P Urpose/intent

Gresham, Oregon’s New City Hall will act as a catalyst for the urban renewal of downtown Gresham and will contribute to Gresham’s emerging identity.

Location

We propose to locate the new city hall on the south west corner of site 3 along Hood Ave. and 5th St.

Identity

We propose to locate the prominent entry facade for the new City Hall at the south along 5th street to create a civic presence within the city context.

Program Contents - Site 3

1. Purpose/intent

2. Design Considerations for the Site
   - Current development located on the site
   - Images, maps, and pictures
   - Zoning and Planning information
   - Site access/circulation

3. Site Context
   - Site history
   - How will the development impact neighbors/community?
   - Site plan

4. Building Design Considerations
   - Floor plan diagrams
   - Building massing diagrams

5. Project Requirements
   - Space organization chart
   - Schematic floor plans
   - 3D digital model
   - Energy conservation analysis

Andrew Harmon, Kris Celtnieks, Elisabeta Curea, Jon DeLeonardo
DESIGN PRINCIPLES

2. ENVIRONMENTAL CONSIDERATIONS - PROGRAM AROUND DAYLIGHT

IN A TYPICAL BUILDING, LIGHTING ACCOUNTS FOR 20-40 PERCENT OF ENERGY CONSUMPTION. LIGHTING LOADS CAN BE REDUCED BY ALLOWING MORE NATURAL LIGHT TO PENETRATE THE INTERIOR OF THE BUILDING. THE FINANCIAL SAVINGS COULD BE CONSIDERABLE AND THE HEALT BENEFITS TREMENDOUS.
DESIGN PRINCIPLES

3. INSPIRATIONAL INTERIORS

UTILIZE SHORT CORRIDORS THAT ARE BROKEN DOWN BY CIRCULATION AND COMMON SPACES. USE COLOR AND TEXTURE TO CREATE INTERESTING EDGES AS WELL AS “DESTINATION” POINTS. INFILTRATE NATURAL LIGHT INTO CORRIDORS WHENEVER POSSIBLE.
DESIGN PRINCIPLES

4. DISTINCT URBAN SPACES

UTILIZE ART TO ACTIVELY ENGAGE THE EXTERIOR SPACES OF THE BUILDING. FORM EXTERIOR URBAN SPACES FOR BUILDING OCCUPANTS AND PEOPLE WHO MAY BE SIMPLY PASSING BY.
DESIGN CONSIDERATIONS FOR THE SITE

CURRENT BUILDING LOCATED AT THE SITE:
OUR SITE IS CURRENTLY OCCUPIED BY GRESHAM REHAB AND SPECIALTY CARE. THEY ARE A FOR PROFIT CORPORATION WHICH PROVIDES TREATMENT FOR DRUG AND ALCOHOL ADDICTIONS. THEY ARE ALSO A CORPORATE FRANCHISE FORM OF TREATMENT CENTER. INHABITANTS ARE GENERALLY PLACED INTO THE PROGRAM BY DOCTORS AND THE DURATION OF STAY RANGES FROM 6 MONTHS TO ONE YEAR.

BUILDING/SITE CONTAINS:
TREATMENT/HOSPITAL PROGRAM
88 BEDS
56 RESIDENTS
24 FTE’S

BUILDING DETAILS:
TYPICAL TYPE V CONSTRUCTION TYPICAL OF THIS AREA
BUILT AND CERTIFIED AS A CARE FACILITY IN 1989
SLAB ON GRADE
100 SURFACE PARKING SPACES (ROUGHLY)
DESIGN CONSIDERATIONS FOR THE SITE

SITE LOCATION:

OUR SITE IS LOCATED ALONG A MAX TRANSIT PLATFORM EAST OF THE CURRENT CITY HALL. IT'S BOUNDED BY KELLY AVE., HOOD AVE., 5TH ST, AND 7TH ST.
**DCC - DOWNTOWN COMMERCIAL CORE:**
The DCC is the city’s long-standing center and features unique local businesses, small-scale storefronts, and intimate sidewalks.

