting Schedule and backup confirming compliance with requirement.						
		CD - Update DD Submission.						
		C - Submit backup certification confirming compliance of each material to requirement during construction.						
2.2.3	Prohibit the use of Added Urea-Formaldehyde in Wood Products	DD - Submit a Wood Products Schedule (see Submittals, § 3.8.1).						
		CD - Update DD Submission.						
		C - Submit backup certification confirming materials' compliance with requirement during construction.						
2.3	Controllability of Systems							
2.3.1	Provide Programmable HVAC Controls	DD - Submit plan layout and specifications.						
		CD - Update DD Submission. Submit Equipment Schedule, cuts and specification.						
		PO - Include instructions for programming and operating HVAC controls in the Tenant Guide (see § 4.1.1).						
2.3.2	Provide Computerized Base Building BMS Systems or Equivalent Controls	DD - Submit description of system components Include in Maintenance Manual (see § 4.4.1).						
		CD - Submit Equipment Schedule and specifications.						
2.4	Lighting & Daylighting							
2.4.1	Increase Natural Light in Habitable Rooms by 30% over NYC Code	DD - Submit design calculations, plan layout, elevations, sections, and comparison to NYC code.						
2.4.2	Maintain Minimum Floor-to-Ceiling Heights of 8'-6"	DD - Submit plan layouts, elevations, and sections and include any areas being considered for heights inferior to 8'-6".						
2.5	Indoor Pest Control							
2.5.1	Prepare and Implement an Integrated Pest Management Plan	CD - Submit an Integrated Pest Management Plan prior to beginning construction including all design measures to be incorporated into the building.						





SCHEDULE OF SUBMISSION REQUIREMENTS (cont.)							9	
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL
3.3.2 Fly Ash/Blast Slag (cont.)	CD - Submit calculated fractional percentages of recycled material							
	C - Submit log on a monthly basis. Submit pertinent certifications from concrete/cement suppliers.							
	PC - Submit completed Log and Certification Report.							
3.4 Local/Regional Materials								
3.4.1 Use a Minimum of 50% Local/Regional Materials	DD - Submit Building Material Schedule indicating local materials as percentage of total materials.							
	CD - Submit a Building Materials Provenance Schedule as per the current USGBC's LEED matrix and formulas tracking provenance of all materials in the building. Indicate evidence of transportation service by rail or water if applicable.							
	C - Update Building Materials Provenance Schedule on a monthly basis. Submit all pertinent certifications of compliance and evidence of transportation service by rail or water if applicable.							
	PC - Submit completed Log and Certification Report.							
3.5 Renewable & Rapidly Renewable Materials								
3.5.1 Use Best Efforts to Specify Products with Renewable or Rapidly-Renewable Materials	DD - Submit Building Materials Schedule indicating renewable or rapidly renewable materials and quantity.							
	CD - Submit a Memorandum delineating efforts made.							
	C - Submit certification of renewable/rapidly renewable materials used during construction. Submit all pertinent certifications of compliance.							
3.6 CFC Elimination								
3.6.1 Prohibit use of CFCs and CFC-Based Equipment	DD - Submit an HVAC Equipment Schedule confirming compliance with the BPCA's CFC policy.							
	CD - Update DD Submission. Submit specification or cut sheets indicating no use of CFC based equipment.							

SCHEDULE OF SUBMISSION REQUIREMENTS (cont.)							10			
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL		
3.6.2 Avoid Materials Manufactured with CFCs	DD - Submit Building Materials Schedule.									
	CD - Update DD Submission.									
	C - Submit specifications and confirmation (MSDS or otherwise) from manufacturer.									
3.7 Alternative Transportation										
3.7.1 Bicycle Storage	DD - Submit plan layout/configuration and equipment for bicycle storage space. Submit calculation on quantity of bicycles.									
	CD - Update DD Submission. Submit specification on bicycle storage system.									
	PO - Include information about bicycle storage in Tenant Guide (see § 4.1.1).									
3.7.2 Preferred Parking	DD - Submit plan layout showing area of preferred parking and indication of method to confirm high-performance.									
	CD - Update DD Submission.									
	PO - Submit copy of pertinent sections of agreement with parking provider. Include information about preferred parking spots in Tenant Guide (see § 4.1.1).									
3.8 Certified Wood										
3.8.1 Use Certified Wood Products	DD - Submit Wood Products Schedule.									
	CD - Submit log on a monthly basis, including certification.									
	PC - Submit completed log and certification report.									
3.8.2 Encourage Tenants to Use Certified Wood Products	PO - Include sustainable wood product information in Tenant Guide (see § 4.1.1).									
3.9 Low-Pollution Fuels										
3.9.1 Use Low-Pollution Fuels	CD - Submit specifications and estimate of fuel to be used.									
	C - Submit affidavits certifying the use of low-pollution vehicles and fuels during construction.									

