

WENTWORTH INSTITUTE OF TECHNOLOGY
Department of Architecture

MEMORANDUM OF MEETING

Meeting

Date: April 9, 1997

Meeting

Location: Boston City Hall, Room 811

Subject: Project Progress Report: Proposal for a Sustainable Renovation of Boston City Hall

Present:

Michael Galvin, Chief of Basic City Services, City of Boston

Andrew Hudak, Deputy Director, Boston Public Facilities Department (PFD)

Susan Myers, Chief Architect, Boston PFD

Jackie McBride, Architect, Boston PFD

Geeta Pradhan, Director, City of Boston Sustainable Boston Taskforce

Simone Auster, Chair, Trust for City Hall Plaza

John Sinagra, Dept. Manager, Office of Basic City Services HVAC Department

ProjectTeam:

Henry MacLean, Architect and Adjunct Professor, Wentworth Institute of Technology

Franziska Amacher, Architect, co-chair of Architects for Social Responsibility (ASR),

Adjunct Professor at Wentworth Institute of Technology

Ambrose Spencer, Northeast Sustainable Energy Association (NESEA) and ASR member,

Adjunct Professor at Wentworth Institute of Technology

John Cooke, PE, Energy Consultant, Professor Emeritus at Massachusetts Institute of Technology (MIT)

Peter Roudebush, Architect and Systems Consultant, ASR member

Harvey Bryan FAIA, Architect & Energy Consultant, ASR member

Peter R. Nobile III, AIA, Architect and co-chair of ASR

Robert Hodgkinson, Wentworth Graduate, Designer and Builder

I. Summary of Meeting

The Project Team would like to thank Michael Galvin and his staff at Basic City Services for giving us access to Boston City Hall and its operational records, and for providing us with the opportunity to share this progress report.

Henry MacLean presented an overview of the Proposal for a Sustainable Renovation to Boston City Hall. The Proposal identifies two overarching possibilities or themes for the refurbishment of Boston City Hall.

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The first possibility is a vision for making the first truly "green" city hall in America. Through careful study and analysis, the project team has identified economic, health, and ecological possibilities for the building and plaza that could help create an outstanding model of cutting edge sustainable architecture and landscape architecture.

- The second possibility or masterplan aspect of the proposal treats the building as a bridge between the Faneuil Hall marketplace/waterfront and the revived plaza. Architectural additions and alterations would allow for significant movement over, under, and through City Hall.

Overall, the project identifies the possible reclamation of 100,000 square feet of floor space in the building for activities linked to our proposed Ecological Research Center. This Center would be open to the public and would be integrated with a revived commercial market, restaurants, and the redeveloped landscape of the plaza. It could be operated as a joint venture between the City; the Trust for City Hall; a consortium of universities, museums and private foundations; and by corporate sponsors.

The themes of this proposal support Mayor Menino's notion of Boston as America's premier city in the Information Age, his desire for a Sustainable Boston, and his concern for building meaningful, local connections into the 21st century. These visions also support the goals of the Trust by offering a larger focus with respect to the revival of the plaza. An ecologically planned building and site plan for the plaza would provide an added boost to the economic engine the Trust is seeking to develop by positively increasing recognition of the City of Boston, again as in the 1960's, through the re-design of its City Hall. In addition, ecological planning would result in significant avoided costs associated with the hotel (currently under consideration for the plaza), which is by nature resource intensive.

Most significantly, the proposal affords us the opportunity to retrofit this architecturally significant building from the 1960s and bring it gently into the 21st century, enabling it to reclaim its international reputation for transformative, progressive design.

II. Summary of Concept Proposal Development and Background Information

Events and activities which led to the Proposal for a Sustainable Renovation of Boston City Hall include the following:

- Public Symposium on Boston City Hall, sponsored by the City of Boston, fall 1995
- Wentworth Institute of Technology Thesis Design Studio (Project: a Sustainable Renovation of Boston City Hall and Plaza), winter/spring 1996
- Presentation of a Concept Proposal for a Sustainable Renovation of Boston City Hall and Plaza during the Sustainable Boston Conference, Spring 1996
- Wentworth Institute of Technology Vital Signs Program, summer/fall 1996

- Concept Proposal delivered to Michael Galvin, fall 1996
- Materials and Methods in Sustainable Design, Wentworth Institute of Technology Architecture 475 class, fall 1996
- Concept Proposal delivered to the Trust for City Hall Plaza, January 1997
- Summary of student work and planning for 9 April 1997 meeting, winter 1997

The Concept Proposal was developed as a result of both academic and professional research. This part of the Proposal specifically outlines the development of the project, and presents specific results and recommendations.