**DRL-2: DOWNTOWN RESIDENTIAL LOW-RISE:**
This mixed-use sub district will allow a gradual transformation into more varied and full-service residential neighborhoods that can take advantage of their proximity to transit and nearby shopping and job centers.

**DTM: DOWNTOWN TRANSIT MID-RISE:**
It supports the creation of employment uses within downtown so those who live outside have opportunities and easy access to work downtown.
**SITE**

**DOWNTOWN COMMERCIAL CORE**

85’

The DCC is the city’s long-standing center and features unique local businesses, small-scale storefronts, and intimate sidewalks.

**DOWNTOWN RESIDENTIAL LOW-RISE**

50’

This mixed-use sub district will allow a gradual transformation into more varied and full-service residential neighborhoods that can take advantage of their proximity to transit and nearby shopping and job centers.

**DOWNTOWN TRANSIT MID-RISE**

85’

It supports the creation of employment uses within downtown so those who live outside have opportunities and easy access to work downtown.

**DESIGN CONSIDERATIONS FOR THE SITE**

**ZONING AND PLANNING:**

- MAX HEIGHT: 85 FEET
  - **DCC - DOWNTOWN COMMERCIAL CORE**
  - **DOWNTOWN RESIDENTIAL LOW-RISE**
  - **DOWNTOWN TRANSIT MID-RISE**

MAX HEIGHT: 50 FEET

MAX HEIGHT: 85 FEET
DESIGN CONSIDERATIONS FOR THE SITE

SITE LOCATION:

INFRASTRUCTURE AND CONNECTIONS ENCLOSE OUR SITE ON ALL FOUR SIDES.

MAIN ELEMENTS:

CENTRAL BUS LINES

A MAX PLATFORM (SIMILAR TO THE EXISTING SITE)

MANY BUS STOPS IN THE AREA
DESIGN CONSIDERATIONS FOR THE SITE

SINGLE FAMILY HOMES:
These structures are located mostly to the south of our site. They provide a distinct scale in comparison to the larger structures, surface parking, and multifamily development nearby.

VACANT COMMERCIAL:
Vacant commercial buildings are scattered around the site to the east and west. In some cases, these structures create areas of inactivity and awkward dead-end streets and business parks.

TOWNHOUSES:
Newer townhouses are located at the north end of the site. They are typically composed of 2-3 floors, on-street parking, and simple wood frame construction. Many appear to be newer construction and meet the bare minimum requirements for construction, housing, and code.

STRIP RETAIL:
Strip retail composes the ground floor of nearly all adjacent facades with the exception of the single family housing stock located nearby. This retail is generally combined with surface parking in a manner suitable for low-density retail situations.

NEWER CONDO DEVELOPMENT:
Some newer structures occupy the north end of the site that are more sophisticated in terms of construction, design, and urban response. These structures are typically comprised of a Type 2B base or plinth followed by 5 floors of Type 5 wood construction. This development is typically referred to as 5 over 1.
DESIGN CONSIDERATIONS FOR THE SITE

SINGLE FAMILY HOMES:
These structures are located mostly to the south of our site. They provide a distinct scale in comparison to the larger structures, surface parking, and multifamily development nearby.

VACANT COMMERCIAL:
Vacant commercial buildings are scattered around the site to the east and west. In some cases these structures create areas of inactivity and awkward dead end streets and business parks.

TOWNHOUSES:
Newer townhouses are located at the north end of the site. They are typically composed of 2-3 floors, on street parking, and simple wood frame construction. Many appear to be newer construction and meet the bare minimum requirements for construction, housing, and code.

STRIP RETAIL:
Strip retail composes the ground floor of nearly all adjacent facades with the exception of the single family housing stock located near by. This retail is generally combined with surface parking in a manner suitable for low density retail situations.

