

APPENDIX D

COMMERCIAL SUSTAINABLE DESIGN GUIDELINES

The Lower Manhattan Development Corporation and the Port Authority of New York and New Jersey acknowledge the following organizations for their input in developing the Commercial Sustainable Design Guidelines for the World Trade Center Redevelopment Projects:

Croxtton Collaborative Architects
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Natural Resources Defense Council
Environmental Defense
New York League of Conservation Voters
Albanese Organization
Silverstein Properties
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New Civic Works

Sustainable Design Guidelines Introduction

World Trade Center Redevelopment Projects

SUSTAINABILITY POTENTIALS: An Introduction to the Guidelines

Context

The nature and scope of the redevelopment reaches beyond the traditional boundaries of “building and site” and poses significant challenges and opportunities when framing sustainable potentials.

As a “first order” observation, the entire development is shaped by the “movement infrastructure” of mass transit, roadways, rail, footpaths, escalators and elevators transporting the tens of thousands of people arriving by ferry, rail, subway, bus, car and on foot to and through this unique community of spaces in the heart of the nation’s most dense urban center.

This unique urban center in combination with this infrastructure supports very high levels of development density and supporting services. By breaking out of the traditional individual building model, the development creates a wide range of opportunities for shared resources, capitalizing on the opportunities inherent in urban density and adjacency. The redevelopment, in short, has the potential to establish a leadership model of urban sustainability.

The realization of key potentials, fundamental “whole system” strategies such as district heating/cooling, river water cooling and shared service facilities creates an infrastructure and “connective tissue” that points in the direction of a true leadership project. The purpose of the Guidelines is both to establish a new level of environmental/sustainable quality for an urban center model and to identify the “pathways” to higher performance over time.

Framework

Capturing the urban scale, mixed use and whole-system attributes of the redevelopment has led to an expansion of the traditional model for green guidelines. Notably, as an interrelated list of standards, the guidelines overall exceed the objectives of NY State Executive Order 111 (EO-111), which includes meeting the US Green Building Council’s (USGBC) Leadership in Energy Efficiency (LEED™) Green Building Rating System’s certified level and have been reviewed by the PANYNJ and LMDC.

The challenge then from an environmental sustainable perspective, is to describe a framework of guidelines/metrics, which capture the urban scale/mixed use development, can be applied to purely infrastructure and partial projects over time and can address traditional projects. This objective, which creates a level playing field for assessment and “sustainable” quality has the added advantage of meeting the need for annual reporting and/or audit under the requirements of EO-111. The scope of this effort has allowed the development of a basic framework consisting of a stated “Purpose” and “Action” for each guideline, which will be fully supported by Reference Documentation.

Four basic qualities are unique to these guidelines;

- 1) Urban Environmental Quality (UEQ)
A unique set of large-scale sustainable qualities that the projects bring to the surrounding community and urban context. There are a number of “Green Guidelines” around the United States, including the New York State Green Building Tax Credit (NYSGBTC) and the USGBC’s LEED™ Green Building Rating System, which are excellent references and have been selectively incorporated herein. However, these are inherently focused on a specific building type or project. At the project site, there are issues of regional and neighborhood scale – regional transportation systems, relationships to surrounding neighborhoods, as examples – that have informed the development of these strategies and guidelines that go beyond individual buildings.

- 2) “Whole system” compliance
This organizing principle of the guidelines assures that integrated and overlapping qualities of all project elements (and the spaces in between) are accounted for by having a project-wide “basket” of guidelines from which each individual project is custom tailored. Therefore each individual development, by type, will have only the relevant guidelines assigned, and even a small project or renovation will be assigned a short list of relevant guidelines. (Note: See the attached Matrix for examples).
- 3) Individual projects can draw from a basket of measures with flexible range of scale.
As an interrelated list of standards, in addition to 1 and 2 above, the guidelines overall exceed the objectives of EO-111, have been reviewed by the PANYNJ and LMDC and offer flexibility to design teams. Guidelines indicated as “**Required**” are mandatory and flow directly from the objectives of EO-111, LEED™ certified level requirements and the larger requirements of the PANYNJ and LMDC. Required items are to be implemented. The LEED™ “Roadmap for Silver” creates a pathway for even higher performance. Flexibility is provided through an “**Equivalency Option**” which allows designers to propose an “equivalent option” for a guideline which is part of the LEED™ Calculation, as long as the number of LEED™ points remains the same or better. Guidelines indicated as “**Recommended**” are provided to support efforts by teams seeking additional opportunities to improve environmental performance. Guidelines, which include the “**Exemplar**” as described in item 4 below will also be indicated as part of tenant recommendations. Some of the guidelines include extended considerations and larger scale impacts, important to the realization of the guideline. These “**Universal**” impacts, for instance the requirement for water management plans, which also benefit the municipal water infrastructure, are indicated. The Implementation Matrix indicates “**Required**”, “**Equivalency Option**”, “**Recommended**”, “**Exemplar**” and “**Universal**” designations with a distinct set of symbols.
- 4) Integrated Building Design and Tenant Spaces
There is seldom an integration between the construction of cores and shells, which is the responsibility of the developer, and the fit-out of tenant spaces. This has traditionally been an impediment to achieving an integrated high performance design, particularly in commercial office projects.

In order to create an integrated project design and capture the maximum performance potentials of such preferred tenant fit-outs, each major office and retail segment will design and build an “exemplar” or model of a typical high performance tenant fit out. The performance attributes (energy savings, daylight, air quality, etc.) of the space will be fully quantified and described in the reference standard: the WTC High Performance Prototype and advocated as the landlord “preferred” standard. Tenants will be encouraged to apply to federal, state, municipal and utility incentive programs for assistance in offsetting initial investment costs.

Specific Plans

A specific way in which these guidelines are unique is in the requirement for development and implementation of Resource Management Plans and the development of “exemplars”, models for integration of commercial and retail, “shell and core” with high performance tenant fit-outs. The 11 Resource Management Plans, required as part of this set of guidelines, go beyond the framework of existing Green Building Rating Systems (LEED™ for instance, only requires 3 of the 11 incorporated here) and clearly demonstrate the broader consideration of sustainability potentials inherent to the development. These plans will be assured through an approval process requiring the submission of compliance templates, calculations and field verification. The exemplars will also be required to meet performance criteria established in a WTC High Performance Prototype.

The following Plans and Studies are required as part of these guidelines. Each plan will require the submission of appropriate documentation such as letter templates, calculations and documentation in the sequence of "Implementation Reviews" running from Conceptual/Schematic to Construction Administration/Signoff (see Implementation Authority)

SEQ-1	Comprehensive Resource Management Plan
SEQ-5	Construction Environment Plan
SEQ-6	Construction Storm Water Pollution Prevention Plan
WEQ-1	Water Management Plan
EEQ-1	Energy Management Plan
EEQ-3	Building Energy Model
EEQ-5	Renewable Energy Transition Plan
MEQ-1	Materials Management Plan
MEQ-2	Construction Waste Management Plan
IEQ-1	Indoor Air Quality Management Plan
IEQ-5	Construction IAQ Management Plan
IEQ-9	Integrated Pest Management Plan

Structure of Guidelines

The Guidelines will be organized in three basic parts:

- I. **Master Plan Objectives:** A summary of sustainable design objectives organized by general subject headings.
- II. **Master Plan Sustainable Design Guidelines:** A specific listing of Purpose and Action for each guideline organized by subject to facilitate exceeding EO-111 and its related cross-reference to LEED™ Certified level. (Note: Currently being completed are the supporting reference documents, standards and case studies for all non-LEED requirements.)
- III. **Guideline Implementation Matrix:** A matrix is provided to describe how each purpose and action would be applied to selected project types.

Implementation

The Sustainable Guidelines have been developed as an integral part of the Commercial Design Guidelines for WTC Redevelopment Projects. These guidelines reference the current LEED™ 2.1 Building Rating System for new construction. As new versions of LEED™ are adopted by the USGBC in the future, these guidelines will be updated to maintain conformance with EO-111. The projects will exceed the New York State Energy Conservation Construction Code by at least 20%.

The guidelines that are cross-referenced to the USGBC's LEED™ Guidelines, must meet USGBC's requirements, which are supported by a context or background statement. The USGBC has also developed a detailed Reference Manual for these LEED™ Guidelines, which provides specific guidance and case studies to assure clarity and full implementation. As with all codes and reference standards, this supports and facilitates the efficiency/currency of the design team's work. The remaining guidelines herein, that currently consist of only Purpose and Action Statements, will be supported by their own detailed Reference Manuals. The Reference Documentation of USGBC's LEED™, will also be supplemented by some location-specific New York City and World Trade Center Site comments and/or elaboration.

Consistent with the Commercial Design Guidelines process, the implementation of these Guidelines will be accomplished by the review process administered as described in Chapter 10 of the Commercial Design Guidelines. This process will require each project to be reviewed for compatibility and conformance with these Sustainable Design Guidelines, as well as, the Commercial Design

Guidelines. The attached "Implementation Matrix" provides clarification of the process by way of a listing of some general building types and their relevant guidelines.

Sustainable Design Objectives

DAYLIGHT/SOLAR RESOURCE MANAGEMENT

Maximize Available Outdoor Daylight Resources to Public Spaces

Design buildings and site structures to optimize available daylight for public open spaces and green areas. Utilize shadow studies to track path of sun and assist in final design of outdoor public spaces. Organize site structures, materials and landscape to improve environmental comfort of outdoor spaces and mitigate the effects of heat islands. Consider site environmental wind conditions. Select and locate materials and landscape features so that thermal properties and shading effects will extend outdoor comfort levels further into the shoulder seasons.

Daylight Harvesting & Views for Tower Interiors

Maximize daylight harvesting. Design exterior building envelope to facilitate daylight penetration to regularly occupied tenant spaces. A demonstration model of a tenant fit out will be provided to demonstrate these daylighting strategies. This model will provide building occupants with direct line of sight views to the outdoors from the majority of regularly occupied spaces and control glare.

Daylight Harvesting & Views Below Grade

Maximize daylight penetration to concourse areas and below grade retail areas. Provide views to the outdoors from concourse areas to assist users in wayfinding and orientation.

Heat Island Effect Mitigation

Reduce site development contributions to “heat island” effects in Lower Manhattan. Provide landscape planting (green infrastructure) coupled with high albedo surfaces at other areas to mitigate thermal gains of site surfaces and building roofs.

WATER QUALITY AND CONSERVATION MANAGEMENT

Comprehensive Water Management Plan

Implement a Water Management Plan to optimize use of storm water, waste water and potable water and provide a coordinated management plan in conjunction with full site development. Study on-site reclamation of wastewater.