SCHEDULE OF SUBMISSION REQUIREMENTS (cont.)							11	
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL
3.9.2	Use Low-Pollution Diesel Equipment	CD - Submit specifications and/or manufacturer's data. C - Submit confirmation of equipment.						
<b>4.0 Education, Operations &amp; Maintenance</b>								
4.1	Education							
4.1.1	Provide "Green Construction Practices" and Training to Construction Personnel	CD- Submit curriculum of training. C - Submit confirmation of trained attendees and dates of training. Provide hard hat sticker for participants.						
4.1.2	Green Team Leader	DD - Submit job description and proof of employment for GTL.						
4.1.3	Tenant Guide	DD - Submit outline of Tenant Guide CD - Submit developed, comprehensive Tenant Guide for approval.						
4.1.4	Provide O&M Training to Building Operations Manager and Key Staff	PO - Submit a final Tenant Guide before the first TCO. Provide Guide to tenants at lease signing in hard-copy form and as an on-line resource. CD - Submit curriculum of training PO - Submit confirmation of trained attendees and dates of training.						
4.1.5	Provide Bulletin Board or Web Screen in Lobby Area	DD - Submit plan layout/elevation showing location and size. CD - Submit details of system. PC - With As-Built submittals, include copies of material initially posted in the bulletin board/web screen.						
4.2	Commissioning							
4.2.1	Engage an Independent Commissioning Authority	DD - Submit roster of team members and credentials.						
4.2.2	Develop and Utilize a Commissioning Plan	DD - Submit a Commissioning Plan.						
4.2.3	Incorporate Commissioning Requirements into Construction Documents	DD - Submit specifications, highlighting commissioning requirements.						

SCHEDULE OF SUBMISSION REQUIREMENTS (cont.)							12				
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL			
4.2.4 ICA Report											
4.2.4.a Conduct a Design Development Review	DD - Submit an Initial Commissioning Report for design development review, and a Final Commissioning Report before issuance of contract documents.										
4.2.4.b Conduct a Construction Document Review	CD - Submit a Commissioning Report and a Final Commissioning Report before issuance of contract documents.										
4.2.4.c Review Contractor Submittals Relative to Systems Being Commissioned	C - Submit Commissioning Report documenting review of contractor submittals.										
4.2.4.d Provide Developer with a Complete Commissioning Report	PC - Submit final Commissioning Report.										
4.2.4.e Review Building Operation with O&M Staff	PC - Submit ICA report of building operation staffing plan.										
4.3 Building Systems Monitoring											
4.3.1 Install and Maintain a Permanent BMS or Equivalent	DD - Submit schematic of Building Monitoring System.										
	CD - Submit Building Monitoring Equipment Schedule and schematics.										
4.3.2 Submit an Air Quality Testing Protocol	CD - Submit air quality testing protocol.										
	PO - Submit an Air Quality Profile at the time of initial occupancy, as outlined in § 4.3.2. Declare and summarize the installation, operational design, and controls/zones for any and all permanently installed monitoring systems. Include in Maintenance Manual.										
4.4 Maintenance Accountability											
4.4.1 Prepare and Submit a Maintenance Manual	DD - Submit outline of Maintenance Manual.										
	CD - Submit developed Maintenance Manual.										
	PO - Submit a finalized Maintenance Manual prior to the first TCO.										
4.4.2 Include Key O&M Staff in the Design, Selection, and Commissioning of Building Systems and Equipment	DD - Submit a roster of the building's maintenance staff during the design phase.										



SCHEDULE OF SUBMISSION REQUIREMENTS (cont.)							14	
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL
5.2.3	Utilize Drip Irrigation Systems	CD - Submit plan layout and specifications.						
5.3.1	Treat and Reuse Waste Water with a Reclaimed Water Treatment System	DD - Submit design calculations and assumptions, system design schematics, plan layout, and description of system. CD - Update DD Submission.						
5.3.2	Use Ecology-Based Treatment Processes for Reclaimed Water	DD - See above. CD - Update DD Submission. Submit specifications to show use of ecology-based treatment processes as opposed to a chemical treatment system						
5.3.3	Use Reclaimed Water for Sewage Conveyance, Toilet Flushing, Cooling Tower Make-up, Irrigation, and Building Management Uses	DD - Submit design layout, system schematics and design calculations. CD - Update DD Submission.						
5.3.4	Minimize Chemical Maintenance in Cooling Tower	CD - Submit plan layout and specifications to show best efforts to minimize use of chemicals in the maintenance of cooling towers.						
5.4	Water Efficient & Responsible Landscaping Practices							
5.4.1	Specify only BPCA/BPCPC Approved Plantings	DD - Submit schematic landscape drawings. CD - Submit specifications, and plant lists for review and approval.						
5.4.2	Specify only BPCA/BPCPC Approved Topsoils	CD - Submit topsoil specifications for review and approval.						
5.4.3	Landscape Maintenance Plan	CD - Submit outline of Landscape Maintenance Plan. PO - Submit landscape maintenance plan of sustainable landscape practices for all landscaped areas.						
5.5	Landscape and Roof Design to Reduce "Heat Islands"							
5.5.1	Designate 75% of all Roof Area(s) as "Green" Roof Gardens	DD - Submit schematic roof landscape drawings, elevations, and area calculations						