NEWER CONDO DEVELOPMENT:
Some newer structures occupy the north end of the site that are more sophisticated in terms of construction, design, and urban response. These structures are typically comprised of a type 2B base or plinth followed by 5 floors of type 5 wood construction. This development is typically referred to as 5 over 1.
SITE CONTEXT

GRESHAM HISTORY:

THE TOWN GRESHAM WAS NAMED FOR A FAMOUS CIVIL WAR GENERAL NAMED WALTER QUINTON GRESHAM. A POST OFFICE WAS ESTABLISHED IN 1884 AND THE STORE OWNER CHOSE THIS NAME. BEFORE 1884 IT WAS A HEAVILY WOODED AREA THAT SERVED AS A CAMPGROUND OF SORTS FOR PEOPLE TO STOP AND COMPOSE THEMSELVES BEFORE GOING TO PORTLAND. THROUGHOUT THE EARLY TO MID 1900’S MUCH OF THE LANDSCAPE WAS CLEARED AND CONVERTED TO AGRICULTURAL FARM LAND. IN RECENT TIME THESE FARMLANDS HAVE BEEN INCREASINGLY DEVELOPED INTO LOW DENSITY HOUSING.
SITE PLAN

PHASED SITE PLAN:

Thursday, December 10, 2009
BUILDING DESIGN CONSIDERATIONS

PLAN DIAGRAMS:

Utilize short corridors that are broken down by circulation and common spaces. Use color and texture to create interesting edges as well as "destination" points. Infiltrate natural light into corridors whenever possible.

EXISTING

PRIVATE

PUBLIC

PROPOSED

PRIVATE

PUBLIC

SEMI-PUBLIC

CIRCULATION CORE

EXISTING

PROPOSED
BUILDING DESIGN CONSIDERATIONS

MASSING DIAGRAM:

INCORPORATE A CENTRAL ATRIUM INTO THE BUILDINGS CORE AND ARRANGE FUNCTIONAL PROGRAMS AND DEPARTMENTS AROUND IT.
PROJECT REQUIREMENTS

ADJACENCY DIAGRAM: CITY HALL
PROJECT REQUIREMENTS

3D DIGITAL MODEL:

AXONS AND SITE CONTEXT.
PROJECT REQUIREMENTS

3D DIGITAL MODEL:

BUILDING ELEVATION
PROJECT REQUIREMENTS

3D DIGITAL MODEL:
ENTRY PERSPECTIVES.
PROJECT REQUIREMENTS

3D DIGITAL MODEL:
ENTRY PERSPECTIVES.
“IF A BUILDING DESIGN IS OPTIMIZED TO TAKE ADVANTAGE OF IT’S INTERACTION WITH THE CLIMATE AND USE PATTERNS, BOTH IT’S TOTAL AND PEAK ENERGY USE CAN BE SUBSTANTIALLY DECREASED, REDUCING FIRST COST AND OPERATING COSTS”

G.Z.BROWN
ENERGY CONSERVATION STRATEGIES THROUGH ARCHITECTURE

Day Lighting

- 45% Window-to-wall ratio provides for maximum lighting and minimal heat loss
- Deep window punches to block direct light during cooling seasons
- Atrium Courtyard
  - Allows for major circulation spaces to be lit naturally throughout the day
  - Areas around the atrium also receive natural light

Passive Heating & Cooling

- High thermal mass in walls, ceilings, & floors
- Operable windows for ventilation & cooling
- Operable atrium for stack ventilation

