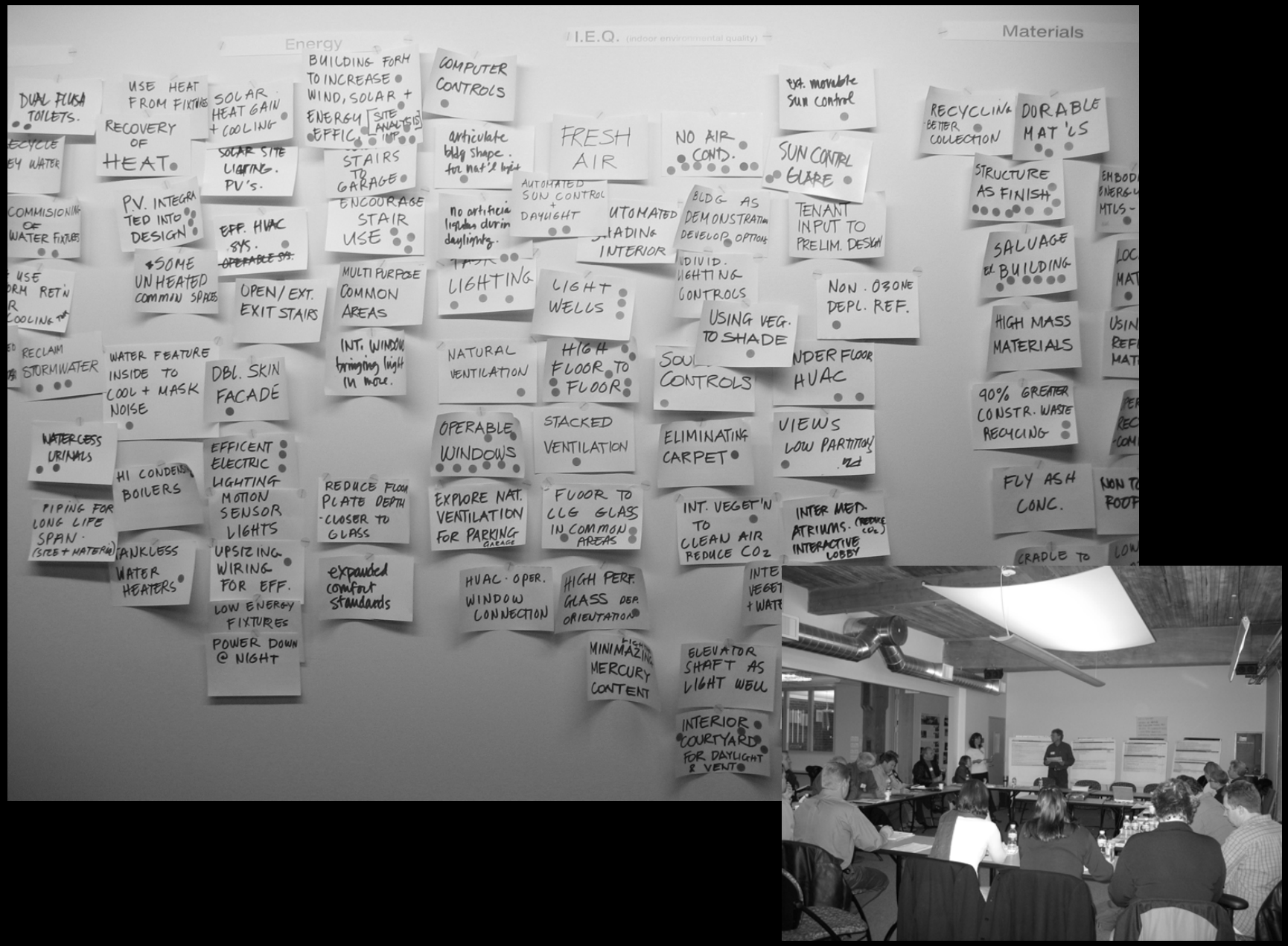
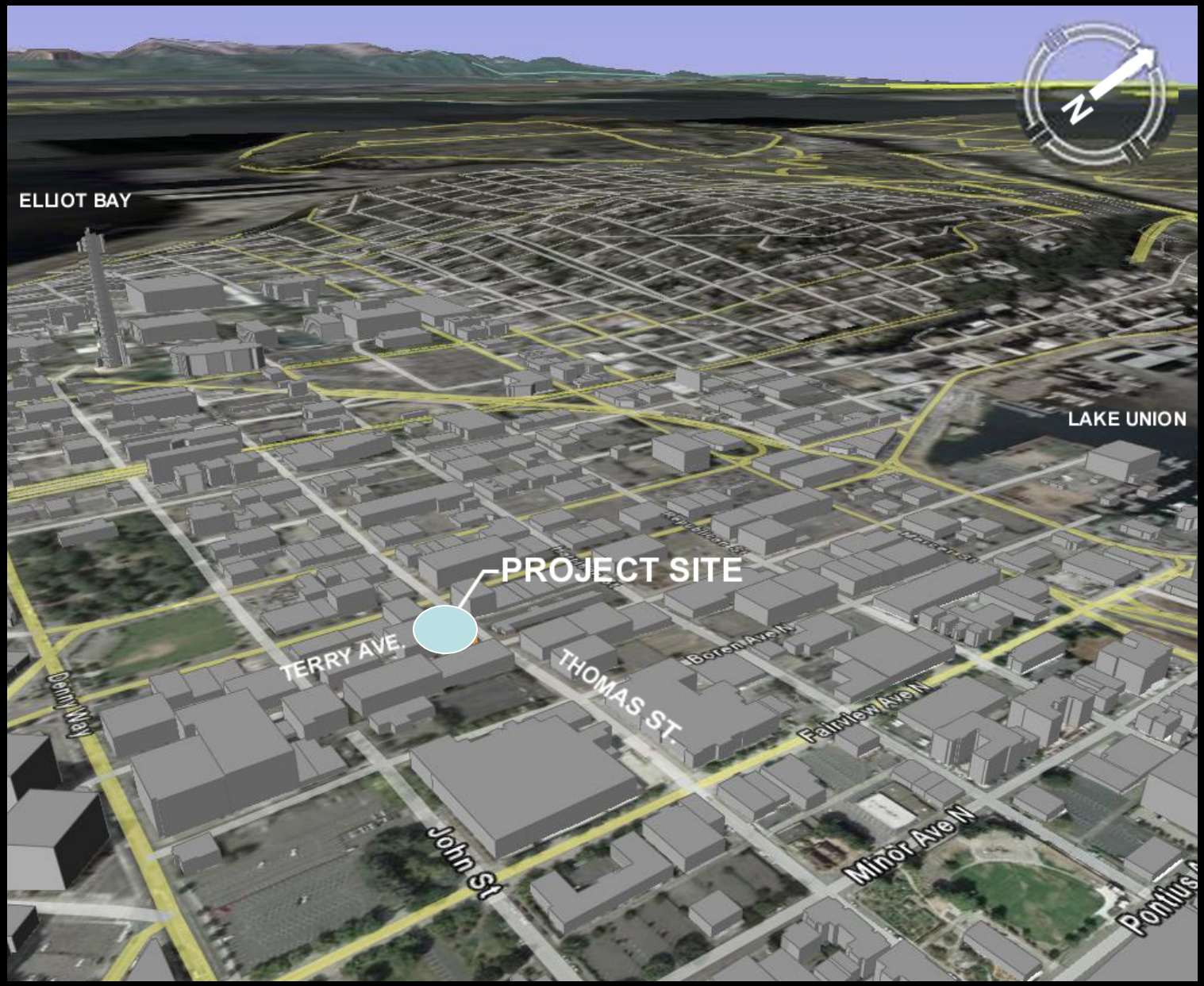
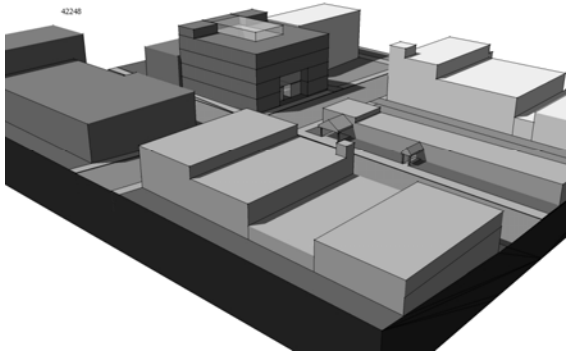
PROCESS


