
The Environment is the Source of All Life and Every Economy
Donella Meadows

Green Design Leadership for Boston's City Center

A Presentation by: The Green City Team

Special Committee on City Hall , Greening Boston City Hall

Councilor Michael Flaherty, Chair

Boston City Council Public Hearing, November 18, 2008

in order of Integrated Team Presentation:

Gerard Ives, Architect, Ives Architects	* Context - A Center for People
Franziska Amacher, LEED AP, Amacher and Associates, Architects	* Imagining Design Opportunities Precedents, Materials, & Colors
Henry P. MacLean, AIA, Timeless Architecture	* Visualizations and Costs Greening a Lovable City Hall
Mark Kelley, PE, Hickory Consortium	* Measuring Energy Savings

* Context - A Center for People

BOSTON'S PAST AND FUTURE

AN AMERICAN CITY -NOW- REDEFINING IT'S ROLE IN:

A GLOBAL ECOLOGY

A GLOBAL COMMUNITY

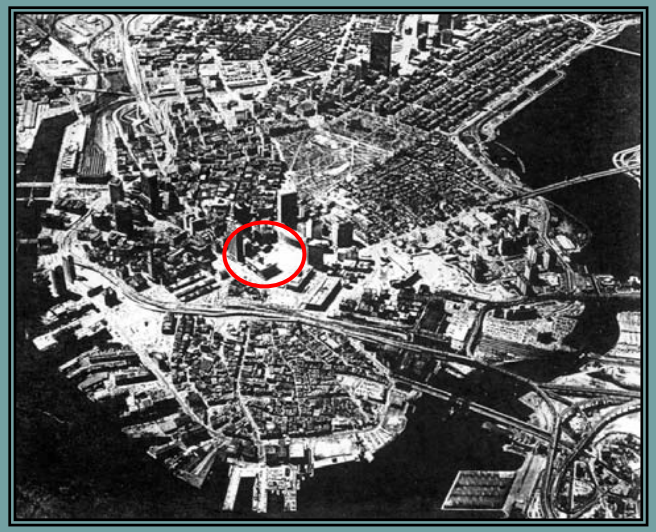
A GLOBAL ECONOMY

BOSTON CITY CENTER- EVOLVING w/ its Natural & Urban ENVIRONMENT

CITY HALL and PLAZA- Part of a continuum in both time and space.

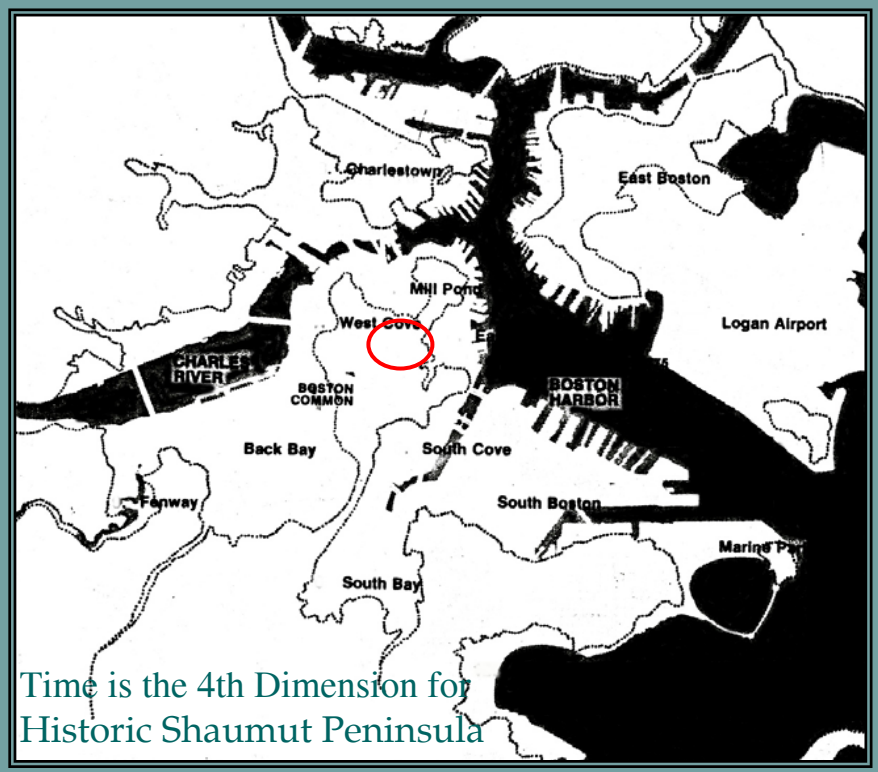
Alex MacLean, Landslides

Through 7 Generations, the Center of the City sits at the same central location.



Boston 1776
783 acres
Pop. 16,000

Boston 2000
3,000 acres
Pop. 2,500,000



Time is the 4th Dimension for Historic Shaumut Peninsula

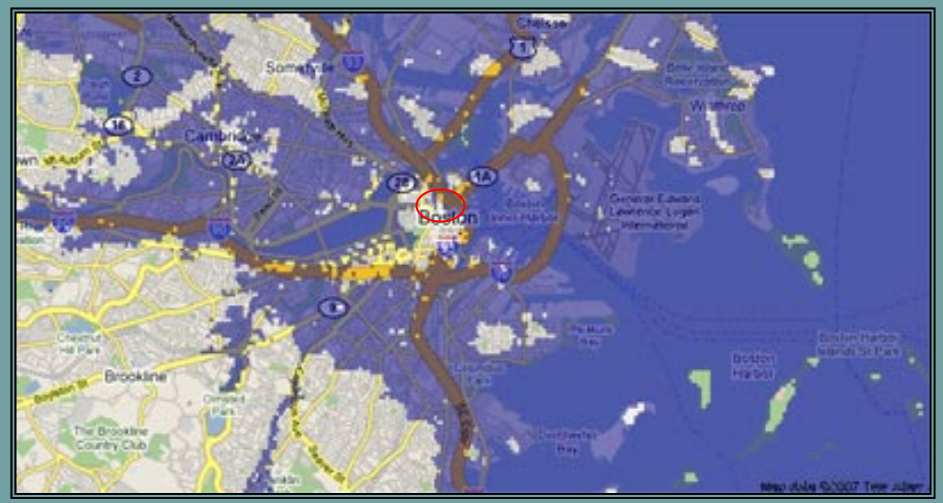
WITH GLOBAL WARMING & A POTENTIAL SHRINKING SHORELINE, TOMORROW'S SECURITY AND PROSPERITY IS IN QUESTION.

As large cities take up 2% of the Earth's land mass, and are responsible for 75% of Greenhouse gases, we believe that ….

the Time for Environmental Leadership ……. is Now

Boston business as-usual, w/ 16.5 foot sea level rise.

Boston w/ potential sea level rise of 7 feet



Boston w/ potential sea level rise of 14 feet

CITY HALL - HISTORIC CONTEXT

A Spine connects the Sea to the Land (Waterfront to Statehouse w/ City Hall at its midpoint) and helps define & trace the history of the economy & ecology of Boston.