Site Planning

- Location on southwest corner of site
- Allows for maximum southern exposure
- Small footprint used to maximize density on the site
<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>ACTIVITIES IN SPACE</th>
<th>OCCUPANTS</th>
<th>AREA</th>
<th>HEIGHT</th>
<th>LIGHTING REQUIREMENTS</th>
<th>SCHEDULE</th>
<th>TEMPERATURE NEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>URBAN RENEWAL</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>6</td>
<td>1200 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>ECONOMIC DEVELOPMENT</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>6</td>
<td>1000 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>CITY ATTORNEY</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>10</td>
<td>2800 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>DEPARTMENT OF ENVIRONMENTAL SERVICES</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>17</td>
<td>2000 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>FACILITIES</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>12</td>
<td>2000 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>24 HR ON CALL</td>
<td>68-78 F</td>
</tr>
<tr>
<td>FINANCIAL MANAGEMENT</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>30</td>
<td>10,530 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>URBAN PLANNING</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>35</td>
<td>5700 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>COMMUNITY DEVELOPMENT</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>40</td>
<td>12,500 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>INFORMATION TECHNOLOGIES</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>12</td>
<td>4000 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>24 HR ON CALL</td>
<td>INDEPENDENT CONTROL NEEDED</td>
</tr>
</tbody>
</table>

- **LIGHT TO MEDIUM OFFICE WORK**
- **TASK LIGHTING**
- **8AM-5PM**
- **68-78 F**
ADJACENCY DIAGRAMS BY THEIR FUNCTIONAL NEEDS
ENERGY ZONES

ZONE 1
CONTAINS MAJOR SPACES OF OCCUPANCY THROUGHOUT THE DAY

ZONE 2
CONTAINS THE MAIN CIRCULATION AND ATRIUM AREA

ZONE 3
LIBRARY

ZONE 4
PUBLIC SPACES

ZONE 5
STORAGE AND LOCKER ROOM AREAS

ZONE 6
MECHANICAL AREAS

ZONE 7
COUNCIL CHAMBER AND MEETING SPACES

ZONE 8
REST ROOMS

ZONE 9
SERVER ROOM
SCHEDULING NEEDS BY DEPARTMENT USE

- URBAN PLANNING
- COMMUNITY DEVELOPMENT
- ENVIRONMENTAL SERVICES
- ECONOMIC DEVELOPMENT
- URBAN RENEWAL
- OFFICE OF GOVERNANCE
- FINANCE AND MANAGEMENT
- CITY ATTORNEY

- 9AM-9PM
- 9AM-8PM
- 9AM-6PM
- 24 HOURS/DAY

- FACILITIES & I.T.
- LIBRARY
- PUBLIC SPACE
- URBAN PLANNING
- COMMUNITY DEVELOPMENT
- ENVIRONMENTAL SERVICES
- ECONOMIC DEVELOPMENT
- URBAN RENEWAL
- OFFICE OF GOVERNANCE
- FINANCE AND MANAGEMENT
- CITY ATTORNEY
ENERGY STAR BUILDING CALCULATIONS
CURRENT BUILDING ESTIMATES

<table>
<thead>
<tr>
<th>Energy</th>
<th>Design</th>
<th>Target</th>
<th>Average Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Performance Rating (1-100)</td>
<td>59</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Energy Reduction (%)</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Source Energy Use Intensity (kBTU/Sq. Ft./y)</td>
<td>197</td>
<td>218</td>
<td>218</td>
</tr>
<tr>
<td>Site Energy Use Intensity (kBTU/Sq. Ft./y)</td>
<td>59</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Total Annual Source Energy (kBTU)</td>
<td>30,313,573</td>
<td>33,504,951</td>
<td>33,504,951</td>
</tr>
<tr>
<td>Total Annual Site Energy (kBTU)</td>
<td>9,075,920</td>
<td>10,031,422</td>
<td>10,031,422</td>
</tr>
<tr>
<td>Total Annual Energy Cost ($)</td>
<td>$133,000</td>
<td>$147,002</td>
<td>$147,002</td>
</tr>
<tr>
<td>Pollution Emissions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2-eq Emissions (metric tons/year)</td>
<td>1,095</td>
<td>1,210</td>
<td>1,210</td>
</tr>
<tr>
<td>CO2-eq Emissions Reduction (%)</td>
<td>10%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