Storm Water Capture and Reuse

Capture and utilize storm water flows. Consider towers with ledges, roofs and setbacks, which will assist in capturing water sheeting off buildings at high elevations to reduce water pump energy requirements. Use reclaimed storm water and/or site water for toilet flushing, cooling tower makeup, vehicle maintenance and irrigation needs.

Water Use Efficiency

Seek highest water efficiency within buildings and reduce the burden on municipal water supply. Design landscape to minimize potable water requirements. Endeavor to utilize waterless urinals and high efficiency fixtures.

AIR QUALITY MANAGEMENT

Site Air Quality

Work to improve site outdoor and neighborhood air quality. Support and expand pedestrian accessibility and increase bicycle access. Reduce site generated vehicular emissions.

IAQ Performance and Monitoring

Optimize the indoor environment for the comfort, well-being and enhanced productivity of the buildings' occupants by establishing minimum indoor air quality (IAQ) performance and standards. Provide indoor air quality monitoring so that a standard of quality in the overall indoor environment and resulting well-being of the occupants is maintained.

100% Outside Air

Provide capability for 100% outside air where practicable and balanced with energy conservation to support the comfort and well-being of building occupants.

Low Emitting Materials

Minimize indoor air contaminants originating in materials, that are harmful to the comfort and well-being of building occupants and users. Specify materials with no or low volatile organic compounds (VOC's) and other toxic characteristics which affect IAQ.

Chemical & Particulate Control

Minimize sources of chemical and particulate air contamination. Design all major entrances with permanent walk-off grilles. Mitigate health concerns caused by unwanted pests, their excrement and the typical, toxic chemicals used to control them through the development of an integrated pest management plan. Provide high efficiency filtration of all air to occupied areas.

ENERGY CONSERVATION

Comprehensive Energy Management Plan

Conserve and optimize energy use and minimize air emissions, associated with energy use, through the implementation of a Site/Building Energy Management Plan.

Provide for ongoing verification of optimal operation and energy utilization of building energy systems by providing a computerized, fully-integrated Building Management System (BMS). Provide for full building commissioning with ongoing verification, maintenance and energy systems management.

Opportunities for Energy Conservation and Efficiency

Review large and small scale opportunities for energy conservation and enhanced reliability and capacity. Include exploration of the feasibility and potential benefits and reliability of co-generation, central heating/cooling, river water cooling and recovery of resources.

Renewable Energy

Utilize on-site or purchased renewables for at least 20% of site energy requirements (by 2010 per EO-111) and prepare a plan for further transition to renewable technologies as these become more cost-effective. To the extent practicable, provide pathways, access and space allocation for "near threshold" renewable and clean energy technologies such as solar and fuel cells.

Optimize Energy Performance

Optimize the performance of building energy systems through the utilization of a full DOE-2.1E or Energy Plus building energy model to compare energy conservation, in alternative strategies. Integrate with Site Energy Management Plan and implement strategies for moderating peak power loads. This is to include the full analysis of architectural and mechanical decisions in relationship to building energy expenditures to achieve a minimum 20% decrease in energy consumption from

ASHRAE 90.1-1999. This savings reflects both tower and office tenant build-out potentials. Tenant build-out potential (as demonstrated in a typical tenant build-out) will be modeled in the same integrated exercise and the economic results provided to potential tenants in support of the preferred buildout. Information will be provided to tenants.

Metering at Point of Use

Implement end-user metering of electricity to maximize tenant incentive for resource conservation.

Ozone Layer Protection

Reduce emission of ozone depleting chemicals. Specify building HVAC systems and materials with zero levels of CFC refrigerants.

Thermal Comfort & Personal Control

Provide building users with a high level of thermal, ventilation and lighting system control to promote comfort, well-being and enhanced productivity.

Light Pollution Reduction

Reduce light pollution to surrounding sites and night sky. Satisfy Illuminating Engineering Society of North America (IESNA) recommended practice per manual (RP-33-99) for exterior illumination. Tower tops to be exempt from these requirements.

MATERIAL CONSERVATION

Comprehensive Material Management Plan

The Material Management Plan provides a tool for an optimized utilization of all site material resources. This integrated resource management tool is designed to reduce waste generated by building occupants that would otherwise be hauled to and disposed of in landfills and/or incinerators. Consider potential of “design for disassembly” strategies on IAQ and site material resourcefulness. Encourage the re-use of existing site structures, utilities and foundations. Incorporate previously used building materials and products into new construction where practicable.

Construction Waste Management

Reduce the amount of construction and demolition (C&D) waste going to landfills and/or incinerators and conserve resources through reuse and recycling.

Recovery of Resources

Study small and large-scale opportunities for recovery of resources along with Energy Conservation measures. Provide space or means for recycling of resources on site during operations.

Materials with Recycled Content

Increase markets for building materials and products that incorporate recycled content.

Material Proximity

Encourage the use of building materials and products that are extracted and manufactured or assembled within a 500-mile radius of the site.

Agricultural Materials

Encourage the specification of materials, which are renewable and are grown in such a way as to support biological diversity and the health of the ecosystem.

Specify lumber, wood and wood products, which have been harvested according to sustainable forest management principles, and have been certified under the Forest Stewardship Council (FSC) guidelines, in conjunction with the Materials Management Plan.

CONSTRUCTION ENVIRONMENT

Construction Environment Pollution Prevention

Reduce pollution and noise from construction activities and vehicles. Implement a Construction Environment Plan designed to reduce pollution and noise from construction activities and vehicles to adjoining neighborhoods. Develop a materials staging and construction access plan prior to start of construction. Control site erosion, collect and utilize storm water as appropriate, and reduce negative impacts on hydrological and atmospheric systems produced by construction activities, through use of ultra low sulfur fuels as appropriate.

Construction IAQ Management Plan

Implement a Construction Indoor Air Quality Management Plan consistent with EO-111.

Phased Development

Address both the “active” portions of the site under development, as well as, the “inactive” areas of the site, which have a supporting role. These inactive areas will have a smaller, focused list of guidelines to address storm water, heat island mitigation and other site issues applicable to temporary sites with PANYNJ oversight.

Sustainable Design Guidelines

URBAN ENVIRONMENTAL QUALITIES

UEQ-1: Support Urban Development

Purpose: Support development in existing urban areas and fully utilize and support existing infrastructure.

Action: Channel development to urban areas. Provide development that supports and maximizes the use of existing infrastructure and exceeds a minimum development density of 60,000SF/acre.

UEQ-2: Expanded Public Transit and Bicycle Access

Purpose: Encourage the development of public transportation, address opportunities to connect/cross-connect systems and support and increase bicycle access.

Action: Integrate and encourage utilization of public transportation. Follow the recommendations of the NYC Department of City Planning (DCP) 1999 Bicycle Parking Needs Study and the 1997 NYC Bicycle Master Plan. Reduce parking from pre 9/11 levels and implement Parking Management Plan to reduce future parking demands. Site parking for commercial uses is not to exceed 1300 cars..

Towers: Support bicycle use by providing bicycle racks or secure and convenient storage.
Site: Support bicycle use by providing bicycle racks near transportation, retail and cultural centers.

UEQ-3: Regional Mass Transit

Purpose: To promote regional mass transit systems.

Action: Provide inter-modal connection facilities for regional transportation system, ferries, subways and buses with clear connections between the various transportation systems. Allow for future integration of other regional transportation systems.

UEQ-4: Pedestrian Movement

Purpose: Support neighborhood, community, visitor and commuter pedestrian pathways and facilitate pedestrian access to and through the site.

Action: Diagram anticipated pedestrian pathways that are coordinated with plans for WTC Redevelopment Projects. Enhance pedestrian pathways, both above and below ground, to facilitate and support pedestrian traffic. Describe enhancements including and illustrating connections to buildings, additional pathways and transportation nodes, path size, adjacent area uses, public art, vegetation, access to daylight and direct sun, furnishings, wayfinding, paving materials and patterns and view corridors.

UEQ-5: Green Infrastructure

Purpose: Support the development of green infrastructure by developing and linking vegetated site areas with existing neighborhood green spaces.

Action: Diagram "green" infrastructure within 1000' of site boundary. Create site vegetated areas to enhance site contributions to natural ecological processes, sustain air and water resources, promote biodiversity and reduce heat island effects. Facilitate creation of green infrastructure linkages in conjunction with adjacent neighborhood green spaces.

UEQ-6: Outdoor Environmental Comfort

Purpose: To facilitate site development that supports outdoor environmental comfort.

Action: Design site structures, materials and landscape to enhance comfort and functionality of outdoor spaces and mitigate the effects of heat islands. Extend outdoor comfort levels further into the Spring and Fall seasons with passive strategies that maximize natural assets. Design structures with consideration for site environmental wind conditions where pedestrians would be affected and seek to moderate any such effects.

UEQ-7: Wayfinding

Purpose: To facilitate both neighborhood and site-user orientation and site readability.

Action: Integrate wayfinding as an integral design quality when developing green corridors, visual corridors and memorable place markers in conjunction with surrounding neighborhoods.

UEQ-8: Vehicular Emissions

Purpose: Reduce back-up of traffic into neighboring streets in order to minimize vehicle emissions and improve neighborhood air quality from pre 9/11 base. Minimize potential idling time for all vehicles.

Action: Optimize traffic flow of all vehicles coming to site to reduce the amount of time that vehicles must idle. Seek to reduce traffic backups through scheduling and onsite accommodation. Design bus stops to minimize traffic backups and potential vehicle idling times.

To the extent that there is NY State Agency and/or other governmental presence on site, at least 50% of light duty fleet vehicles will be alternative fuel or hybrid vehicles by 2005 and 100% by 2010.

SITE / PARCEL ENVIRONMENTAL QUALITIES

SEQ-1: Comprehensive Resource Management Plan

Purpose: Draft and implement the requirements of the Comprehensive Resource Management Plan.

Action: The Comprehensive Resource Management Plan provides a tool for an integrated consideration of water, material and energy resources with the goal of identifying, evaluating and optimizing utilization of all resources on the site. The plan overlays information from the individual water, material and energy management plans and identifies integrated opportunities for resource conservation (i.e. high capture and utilization of stormwater at upper levels of tower reduces pump energy required for lifting equivalent amount of water).

SEQ-2: Storm Water Use

Purpose: To capture and utilize site storm water flows, thereby reducing storm water volume and surges through the system.