SCHEDULE OF SUGGESTED ADDITIONAL MEASURES SUBMISSION REQUIREMENTS										16
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL		
EE Add 1	Additional Energy Efficiency	PC - Confirmation of 35% overall energy efficiency after project is completed with on-site measurement (see § 4.3.1). Include in Annual Building Performance Report (see § 4.4.3).								
EE Add 2	Enthalpy Wheel	DD - Submit plan layout and specifications to show use of enthalpy heat wheel technology for year-round conditioning of air for 75% of apartments.								
EE Add 3	Geothermal	CD - Update DD Submission. DD - Submit plan layout to show use of 30 tons cooling and heating using geothermal technology.								
IAQ Add 1	Thermostat Connectivity	CD - Update DD Submission. Submit specifications. CD - Submit Equipment Schedule and specifications. Include in Maintenance Manual (see § 4.4.1).								
MIR Add 1	Composting	PO - Update CD Submission. DD - Submit outline plan for composting.								
MIR Add 2	Add. Recycled Content	CD - Submit plan layout and specifications to show designated area for composting collection on each apartment floor or provide separate waste line for garbage disposals to a central point for composting. Include additional area on site for storage and in Maintenance Manual. PO - Update CD Submission. Provide proof of 5-year agreement within building or via outside party showing use of compost produced.								
MIR Add 3	Renewable Materials	C - Submit a Recycled Materials Log as per § 3.3.1, confirming use of recycled materials for 20% of the total value of materials in the project. C - Submit a Recycled Materials Log, confirming use of renewable bio-based materials, as defined in the Glossary, for 2% of the total value of materials in the project.								
OP Add 1	Life Cycle Analysis	CD - Submit an Environmental Impact Assessment of the proposed building, showing the overall life cycle analysis of the building. The analysis / assessment should be done using the Athena Institute's Environmental Impact Estimator system, or an equivalent methodology approved in advance by the BPCA.								

SCHEDULE OF SUGGESTED ADDITIONAL MEASURES SUBMISSION REQUIREMENTS (cont.)											17
Section	Requirements	BPCA Comments	DD	CD	C	PO	PC	ALL			
WC Add 1 Intensive Green Roof	DD - Submit plan layout and specifications to show intensive green roof cover over 75% of all roof area over conditioned space and including terraces, not used for mechanical equipment or skylights.  CD - Update DD Submission.										
WC Add 2 Additional Green Roof	DD - Submit plan layout and specifications to show additional green roof cover over 90% of all roof area over conditioned space and including terraces, not used for mechanical equipment or skylights. System to be intensive for at least 50% of green roof.  CD - Update DD Submission.										



ADDITIONAL DOCUMENT SUBMITTALS							
Submittal	Requirement	DD	CD	C	PO	PC	ALL
Cost Analysis	Submit a cost analysis of all green features. Format shall be as per the Residential Environmental Guidelines Independent Cost Impact Study of 2003, prepared by Skanska USA Building Inc.						
Agency Approvals	Submit to BPCA copies of all agency approvals.						
As-Built Drawings & Specifications	Submit to BPCA copies of as-built drawings and specifications.						
LEED <sup>™</sup> NC Submission	Submit to BPCA copies of USGBC LEED <sup>™</sup> NC submission and any CIR or follow-up information.						
LEED <sup>™</sup> EB Submission	Submit to BPCA copies of format for LEED <sup>™</sup> EB submission with subsequent full document submission at 5-year intervals.						
LEED <sup>™</sup> CI Support	Submit to BPCA supporting core and shell documentation required for them to submit for LEED <sup>™</sup> Commercial Interiors.						
Annual Building Report	Submit to BPCA copies of outline of Annual Building Report and submittal after one year of occupancy.						
Commissioning Report	Submit to BPCA copies of the Commissioning Report.						
Maintenance Manual	Submit to BPCA copies of Maintenance Manual, electronically and as a hard copy.						
Tenants Manual	Submit to BPCA copies of Tenant Guide, required before initial occupancy.						
Green Building Tax Credit Submission	Submit to BPCA copies of Green Building Tax Credit submission, if applicable.						

