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Building Project
The Solaire

Battery Park City, New York, is a thriving area along the Hudson River, next to the financial district of Manhattan. Given its name for its storing of munitions at various times by the Dutch and British (Battery Park (New York), 1), the city is now considered a "new-town-in-town" (Garvin, 60) which has developed under various leaders and architects. The original development plan, under the leadership of Nelson Rockefeller in 1960, called for futuristic buildings and walkways to be built over the existing piers and waterfront. However, the project underwent bond difficulties and scrutiny over its feasability, and eventually the master plan was changed. Alexander Cooper and Stanton Eckstut, the architects of the new plan, chose instead to create separate neighborhoods, made up of moderate-size city blocks that were, in turn, divided into moderate-size building parcels that could be built at different times by different developers (Garvin, 363). This area, which has been named an "urban experiment" (BPCA, /Concept/urban_experiment.htm), has developed to include numerous residencies, buildings, parks, museums, and even the New York Mercantile Exchange, in its neighborhood setting. In true "urban experiment" mode, this area is now home to the first green residential high-rise building: the Solaire.

True green building is a holistic approach to programming, planning, designing, and constructing buildings and sites (Karolides, 2). In 2000, the Battery Park City Authority (BPCA) issued the BPCA Residential Environmental Guidelines, which set out to "establish a process for the creation of environmentally responsible residential buildings that are appreciably ahead of current standards and practices for development" (BPCA Residential Environmental Guidelines, Mission Statement). These standards addressed such topics as energy efficiency, enhanced indoor environmental quality, conserving materials and resources, operations and maintenance, and water conservation

and site management. When developing a plan for the Solaire, all of these topics, and many others, had to be taken into consideration. The goal of the Solaire was simple: create the first green high-rise residential building according to the BPCA guidelines. The execution of this goal required extensive teamwork, cooperation, diligent planning and reevaluation, and a complete change in the mindset of an average building development team.

While green buildings are a relatively new idea, there are many cities which are addressing the issue with guidelines similar to the BPCA's. Such cities include Seattle, WA, Scottsdale, AZ, and Portland, OR, while California and Colorado have established state-wide guidelines. In addition, the Leadership in Energy and Environmental Development (LEED) program has created a national standard for green building rating. Many buildings have been built on green principles, such as the Environmental Protection Agency Headquarters in Washington, D.C., or the Gap Corporate Headquaters in San Bruno, CA, and even a few residential community developments. One of the hurdles that green developers face is the lack of past case studies- that is, they may be doing something for the first time. The Solaire team worked through this hurdle by concentrating on developing a unified, integrated design structure as opposed to a collection of independent ideas and systems (Janke, 22) while sticking to the BPCA guidelines.

Among the new ideas integrated into the Solaire was energy efficiency. According to the U.S. Department of Energy's Smart Communities Network, buildings in the U.S. account for one-third of all energy consumed and two-thirds of all electricity used (DOE, /welcome.shtml). Designers of the Solaire used a Department of Energy software system, DOE-2, which enabled architects and engineers to construct the building on a computer and then evaluate different energy saving techniques. Resulting designs included previously used ideas such as motion sensor controls, energy efficient lighting and appliances, and correct sizing of machinery, as well as a few not so prevalent ideas such as a gas-fired absorption chiller for the heating, ventilation, and cooling system. As Amory Lovins, founder of the Rocky Mountain Institute and renowned energy expert, has said, "saving… fuel is a lot cheaper than buying it" (Lovins, 74), and the Solaire team stuck to this mantra by creating a building envelope which consisted of

effective insulation, high performance glass for windows, and extra caulking around window gaps. One of the most inventive ideas was the integration of photovoltaic cells into the buildings façade. These cells, themselves made of recycled computer chips, feed directly into the building's electrical grid and provide no less than 5% of the building's electrical requirements. The results of this energy effort produced a building that uses 35% less energy than a similar building designed to New York State Energy Code requirements, and provides a 65% reduction in summer peak demand (Janke, 28).

The construction phase of the Solaire involved as many green parameters as did the final design. Under the BPCA's guidelines, the Solaire team initiated a commissioning process which monitored every phase of development and ensured adherence to guidelines, quality control, and equipment evaluation. The design of the building required extensive cooperation between contractors as the systems were often unique to the Solaire. The materials included in every aspect of construction and design were scrutinized for their toxicity and effects on indoor air quality, durability, recycled content, reusability and whether the raw material sources were sustainable (Janke, 47). The concrete used in construction contained fly ash, many of the shelving materials contained sawdust, and the wallpaper in the hallway was made from honeysuckle vine, a natural and rapidly renewable material. One of the biggest parameters to meet in construction was that at least 40% of the materials used had to come from within a 500-mile radius of the construction site, thus reducing the environmental effects of transportation. The construction team was required to recycle a minimum of 60% of total construction waste under the guidelines, and they surpassed this by recycling 85%.