Action: Implement a plan for stormwater management as part of the Water Management Plan that reduces the post-development flow of stormwater from the site (9/11 base). Construct treatment systems to remove 80% of total suspended solids (TSS) and 40% of total phosphorous (TP) per EPA Document (840-B-93-001c) Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (based on the average annual loadings from all storms less than or equal to the 2 year/24 hour storm).

Site/Parcel: Design site surfaces to allow collection of site storm water flows from other than street surfaces. Provide storage and filtration infrastructure. Fully use captured water as appropriate and in conjunction with Water Management Plan.

Towers: Consider towers with ledges, roofs and setbacks, which will assist in capturing water sheeting off buildings at high elevations to capture potential energy of water and reduce water pump energy requirements. Provide storage and filtration infrastructure near point of capture. Use water, as appropriate for toilet flushing and as part of building water systems.

SEQ-3: Heat Island Effect Mitigation

Purpose: Reduce site development contributions to “heat island” effects in Lower Manhattan. Seek to maximize areas of landscape planting (green infrastructure) coupled with high albedo surfaces at other areas to mitigate thermal loading of site surfaces and building roofs.

Action: Provide green infrastructure coupled with high albedo surfaces to mitigate thermal loading of site surfaces and building roofs.

Site/Parcel: Provide shade and/or use light-colored/high-albedo materials (reflectance of at least .3) or open reinforced grid pavement for at least 30% of the site’s walkways, plazas and open spaces.

Tower: Use ENERGY STAR® compliant AND high emissivity roofing (emissivity of at least 0.9 when tested in accordance with ASTM 408) for a minimum of 75% of the roof surface; OR install a “green” (vegetated) roof for at least 50% of the roof area.

Combinations of high albedo and vegetated roof can be used providing they collectively cover 75% of the roof area.

SEQ-4: Light Pollution Reduction

Purpose: To reduce light pollution and glare to surrounding sites and night sky.

Action: Satisfy Illuminating Engineering Society of North America (IESNA) recommended practice per manual (RP-33-99) for exterior illumination. Design exterior lighting such that all exterior luminaires with more than 1000 initial lamp lumens are shielded and all luminaires with more than 3500 initial lamp lumens meet the Full Cutoff IESNA Classification. The maximum candela value of all interior lighting shall fall within the building (not out through windows) and the maximum candela value of all exterior lighting shall fall within the property. Tower tops will not be constrained by these requirements. Minimize glare from reflected sunlight by minimizing use of highly reflective materials on building facades. Incorporate lighting controls to minimize energy use during unnecessary periods.

SEQ-5: Construction Environment

Purpose: To reduce pollution, noise and vibration from construction activities and vehicles.

Action: Implement a Construction Environment Plan, which reduces pollution, noise and vibration from construction activities and vehicles to adjoining neighborhoods.

Develop a materials staging and construction access plan prior to start of construction. Truck staging zones are to be placed for minimum disruption and impact. Limit unnecessary idling times on diesel powered engines to 3 minutes. Consider bio-diesel fuel as an alternative to pure diesel.

Non-road construction equipment of 50hp or greater to include diesel emissions control technology according to EPA diesel retrofit recommendations, unless not technically feasible. All non-road diesel equipment to utilize ultra low sulfur diesel fuel (limit sulfur levels to 15ppm). Explore accelerated implementation of proposed EPA emission standards for non-road diesel equipment. Locate fixed diesel powered exhausts away from fresh air intakes.

Reduce noise and vibration impacts through scheduling and coordination with adjacent construction activities. Consider noise barriers where practicable.

Consider condition of surrounding buildings, structures, infrastructure and utilities where appropriate. Coordinate construction activities in adjacent and nearby locations to avoid or minimize impacts and communicate plans with the public.

Prepare contingency measures in the event established limits are exceeded.

SEQ-6: Construction Storm Water Runoff and Pollution Prevention

Purpose: Control site erosion and reduce negative impacts on hydrological and atmospheric systems produced by construction activities.

Action: Provide Construction Storm Water Pollution Prevention Plan conforming to US EPA document 832/R-92-005. Prevent air pollution from dust and particulate matter during the course of construction. Utilize sprayed suppressing agents (nonhazardous, biodegradable) for containment of fugitive dust and adjust strategies per meteorological conditions. Coordinate with SEQ-5 Construction Environment Plan.

SEQ-7: Use Existing Site Structures

Purpose: Encourage the re-use of existing site structures to conserve resources.

Action: Incorporate existing slurry wall, bathtub excavation, elements of Temporary PATH Station and utilities (such as the River Water Pump Station) for re-use in new site development to the extent possible.

SEQ-8: Plant/Vegetation Selection

Purpose: Use indigenous or acclimatized plants to reduce irrigation and maintenance requirements.

Action: Specify naturalized or indigenous plant materials, which will promote biodiversity and support site ecological systems, as well as, reduce maintenance requirements. Use plantings that can be sustained by natural rainfall levels to reduce irrigation requirements.

SEQ-9: Daylight/Exterior Public Spaces

Purpose: Design buildings and site structures to consider available daylight for public open spaces and green areas (within the context of the established massing guidelines).

Action: Determine critical open spaces and green areas. Utilize shadow studies to determine available sunlight. Consider available sunlight in planning outdoor public spaces and site plantings.

SEQ-10: Solar Access/Harvesting

Purpose: To optimize solar access for utilization of solar energy.

Action: Determine maximum available photovoltaic potentials for all building surfaces. Develop strategy for possible future transition to capture this potential. Quantify and document this strategy and any other “near threshold” renewable technologies in the Renewable Energy Transition Plan.

SEQ-11: Recovery of Resources

Purpose: To optimize utilization of site material resources and to facilitate the reduction of waste generated by building occupants that would otherwise be hauled to and disposed of in landfills and/or incinerators.

Action: Study large-scale and small-scale opportunities for on-site recovery of waste. Consider opportunities to recover food, paper, plastic, metal and construction waste. Consider composting, biomethanization and other viable “waste to reuse” strategies. Consider in conjunction with Renewable Energy Transition Plan and Co-generation study.

SEQ-12: Use of Undeveloped Parcels

Purpose: Utilize inactive and undeveloped site parcels to provide a positive contribution to site environmental qualities.

Action: Address both the “active” portions of the site under development, as well as, the “inactive” areas of the site, which have a supporting role. Apply guidelines Storm Water Use (SEQ-2) and Heat Island Effect Mitigation (SEQ-3) to “inactive” site areas.

WATER ENVIRONMENTAL QUALITIES

WEQ-1: Comprehensive Water Management Plan

Purpose: To optimize utilization of site water resources.

Action: Implement a Water Management Plan to evaluate use of storm water, waste water and potable water resources, study potentials for onsite reclamation of wastewater and provide a coordinated management plan for full site water resources.

Use EPA recommendations per EO 12123 (June 1999) and Federal Energy Management Program (FEMP) Best Management Practices to develop Plan. The Plan must include, at a minimum, information on operation & maintenance, utility information, facility information, emergency response information and planning considerations.

WEQ-2: Wastewater Reuse

Purpose: To minimize site wastewater outflows.

Action: Implement wastewater strategies as required by Water Management Plan. Use reclaimed storm water and/or site water for toilet flushing, cooling tower makeup, vehicle maintenance and irrigation needs. Study additional opportunities to reduce the amount of potable water used in the building for conveying sewage.

WEQ-3: Water Use Efficiency

Purpose: To maximize water efficiency within buildings and reduce the burden on municipal water systems.

Action: Reduce consumption of potable water as required by Water Management Plan. Use 30% less potable water than a baseline building (utilize 1992 Energy Policy Act fixture requirements to determine baseline) would by utilizing efficient water fixtures, automatic controls and/or waterless urinals.

WEQ-4: Landscape Hydrology

Purpose: To maximize utilization of site water for landscape requirements.

Action: Use storm water for landscape irrigation requirements in conjunction with Water Management Plan. Specify plantings requiring low amounts of watering. Use indigenous or acclimatized plants suitable for the current nature of the site. Employ high-efficiency irrigation systems with slow-drip, sub-soil irrigation and computer operation with linkages to meteorological data to optimize water resources.

ENERGY ENVIRONMENTAL QUALITIES

EEQ-1: Comprehensive Energy Management Plan

Purpose: To conserve and optimize building energy use and minimize air emissions, including greenhouse gases, associated with energy consumption at the site.

Action: Prepare an Energy Management Plan to conserve and optimize building energy use, minimize air emissions and coordinate and maximize the utilization of any site generated energy resources. The Plan shall include an energy use budget for the project for the first year of operation (building shall be a minimum of 50% occupied with unoccupied areas and building systems normalized for full occupancy) and broken down by major energy consumption category (i.e., heating, cooling, lighting, fan energy, pump energy, etc.). Consider base building systems apart from occupancy with allowances for interconnections. After each year of operation, the actual utilization of energy shall be recorded and compared to this baseline energy use budget with appropriate adjustments for deviations in occupancy, base building conditions and climate norms. Significant deviations shall be evaluated and a detailed explanation for the probable cause of the deviation recorded in the updated plan. Strategies for reducing energy consumption below the first year of operation, as defined above, shall be identified and described.

The Energy Management Plan shall include a similar itemization of any site generated energy resources, including a budget for each component, and annual updates of actual performance. The Plan shall identify measures and strategies for increasing utilization of clean on-site energy above the first year of operation, as defined above.

Review opportunities for coordinated site strategies to conserve energy. Provide matrix outlining additional costs and savings, available incentives, benefits and impacts from, for instance, a co-generation plant, river water cooling, building integrated PV, fuel cells and other strategies.

EEQ-2: Building Systems Commissioning

Purpose: To implement a Building Commissioning Plan.

Action: Engage an independent commissioning authority to prepare and execute a commissioning plan. Implement fundamental, best practice building commissioning procedures. Include design phase reviews, contractor submittal reviews, pre-functional and functional testing(including seasonal testing), training, Operations & Maintenance manuals and post occupancy review. Provide Building Commissioning Plan consistent with the requirements of NY State Green Building Tax Credit (NYSGBTC) 638.8.

EEQ-3: Optimize Energy Performance

Purpose: To optimize the performance of building energy systems.

Action: Optimize the performance of building energy systems through the utilization of a full DOE-2.1E or Energy Plus building energy model to compare alternative strategies for energy efficiency (kwh) peak load reduction (kW) and reduced use of fossil fuels. Integrate with Energy Management Plan. This is to include the full analysis of architectural and mechanical decisions in relationship to building energy expenditures. Achieve a minimum of 20% decrease in energy cost above ASHRAE 90.1-1999. This savings reflects both tower and office tenant build-out potentials. Tenant build-out potential (as demonstrated in a typical tenant build-out) will be modeled in the same integrated exercise and the economic results provided to potential tenants in support of the preferred buildout. Include full list of energy conserving opportunities available to tenants.