Basic City Services (BSC) provided the Wentworth Institute of Technology Materials and Methods Class (475, fall 1996) with a report outlining the mechanical system of Boston City Hall as it was originally constructed. The report also included additions, repairs and refurbishments that have occurred since City Hall was first built. This document was updated with material from site visits and interviews that the class and its consulting Professional Engineer (PE) conducted with current City Hall operating and managing engineering staff.

Using the BSC report, the class and its consultants devoted significant time and energy to isolating the current operational costs of City Hall by tabulating all of the current electrical, steam and water bills that the City pays out monthly. We were able to calculate that the building's Energy Utilization Rate (EUR) was 277,000 BTUs/sf (British Thermal Units per square foot). Compared with the Building Energy Performance Standards (BEPS) of 110,000 BTUs/sf listed in the Vital Signs catalog for a large office building, it is clear that there is substantial room for improving the building's energy performance. As automobiles were initially redesigned during the 1970's to improve fuel efficiency (MPG or miles per gallon), buildings are being built and renovated today to save BTUs/sf. Incidentally, buildings are directly and indirectly responsible for over 40% of our national energy bill, and automobiles and trucks are responsible for approximately 33%.

Based on the results of our investigation, we developed specific architectural and engineering interventions for our Proposal for a Sustainable Renovation of Boston City Hall.

- The first intervention would upgrade the existing mechanical system equipment and repair or replace broken-down, abandoned, and inoperable components.
- The second intervention would be a complete review of the building's automatic temperature controls system, which would involve the reactivation and salvaging of the existing computer control center. An important part of our sustainable approach is least costs first.
- The third intervention would be a design/build contract to renovate the interior court of City Hall, providing a new insulated glass and panel skin on the exposed vertical

faces of the structure and the roof opening. The result would be a fully conditioned space or "winter garden" that would be accessible from the new plaza, from Congress Street, and from a balcony connection to the new Congress Street bridge.

Also, the interior atmosphere of the building could be transformed into one "looped" stack or continuous column of air by adding the new roof structure; removing the two upper roof monitors that top the existing interior building shafts; and, removing substantial sections of the window wall separating the current central core from the entrance concourse on the third and fourth floors. In addition to the architectural possibilities that this new continuous column of air would offer, it would also become the primary component of a state of the art mechanical heat recovery ventilation system that would reduce the building's energy costs- in conjunction with the first two phases- by 65% (we calculate a reduction from the current annual cost of \$1.6 million to roughly \$600,000).

Furthermore, the building would be given a new fresh air system as a result of our proposed renovation. The current air handling system is constantly pushing some 390,000 to 410,000 cfm (cubic feet per minute) of air through the building. With the new proposed system, the required air volume would be reduced to roughly 196,000 cfm, 90,000 of which would be outside (fresh) air, ultimately providing a very generous improvement of over 40 additional cfm of fresh air per person.

The proposed renovation would also redevelop the existing 30,000 sf of garage and dead storage area, along with opening up about 300 linear feet of street frontage directly opposite the Quincy Market/Faneuil Hall area (which is one of the most successful commercial centers in the country) on level one of the building off of Congress Street. This area could be redeveloped into offices and street front shops. Environmentally certified merchandise could be sold in these shops which would front and support offices for the new Ecological Research, Education and Monitoring Center.

The design would provide a new exterior elevator for public access to the roof of the building. This elevator could have an off-street entry from Congress Street with a stop at the new third level public atrium. The renovated roof would house a new public restaurant and a series of greenhouses and laboratory spaces tied into the proposed Ecological Center. The roof would also house a walking promenade and city-viewing platform, open year round, which could incorporate dioramas on the history of the city. Additionally, sections of the roof level and the open atrium would house components of a "living museum" geared to demonstrating and teaching sustainable and restorative approaches and technologies to the public.