State House

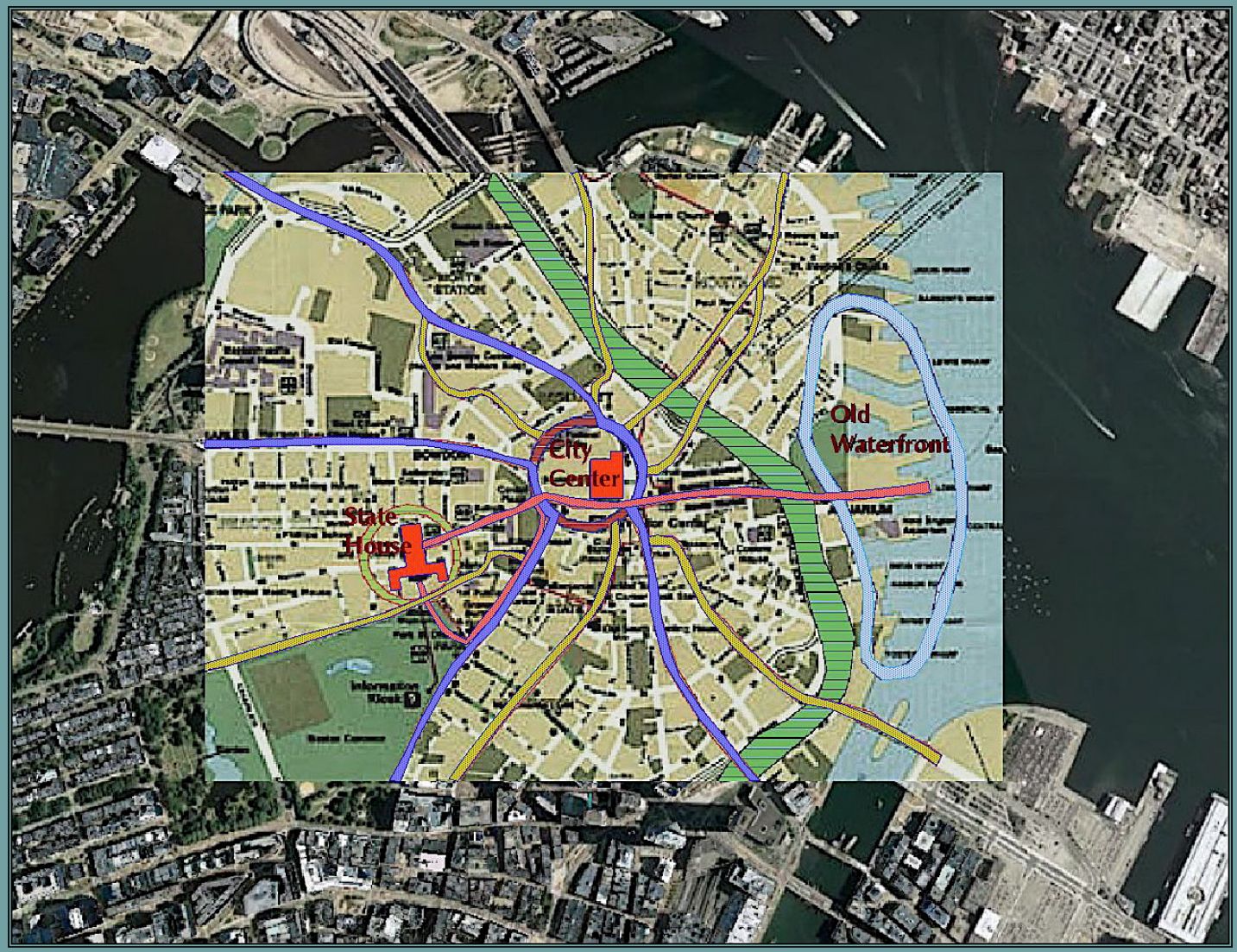
BOSTON CITY HALL - A GREEN CITY CENTER

sits at the hub of a wheel of pathways radiating out into the City

& Converging from:
- The Financial District
- The New Greenway
- Boston Neighborhoods
- Boston Medical Areas

& Across the Water to:
- Cambridge
- Charlestown
- East Boston
- South Boston

Government Center is the center point for the major public transport routes & connections for Boston. It functions as a trunk to the branches of the urban fabric, a place of lasting influence for the future Greening of the City, the larger transformation at hand.



THE NEW GREENWAY - RE-LINKING THE CITY CENTER TO THE HARBOR AND EXPANDED PUBLIC REALM

historic de-construction and transformation

The re-connection has begun with a new green arterial spine tangential to City Hall Plaza, a RECLAIMED PEDESTRIAN URBAN HABITAT.

A GREEN & TRANSPARENT BOSTON CITY HALL

extends its' influence through:

Place-making - Our Ecology -

A Place of Revolutionary Heritage - then and now- for Boston's unity in action and example of working towards our better common future.

Norman B. Leventhal Map Center

People

- Our Community -

Access to Government and to Jobs - CITY HALL as the Center of a potential Pedestrian/Transit , Car Free zone.

Prosperity

- Our Economy -

Setting a living example of Green Building for a City w/ past & current success in Global Markets w/ Educational, Medical, Cultural, and Financial Resources.

GREEN CITY HALL WITHIN IT'S GREEN URBAN CENTER

A plan for the Transformation of tomorrow's Green City Center is an opportunity for leadership, a Pearl in the Oyster of a renewed core to Boston.

* Imagining Design Opportunities

Precedents, Materials, & Colors

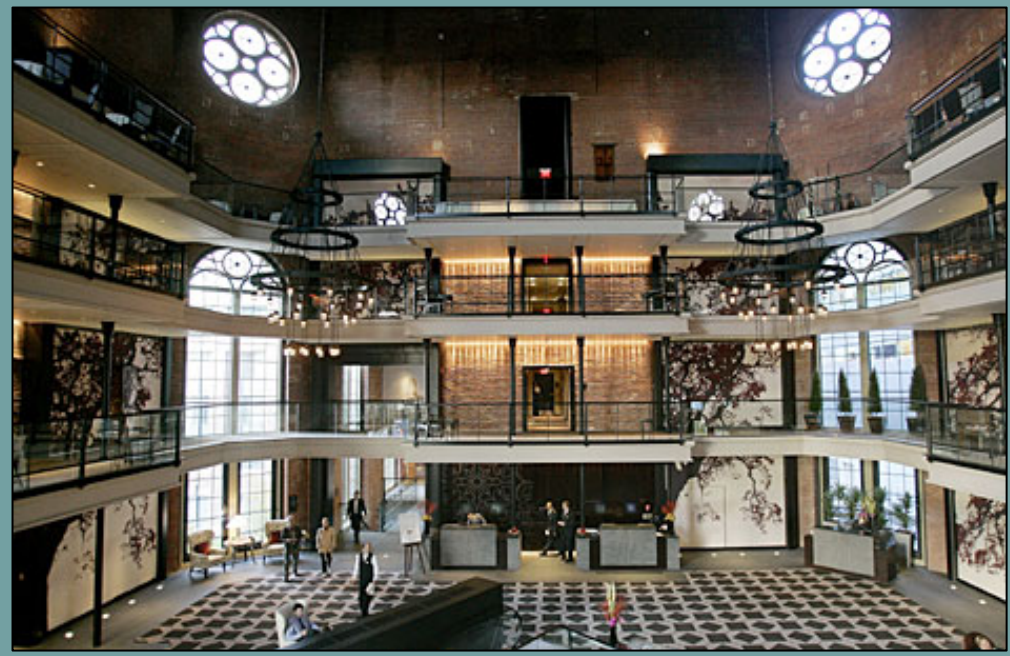
PRECEDENTS of TRANSFORMATIONS

It has been done before, down Cambridge St. on the Charles.