Provide daylight dimming and occupancy sensors on light fixtures where appropriate. All light fixtures to use high efficiency ballasts and low mercury/low lead, long life lamps. Specify recyclable lamps. Utilize energy efficient equipment such as variable speed systems for fans, pumps and motors; motors that meet or exceed NEMA premium efficiency ratings and equipment that meets or exceeds ENERGY STAR® ratings. Comply with FEMP levels for commercial products not rated by ENERGY STAR®. Provide a high performance building envelope, including minimized thermal bridging, superior insulation, air infiltration barrier and insulated wavelength selective glazing (to improve daylight transmission). Provide envelope construction details consistent with NYSGBTC 638.7(d)(2). Use air-side and water-side economizers, as appropriate.

EEQ-4: Ozone Layer Protection

Purpose: To reduce emission of ozone depleting chemicals.

Action: Specify building HVAC systems with zero levels of CFC refrigerants, and provide plan for future elimination of HCFC's and halon in HVAC and refrigeration equipment and fire suppression systems. Avoid insulation materials that utilize chlorine based gases

EEQ-5: Renewable Energy Plan

Purpose: To meet a portion of site energy requirements with on site and/or purchased renewable energy sources and institute a plan for transition as renewables become more cost-effective.

Action: Utilize site generated and/or purchased renewable energy for a percentage of total building energy use. Provide transition plan for future conversion to renewables. Purchase or generate on-site a minimum of 20% of overall annual electric energy requirements with renewables by 2010 consistent with NY State EO-111's evolving requirements and capabilities. Provide infrastructure to integrate technology into building systems, when possible.

EEQ-6: Energy Systems Control and Maintenance

Purpose: To provide for ongoing verification of initial operation and energy utilization of building energy systems.

Action: Provide a computerized, fully-integrated Building Management System (BMS) with energy and fluid flow measurement capabilities for all major energy consuming systems. Institute a maintenance plan for ongoing measurement, verification and maintenance of equipment efficiencies and resource utilization. Provide programmable controls. Install permanent monitoring systems to track energy performance. Provide for maintenance and operational continuity through manuals and education. Install continuous metering equipment for a representative sample of lighting systems, motors, drives, chiller efficiencies, and trending of economizer and heat recovery equipment cycles, air distribution pressures and volumes and boiler efficiencies. Integrate the above systems into the Building Commissioning Plan.

EEQ-7: End User Metering

Purpose: Maximize tenant incentives to conserve energy.

Action: Include electrical distribution infrastructure required to allow end-user metering of tenants, including electricity use (kWh) and demand (kW) metering. Provide examples of existing incentive programs to tenants.

MATERIAL ENVIRONMENTAL QUALITIES

MEQ-1: Comprehensive Material Management Plan

Purpose: To optimize utilization of site material resources and to facilitate the reduction of waste generated by building occupants that would otherwise be hauled to and disposed of in landfills and/or incinerators.

Action: Implement a Materials Management Plan, which coordinates and implements material guideline requirements within the Sustainable Design Guidelines. Describe materials utilized, recycled content, location of manufacture/harvest, agricultural content, sustainable harvest certification, expected lifetime, maintenance requirements and recyclable/reuse potential at end of useful life. Minimize travel distance for building products and systems and locate sinks for highest recycled use for 'waste' materials in conjunction with MEQ-2 and MEQ-5. Provide infrastructure necessary to implement the recycling requirements of the plan. A central location for appropriately-sized recycling facilities must be provided for all buildings. Facilities must include, at a minimum, space for the separation, collection and storage for recycling of paper, corrugated cardboard, glass, plastics and metals, and each of these areas should be clearly identified. Provide easy truck access for the pick-up and removal of recyclables.

MEQ-2: Construction Waste Management

Purpose: To reduce the amount of construction and demolition (C&D) waste going to landfills and/or incinerators and to conserve resources through reuse and recycling.

Action: Implement a Construction Waste Management Plan to divert construction, demolition and land clearing debris from landfill disposal to redirect recyclable and/or recovered resources back to the manufacturing process and to redirect salvageable materials to appropriate sites. Recycle and/or salvage a minimum of 50% of construction, demolition and land clearing waste, calculated by weight. Divert a minimum of 50% of construction waste by weight from landfill.

MEQ-3: Resource Reuse

Purpose: To incorporate previously used building materials and products into new construction.

Action: In coordination with the Materials Management Plan consider the use of salvaged, refurbished or reused materials and products in the building. Materials for reuse typically include reclaimed lumber and wood such as salvaged wood flooring and wood doors and cabinets, structural metal work such as beams, and miscellaneous metal such as doors, door hardware, etc. Decorative and specialized items such as salvaged wood and glass panels, banquettes, front and back bars and decorative or period lighting fixtures may be used in special public locations such as cafeterias or restaurants, and can contribute to this credit.

MEQ-4: Materials with Recycled Content

Purpose: To incorporate materials with recycled content and increase market demand for building materials and products that incorporate recycled content.

Action: Specify materials with recycled-content in conjunction with the Materials Management Plan. The value of the recycled content portion of materials is to be at least 10% of the total project materials value (mechanical and electrical components are not to be included in these calculations).

Determine recycled content value according to the following formula. For post-consumer recycled content determine percentage of recycled content in the material and multiply by value of material. For post-industrial recycled content determine percentage of recycled content in the material, multiply by $\frac{1}{2}$ and multiply by value of the material.

MEQ-5: Material Proximity

Purpose: To reduce environmental degradation resulting from transportation impacts by increasing the demand for building materials and products that are extracted and/or manufactured in close proximity to the building site.

Action: Utilize local/regional materials in conjunction with the Materials Management Plan. Use a minimum of 20% of all building materials (based on cost) that are manufactured within a 500 mile radius of the site. Manufactured in this context means the location where 'final assembly' takes place.

MEQ-6: Wood Certification

Purpose: To specify wood which has been harvested according to sustainable forest management principles.

Action: Utilize wood materials certified under the Forest Stewardship Council's Principles and Criteria (FSC) in conjunction with the Materials Management Plan. These materials may include dimensional framing components, flooring, doors, paneling, millwork and furnishings, handrails and trim, etc., as well as, temporary lumber and wood construction materials. Request vendor's chain-of-custody certificate number to verify certification.

MEQ-7: Agricultural Materials

Purpose: To encourage the specification of materials which are renewable and that grow in such a way as to support biological diversity and the health of the ecosystem.

Action: In coordination with the Materials Management Plan use renewable and rapidly renewable building materials and products. Materials with annual growing cycles or which regenerate naturally within a 10-year-cycle are considered to be rapidly renewable materials. These materials include bamboo, poplar, cork, wool, cotton, jute, sisal, and soy-based products. Agricultural 'waste' materials such as wheatgrass, sunflower seed husks, and straw also qualify under this category. Release agents for concrete forms, which are made from plant oils such as corn oil are included. Use agricultural compost for site applications, including, but not limited to, turf, plantings and erosion control.

INDOOR ENVIRONMENTAL QUALITIES

IEQ-1: IAQ Performance

Purpose: Establish high indoor air quality (IAQ) for the comfort and well-being of the building's occupants by minimizing the potential for poor air quality, and by establishing minimum IAQ performance and standards.

Action: Provide an Indoor Air Quality Management Plan which employs architectural and HVAC design strategies to establish minimum outdoor air quantities, chemical, biological and particulate source control and on-going air quality monitoring to achieve a positive impact on the overall indoor environment and well being of the occupants. Meet the requirements of ASHRAE Standard 62-2001: "Ventilation for Acceptable Indoor Air Quality", utilizing the Ventilation Rate Procedure.

Prepare plan in accordance with the requirements of NYSGBTC 638.7(d)(1,2 and 3). Draft the plan in accordance with the EPA "Building Air Quality: A Guide for Building Owners and Facility Managers", 1991 and EPA and National Institute for Occupational Safety and Health, Building Air Quality Action Plan, 1998.

IEQ-2: Daylight & Views

Purpose: Provide building occupants with connections to the outdoors through the introduction of daylight into habitually occupied areas of the building. Provide building occupants with views via direct line of sight to the outdoors from regularly occupied spaces when possible.

Action: Towers: Provide a 2% minimum daylighting factor to 75% of regularly occupied tenant spaces. Build a tenant office fit-out (5,000 SF) to demonstrate optimum daylight access, louvers and glare controls, and ceiling geometries intended to optimize daylighting strategies. Quantify performance of integrated curtain wall and tenant fit-out with proposed savings

Retail: Seek to maximize daylight penetration to concourse areas and below grade retail areas. Provide views to the outdoors from concourse areas to assist users in wayfinding and orientation.

IEQ-3: Air Quality Monitoring

Purpose: To retain high indoor air quality standards by establishing monitoring protocols to assist in maintaining appropriate ventilation rates for the comfort and well-being of building occupants.

Action: Indoor air quality must be tested annually and must meet minimum criteria for five years in accordance with minimum requirements of NY State EO-111reference to NYSGBTC 638.7(d)(1). Once radon measurements are found to be satisfactory, subsequent testing for this contaminant is not required. Where concentration levels of noted contaminants exceed the established parameters in any specific area during this 5 year period, seek to locate and remediate/eliminate contaminants, then flush out area with 100% outside air for a minimum of one week and retest until a satisfactory result is achieved.

Consideration should be given to a permanent indoor air quality monitoring system with centralized controls that provides feedback on ventilation performance and contaminant concentrations based on a combined carbon monoxide, carbon dioxide and volatile organic compound monitor.

IEQ-4: Ventilation Air Quality

Purpose: To provide outside air to all occupied spaces in the building to support the comfort and well-being of building occupants and as an energy conservation measure.

Action: Demonstrate that the requirements of Section 5, 'Best Practices for Maintaining IEQ' of the International Performance Measurement & Verification Protocol, Volume II 'Concepts and Practices for Improved Indoor Environmental Quality', March 2002 have been met. Provide capability for system default to 100% outside air at all times where practicable and in balance with energy conservation.

IEQ-5: Construction IAQ Management Plan

Purpose: To provide minimum standards for the air quality of building areas upon occupancy.