Energy
I.E.Q. (indoor environmental quality)
Materials
DUAL FLUSH TOILETS.
USE HEAT FROM FIXTURES
RECOVERY OF HEAT
SOLAR HEAT GAIN + COOLING
SOLAR SITE LIGHTING. PV'S.
BUILDING FORM TO INCREASE WIND, SOLAR + ENERGY EFFIC. [SITE ANALYSIS]
STAIRS TO GARAGE
ENCOURAGE STAIR USE
COMPUTER CONTROLS
articulate bldg shape. for nat'l light
FRESH AIR
NO AIR COND.
ext. moveable sun control
SUN CONTROL GLARE
RECYCLING BETTER COLLECTION
DURABLE MAT'LS
STRUCTURE AS FINISH
COMMISIONING OF WATER FIXTURES
PV. INTEGRATED INTO DESIGN
EFF. HVAC SYS.
SOME UNHEATED COMMON SPACES
AUTOMATED SUN CONTROL + DAYLIGHT
UTOMATED DIMMING INTERIOR
BLDG AS DEMONSTRATION DEVELOP. OPTIONS
TENANT INPUT TO PRELIM. DESIGN
SALVAGE EX. BUILDING
MULTI PURPOSE COMMON AREAS
OPEN/EXT. EXIT STAIRS
LIGHTING
LIGHT WELLS
INDIVID. LIGHTING CONTROLS
NON. OZONE DEPL. REF.
USING VEG. TO SHADE
HIGH MASS MATERIALS
RECLAIM STORMWATER
WATER FEATURE INSIDE TO COOL + MASK NOISE
DBL. SKIN FACADE
INT. WINDOW bringing light in more.
NATURAL VENTILATION
HIGH FLOOR TO FLOOR
SOLAR CONTROLS
UNDER FLOOR HVAC
90% GREATER CONSTR. WASTE RECYCLING
WATERLESS URINALS
OPERABLE WINDOWS
STACKED VENTILATION
ELIMINATING CARPET
VIEWS LOW PARTITIONS
HI CONDENS. BOILERS
EFFICENT ELECTRIC LIGHTING
MOTION SENSOR LIGHTS
REDUCE FLOOR PLATE DEPTH - CLOSER TO GLASS
EXPLORE NAT. VENTILATION FOR PARKING GARAGE
FLOOR TO CLG GLASS IN COMMON AREAS
INT. VEGET'N TO CLEAN AIR REDUCE CO2
INTER MED. ATRIUMS. (REDUCE CO2) INTERACTIVE LOBBY
FLY ASH CONC.
PIPING FOR LONG LIFE SPAN. (SIZE + MATERIAL)
TANKLESS WATER HEATERS
UPSIZING WIRING FOR EFF.
LOW ENERGY FIXTURES
POWER DOWN @ NIGHT
expanded comfort standards
HVAC · OPER. WINDOW CONNECTION
HIGH PERF. GLASS DEP. ORIENTATION
MINIMIZING MERCURY CONTENT
ELEVATOR SHAFT AS LIGHT WELL
INTERIOR COURTYARD FOR DAYLIGHT & VENT.
CRADLE TO


ELLIOT BAY
LAKE UNION
PROJECT SITE
TERRY AVE.
THOMAS ST.
Boren Ave N
Fairview Ave N
Denny Way
John St
Minor Ave N
Pontius
N

SUMMER PM
SBRI
GROUP HEALTH
BIOTECH
TERRY AVE NORTH
SUMMER AM
BOREN AVE NORTH
STREET CAR LINE
THOMAS STREET
SELLEN
ATHLETIC SUPPLY COMPANY
SITE
PROPOSED PEDESTRIAN STREET
WINTER
WINTER
JOHN ST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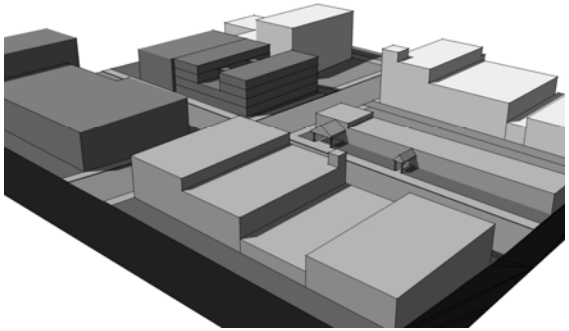