In summary, we are proposing that the City of Boston can buy a sustainable building that demonstrates how to create more economical, efficient, and healthy environments while teaching these issues to the larger audience of the city, all for the cost of what could be saved in the next 20 years on City Hall's utilities. In other words, the roughly one million dollar savings per year generated by the ecological retrofit would pay for the \$20-\$30 million renovation cost in less than a generation. The previously mentioned avoided costs are in fact deferred or transferred costs which could be used to fund the Ecological Center. This process could serve as an example to thousands of owners of other structures and complexes in the city.

III. In support of sustainable design: issues, trends and case studies of existing projects.

Greenhouse gases such as carbon dioxide and carbon monoxide, forty percent of which are a result of the operation and construction of buildings, are now being linked by scientists around the world to global climate change. Eighty percent of greenhouse gases come from the developed world (the United States is a major contributor), which hosts only 30% of the world's population. The average American uses twice as much energy of the average European. Scientists agree that fluctuations and changes in temperature patterns, greater than any seen in the geological record of the past 9000 years, and the resultant rises in sea level pose a growing threat to coastal communities like Boston.

Most of the technology and design tools required to implement ecological design are currently available and are being implemented in civic, commercial, and residential projects throughout the world. These projects are realizing significant savings of natural resources and energy (see attached case studies from Glasgow, Scotland and Oslo, Norway from a 1996 International Council for Local Environmental Initiative [ICLEI] report). These buildings are much less costly to operate, and they provide dividends in capital expenditure that repay initial costs in a short time relative to the life span of the project.

Another notable development is that the insurance industry in the United States is now supporting sustainable development and rebuilding incentives as disaster related claims on buildings due to severe weather have gone from \$12 billion between 1980 to 1990 to \$52 billion between 1990 and 1995, a more than fourfold increase.

The 1996 ICLEI report states that because cities have power over land use, transportation, building construction, waste management, and energy supply, they will play a vital role in reducing energy use and greenhouse gases. The report also suggests that cities like Boston join the international organization Cities For Climate Protection which helps local governments address global warming through proper municipal energy policy. Boston could begin to participate in this process: as a component of our proposed retrofit to Boston City Hall, we suggest that the city reactivate the energy studies it began in the 1970's on over a hundred city-owned Boston buildings.

There are nothing like positive case studies to help reinforce the benefits of sustainable development. The ING Bank's 500,000 sf International Headquarters building in Amsterdam, built in 1986, has a 50,000 BTU/sf energy utilization rate and saves \$2.4 million annually as a result of its progressive energy utilization strategies alone. As a result, the Bank recaptured its \$700,000 energy system investment in the first four months of operation. Avoided costs from utilities are joined by savings on health insurance cost as a result of improved employee health and significant cuts in employee absenteeism. The ING Bank reported in 1994 (In Context, No. 35) savings in excess of \$1.4 million due to reduced absenteeism alone.

Another project closer to home is the Greening of the White House, a comprehensive energy analysis program coordinated by the Rocky Mountain Institute in Snowmass, CO. By adopting sustainable or energy efficient heating, cooling, lighting and

insulation strategies, the sustainable rehab of the White House the projected to save American taxpayers close to \$250,000 per year.

IV. Conclusion and Future Steps

As an extension of our proposal (which may involve more student work at Wentworth) our group suggests the formation of a forum that can expand on some of the ideas presented here. Ideally, this forum would lead to the creation of an advisory committee that would work with the City, the Trust, and the newly formed Civic Advisory Committee on the integration of sustainable, restorative design to the plaza and City Hall. One of our goals is to develop an RFP that would attract the world's top experts in sustainable design and planning, some of whom are currently living and working in New England.

Boston is a place where limits have traditionally been exceeded, and where there is no shortage of vision. There are historical models such as the Sons of Liberty and their Tea Party tax protest, or the leveling of most of the tri-mount to create 70% of modern Boston from fill; and there are contemporary models such as Boston's recent initiatives that have come to serve as a national model for crime prevention. In our opinion, it is only reasonable to assume that Boston, the city with more open space per capita than any other city in the country, should be considered a leading example of sensible, forward looking American urban planning: Boston should be the greatest American Green City. In support of Mayor Menino's vision for the highest quality of life and strongest economy of any major city in America, an ecological renovation to Boston City Hall and its Plaza can set a new standard that the entire country will ultimately follow in preserving the earth for our children and into the next millennium.

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c: attendees

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