Action: Implement a Construction Indoor Air Quality Management Plan in conformance with NY State EO-111reference to NYSGBTC 638.7(d)(2) and the USGBC LEED 2.1 Rating System. During construction, meet or exceed the recommended Design Approach of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, Chapter 3. Use high efficiency filtration media at all HVAC return air grilles during construction and replace all base building mechanical system filtration media with Minimum Efficiency Reporting Value of 13 (MERV 13) filters in accordance with ASHRAE 52.2 – 1999 immediately prior to occupancy.

On completion of construction and prior to occupancy, conduct a two-week flush out with new filtration media using 100% outside air, in accordance with NYSGBTC 638.7(d)2. Replace all filtration media used with new MERV 13 filters. Alternatively, test indoor air quality at random sampling points for every 20,000 sf, or by each floor if smaller, in accordance with recognized national standards, to achieve an air quality profile at time of occupancy which satisfies the specific minimums for carbon dioxide, carbon monoxide, formaldehyde, volatile organic compounds, particulates and radon as per NY State EO-111reference to NYSGBTC 638.7(d)(2) and include one additional testing procedure for 4-PCh to satisfy all of the Alternate Procedure Requirements for LEED 2.1. Where concentration levels of contaminants exceed the established parameters in any specific area, flush out area with 100% outside air for a minimum of two weeks and retest until a satisfactory result is achieved.

IEQ-6: Reduce Contaminants from Materials

Purpose: To reduce the density of contaminants that are emitted by common building materials and which affect the comfort and well-being of building occupants.

Action: Develop and implement a Materials Management Plan to minimize utilization of materials with high levels of volatile organic compounds (VOC's) and other toxic characteristics which adversely affect Indoor Air Quality (IAQ). VOC's must meet or be lower than those in the following standards:

- Adhesives and sealants: South Coast Air Quality Management District Rule #1168
- Paints and coatings: Green Seal Standard GS-11
- Carpet and carpet adhesives: Carpet and Rug Institute Green Label Indoor Air Quality Test Program

Where possible use non-urea-formaldehyde-based bonding agents in composite wood and typical millwork applications such as veneer and plastic laminate applications, etc.

Minimize unprotected insulation in ducts, supply plenums and return plenums per NYSGBTC 638.7(j).

IEQ-7: Chemical & Particulate Control

Purpose: To minimize sources of chemical and particulate air contamination.

Action: Design all major entrances with permanent walk-off grilles to minimize particulate transfer. Provide MERV 13 air filters for removal of 90% of particulates at air supply systems and provide building owner with a maintenance schedule for filter replacement. Build slab-to-slab partitions and provide negative air pressure of at least 7PA with isolated exhaust systems of at least .5cfm/sf at work rooms with printing and copying equipment, janitorial closets and all chemical use areas. Locate exhausts to ensure that there is no potential for re-entrainment of exhaust air to other supply in-takes. Provide drains for appropriate disposal of liquid waste in spaces where water and chemical concentrate mixing occurs.

IEQ-8: Thermal Comfort

Purpose: To provide building users with a high level of thermal comfort to promote comfort, well-being and enhanced productivity.

Action: Design the building envelope in accordance with ASHRAE Standard 55-2004 to manage the flow of air, moisture and thermal energy in the building. Include capability for adjustments to thermal conditions to address seasonal changes and associated modifications in typical levels of clothing. Design an integrated system (thermal shell and HVAC) that allows building operators to monitor and control air temperature in each zone. To avoid condensation problems, mechanical systems must be designed to deal with part-load cooling conditions so that they are able to maintain appropriate dehumidification levels.

IEQ-9: Pest Control

Purpose: To mitigate health concerns caused by any unwanted pests, their excrement and the chemicals used to control them.

Action: Develop an Integrated Pest Management Plan based on USEPA Best Management Practices, which promotes physical controls and non-pesticide measures over pesticide application. Physical controls include building sealing strategies, improved sanitation, pest-resistant plantings and improved maintenance of wet areas. When necessary, use boric acid or other nontoxic alternatives in lieu of more toxic chemicals to control and eliminate rodent populations from building.

IEQ-10: Occupant Control

Purpose: To provide building occupants with a high level of thermal, ventilation and lighting system control to promote productivity, comfort and well-being.

Action: Provide building occupants with controls over airflow, temperature and lighting systems including individual controls where practicable or feasible. Provide operable windows where practicable and feasible.

IEQ-11: Acoustics

Purpose: Minimize vibration and noise levels in indoor spaces and at exterior environments to achieve appropriate physical comfort and sound isolation for tasks and speech intelligibility, while contributing to human well-being and productivity.

Action: Where practical program locations of mechanical equipment and other sources of noise away from areas of building and exterior spaces designed for use by building tenants and the public. Design separations to minimize transfer of noise. Consider strategies to reduce the transmission of exterior ambient noise. Comply with the recommendations of ASHRAE Applications Chapter 46 Design Guidelines to reduce potential noise and vibration from mechanical equipment, and the Architectural Graphic Standards 8th Edition: Sound Isolation Criteria Table, page 44 to address acoustic criteria for enclosed office space such as offices, meeting rooms and other occupied areas.

IEQ-12: Lighting Quality

Purpose: Employ advanced lighting design to maximize comfort and productivity of building occupants and enhance the quality and efficiency of electric lighting. Fully coordinate ambient electrical lighting design with daylighting strategies.






Action: Design an ambient electrical lighting system that is coordinated with daylighting strategies to provide flexible illumination. Endeavor to meet the recommendations of the Illuminating Engineering Society of North America's (IESNA) 9th Edition Handbook, Chapter 10 Quality of the Visual Environment, and the Lighting Design Guide. Provide high frequency electronic ballasts, recyclable lamps and low mercury/low lead lamps as defined by the US Environmental Protection Agency's Toxicity Characteristic Leaching Procedure (TCLP) testing procedure. Supplement ambient lighting system with multi-level task lighting to maintain a minimum of 35 footcandles (in typical office area) at desk level throughout hours of occupancy.


































SUSTAINABLE DESIGN GUIDELINES IMPLEMENTATION MATRIX

WORLD TRADE CENTER REDEVELOPMENT PROJECTS

As an interrelated list of standards, the guidelines overall exceed the objectives of EO-111, which includes meeting the USGBC's LEED™ Green Building Rating System's certified level and have been reviewed by the PANYNJ and LMDC. Guidelines indicated as "Required" are mandatory and flow directly from the objectives of EO-111, LEED™ certified level requirements and the larger requirements of the PANYNJ and LMDC. Required items are to be implemented. The LEED™ "Silver Roadmap" creates a pathway for even higher performance. Flexibility is provided through an "Equivalency Option" which allows designers to propose an "equivalent option" for a guideline which is part of the LEED™ Calculation, as long as the number of LEED™ points remains the same or better. Guidelines indicated as "Recommended" are provided to support efforts by teams seeking additional opportunities to improve environmental performance. Guidelines, which include the "Exemplar" as described in item 4 below will also be indicated as part of tenant recommendations. Some of the guidelines include extended considerations and larger scale impacts, important to the realization of the guideline. These "Universal" impacts, for instance the requirement for water management plans, which also benefit the municipal water infrastructure, are indicated. The Implement

(Note: The Implementation Authority utilizing these Guidelines will make the final determination as to which of the guidelines are applicable to any given project. This "Implementation Matrix" is designed to provide a general guide by building type. Projects of lesser scope or of a mixed use will require the final determination of the Implementation Authority as to which Guidelines apply.)

- KEY**
-  Action on Guideline **Required**
 -  LEED™ **Equivalency Option** allowed
 -  Action on Guideline **Recommended**
 -  **Universal** Relationship
 -  **Exemplar** model Encouraged for Tenant Implementation
- Prq** Prerequisite (under LEED™) required to meet EO-111 LEED™ Certification objectives

URBAN ENVIRONMENTAL QUALITY												LEED™	
No.	Quality	WTC Guideline Purpose	WTC Guideline Action	Urban	Site/ Parcel	Commercial Retail	Commercial Office	Tenant	Base Points	"Silver Roadmap"			
UEQ-1	Support Urban Development	Support development in existing urban areas and fully utilize and support existing infrastructure.	Channel development to urban areas. Provide development that supports and maximizes the use of existing infrastructure and exceeds a minimum development density of 60,000SF/acre.						1	1			
UEQ-2	Expanded Public Transit and Bicycle Access	Encourage the development of public transportation, address opportunities to connect/cross-connect systems and support and increase bicycle access.	Integrate and encourage utilization of public transportation. Follow the recommendations of the NYC Department of City Planning (DCP) 1999 Bicycle Parking Needs Study and the 1997 NYC Bicycle Master Plan. Reduce parking from pre 9/11 levels and implement Parking Management Plan to reduce future parking demands. Site parking for commercial uses is not to exceed 1300 cars. Towers: Support bicycle use by providing bicycle racks or secure and convenient storage. Site/Parcel: Support bicycle use by providing bicycle racks near transportation, retail and cultural centers.						1	1			
UEQ-3	Regional Mass Transit	To promote regional mass transit systems.	Provide inter-modal connection facilities for regional transportation system, ferries, subways and buses with clear connections between the various transportation systems. Allow for future integration of other regional transportation systems.										
UEQ-4	Pedestrian Movement	Support neighborhood, community, visitor and commuter pedestrian pathways and facilitate pedestrian access to and through the site.	Diagram anticipated pedestrian pathways that are coordinated with plans for WTC Redevelopment Projects. Enhance pedestrian pathways, both above and below ground, to facilitate and support pedestrian traffic. Describe enhancements including and illustrating connections to buildings, additional pathways and transportation nodes, path size, adjacent area uses, public art, vegetation, access to daylight and direct sun, furnishings, wayfinding, paving materials and patterns and view corridors.										
UEQ-5	Green Infrastructure	Support the development of green infrastructure by developing and linking vegetated site areas with existing neighborhood green spaces.	Diagram "green" infrastructure within 1000' of site boundary. Create site vegetated areas to enhance site contributions to natural ecological processes, sustain air and water resources, promote biodiversity and reduce heat island effects. Facilitate creation of green infrastructure linkages in conjunction with adjacent neighborhood green spaces.										
UEQ-6	Outdoor Environmental Comfort	To facilitate site development that supports outdoor environmental comfort.	Design site structures, materials and landscape to enhance comfort and functionality of outdoor spaces and mitigate the effects of heat islands. Extend outdoor comfort levels further into the Spring and Fall seasons with passive strategies that maximize natural assets. Design structures with consideration for site environmental wind conditions where pedestrians would be affected and seek to moderate any such effects.										
UEQ-7	Wayfinding	To facilitate both neighborhood and site-user orientation and site readability.	Integrate wayfinding as an integral design quality when developing green corridors, visual corridors and memorable place markers in conjunction with surrounding neighborhoods.										
UEQ-8	Vehicular Emissions	Reduce back-up of traffic into neighboring streets in order to minimize vehicle emissions and improve neighborhood air quality from pre 9/11 base. Minimize potential idling time for all vehicles.	Optimize traffic flow of all vehicles coming to site to reduce the amount of time that vehicles must idle. Seek to reduce traffic backups through scheduling and onsite accommodation. Design bus stops to minimize traffic backups and potential vehicle idling times. To the extent that there is NY State Agency and/or other governmental presence on site, at least 50% of light duty fleet vehicles will be alternative fuel or hybrid vehicles by 2005 and 100% by 2010.										