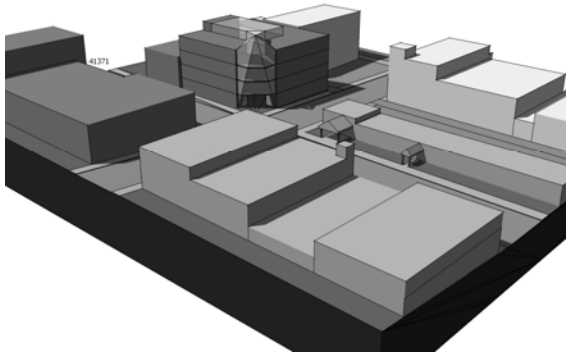
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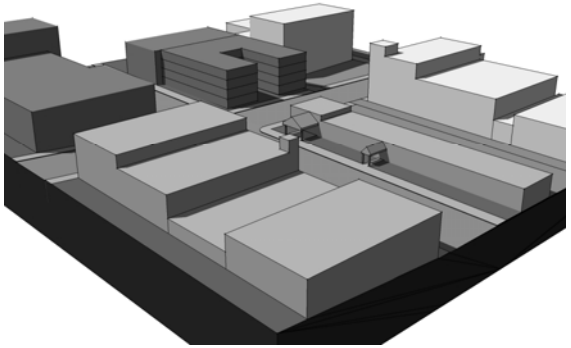
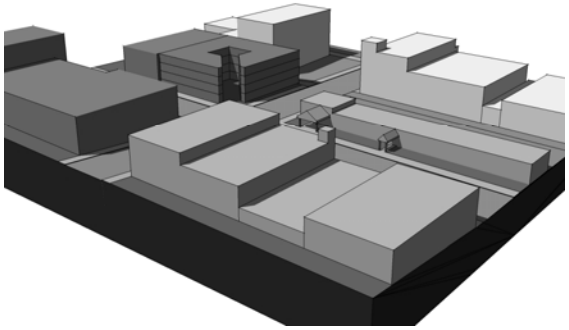
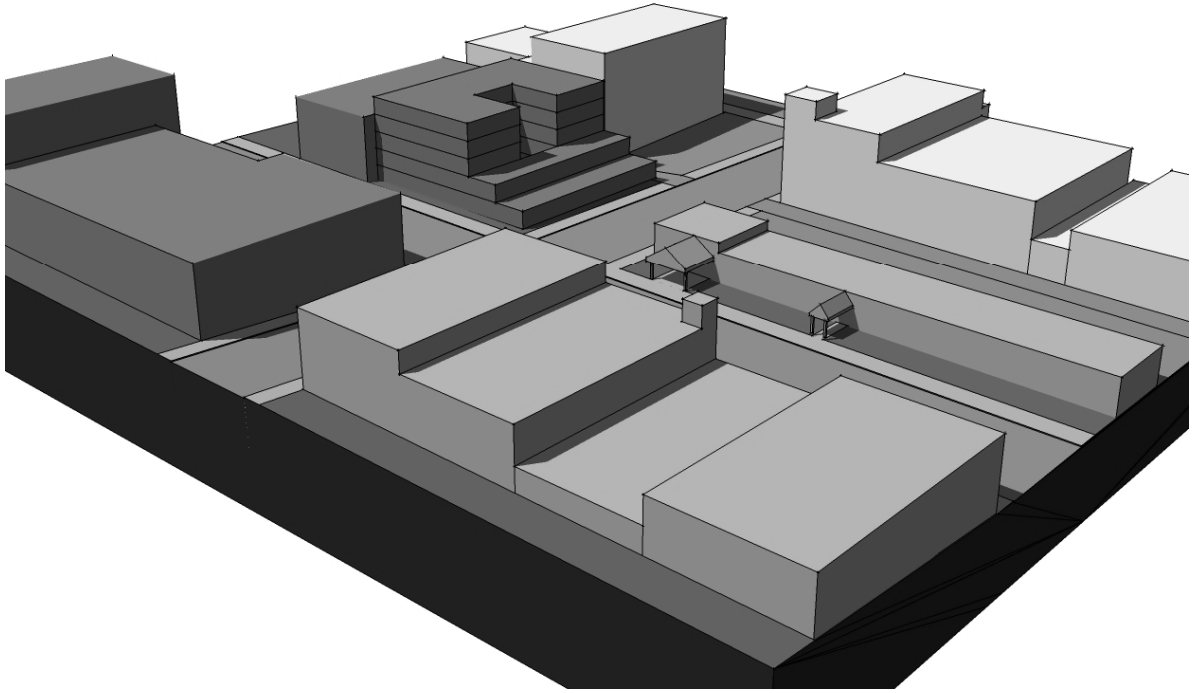
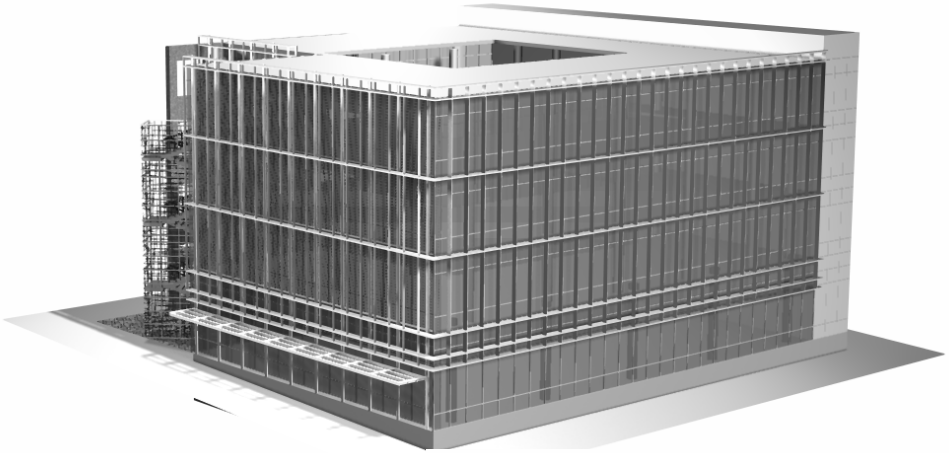
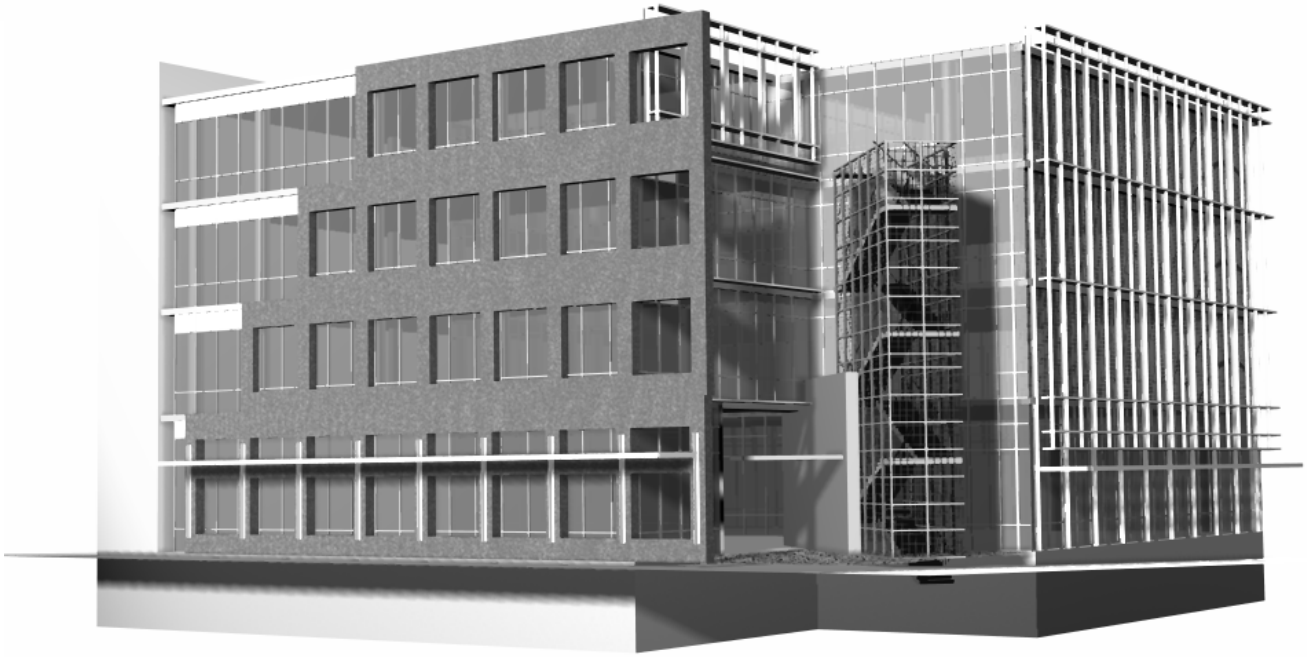








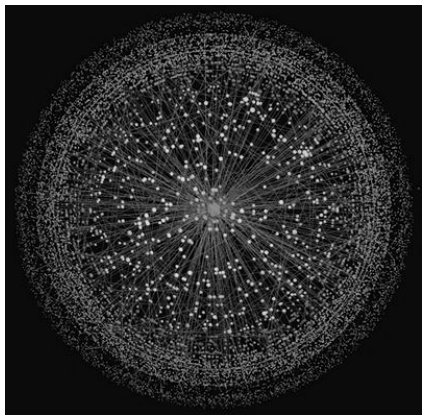


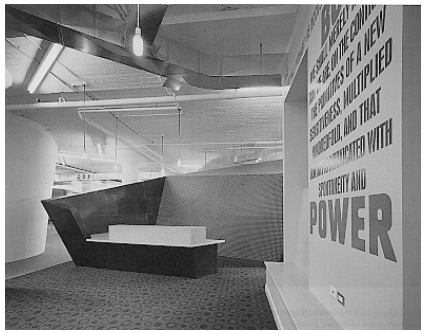
WHAT IS A PLACE-BASED ENVIRONMENT?

“A PLACE-BASED ENVIRONMENT IS ONE THAT PROVIDES THE RESOURCES NECESSARY TO SUSTAIN LIFE, ALLOWS PHYSICAL CONTACT, AND KNOWS A SPECIFIC LOCATION.”

-DAVID KORTEN
ENVIRON. AND ECON.THEORIST

WHY CREATE A PLACE-BASED ENVIRONMENT?





•COMPUTING TECHNOLOGY IS **ERASING GEOGRAPHIC BOUNDARIES**.

•THE TYPICAL DESIGN SOLUTION OF A HIGH-TECH FIRM IS TO **BOMBARD EMPLOYEES WITH SIGNS AND SYMBOLS** INSTEAD OF ADDRESSING **INNATE BIOLOGICAL NEEDS**.