WHILE THE CURRENT BUILDING IS HIGHER THEN THE AVERAGE BUILDING IT IS FAR FROM THE TARGET OF 100 SET BY THE 2030 CHALLENGE
NEW BUILDING ESTIMATES

WITH THE ENERGY CONSERVATION STRATEGIES USED IT IS ESTIMATED THAT THE BUILDING WILL MEET THE 2030 CHALLENGE AND DECREASE ENERGY USE BY 50%
MIT DESIGN ADVISOR TEST RESULTS
SCENARIO ONE BASED OFF OF CURRENT BUILDING DESIGN

ENERGY USE PER SQUARE METER

1ST YEAR ENERGY COST/SQUARE FOOT

-50% W-W RATIO
-R-17 WALLS
-R-17 ROOF
-DOUBLE GLAZED GREEN WINDOWS
-LOW MASS WALLS
-NO WINDOW SHADES
-LIGHTS DIM TOGETHER
-MECHANICAL HEATING AND COOLING

HEATING  COOLING  LIGHTING

HEATING  COOLING  LIGHTING
### Scenario Two

<table>
<thead>
<tr>
<th>Energy Use per Square Meter</th>
<th>1st Year Energy Cost/square foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>kWh/m²</td>
<td>$/ft²</td>
</tr>
<tr>
<td>500</td>
<td>5</td>
</tr>
<tr>
<td>400</td>
<td>4</td>
</tr>
<tr>
<td>300</td>
<td>3</td>
</tr>
<tr>
<td>200</td>
<td>2</td>
</tr>
<tr>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- **50% W-W Ratio**
- **R-28 Walls**
- **R-28 Roof**
- **Triple Glazed High Performance Windows**
- **High Mass Walls**
- **1’ Window Punches**
- **Lights Dim Separately**
- **Joint Mechanical and Natural Ventilation**

**Heat, Cool, Light**

**Heat**

**Cool**

**Light**
SCENARIO THREE

ENERGY USE PER SQUARE METER

<table>
<thead>
<tr>
<th>kWh/m²</th>
<th>1ST YEAR ENERGY COST/SQUARE FOOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>-50% W-W RATIO</td>
</tr>
<tr>
<td>400</td>
<td>-R-60 WALLS</td>
</tr>
<tr>
<td>300</td>
<td>-R-60 ROOF</td>
</tr>
<tr>
<td>200</td>
<td>-TRIPLE GLAZED HIGH PERFORMANCE WINDOWS</td>
</tr>
<tr>
<td>100</td>
<td>-HIGH MASS WALLS</td>
</tr>
<tr>
<td>100</td>
<td>-3’ WINDOW SHADES</td>
</tr>
<tr>
<td>100</td>
<td>-LIGHTS DIM SEPERATELY</td>
</tr>
<tr>
<td>100</td>
<td>-NATURAL COOLING AND MECHANICAL HEATING</td>
</tr>
</tbody>
</table>

HEATING

COOLING

LIGHTING

HEATING

COOLING

LIGHTING
RESULTS COMPARED

ENERGY USE PER SQUARE METER

HEATING

COOLING

LIGHTING

1ST YEAR ENERGY COST/SQUARE FOOT

INDOOR AIR TEMPERATURE FROM NATURAL VENTILATION
IES VE-WARE 2030 CHALLENGE RESULTS

09/Dec/2009

Contents:
Energy & Carbon results
Architecture 2030 Challenge
Climate Energy Index

Energy and Carbon Results
Proposed building energy use  6,160.71 MBtu/yr

Proposed building carbon emissions  744.7 tons CO2/yr

Energy breakdown:
Heating  18%
Cooling  0%
Lights  32%
Equipment  50%

AIA 2030 Challenge - summary

Current design meets 2030 Challenge Target for: Current!