SITE ENVIRONMENTAL QUALITY							LEED™				
No.	Quality	WTC Guideline Purpose	WTC Guideline Action	Urban	Site/ Parcel	Commercial Retail	Commercial Office	Tenant	Base Points	"Silver Roadmap"	
SEQ-1	Comprehensive Resource Management Plan	Draft and implement the requirements of the Comprehensive Resource Management Plan.	The Comprehensive Resource Management Plan provides a tool for an integrated consideration of water, material and energy resources with the goal of identifying, evaluating and optimizing utilization of all resources on the site. The plan overlays information from the individual water, material and energy resource plans and identifies integrated opportunities for resource conservation (ie. high capture and utilization of stormwater at upper levels of tower reduces pump energy required for lifting equivalent amount of water).								
SEQ-2	Storm Water Use	To capture and utilize site storm water flows, thereby reducing storm water volume and surges through the system.	Implement a plan for stormwater management as part of the Water Management Plan that reduces the post-development flow of stormwater from the site (9/11 base). Construct treatment systems to remove 80% of total suspended solids (TSS) and 40% of total phosphorus (TP) per EPA Document (840-B-93-001c) Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (based on the average annual loadings from all storms less than or equal to the 2 year/24 hour storm). Site/Parcel: Design site surfaces to allow collection of site storm water flows from other than street surfaces. Provide storage and filtration infrastructure. Fully use captured water as appropriate and in conjunction with Water Management Plan. Towers: Consider towers with ledges, roofs and setbacks, which will assist in capturing water sheeting off buildings at high elevations to capture potential energy of water and reduce water pump energy requirements. Provide storage and filtration infrastructure near point of capture. Use water, as appropriate for toilet flushing and as part of building water systems.						2	2	
SEQ-3	Heat Island Effect Mitigation	Reduce site development contributions to "heat island" effects in Lower Manhattan. Seek to maximize areas of landscape planting (green infrastructure) coupled with high albedo surfaces at other areas to mitigate thermal loading of site surfaces and building roofs.	Provide green infrastructure coupled with high albedo surfaces to mitigate thermal loading of site surfaces and building roofs. Site/Parcel: Provide shade and/or use light-colored/high-albedo materials (reflectance of at least .3) or open reinforced grid pavement for at least 30% of the site's walkways, plazas and open spaces. Tower: Use ENERGY STAR® compliant AND high emissivity roofing (emissivity of at least 0.9 when tested in accordance with ASTM 408) for a minimum of 75% of the roof surface; OR install a "green" (vegetated) roof for at least 50% of the roof area. Combinations of high albedo and vegetated roof can be used providing they collectively cover 75% of the roof area.						2	2	
SEQ-4	Light Pollution Reduction	To reduce light pollution and glare to surrounding sites and night sky.	Satisfy Illuminating Engineering Society of North America (IESNA) recommended practice per manual (RP-33-99) for exterior illumination. Design exterior lighting such that all exterior luminaires with more than 1000 initial lamp lumens are shielded and all luminaires with more than 3500 initial lamp lumens meet the Full Cutoff IESNA Classification. The maximum candela value of all interior lighting shall fall within the building (not out through windows) and the maximum candela value of all exterior lighting shall fall within the property. Tower tops will not be constrained by these requirements. Minimize glare from reflected sunlight by minimizing use of highly reflective materials on building facades. Incorporate lighting controls to minimize energy use during unnecessary periods.						1	1	
SEQ-5	Construction Environment	To reduce pollution, noise and vibration from construction activities and vehicles.	Implement a Construction Environment Plan, which reduces pollution, noise and vibration from construction activities and vehicles to adjoining neighborhoods. Develop a materials staging and construction access plan prior to start of construction. Truck staging zones are to be placed for minimum disruption and impact. Limit unnecessary idling times on diesel powered engines to 3 minutes. Consider bio-diesel fuel as an alternative to pure diesel. Non-road construction equipment of 50hp or greater to include diesel emissions control technology according to EPA diesel retrofit recommendations, unless not technically feasible. All non-road diesel equipment to utilize ultra low sulfur diesel fuel (limit sulfur levels to 15ppm). Explore accelerated implementation of proposed EPA emission standards for non-road diesel equipment. Locate fixed diesel powered exhausts away from fresh air intakes. Consider condition of surrounding buildings, structures, infrastructure and utilities where appropriate. Coordinate construction activities in adjacent and nearby locations to avoid or minimize impacts and communicate plans with the public. Prepare contingency measures in the event established limits are exceeded.								
SEQ-6	Const Storm Water Runoff and Pollution Prevention	Control site erosion and reduce negative impacts on hydrological and atmospheric systems produced by construction activities.	Provide Construction Storm Water Pollution Prevention Plan conforming to US EPA document 832/R-92-005. Prevent air pollution from dust and particulate matter during the course of construction. Utilize sprayed suppressing agents (nonhazardous, biodegradable) for containment of fugitive dust and adjust strategies per meteorological conditions Coordinate with SEQ-5 Construction Environment Plan.						Prq	Prq	
SEQ-7	Use Existing Site Structures	Encourage the re-use of existing site structures to conserve resources.	Incorporate existing slurry wall, bathtub excavation, elements of Temporary PATH Station and utilities (such as the River Water Pump Station) for re-use in new site development to the extent possible.								
SEQ-8	Plant Selection	Use indigenous or acclimatized plants to reduce irrigation and maintenance requirements.	Specify naturalized or indigenous plant materials, which will promote biodiversity and support site ecological systems, as well as, reduce maintenance requirements. Use plantings that can be sustained by natural rainfall levels to reduce irrigation requirements.								
SEQ-9	Daylight Exterior Public Spaces	Design buildings and site structures to consider available daylight for public open spaces and green areas (within the context of the established massing guidelines).	Determine critical open spaces and green areas. Utilize shadow studies to determine available sunlight. Consider available sunlight in planning outdoor public spaces and site plantings.								
SEQ-10	Solar Access	To optimize solar access for utilization of solar energy.	Determine maximum available photovoltaic potentials for all building surfaces. Develop strategy for possible future transition to capture this potential. Quantify and document this strategy and any other "near threshold" renewable technologies in the Renewable Energy Transition Plan.								
SEQ-11	Recovery of Resources	To optimize utilization of site material resources and to facilitate the reduction of waste generated by building occupants that would otherwise be hauled to and disposed of in landfills and/or incinerators.	Study large-scale and small-scale opportunities for on-site recovery of waste. Consider opportunities to recover food, paper, plastic, metal and construction waste. Consider composting, biomethanization and other viable "waste to reuse" strategies. Consider in conjunction with Renewable Energy Transition Plan and Co-generation study.								
SEQ-12	Use of Undeveloped Parcels	Utilize inactive and undeveloped site parcels to provide a positive contribution to site environmental qualities.	Address both the "active" portions of the site under development, as well as, the "inactive" areas of the site, which have a supporting role. Apply guidelines Storm Water Use (SEQ-2) and Heat Island Effect Mitigation (SEQ-3) to "inactive" site areas.								