•THERE IS A LARGE BODY OF RESEARCH CONFRONTING THE **PROBLEMS OF THE MODERN WORK PLACE**. WHEN CONFRONTED WITH AN UNNATURAL WORK ENVIRONMENT PEOPLE HAVE FEELINGS OF **ANXIETY, SICKNESS, DISORENTATION, AND STRESS**.

HOW DOES ONE CREATE A PLACE-BASED ENVIRONMENT?

NATURE

- LIGHT
- VENTILATION
- VIEWS

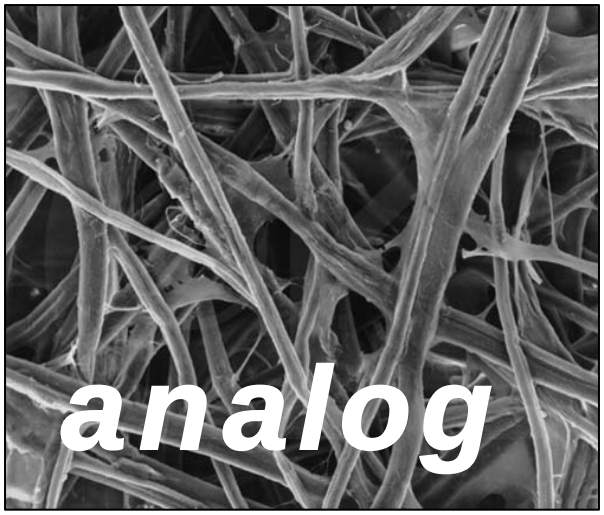
TECHNOLOGY

- THERMAL MODELING
- TECHNICAL TOOLS
- 3D DESIGN
- MATERIALS AND METHODS

CULTURE

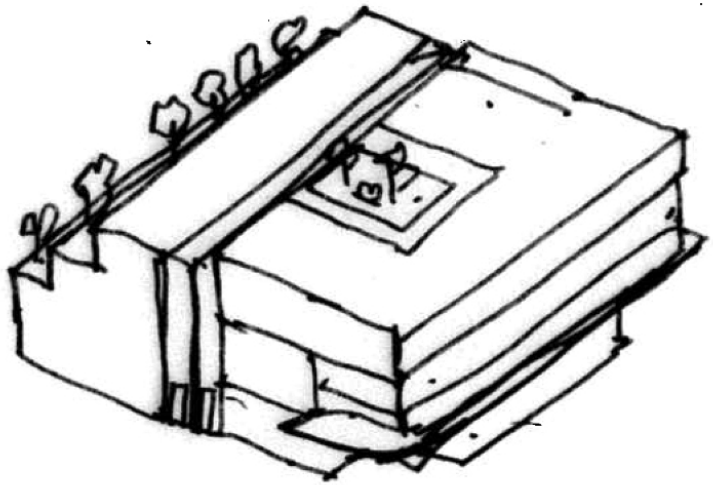
- PHYSICAL INTERACTION
- SENSE OF COMMUNITY

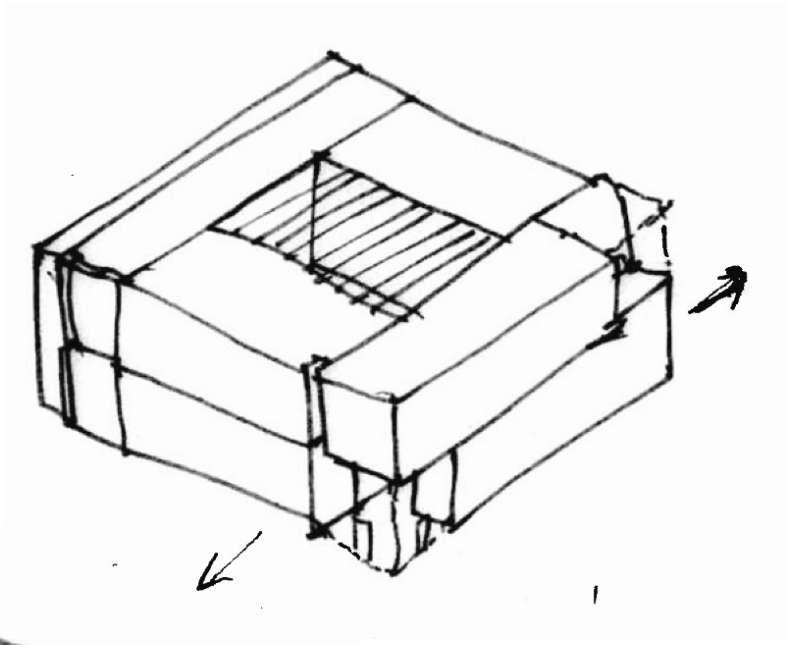
RESULT= AS MANY ELEMENTS OF **NATURE** AND **CULTURE** HAVE BEEN CONSIDERED AS POSSIBLE TO CREATE A **CONTEXTUALLY SPECIFIC DESIGN** WHERE **TECHNOLOGY** IS THE TOOL THAT **BINDS** TO PROMOTE **ENVIRONMENTAL COHESION**.

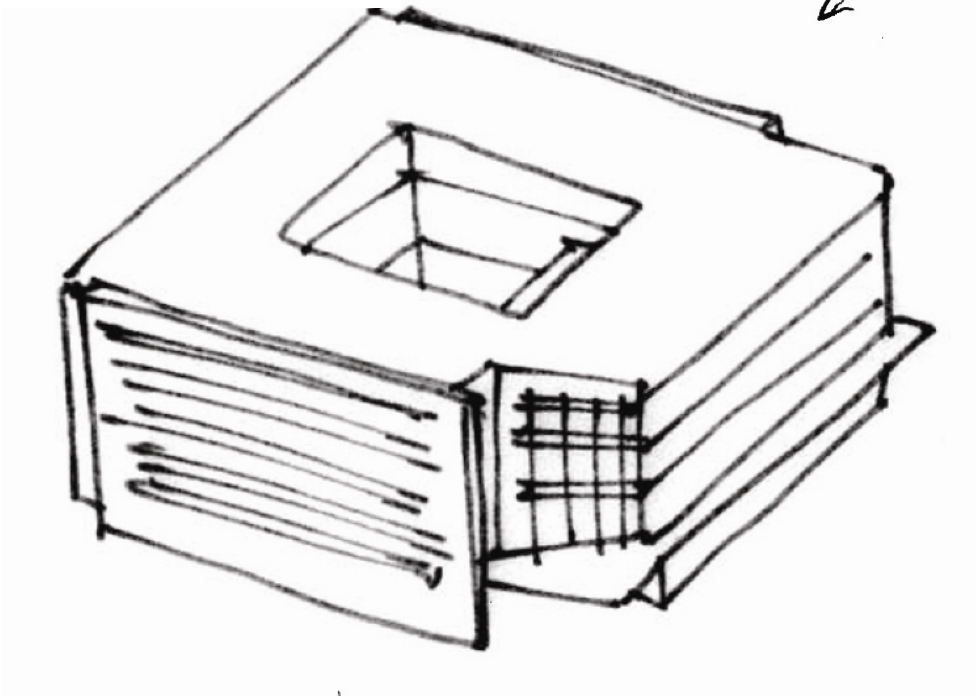


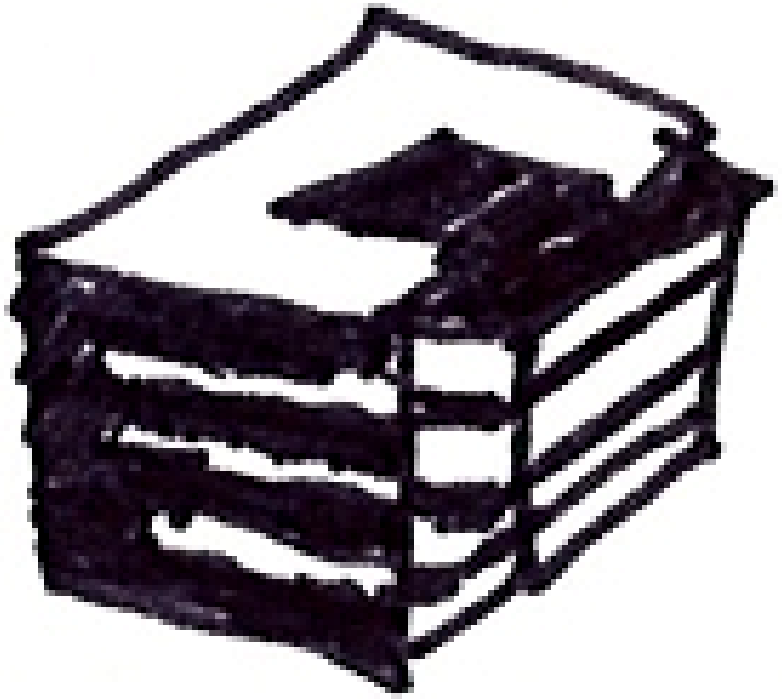
- OBJECTIVE
- SEQUENTIAL
- END RESULT
- LEFT BRAIN
- CONCRETE
- VIRTUAL
- LINEAR