Design Building Energy Use Intensity:

39 kBTU/ft²
(Design EUI = Energy / Building Area)

Average Building Energy Use Intensity:

82 kBTU/ft²
(Used to generate 2030 Challenge Targets)

Building Type:

Administrative/Professional and Government Office

Analysis Details:

The Climate Energy Index is simple global unitary measure of energy required to maintain air at ASHRAE 55: 1981 comfort conditions. The Index is solely dependent on the climate data. Building simulation results can be compared with the Index to provide a simple measure of performance in the context of global climate
The AIA 2030 Challenge provides a roadmap of targets for US building projects culminating in being carbon neutral by 2030. Implementation of the Challenge requires the use of targets by building type derived from current building stock benchmarks.

Challenge targets for selected building type:

<table>
<thead>
<tr>
<th>Year</th>
<th>%reduction</th>
<th>kBTU/ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>50</td>
<td>42</td>
</tr>
<tr>
<td>2010</td>
<td>60</td>
<td>34</td>
</tr>
<tr>
<td>2015</td>
<td>70</td>
<td>29</td>
</tr>
<tr>
<td>2020</td>
<td>80</td>
<td>25</td>
</tr>
<tr>
<td>2025</td>
<td>90</td>
<td>25</td>
</tr>
<tr>
<td>2030</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

For certain building types targets are calculated using Energy Star methodology where energy consumption is not direct % reduction against average.
“IF A BUILDING DESIGN IS OPTIMIZED TO TAKE ADVANTAGE OF IT’S INTERACTION WITH THE CLIMATE AND USE PATTERNS, BOTH IT’S TOTAL AND PEAK ENERGY USE CAN BE SUBSTANTIALLY DECREASED, REDUCING FIRST COST AND OPERATING COSTS”
G.Z.BROWN
The new Gresham City Hall will act as an urban catalyst for the Gresham Downtown area. A civic building needs to be a precedent in the area for energy conservation. Energy conservation was a major focus for the entire programming process.

Conservation led us to help make many of our programmatic decisions in the building, especially when locating all of the different inhabitants of the building. Locating the different users in the correct areas of the building will help the building to use the least amount of energy.

The orientation of the building on the site was an important concern. The building is located on the southwest corner of our site to take advantage of the sunlight during the peak work hours of the day. Because of this orientation the building is also orientated to take advantage of passive heating during the cooler winter months to minimize heat loss. This building will be one of the taller buildings in the direct vicinity so there will be no hazards of other buildings blocking the sun and wind at its location.

The circulation system used provides a major source of the energy conservation in the building. The main circulation area for the building is located around a large atrium space. This atrium receives ample amounts of daylight throughout the entire day, lighting all areas at different times of the day. By focusing our major areas of circulation around this atrium there is a decreased need for artificial lighting in the major circulation areas. Not only does this cut down on the lighting of this area, but the spaces adjacent to the atrium area will also receive most of the lighting needs from this central atrium space. Because of this, it also decreases the distance between the windows on the exterior side to the atrium side, so the entire building can be lit naturally instead of artificially.

Cross ventilation will be easily accomplished by slimming the building down with a single loaded corridor along the atrium and utilizing operable windows. Using operable windows will also take advantage of night time cooling during the hot summer months as well. Not only does the orientation and planned spaces take advantage of passive lighting, heating, and cooling strategies, but the materials used for the building will as well.

By cladding our building in brick and using a thick masonry wall we have increased the thermal mass of the building. Doing this has helped us cool the building in the summer by soaking up the heat in the daytime and cooling it at night, and doing the opposite in the winter time to help heat the building.
ENERGY CONSERVATION STRATEGIES THROUGH ARCHITECTURE

Day Lighting

- 45% Window-to-wall ratio provides for maximum lighting and minimal heat loss
- Deep window punches to block direct light during cooling seasons
- Atrium Courtyard
  - Allows for major circulation spaces to be lit naturally throughout the day
  - Areas around the atrium also receive natural light

Passive Heating & Cooling

- High thermal mass in walls, ceilings, & floors
- Operable windows for ventilation & cooling
- Operable atrium for stack ventilation