WATER ENVIRONMENTAL QUALITY										LEED™	
No.	Quality	WTC Guideline Purpose	WTC Guideline Action	Urban	Site/ Parcel	Commercial Retail	Commercial Office	Tenant	Base Points	"Silver Roadmap"	
WEQ-1	Water Management Plan	To optimize utilization of site water resources.	Implement a Water Management Plan to evaluate use of storm water, waste water and potable water resources, study potentials for onsite reclamation of wastewater and provide a coordinated management plan for full site water resources. Use EPA recommendations per EO 12123 (June 1999) and Federal Energy Management Program (FEMP) Best Management Practices to develop Plan. The Plan must include, at a minimum, information on operation & maintenance, utility information, facility information, emergency response information and planning considerations.	▲	●	●	●	○			
WEQ-2	Wastewater Re-use	To minimize site wastewater outflows.	Implement wastewater strategies as required by Water Management Plan. Use reclaimed storm water and/or site water for toilet flushing, cooling tower makeup, vehicle maintenance and irrigation needs. Study additional opportunities to reduce the amount of potable water used in the building for conveying sewage.		○	○	○	○			
WEQ-3	Water Use Efficiency	To maximize water efficiency within buildings and reduce the burden on municipal water systems.	Reduce consumption of potable water as required by Water Management Plan. Use 30% less potable water than a baseline building (utilize 1992 Energy Policy Act fixture requirements to determine baseline) would by utilizing efficient water fixtures, automatic controls and/or waterless urinals.		●	●	●	ⓔ	2	2	
WEQ-4	Landscape Hydrology	To maximize utilization of site water for landscape requirements.	Use site storm water for site landscape irrigation requirements in conjunction with Site Water Management Plan. Specify plantings requiring low amounts of watering. Use indigenous or acclimatized plants suitable for the current nature of the site. Employ high-efficiency irrigation systems with slow-drip, sub-sol irrigation and computer operation with linkages to meteorological data to optimize water resources.		●	●	●	ⓔ	1	1	
ENERGY ENVIRONMENTAL QUALITY										LEED™	
No.	Quality	WTC Guideline Purpose	WTC Guideline Action	Urban	Site/ Parcel	Commercial Retail	Commercial Office	Tenant	Base Points	"Silver Roadmap"	
EEQ-1	Energy Management Plan	To conserve and optimize building energy use and minimize air emissions, including greenhouse gases, associated with energy consumption at the site.	Prepare an Energy Management Plan to conserve and optimize building energy use, minimize air emissions and coordinate and maximize the utilization of any site generated energy resources. The Plan shall include an energy use budget for the project for the first year of operation (building shall be a minimum of 50% occupied with unoccupied areas and building systems normalized for full occupancy) and broken down by major energy consumption category (i.e., heating, cooling, lighting, fan energy, pump energy, etc.). Consider base building systems apart from occupancy with allowances for interconnections. After each year of operation, the actual utilization of energy shall be recorded and compared to this baseline energy use budget with appropriate adjustments for deviations in occupancy, base building conditions and climate norms. Significant deviations shall be evaluated and a detailed explanation for the probable cause of the deviation recorded in the updated plan. Strategies for reducing energy consumption below the first year of operation, as defined above, shall be identified and described. The Energy Management Plan shall include a similar itemization of any site generated energy resources, including a budget for each component, and annual updates of actual performance. The Plan shall identify measures and strategies for increasing utilization of clean on-site energy above the first year of operation, as defined above. Review opportunities for coordinated site strategies to conserve energy. Provide matrix outlining additional costs, benefits and impacts from, for instance, a co-generation plant, river water cooling, building integrated PV, fuel cells and other strategies. Review opportunities for coordinated site strategies to conserve energy. Provide matrix outlining additional costs and savings, available incentives benefits and impacts from, for instance, a co-generation plant, river water cooling, building integrated PV, fuel cells and other strategies	▲	●	●	●	○			
EEQ-2	Building Systems Commissioning	To implement a Building Commissioning Plan.	Engage an independent commissioning authority to prepare and execute a commissioning plan. Implement fundamental, best practice building commissioning procedures. Include design phase reviews, contractor submittal reviews, pre-functional and functional testing (including seasonal testing), training, Operations and Maintenance manuals and post occupancy review. Provide Building Commissioning Plan consistent with the requirements of NYSGBTC 638.8.		●	●	●	ⓔ	1	1	
EEQ-3	Optimize Energy Performance	To optimize the performance of building energy systems.	Optimize the performance of building energy systems through the utilization of a full DOE-2.1E or Energy Plus building energy model to compare alternative strategies for energy efficiency (kwh) peak load reduction (kW) and reduced use of fossil fuels. Integrate with Energy Management Plan. This is to include the full analysis of architectural and mechanical decisions in relationship to building energy expenditures. Achieve a minimum of 20% decrease in energy cost above ASHRAE 90.1-1999. This savings reflects both tower and office tenant build-out potentials. Tenant build-out potential (as demonstrated in a typical tenant build-out) will be modeled in the same integrated exercise and the economic results provided to potential tenants in support of the preferred buildout. Include full list of energy conserving opportunities available to tenants. Provide daylight dimming and occupancy sensors on light fixtures where appropriate. All light fixtures to use high efficiency ballasts and low mercury/low lead, long life lamps. Specify recyclable lamps. Utilize energy efficient equipment such as variable speed systems for fans, pumps and motors; motors that meet or exceed NEMA premium efficiency ratings and equipment that meets or exceeds ENERGY STAR® ratings. Comply with FEMP levels for commercial products not rated by ENERGY STAR®. Provide a high performance building envelope, including minimized thermal bridging, superior insulation, air infiltration barrier and insulated wavelength selective glazing (to improve daylight transmission). Provide envelope construction details consistent with NYSGBTC 638.7(d)(2). Use air-side and water-side economizers, as appropriate. **Silver Roadmap**: three points require a minimum of 25% decrease in energy cost above ASHRAE 90.1-1999		●	●	●	ⓔ	2	3	
EEQ-4	Ozone Layer Protection	To reduce emission of ozone depleting chemicals.	Specify building HVAC systems with zero levels of CFC refrigerants, and provide plan for future elimination of HCFC's and halon in HVAC and refrigeration equipment and fire suppression systems. Avoid insulation materials that utilize chlorine based gases.		●	●	●	ⓔ	Prq	Prq	

ENERGY ENVIRONMENTAL QUALITY											LEED™	
No.	Quality	WTC Guideline Purpose	WTC Guideline Action	Urban	Site/ Parcel	Commercial Retail	Commercial Office	Tenant	Base Points	"Silver Roadmap"		
EEQ-5	Renewable Energy Plan	To meet a portion of site energy requirements with on site and/or purchased renewable energy sources and institute a plan for transition as renewables become more cost-effective.	Utilize site generated and/or purchased renewable energy for a percentage of total building energy use. Provide transition plan for future conversion to renewables. Purchase or generate on site a minimum of 20% of overall annual electric energy requirements with renewables by 2010 consistent with NY State EO-111's evolving requirements and capabilities. Provide infrastructure to integrate technology into building systems, when possible.	▲	●	●	●	○				
EEQ-6	Energy Systems Control and Maintenance	To provide for ongoing verification of initial operation and energy utilization of building energy systems.	Provide a computerized, fully-integrated Building Management System (BMS) with energy and fluid flow measurement capabilities for all major energy consuming systems. Institute a maintenance plan for ongoing measurement, verification and maintenance of equipment efficiencies and resource utilization. Provide programmable controls. Install permanent monitoring systems to track energy performance. Provide for maintenance and operational continuity through manuals and education. Install continuous metering equipment for a representative sample of lighting systems, motors, drives, chiller efficiencies, and trending of economizer and heat recovery equipment cycles, air distribution pressures and volumes and boiler efficiencies. Integrate the above systems into the Building Commissioning Plan.		●	●	●	ⓔ	1	1		
EEQ-7	End-use metering	To maximize tenant incentives to conserve energy.	Include electrical distribution infrastructure required to allow end-user metering of tenants, including electricity use (kWh) and demand (kW) metering. Provide examples of existing incentive programs to tenants.		●	●	●	○				
MATERIAL ENVIRONMENTAL QUALITY											LEED™	
No.	Quality	WTC Guideline Purpose	WTC Guideline Action	Urban	Site/ Parcel	Commercial Retail	Commercial Office	Tenant	Base Points	"Silver Roadmap"		
MEQ-1	Material Management Plan	To optimize utilization of site material resources and to facilitate the reduction of waste generated by building occupants that would otherwise be hauled to and disposed of in landfills and/or incinerators.	Implement a Materials Management Plan, which coordinates and implements material guideline requirements within the Sustainable Design Guidelines. Describe materials utilized, recycled content, location of manufacture/harvest, agricultural content, sustainable harvest certification, expected lifetime, maintenance requirements and recyclable/reuse potential at end of useful life. Minimize travel distance for building products and systems and locate sinks for highest recycled use for 'waste' materials in conjunction with MEQ-2 and MEQ-5. Provide infrastructure necessary to implement the recycling requirements of the plan. A central location for appropriately-sized recycling facilities must be provided for all buildings. Facilities must include, at a minimum, space for the separation, collection and storage for recycling of paper, corrugated cardboard, glass, plastics and metals, and each of these areas should be clearly identified. Provide easy truck access for the pick-up and removal of recyclables.	▲	●	●	●	ⓔ	Prq	Prq		
MEQ-2	Construction Waste Management	To reduce the amount of construction and demolition (C&D) waste going to landfills and/or incinerators and to conserve resources through reuse and recycling	Implement a Construction Waste Management Plan to divert construction, demolition and land clearing debris from landfill disposal to redirect recyclable and/or recovered resources back to the manufacturing process and to redirect salvageable materials to appropriate sites. Recycle and/or salvage a minimum of 50% of construction, demolition and land clearing waste, calculated by weight. Divert a minimum of 50% of construction waste by weight from landfill.		●	●	●	ⓔ	1	1		
MEQ-3	Resource Reuse	To incorporate previously used building materials and products into new construction.	In coordination with the Materials Management Plan consider the use of salvaged, refurbished or reused materials and products in the building. Materials for reuse typically include reclaimed lumber and wood such as salvaged wood flooring and wood doors and cabinets, structural metal work such as beams, and miscellaneous metal such as doors, door hardware, etc. Decorative and specialized items such as salvaged wood and glass panels, banquettes, front and back bars and decorative or period lighting fixtures may be used in special public locations such as cafeterias or restaurants, and can contribute to this credit		○	○	○	ⓔ				
MEQ-4	Materials with Recycled Content	To incorporate materials with recycled content and increase market demand for building materials and products that incorporate recycled content.	Specify materials with recycled-content in conjunction with the Materials Management Plan. The value of the recycled content portion of materials is to be at least 10% of the total project materials value (mechanical and electrical components are not to be included in these calculations). Determine recycled content value according to the following formula. For post-consumer recycled content determine percentage of recycled content in the material and multiply by value of material. For post-industrial recycled content determine percentage of recycled content in the material, multiply by ½ and multiply by value of the material.		●	●	●	ⓔ	2	2		
MEQ-5	Material Proximity	To reduce environmental degradation resulting from transportation impacts by increasing the demand for building materials and products that are extracted and/or manufactured in close proximity to the building site.	Utilize local/regional materials in conjunction with the Materials Management Plan. Use a minimum of 20% of all building materials (based on cost) that are manufactured within a 500 mile radius of the site. Manufactured in this context means the location where 'final assembly' takes place		●	●	●	ⓔ	1	1		
MEQ-6	Wood Certification	To specify wood which has been harvested according to sustainable forest management principles.	Utilize wood materials certified under the Forest Stewardship Council's Principles and Criteria (FSC) in conjunction with the Materials Management Plan. These materials may include dimensional framing components, flooring, doors, paneling, millwork and furnishings, handrails and trim, etc., as well as, temporary lumber and wood construction materials. Request vendor's chain-of-custody certificate number to verify certification. "Silver Roadmap" ; this point requires that a minimum of 50% of wood based products (by value) are certified according to LEED™ criteria.		○	○	○	ⓔ		1		
MEQ-7	Agricultural materials	To encourage the specification of materials which are renewable and that grow in such a way as to support biological diversity and the health of the ecosystem	In coordination with the Materials Management Plan use renewable and rapidly renewable building materials and products. Materials with annual growing cycles or which regenerate naturally within a 10-year-cycle are considered to be rapidly renewable materials. These materials include bamboo, poplar, cork, wool, cotton, jute, sisal, and soy-based products. Agricultural 'waste' materials such as wheatgrass, sunflower seed husks, and straw also qualify under this category. Release agents for concrete forms, which are made from plant oils such as corn oil are included. Use agricultural compost for site applications, including, but not limited to, turf, plantings and erosion control. "Silver Roadmap" ; this point requires that 5% of project materials and products (by value) are renewable according to LEED™ criteria.		○	○	○	ⓔ		1		