- SUBJECTIVE
- TACTILE
- OPEN-ENDED
- RIGHT BRAIN
- ABSTRACT
- PHYSICAL
- INTER-RELATED



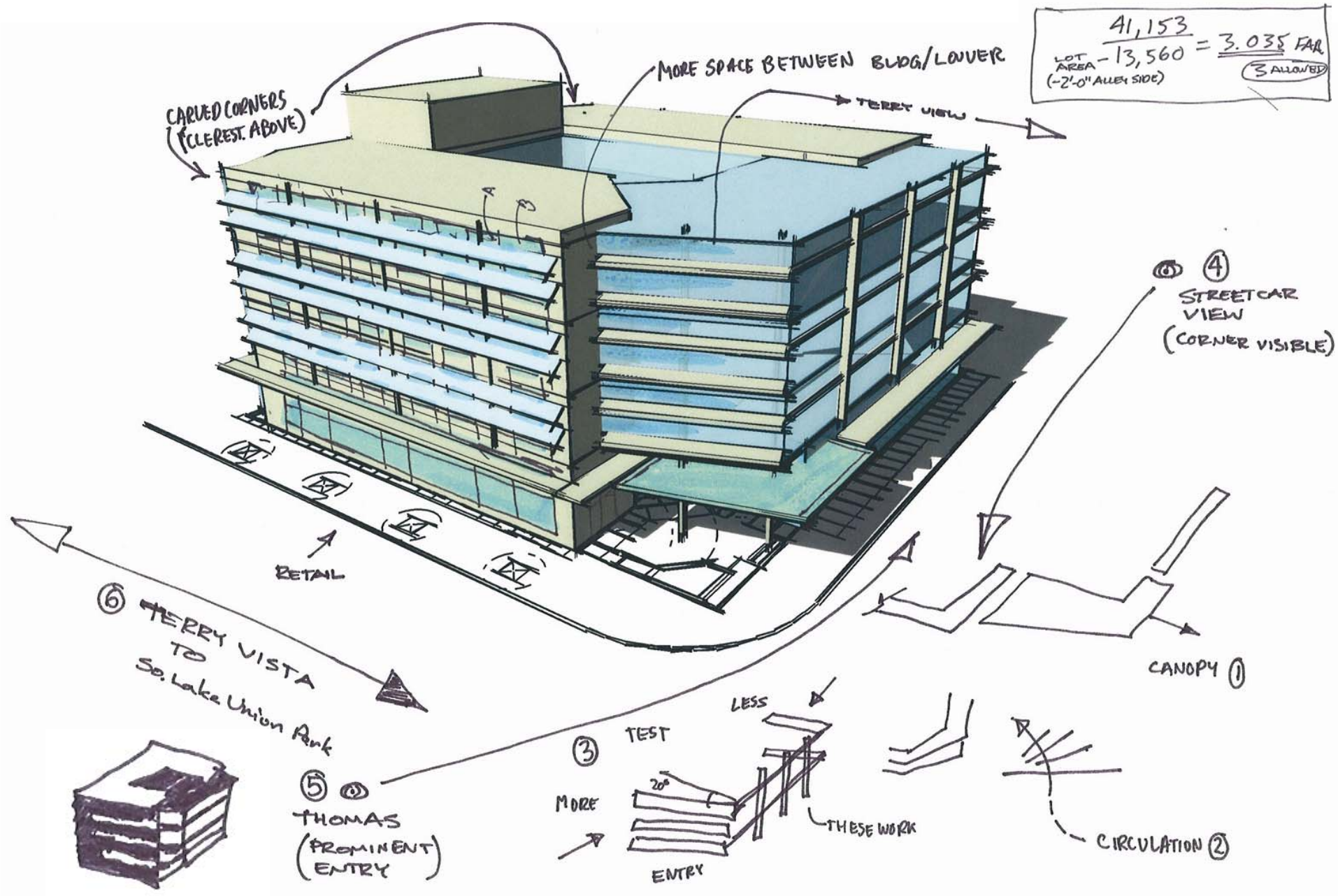


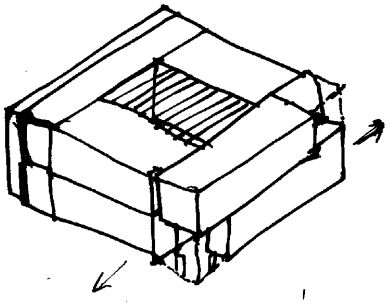


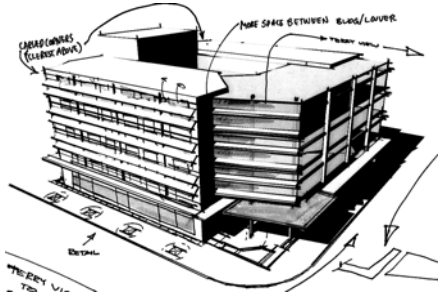


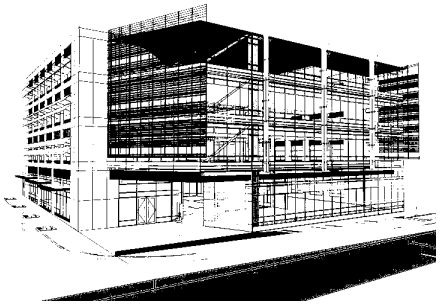
NATURE - EAST/WEST FACADES BECAME SUBTRACTIVE ANCHORING ELEMENTS TO HELP IN MITIGATING SOLAR HEAT GAIN