Another guideline for design was the water system in the building, which includes an onsite waste-water treatment facility, stormwater reuse, and vigilant water conservation strategies (Janke, 36). The rainwater is stored in the basement and then used to irrigate the planted roofs, which in turn help to control future rainwater flow. These planted roofs also have the added benefit of helping to control the temperature of the building, reducing the heat island effect, and providing an oasis of sorts for the residents to use for personal gardening. The net result of these strategies is the Solaire's consumption of potable water, which is 50% less than a traditional building of its size (Janke, 35).

The internal air quality of the Solaire is regulated by a double-filtration system which removes 85% of particulate matter. This, in addition to only using materials, finishes, paints, and adhesives that do not emit gases during their lifetime, has made the indoor air quality such that many tenants who suffer from asthma do not have symptoms while in the building. These attempts to defend against the "sick building syndrome" (Karolides, 16) have made a building which, according to James E. Gill, the BPCA Chairman, is "so environmentally and medically correct that if a tenant in this building were to go into his or her apartment and never come out, that tenant would live to be at least 150 years old". (Solaire Video)

One of the less prominent, but equally important, factors in the Solaire's design is the education of its tenants, each of whom get a 10-minute introduction on how to manage their place efficiently as well as a gift basket containing approved household products. Thus, the importance of green living is instilled on each tenant. The building was marketed as a luxury high rise with environmental benefits, but the question remained: would it attract tenants?

The Solaire opened for occupancy in 2003 after receiving a LEED Gold rating. Aside from the monumental tasks overcome in the construction and design phase of the Solaire is the fact that *people were willing to pay a comparably higher rent to stay in the building.* The Solaire's 27 floors and 293 family-sized units were fully occupied within six months of completion at rents averaging 4-5% higher than equivalent buildings (Janke, 69). While the location is desirable and the luxury uncompromised, the increase in rent was mainly due to the costs associated with a green building, which, on average, cost 2% more to construct than conventional buildings (Janke, 75). According to the Sustainable Building Task Force, a group of over 40 governmental agencies in California, some benefits such as improving occupant health, comfort, productivity, and reducing pollution and landfill waste are not easily quantified into a building's expense. (CIWMBA, /Basics.htm#Benefits) However, tenants were not afraid to put a monetary value on these seemingly intangible concepts and accepted the increased rent as the cost to live better.

The future of green buildings in the U.S. will only come about through strong leadership. The outstanding leadership which created the Solaire, including that of New

York Governor George Pataki and the BPCA, is evident in the success of the building. As Governor Pataki said, “the guidelines we have set forth for “green” development have been the subject of international recognition and will dictate all future development at Battery Park City”. (BPCA, 2002 Annual Report, 4) Already there are plans for more buildings like the Solaire, and a new green residential high rise, Tribeca Green, just opened in Battery Park City. The Solaire team has been very forthcoming with their experience in hopes of educating others and making their project the first of many similar future projects. In this way, in addition to creating a groundbreaking building, the Solaire team has paved the way for future success in green building innovation.

Tour Map of Battery Park City

The Solaire is #18 (left building)

(http://www.batteryparkcity.org/Visiting/site_tour.htm)

A view from Battery Park City's river esplanade, which separates the neighborhoods from the Hudson River (http://www.batteryparkcity.org/)

A view from one of the many park areas in Battery Park City. The Solaire is in the background. (http://www.lookat.ch/index.php/article/articleview/281/1/85)

A front view of The Solaire. The characteristic blue panels on the front are the photovoltaic cells. (http://www.batteryparkcity.org/)

Samples of the Solaire’s interior luxury

(http://www.batteryparkcity.org/Concept/green/gallery.html)

Works Cited

Battery Park City Authority. 2005. 16 October 2005. <http://www.batteryparkcity.org>.

Battery Park City Authority. 2002 Annual Report.

Battery Park City Authority. Residential Environmental Guidelines. May 2003.

"Battery Park (New York)." Wikipedia. 2005. Wikipedia. 15 October 2005 <http://en.wikipedia.org/wiki/Battery_Park>.

California Integrated Waste Management Board. "Green Building Basics." 15 October 2005. <http://www.ciwmb.ca.gov/GreenBuilding/Basics.htm#Benefits>.

Garvin, Alexander. *The American City: What Works, What Doesn't*. 2nd ed. New York: McGraw-Hill, 2002.

Janke, Nicholas, and Malin, Nadav, eds. *The Solaire: Green By Design.* New York: Battery Park City Authority, 2005.

Karolides, Alexis. *Green Building: Project Planning and Cost Estimating: Chapter One, Green Building Approaches*. Ed. M. Green. Massachusetts: R.S. Means, Co.

Lovins, Amory B. "More Profit With Less Carbon." *Scientific American*, Sept. 2005: 74.

The Solaire: Green By Design (Video). Battery Park City Authority, 2005..

U.S. Department of Energy. "Green Buildings Introduction." 16 October 2005. <http://www.sustainable.doe.gov/welcome.shtml>