INDOOR ENVIRONMENTAL QUALITY							LEED™				
No.	Quality	WTC Guideline Purpose	WTC Guideline Action	Urban	Site/ Parcel	Commercial Retail	Commercial Office	Tenant	Base Points	"Silver Roadmap"	
IEQ-1	IAQ Performance	Establish high indoor air quality (IAQ) for the comfort and well-being of the building's occupants by minimizing the potential for poor air quality, and by establishing minimum IAQ performance and standards.	Provide an Indoor Air Quality Management Plan which employs architectural and HVAC design strategies to establish minimum outdoor air quantities, chemical, biological and particulate source control and on-going air quality monitoring to achieve a positive impact on the overall indoor environment and well being of the occupants. Meet the requirements of ASHRAE Standard 62-2001: "Ventilation for Acceptable Indoor Air Quality", utilizing the Ventilation Rate Procedure. Prepare plan in accordance with the requirements of NYSGBTC 638.7(d)(1,2 and 3). Draft the plan in accordance with the EPA "Building Air Quality: A Guide for Building Owners and Facility Managers", 1991 and EPA and National Institute for Occupational Safety and Health, Building Air Quality Action Plan, 1998.		▲	●	●	ⓔ	Prq	Prq	
IEQ-2	Daylight & Views	Provide building occupants with connections to the outdoors through the introduction of daylight into habitually occupied areas of the building. Provide building occupants with views via direct line of sight to the outdoors from regularly occupied spaces when possible.	Towers: Provide a 2% minimum daylighting factor to 75% of regularly occupied tenant spaces. Build a tenant office fit-out (5,000 SF) to demonstrate optimum daylight access, louvers and glare controls, and ceiling geometries intended to optimize daylighting strategies. Quantify performance of integrated curtain wall and tenant fit-out with proposed savings. Retail: Seek to maximize daylight penetration to concourse areas and below grade retail areas. Provide views to the outdoors from concourse areas to assist users in wayfinding and orientation.		▲	●	●	ⓔ	1	1	
IEQ-3	Air Quality Monitoring	To retain high indoor air quality standards by establishing monitoring protocols to assist in maintaining appropriate ventilation rates for the comfort and well-being of building occupants.	Indoor air quality must be tested annually and must meet minimum criteria for five years in accordance with minimum requirements of NY State EO-111reference to NYSGBTC 638.7(d)(1). Once radon measurements are found to be satisfactory, subsequent testing for this contaminant is not required. Where concentration levels of noted contaminants exceed the established parameters in any specific area during this 5 year period, seek to locate and remediate/eliminate contaminants, then flush out area with 100% outside air for a minimum of one week and retest until a satisfactory result is achieved. Consideration should be given to a permanent indoor air quality monitoring system with centralized controls that provides feedback on ventilation performance and contaminant concentrations based on a combined carbon monoxide, carbon dioxide and volatile organic compound monitors. "Silver Roadmap"; this point requires that Carbon Dioxide Monitors are installed according to LEED™ criteria.			●	●	ⓔ		1	
IEQ-4	Ventilation Air Quality	To provide outside air to all occupied spaces in the building to support the comfort and well-being of building occupants and as an energy conservation measure.	Demonstrate that the requirements of Section 5, "Best Practices for Maintaining IEQ" of the International Performance Measurement & Verification Protocol, Volume II "Concepts and Practices for Improved Indoor Environmental Quality", March 2002 have been met. Provide capability for system default to 100% outside air at all times where practicable and in balance with energy conservation. "Silver Roadmap"; this point requires that an air change effectiveness of .9 as determined by ASHRAE 129-1997 be achieved in mechanically ventilated spaces.			●	●	ⓔ		1	
IEQ-5	Construction IAQ Management Plan	To provide minimum standards for the air quality of building areas upon occupancy.	Implement a Construction Indoor Air Quality Management Plan in conformance with NY State EO-111reference to NYSGBTC 638.7(d)(2) and the USGBC LEED 2.1 Rating System. During construction, meet or exceed the recommended Design Approach of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, Chapter 3. Use high efficiency filtration media at all HVAC return air grilles during construction and replace all base building mechanical system filtration media with Minimum Efficiency Reporting Value of 13 (MERV 13) filters in accordance with ASHRAE 52.2 – 1999 immediately prior to occupancy. On completion of construction and prior to occupancy, conduct a two-week flush out with new filtration media using 100% outside air, in accordance with NYSGBTC 638.7(d)2. Replace all filtration media used with new MERV 13 filters. Alternatively, test indoor air quality at random sampling points for every 20,000 sf, or by each floor if smaller, in accordance with recognized national standards, to achieve an air quality profile at time of occupancy which satisfies the specific minimums for carbon dioxide, carbon monoxide, formaldehyde, volatile organic compounds, particulates and radon as per NY State EO-111reference to NYSGBTC 638.7(d)(2) and include one additional testing procedure for 4-PCh to satisfy all of the Alternate Procedure Requirements for LEED 2.1. Where concentration levels of contaminants exceed the established parameters in any specific area, flush out area with 100% outside air for a minimum of two weeks and retest until a satisfactory result is achieved.			●	●	ⓔ	2	2	
IEQ-6	Reduce Contaminants from Materials	To reduce the density of contaminants that are emitted by common building materials and which affect the comfort and well-being of building occupants	Develop and implement a Materials Management Plan to minimize utilization of materials with high levels of volatile organic compounds (VOC's) and other toxic characteristics which adversely affect Indoor Air Quality (IAQ). VOC's must meet or be lower than those in the following standards: Adhesives and sealants: South Coast Air Quality Management District Rule #1168 Paints and coatings: Green Seal Standard GS-11 Carpet and carpet adhesives: Carpet and Rug Institute Green Label Indoor Air Quality Test Program Minimize unprotected insulation in ducts, supply plenums and return plenums per NYSGBTC 638.7(j). "Silver Roadmap"; this point requires that non-urea-formaldehyde-based bonding agents are utilized in composite wood and typical millwork applications such as veneer and plastic laminate applications according to LEED™ criteria.			●	●	ⓔ	3	4	
IEQ-7	Chemical & Particulate Control	To minimize sources of chemical and particulate air contamination.	Design all major entrances with permanent walk-off grilles to minimize particulate transfer. Provide MERV 13 air filters for removal of 90% of particulates at air intakes and provide building owner with a maintenance schedule for filter replacement. Build slab-to-slab partitions and provide negative air pressure of at least 7PA with isolated exhaust systems of at least .5cfm/sf at work rooms with printing and copying equipment, janitorial closets and all chemical use areas. Locate exhausts to ensure that there is no potential for re-entrainment of exhaust air to other supply in-takes. Provide drains for appropriate disposal of liquid waste in spaces where water and chemical concentrate mixing occurs.			●	●	ⓔ	1	1	

INDOOR ENVIRONMENTAL QUALITY							LEED™			
No.	Quality	WTC Guideline Purpose	WTC Guideline Action	Urban	Site/ Parcel	Commercial Retail	Commercial Office	Tenant	Base Points	"Silver Roadmap"
IEQ-8	Thermal Comfort	To provide building users with a high level of thermal comfort to promote comfort, well-being and enhanced productivity.	Design the building envelope in accordance with ASHRAE Standard 55-2004 to manage the flow of air, moisture and thermal energy in the building. Include capability for adjustments to thermal conditions to address seasonal changes and associated modifications in typical levels of clothing. Design an integrated system (thermal shell and HVAC) that allows building operators to monitor and control air temperature in each zone. To avoid condensation problems, mechanical systems must be designed to deal with part-load cooling conditions so that they are able to maintain appropriate dehumidification levels. "Silver Roadmap"; this point anticipates ASHRAE Standard 55-2004 will be adopted by the USGBC in lieu of Standard 55-1992.			●	●	Ⓔ		1
IEQ-9	Pest Control	To mitigate health concerns caused by any unwanted pests, their excrement and the chemicals used to control them.	Develop an Integrated Pest Management Plan based on USEPA Best Management Practices, which promotes physical controls and non-pesticide measures over pesticide application. Physical controls include building sealing strategies, improved sanitation, pest-resistant plantings and improved maintenance of wet areas. When necessary, use boric acid or other nontoxic alternatives in lieu of more toxic chemicals to control and eliminate rodent populations from building.		●	●	●	Ⓔ		
IEQ-10	Occupant Control	To provide building occupants with a high level of thermal, ventilation and lighting system control to promote productivity, comfort and well-being	Provide building occupants with controls over airflow, temperature and lighting systems including individual controls where practicable and feasible. Provide operable windows where practicable and feasible.			●	●	Ⓔ		
IEQ-11	Acoustics	Minimize vibration and noise levels in indoor spaces and at exterior environments to achieve appropriate physical comfort and sound isolation for tasks and speech intelligibility, while contributing to human well-being and productivity	Where practical program locations of mechanical equipment and other sources of noise away from areas of building and exterior spaces designed for use by building tenants and the public. Design separations to minimize transfer of noise. Consider strategies to reduce the transmission of exterior ambient noise. Comply with the recommendations of ASHRAE Applications Chapter 46 Design Guidelines to reduce potential noise and vibration from mechanical equipment, and the Architectural Graphic Standards 8th Edition: Sound Isolation Criteria Table, page 44 to address acoustic criteria for enclosed office space such as offices, meeting rooms and other occupied areas.			●	●	Ⓔ		
IEQ-12	Lighting Quality	To employ enhanced lighting design to maximize quality and efficiency of electric lighting and fully coordinate with daylighting	Design an ambient electrical lighting system that is coordinated with daylighting strategies to provide flexible illumination. Endeavor to meet the recommendations of the Illuminating Engineering Society of North America's (IESNA) 9th Edition Handbook, Chapter 10 Quality of the Visual Environment, and the Lighting Design Guide. Provide high frequency electronic ballasts, recyclable lamps and low mercury/low lead lamps as defined by the US Environmental Protection Agency's Toxicity Characteristic Leaching Procedure (TCLP) testing procedure. Supplement ambient lighting system with multi-level task lighting to maintain a minimum of 35 footcandles (in typical office area) at desk level throughout hours of occupancy.			●	●	Ⓔ		

Notes:

1. While all projects are encouraged to strive for LEED™ "Silver", the "Base Points" represent the minimum possible for certification according to the requirements of EO-111 (26 is the minimum for "Certification" level, 33 is the minimum for "Silver" level and reasonable allowance must be made for points which would be disallowed in an actual submission).
2. As discussed earlier, the integrated planning and whole systems approach of this high density, mixed-use development contain a significant number of environmental/sustainable dimensions which extend beyond the boundaries of any one project and could be captured under the Innovation Credit category as defined by the USGBC. These opportunities and other potential sustainable strategies should be pursued and they will enhance the achievement of a LEED™ "Silver" level equivalency.

LEED Professional	1	1
Innovation (4 of 4 points)	4	4
Designated LEED Points	30	37