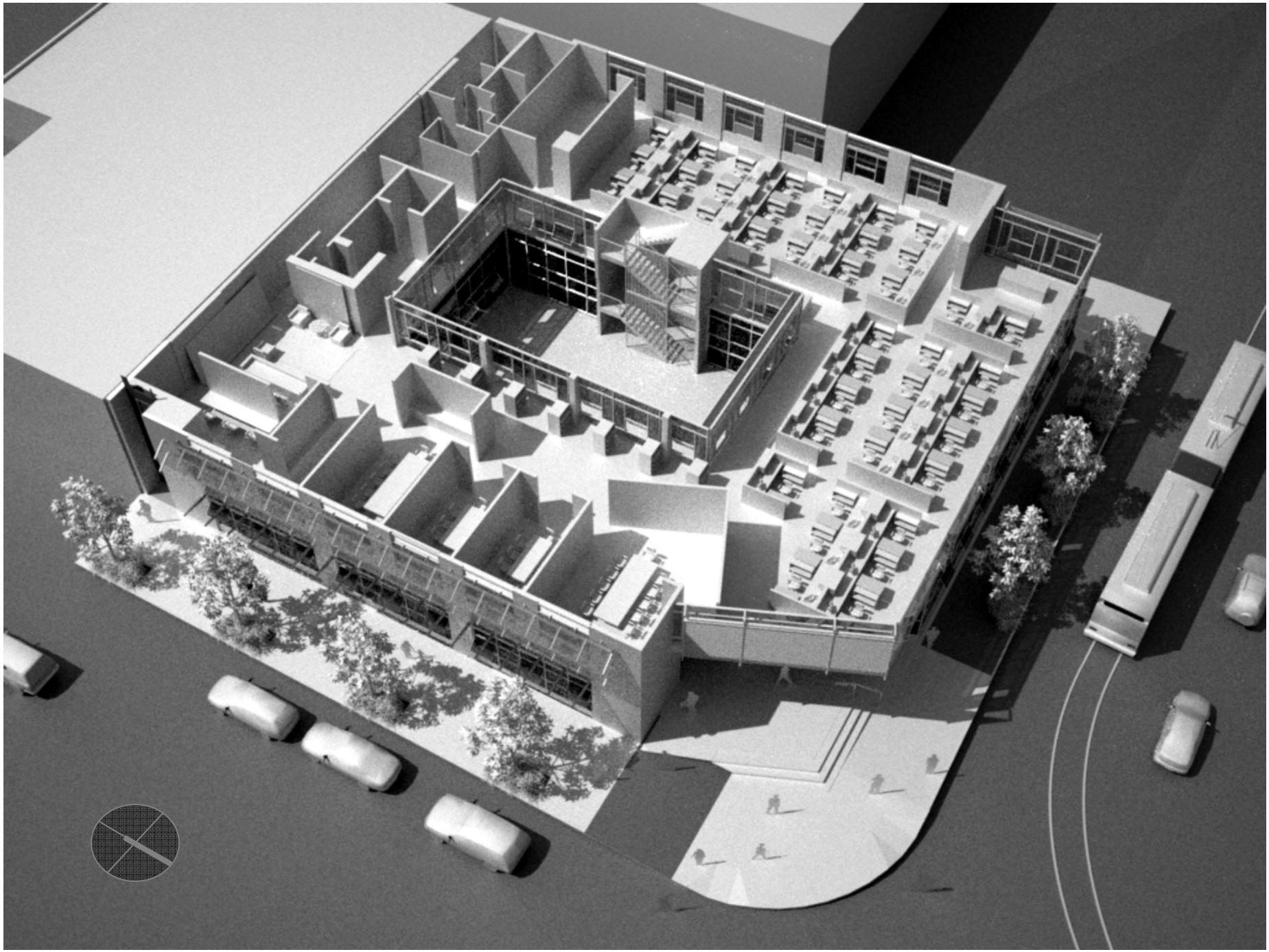
CULTURE - NORTH FAÇADE ENHANCED CULTURAL CONNECTION BY OPENING TO STREET AND PROVIDING COMMUNITY CONNECTION TO STREETCAR


41,153
LOT AREA - 13,560 = 3.035 FAR
(-2'-0" ALLEY SIDE)
3 ALLOWED
CARVED CORNERS (CLEREST. ABOVE)
MORE SPACE BETWEEN BLDG/LOUVER
TERRY VIEW
A
B
D
N
RETAIL
④ STREETCAR VIEW (CORNER VISIBLE)
⑥ TERRY VISTA TO So. Lake Union Park
CANOPY ①
③ TEST
LESS
20°
MORE
ENTRY
THESE WORK
⑤ THOMAS (PROMINENT ENTRY)
CIRCULATION ②



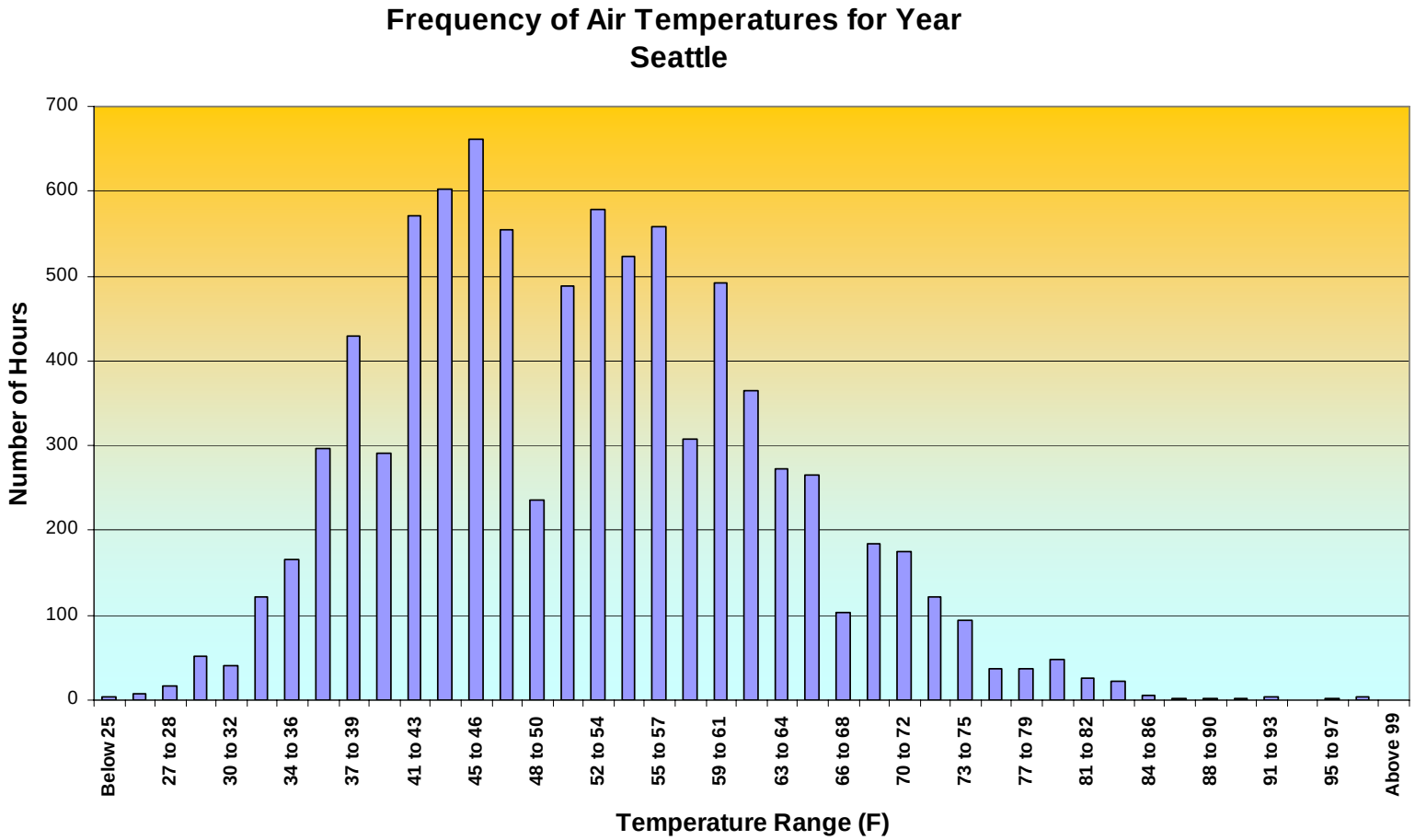

RETAIL





Design Technique for Sustainable Buildings

NATURAL VENTILATION

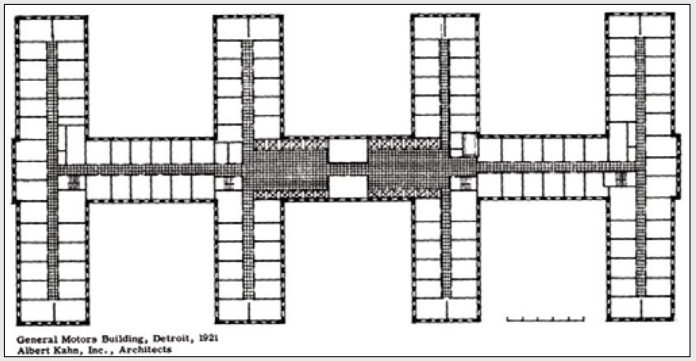


The Puget Sound Area is an ideal climate for Natural Ventilation

Natural Ventilation – Not New At All

General Motors Building, Detroit

General Motors Building, Detroit, 1921, Albert Kahn, Inc., Architects



This plan places each worker within 20 feet of an operable window.