Charles Street Jail

Liberty Hotel

Transformation of stark jail
to exciting new hotel space



Renovation of Another "Brutalist" Style Building

Yale Art and Architecture Building
Renovation and Addition

LEED certification pending

Materials with a Human Touch - Wood

Biblioteca Jaume Fuster, Barcelona

Exeter Library

Yale Center for British Art

Materials – Texture and Transparency

Color, tapestry, curtains, glass

Blackstone Building, Harvard University

Tempe Center for the Arts

Healthy Buildings

Better Lighting

Bio-filter Healthy Air

Nutritional Research Building Tufts University

Courtyards,Vibrant Public Spaces

Copley Place, Boston

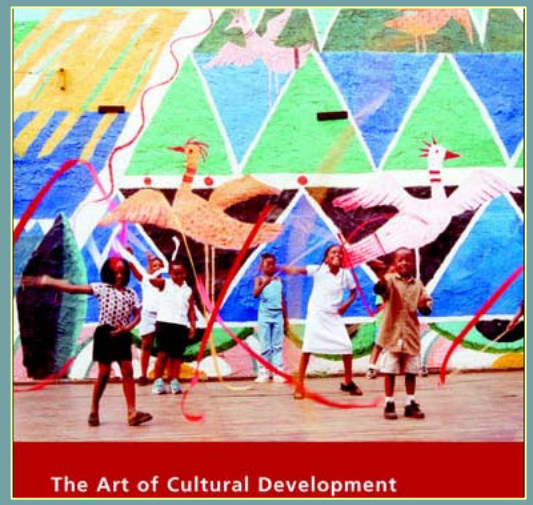
Genetron Bio-filter, Toronto

Music Building, Yale University

Genzyme,
Cambridge

Art, Visual Enhancement and Community Participation

Office D'A



Softening Building's Exterior - Opening & Greening the Base

Arcade in Bologna, Italy

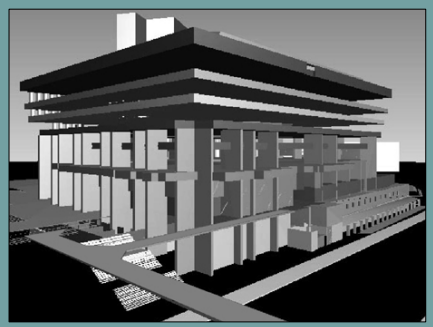
Green Living Wall System

Musée du Quai Branly,
Paris, France

* Visualizations and Costs

Greening a Lovable City Hall

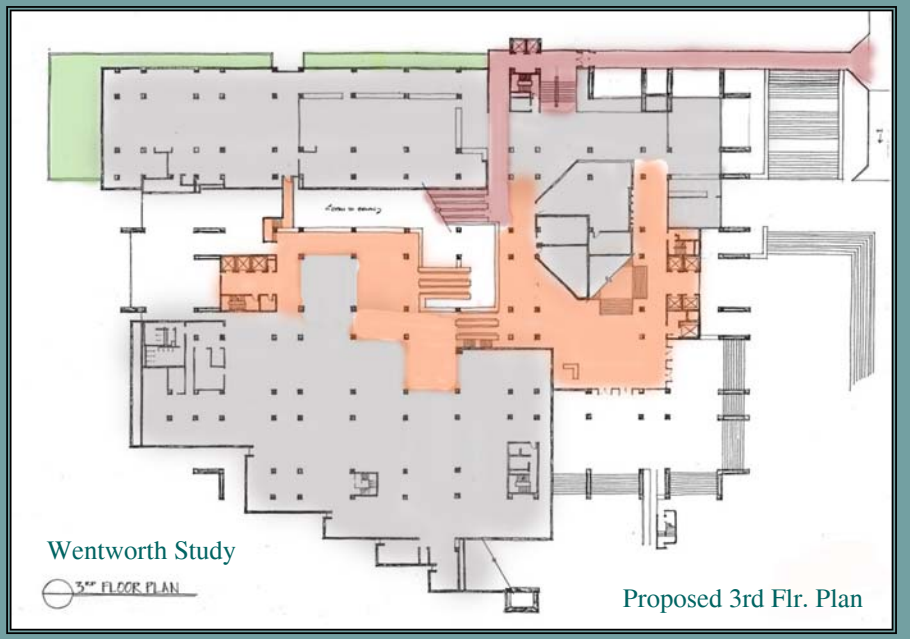
Transforming Boston City Hall



Primary Design Goals

1. Design to make entries to City Hall accessible, transparent and secure.
2. Design to conserve existing infrastructure, embodied and operational energy.
3. Design for healthy interiors with green materials and improved air circulation.
4. Maximize use of existing light, and engage with a transformed City Hall Plaza.

Courtyard to New Atrium



* Open 4th level to activity & enclose from elements.

* Circulation flow can integrate all of the existing escalators & add one from the 3rd to the 4th level, in the place where old skylights just block the light.

* New Green area can be full of light, water & plants.

Transforming City Hall

from Urban Fortress

to a New Green Urban Bridge

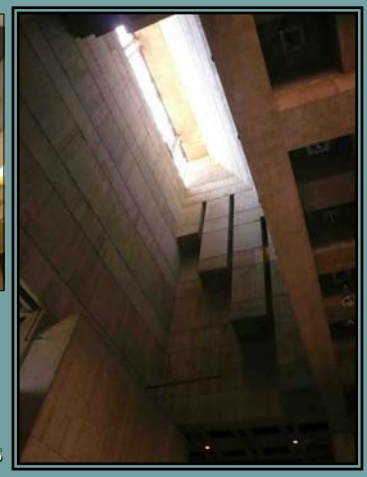
New Atrium as link from Faneuil Hall to revived Plaza

Mechanical Explorations

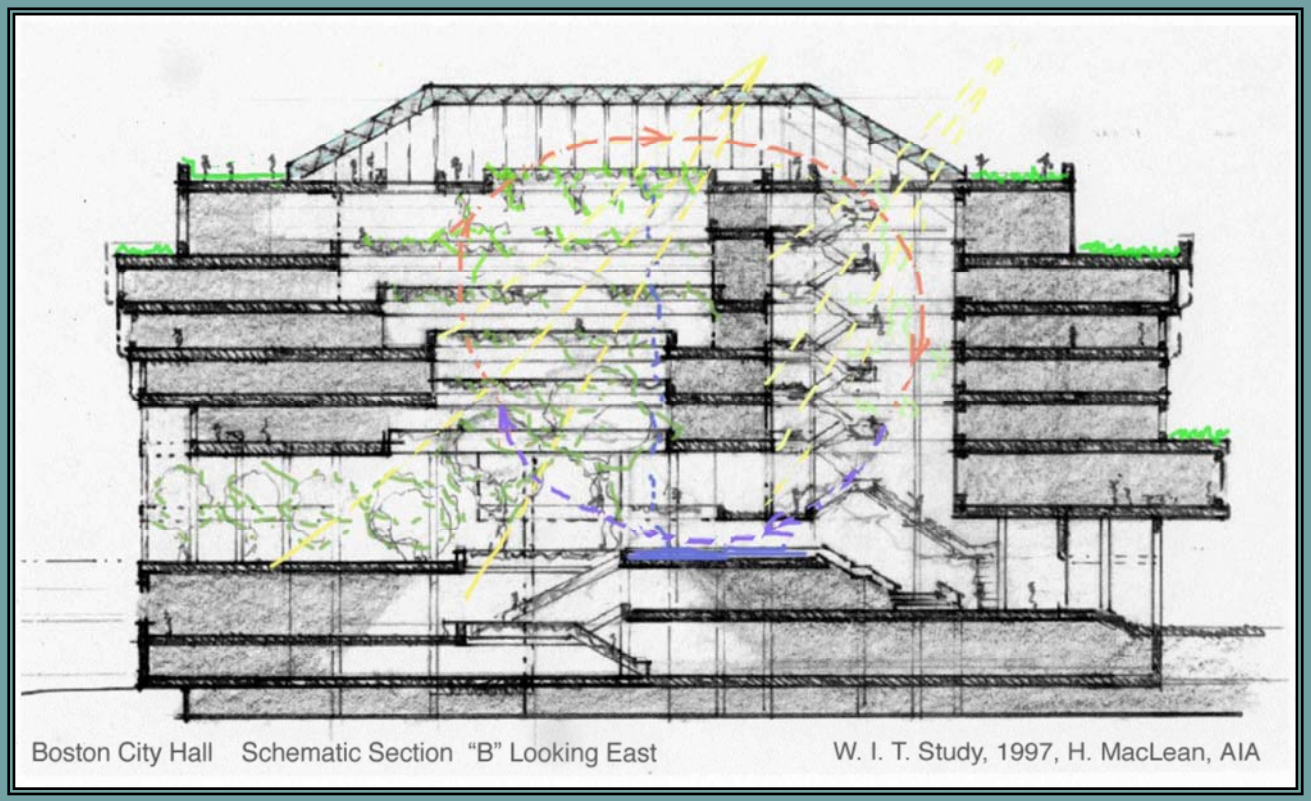
* New Heat Recovery ventilation opportunity can greatly reduce required mechanical pumping of air, taking advantage of passive Stack Effect potential by linking the Towers with the Atrium w/ a new roof.

* Harness the buildings great adaptability with its' unique open truss system for new mechanicals.