Site Planning

- Location on southwest corner of site
- Allows for maximum southern exposure
- Small footprint used to maximize density on the site
<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>ACTIVITIES IN SPACE</th>
<th>OCCUPANTS</th>
<th>AREA</th>
<th>HEIGHT</th>
<th>LIGHTING REQUIREMENTS</th>
<th>SCHEDULE</th>
<th>TEMPERATURE NEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>URBAN RENEWAL</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>6</td>
<td>1200 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>ECONOMIC DEVELOPMENT</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>6</td>
<td>1000 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>CITY ATTORNEY</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>10</td>
<td>2800 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>DEPARTMENT OF ENVIRONMENTAL SERVICES</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>17</td>
<td>2000 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>FACILITIES</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>12</td>
<td>2000 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>24 HR ON CALL</td>
<td>68-78 F</td>
</tr>
<tr>
<td>FINANCIAL MANAGEMENT</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>30</td>
<td>10,530 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>URBAN PLANNING</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>35</td>
<td>5700 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>COMMUNITY DEVELOPMENT</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>40</td>
<td>12,500 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>8AM-5PM</td>
<td>68-78 F</td>
</tr>
<tr>
<td>INFORMATION TECHNOLOGIES</td>
<td>LIGHT TO MEDIUM OFFICE WORK</td>
<td>12</td>
<td>4000 SF</td>
<td>12'</td>
<td>TASK LIGHTING</td>
<td>24 HR ON CALL</td>
<td>INDEPENDENT CONTROL NEEDED</td>
</tr>
</tbody>
</table>

- **Lighting Requirements**: Task Lighting
- **Schedule**: 8AM-5PM
- **Temperature Needs**: 68-78 F
- **Schedule**: 24 HR ON CALL
- **Temperature Needs**: Independent Control Needed
ADJACENCY DIAGRAMS BY THEIR FUNCTIONAL NEEDS
DEPARTMENT LOCATIONS BY THEIR FUNCTIONAL NEEDS
ENERGY ZONES

ZONE 1
CONTAINS MAJOR SPACES OF OCCUPANCY THROUGHOUT THE DAY

ZONE 2
CONTAINS THE MAIN CIRCULATION AND ATRIUM AREA

ZONE 3
LIBRARY

ZONE 4
PUBLIC SPACES

ZONE 5
STORAGE AND LOCKER ROOM AREAS

ZONE 6
MECHANICAL AREAS

ZONE 7
COUNCIL CHAMBER AND MEETING SPACES

ZONE 8
REST ROOMS

ZONE 9
SERVER ROOM
ENERGY STAR BUILDING CALCULATIONS
CURRENT BUILDING ESTIMATES

<table>
<thead>
<tr>
<th>Energy Performance Results (estimated)</th>
<th>Design</th>
<th>Target</th>
<th>Average Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Performance Rating (1-100)</td>
<td>59</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Energy Reduction (%)</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Source Energy Use Intensity (kBTU/Sq. Ft./yr)</td>
<td>197</td>
<td>218</td>
<td>218</td>
</tr>
<tr>
<td>Site Energy Use Intensity (kBTU/Sq. Ft./yr)</td>
<td>69</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Total Annual Source Energy (kBTU)</td>
<td>30,313,573</td>
<td>33,504,961</td>
<td>33,504,961</td>
</tr>
<tr>
<td>Total Annual Site Energy (kBTU)</td>
<td>9,075,920</td>
<td>10,031,422</td>
<td>10,031,422</td>
</tr>
<tr>
<td>Total Annual Energy Cost ($)</td>
<td>$133,000</td>
<td>$147,002</td>
<td>$147,002</td>
</tr>
</tbody>
</table>

Pollution Emissions

| CO2-eq Emissions (metric tons/year) | 1,095 | 1,210 | 1,210 |
| CO2-eq Emissions Reduction (%)     | 10%   | 0%    | 0%    |