Terminal Sales Building, Seattle

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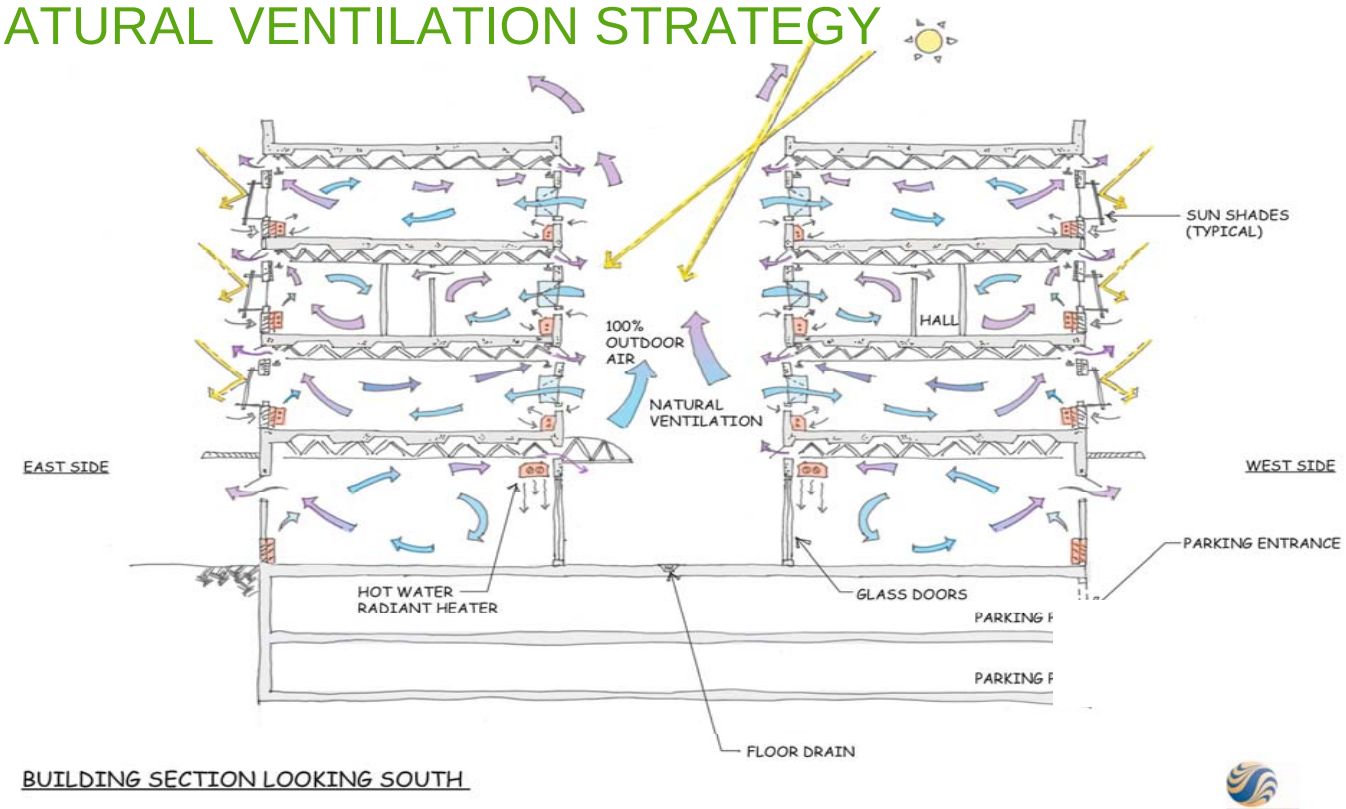
NATURAL VENTILATION STRATEGY



- Operable windows and automated dampers in occupied spaces
- Building form chosen to facilitate cross ventilation and day-lighting
- Narrow floor plate (approximately 35’ deep)

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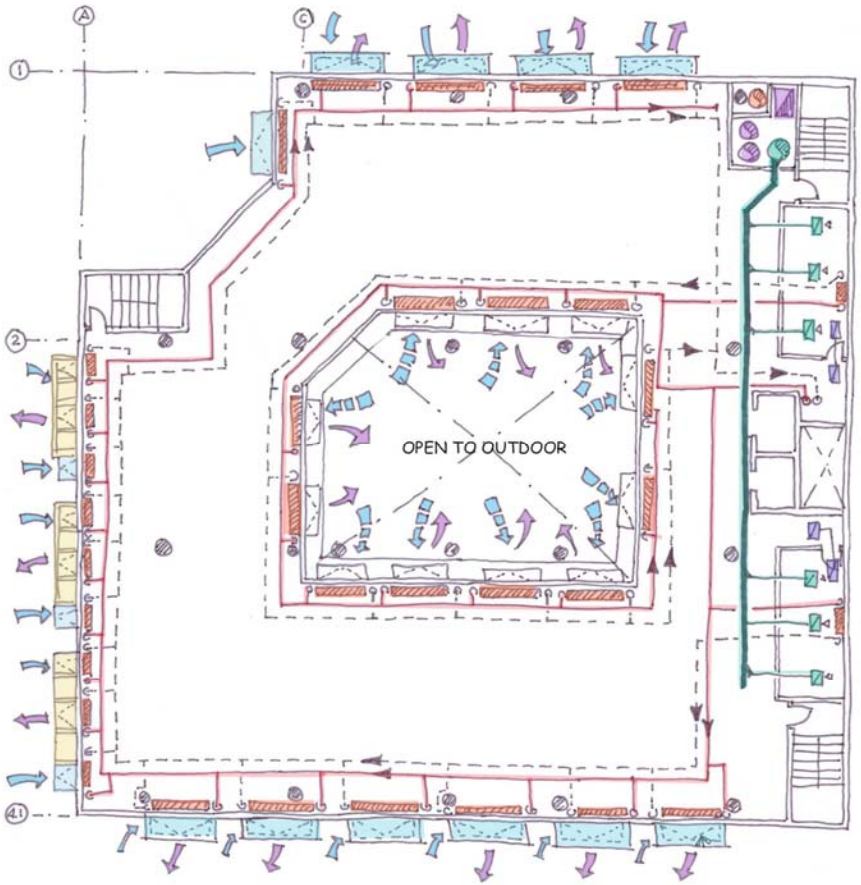
MECHANICAL DESIGN



- Operable windows in all spaces
- Trickle vents for minimum ventilation
- Automated dampers above windows
  CO2 sensors
- Night purge control strategy
- Occupant education about NV
- High efficiency hydronic heating
- Convection heaters at perimeter
- Minimal ductwork

- **No mechanical cooling**

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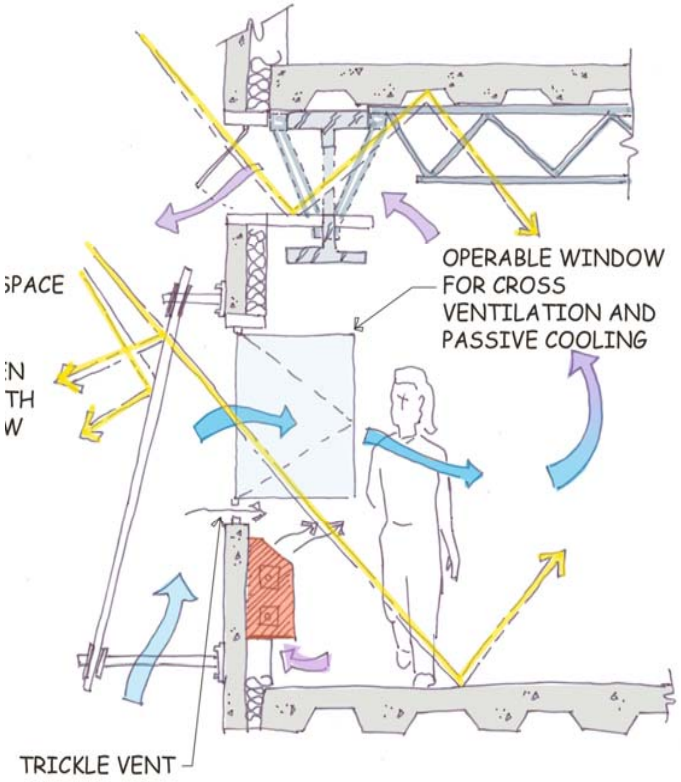
DAYLIGHTING