Adaptability of existing structure

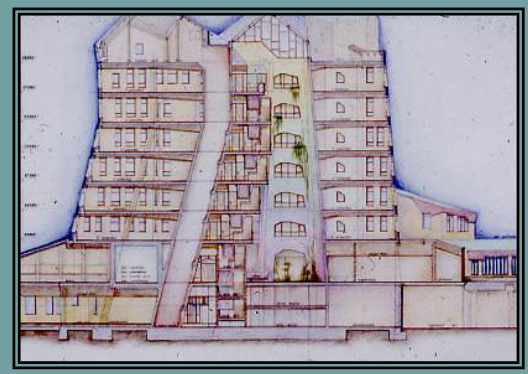


One of two shaft towers



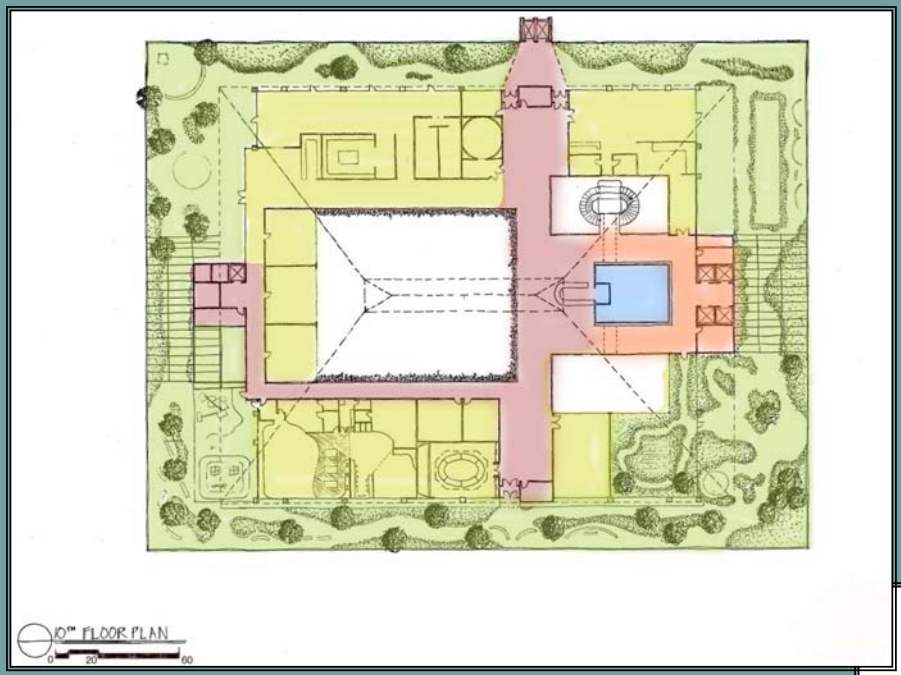
Boston City Hall Schematic Section "B" Looking East W. I. T. Study, 1997, H. MacLean, AIA

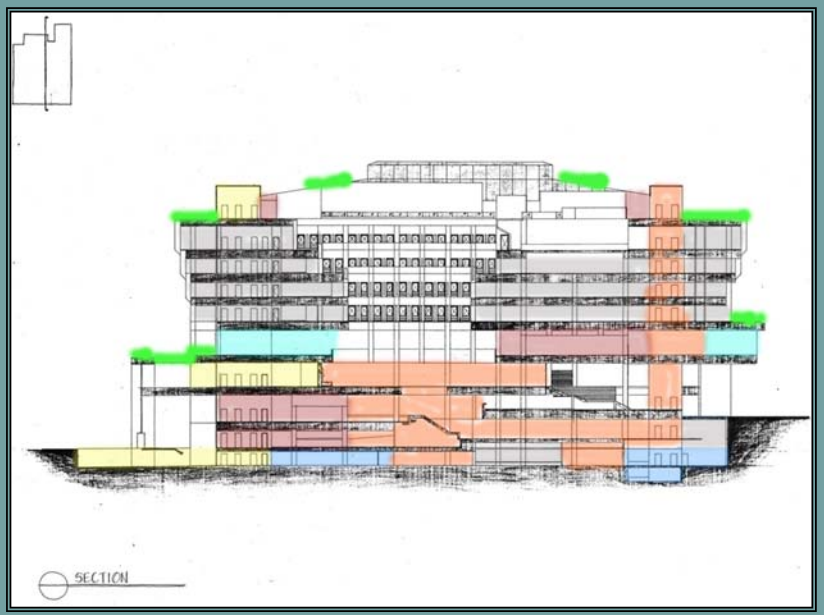
ING Bank, Amsterdam as precedent

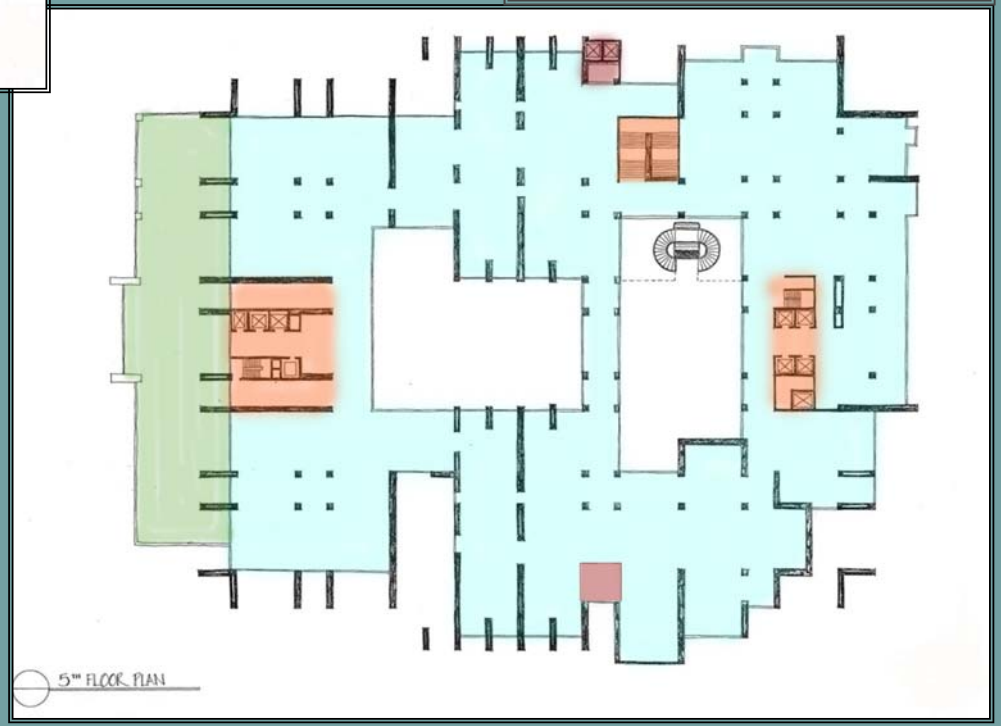


Reclaim Unused and Wasted Space

- Add square footage (up to 130,000 SF) in the building on 5 levels, w/ secure circulation betw. Public, Municipal, Retail and Service.
- At same time, surface area is reduced by 50,000 SF, to save energy