WHILE THE CURRENT BUILDING IS HIGHER THAN THE AVERAGE BUILDING IT IS FAR FROM THE TARGET OF 100 SET BY THE 2030 CHALLENGE
WITH THE ENERGY CONSERVATION STRATEGIES USED IT IS ESTIMATED THAT THE BUILDING WILL MEET THE 2030 CHALLENGE AND DECREASE ENERGY USE BY 50%
MIT DESIGN ADVISOR TEST RESULTS

SCENARIO ONE BASED OFF OF CURRENT BUILDING DESIGN

ENERGY USE PER SQUARE METER

1ST YEAR ENERGY COST/SQUARE FOOT

-50% W-W RATIO
-R-17 WALLS
-R-17 ROOF
-DOUBLE GLAZED GREEN WINDOWS
-LOW MASS WALLS
-NO WINDOW SHADES
-LIGHTS DIM TOGETHER
-MECHANICAL HEATING AND COOLING

HEATING
COOLING
LIGHTING
SCENARIO TWO

ENERGY USE PER SQUARE METER

- 50% W-W RATIO
- R-28 WALLS
- R-28 ROOF
- TRIPLE GLAZED HIGH PERFORMANCE WINDOWS
- HIGH MASS WALLS
- 1’ WINDOW PUNCHES
- LIGHTS DIM SEPERATELY
- JOINT MECHANICAL AND NATURAL VENTILATION
SCENARIO THREE

ENERGY USE PER SQUARE METER

1ST YEAR ENERGY COST/SQUARE FOOT

-50% W-W RATIO

-R-60 WALLS

-R-60 ROOF

-TRIPLE GLAZED HIGH PERFORMANCE WINDOWS

-HIGH MASS WALLS

-3’ WINDOW SHADES

-LIGHTS DIM SEPERATELY

-NATURAL COOLING AND MECHANICAL HEATING
RESULTS COMPARED

ENERGY USE PER SQUARE METER

1ST YEAR ENERGY COST/SQUARE FOOT

INDOOR AIR TEMPERATURE FROM NATURAL VENTILATION
IES VE-WARE 2030 CHALLENGE RESULTS

09/Dec/2009
Contents:
Energy & Carbon results
Architecture 2030 Challenge
Climate Energy Index

Energy and Carbon Results
Proposed building energy use  6,160.71 MBtu/yr
Proposed building carbon emissions  744.7 tons CO2/yr

Energy breakdown:

- Heating  18%
- Cooling  0%
- Lights  32%
- Equipment  50%

AIA 2030 Challenge - summary

Current design meets 2030 Challenge Target for: Current!

Design Building Energy Use Intensity:
39 kBTU/ft2
(Design EUI = Energy / Building Area)

Average Building Energy Use Intensity:
82 kBTU/ft2
(Used to generate 2030 Challenge Targets)

Building Type:
Administrative/Professional and Government Office

Analysis Details:
The Climate Energy Index is simple global unitary measure of energy required to maintain air at ASHRAE 55: 1981 comfort conditions. The Index is solely dependant on the climate data.
Building simulation results can be compared with the Index to provide a simple measure of performance in the context of global climate.
The AIA 2030 Challenge provides a roadmap of targets for US building projects culminating in being carbon neutral by 2030. Implementation of the Challenge requires the use of targets by building type derived from current building stock benchmarks.

Challenge targets for selected building type:

<table>
<thead>
<tr>
<th>Year</th>
<th>% Reduction</th>
<th>kBtu/ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>50</td>
<td>42</td>
</tr>
<tr>
<td>2010</td>
<td>60</td>
<td>34</td>
</tr>
<tr>
<td>2015</td>
<td>70</td>
<td>29</td>
</tr>
<tr>
<td>2020</td>
<td>80</td>
<td>25</td>
</tr>
<tr>
<td>2025</td>
<td>90</td>
<td>25</td>
</tr>
<tr>
<td>2030</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

For certain building types, targets are calculated using Energy Star methodology where energy consumption is not direct % reduction against average.