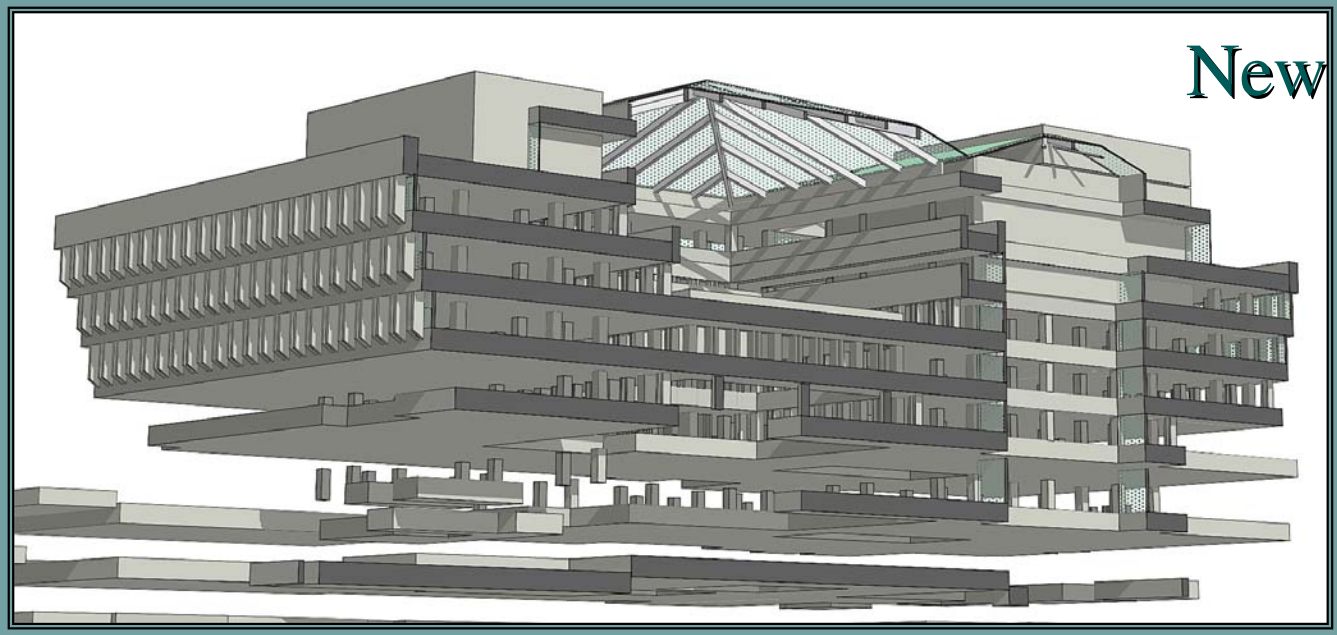


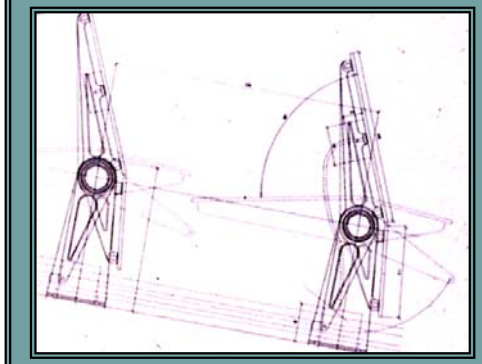


LEGEND

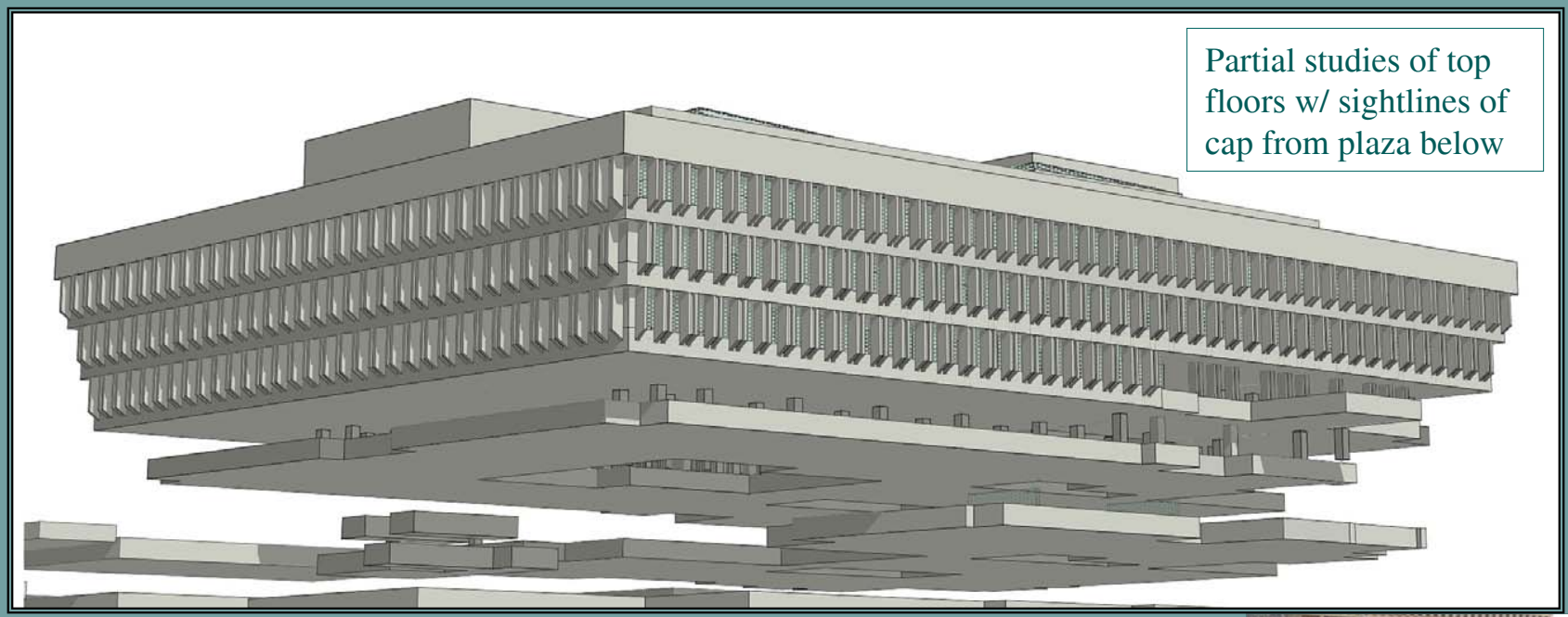
- Public Circulation
- Controlled Circulation
  - Municipal
  - Council
  - Retail (stores,restaurant, conference center)
  - Green Roofs
  - Sustainability Center
  - Service

New Atrium Studies





Shading and directed
PV /daylight options



Partial studies of top floors w/ sightlines of cap from plaza below

Options to Transform/ Integrate Plaza and Roof-scape

* A new cap to City Hall can finish off and enhance the sculptural essence of the building.

New public access to roof, 10th & partial 11th floors can work with the mass of the existing mechanical penthouses, multiple areas of new green roofs, atrium & new viewing upper decks & promenades to the City.

* A Transformed Plaza needs to interface & inform the western face of the building.

Embodied Energy and Carbon Footprints

The embodied energy, or carbon footprint produced by building City Hall was 841,320,000,000 BTU's, 75,000 Tons of carbon, or equivalent to burning about 6,785,000 gallons of gasoline.

Operating at 277,000 BTU's / SF, rate from the 1980's-90's the building produces its own carbon footprint in 5.92 years

Operating at 148,000 BTU's / SF , rate from recent audits, the building produces its own carbon footprint in 11.1 years

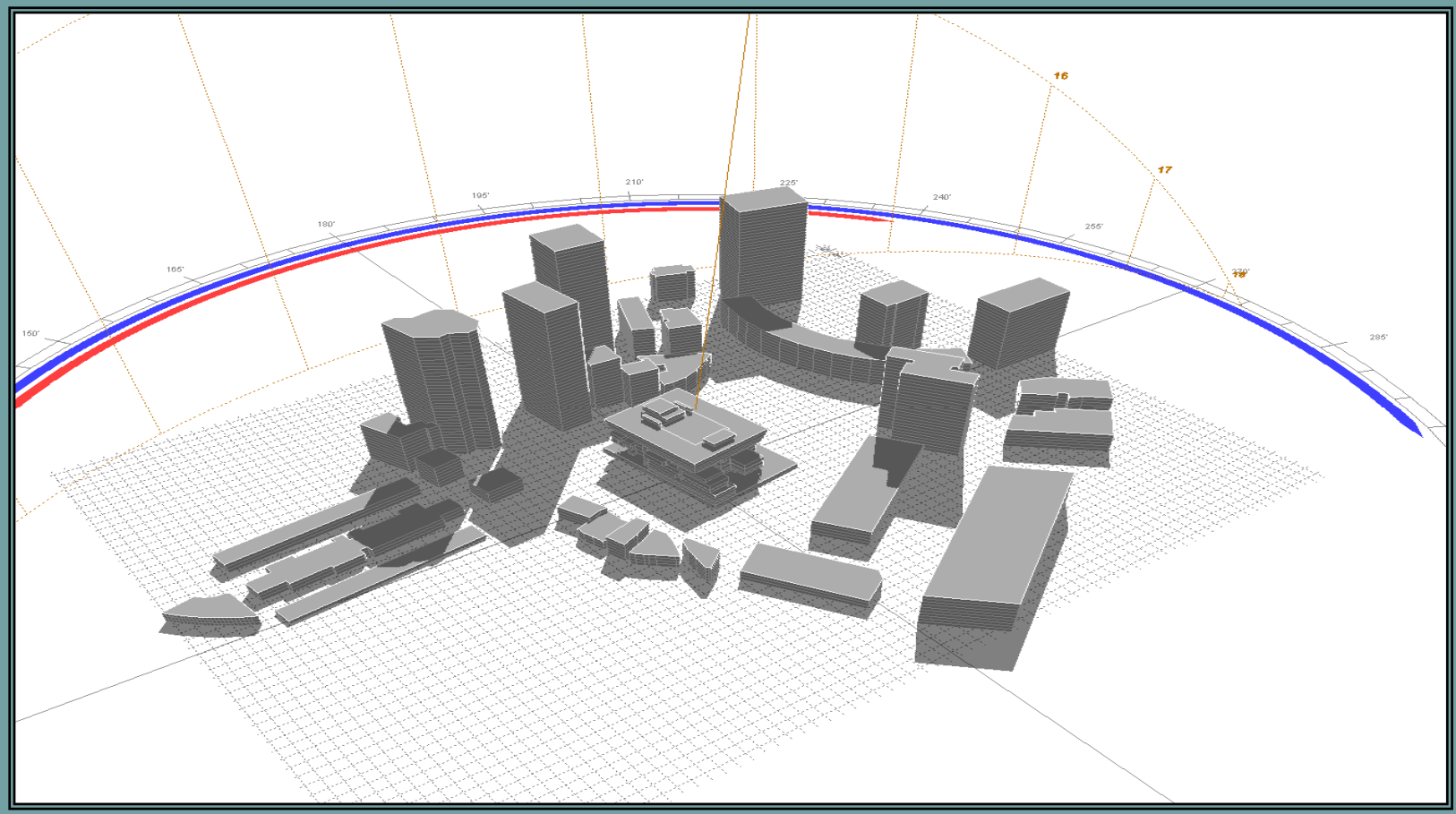
Operating at 38,000 BTU's / SF , best case integrated design, the building produces its own carbon footprint in 43.33 years

Boston City Hall Preliminary Revitalization Pro-Forma

Construction PSF Costs for New Work Outlined		
New, Reclaimed Spaces	130,000 SF @ $ 350.00/sf	$ 45,500,000
Insulate Exterior Surfaces	360,000 SF @ $5.00/sf	1,800,000
Total Construction		$ 47,300,000
Soft Costs		
Engineering & Architecture @ 7.2%		3,400,000
Interest and Construction Financing		2,730,000
Insurance		1,800,000
Bond		270,000
General Conditions @ 5%		2,250,000
Preliminary budget for new work		= $ 57,750,000

Boston City Hall Revitalization
Preliminary Estimates on Pay-Back

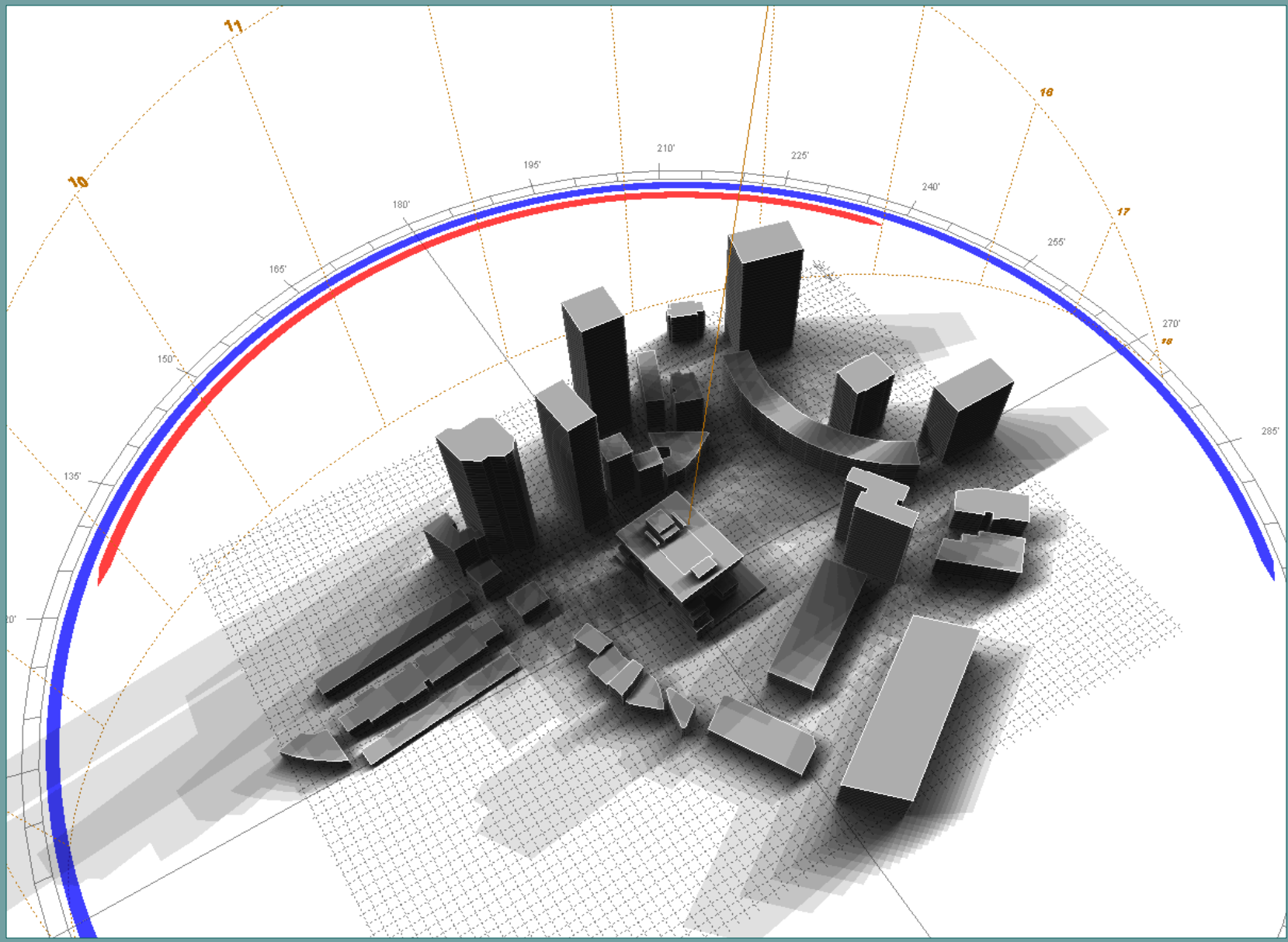
Avoided Costs (annual savings)	
Energy Savings w/ New Integrated Design	1,302,000
Avoided rental for Government Office Space	
42,350 sf @ $ 34 /sf	1,439,900
Income from Rental Spaces	
72,000 sf @ $ 55 /sf	3,960,000
Total Annual Income/Avoided Costs	$ 6,701,900
Payback period for project	
$ 57,750,000 / $ 6,701,900	8.6 years



* Measuring Energy Savings

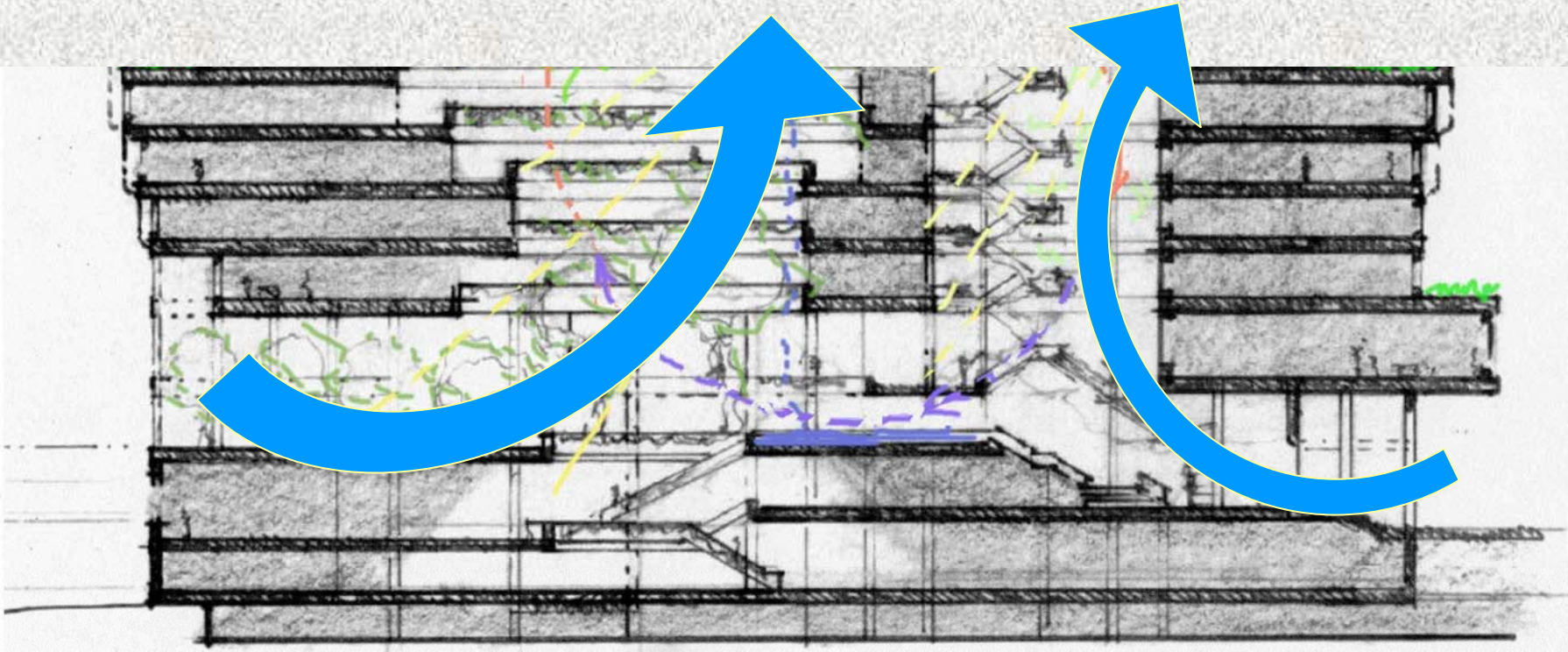
Current Picture

- This building uses far more electricity than comparable buildings (more than twice as much).
- Waste heat from electric use provides most of the heating in winter and demands most of the cooling throughout the year.
- Electricity is far more expensive than steam for heat.
- Cooling is done with electricity (mostly) and greatly increases costs.
- <u>This is a very expensive way to condition a building.</u>



Shadow Study from ECOTECT 5

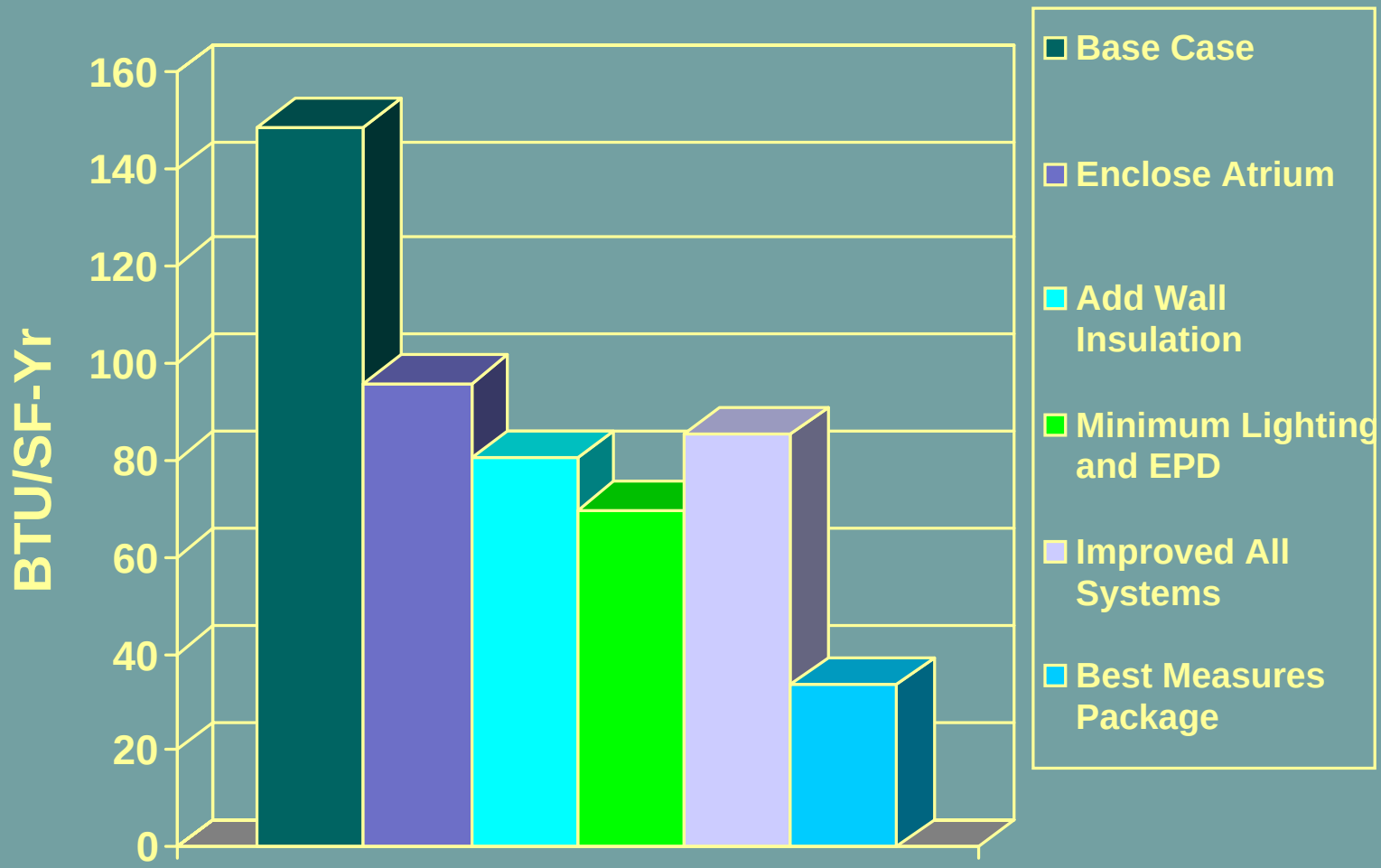
Current configuration maximizes surface area and effect of wind on energy.



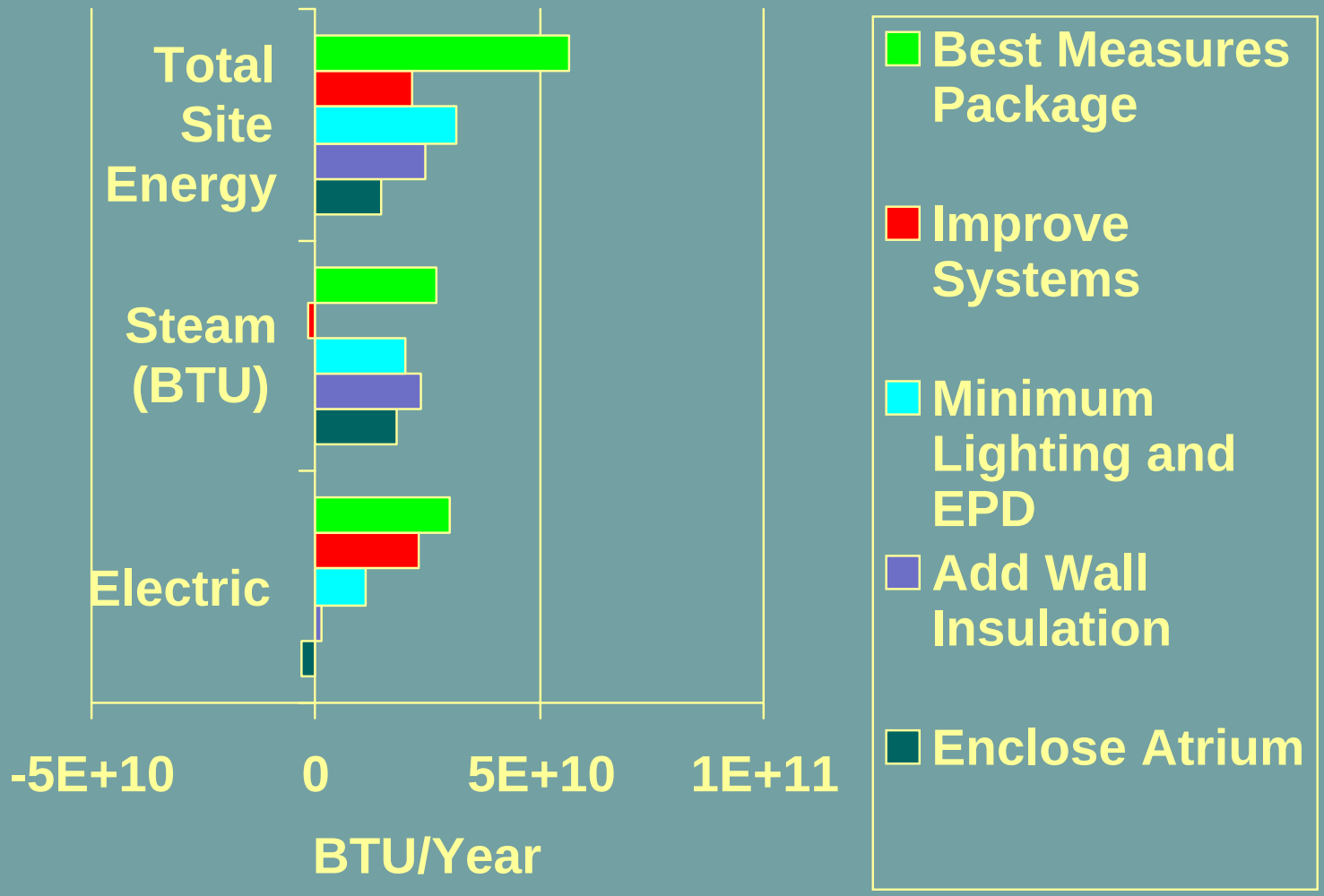
Boston City Hall Schematic Section "B" Looking East W. I. T. Study, 1997, H. MacLean, AIA

Energy Saving Modifications

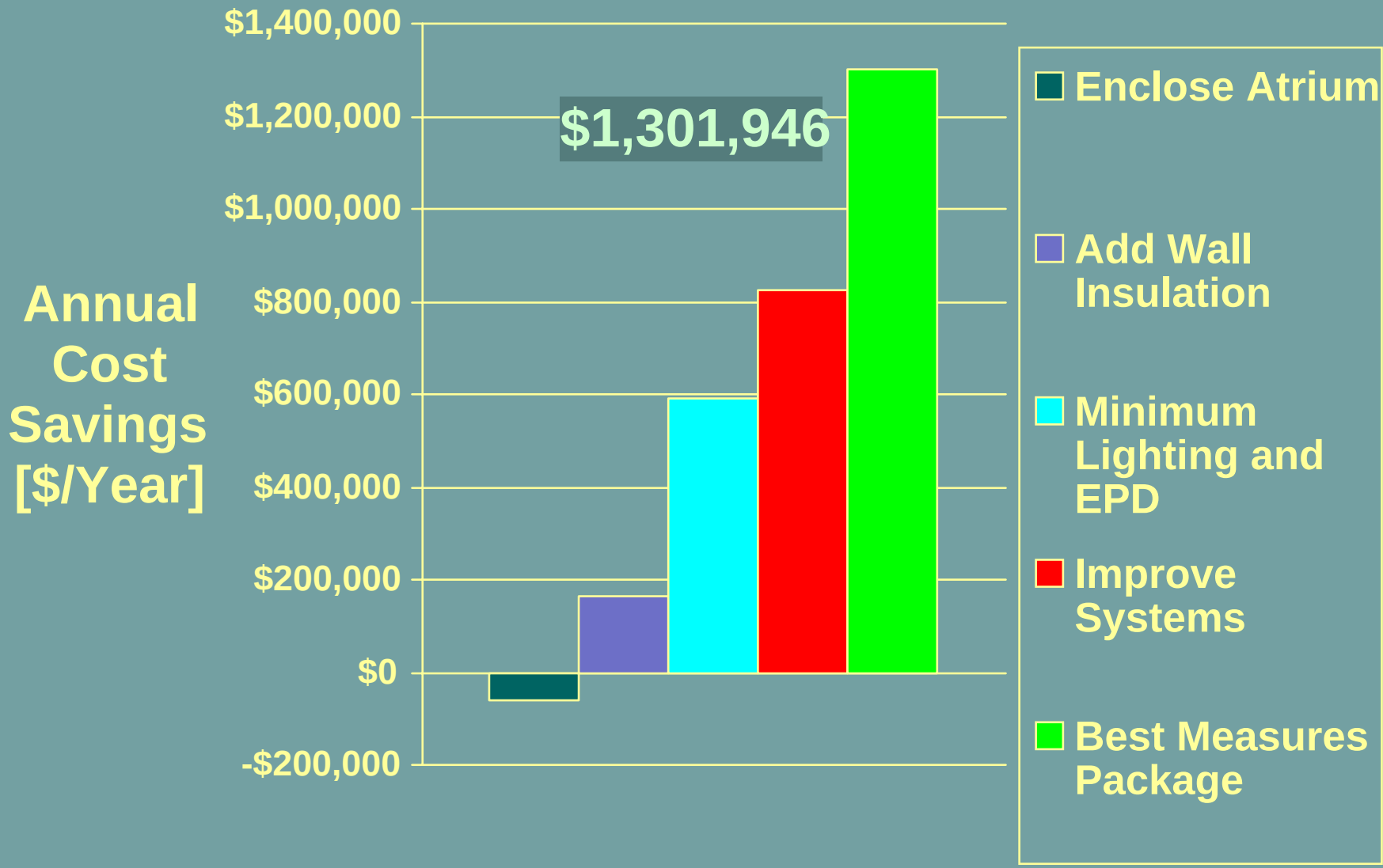
Resulting Energy Intensities for Individual Measures



Savings From Individual Measures By Energy Source



Combined Energy Cost Savings



What's In The Best Measures Package?

- 128,000 Added square feet
- Greater Comfort
- Covered Atrium
- 1" Urethane wall insulation and gyp board covering
- Minimize LPD (Lighting Power Density, W/sf) and EPD (Electrical Power Density)
- New VAV (Variable Air Volume) boxes, highest efficiency fans
- VSD (Variable Speed Drive) pumping
- High efficiency cooling tower and chiller

Best Measures Package can reduce Energy use by nearly 75%, and…

Energy Costs by over 60%…

(over $1 Million per year)

Approach to Optimal Savings

- Evaluate the current building as a whole.
- Use Building Information Modeling, integrating billing and monitored data to get a better picture.
- Work from the outside-in to:
    1. optimize the envelope first,
    2. then lighting,
    3. then redesign delivery system,
    4. then equipment.

Evaluate the whole building in the context of what it could be, not just what it is.

Hope

- The quality we bring to our work and the vision we pursue will influence the lives of the people that the building touches over hundreds of years.

- Sustainability embodies our belief in the future and our care for those who come after us.

- A city hall that expresses these values shows our confidence in Boston's future.

For Additional Information on this Project, visit http://www.basea.org/GreenBCH.php