- Balance benefits of day-lighting with solar gain mitigation
- High performance thermal envelope
- Windows/louvers sizes and locations

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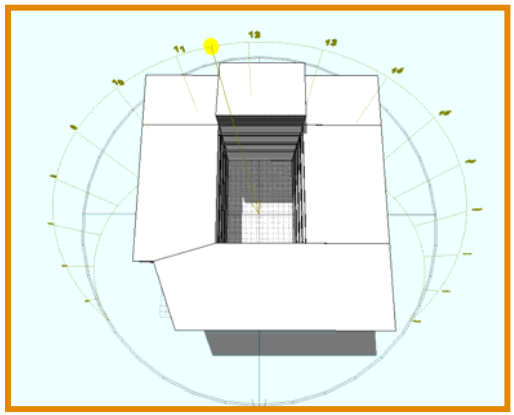
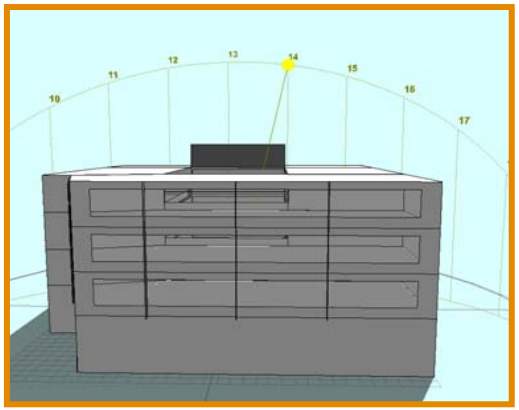
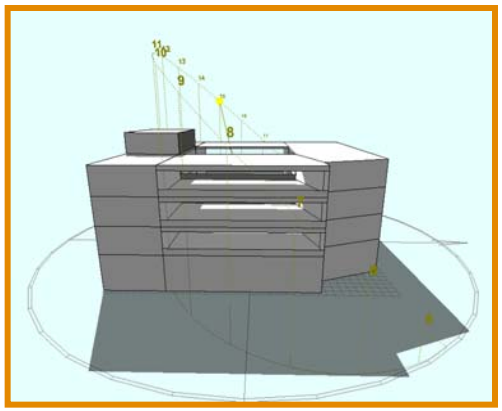
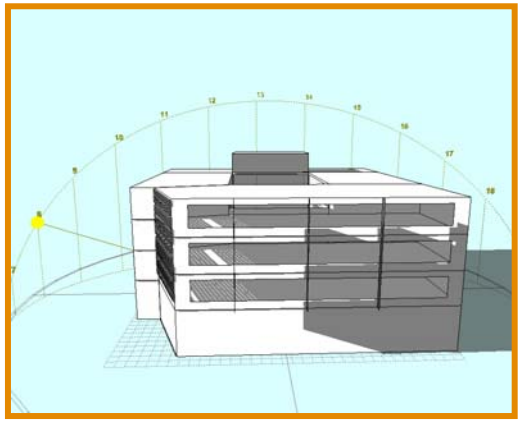
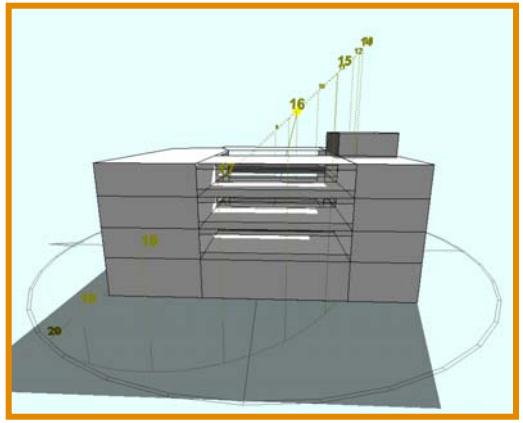
SOLAR SHADING ANALYSIS











The building was analyzed at different times of day throughout the year. This helped shading:

- Type
- Location
- Orientation

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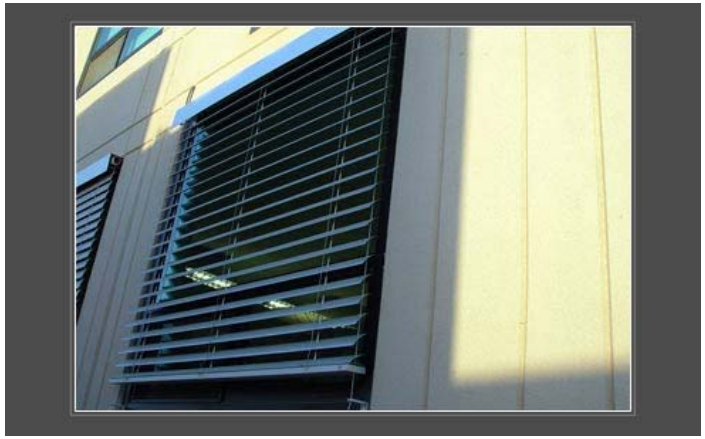
SOLAR SHADING SELECTION

- High performance glazing
- External adjustable aluminum blinds in courtyard and portions of exterior
- Steel and glass sunshades



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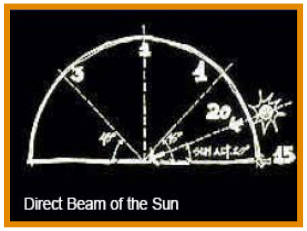
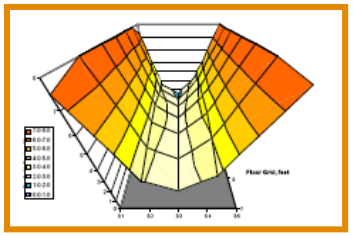
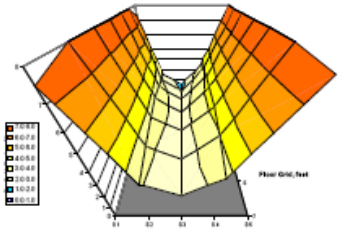
DAYLIGHTING ANALYSIS

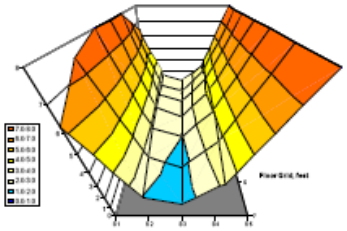


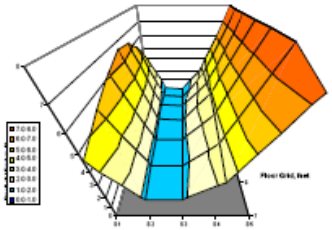


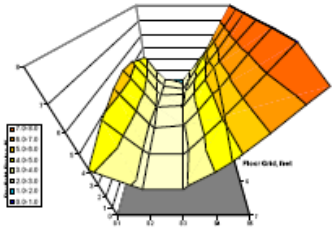
The building is simulated with the shading devices to analyze the effect on daylighting

Solar Shading









- Program elements demanding less daylight are placed in the core
- 10’ floor to ceiling height affects the quality of the daylight
- Occasional use of spandrel does not affect day-lighting significantly

Thermal Analysis

THERMAL MODELING STRATEGY

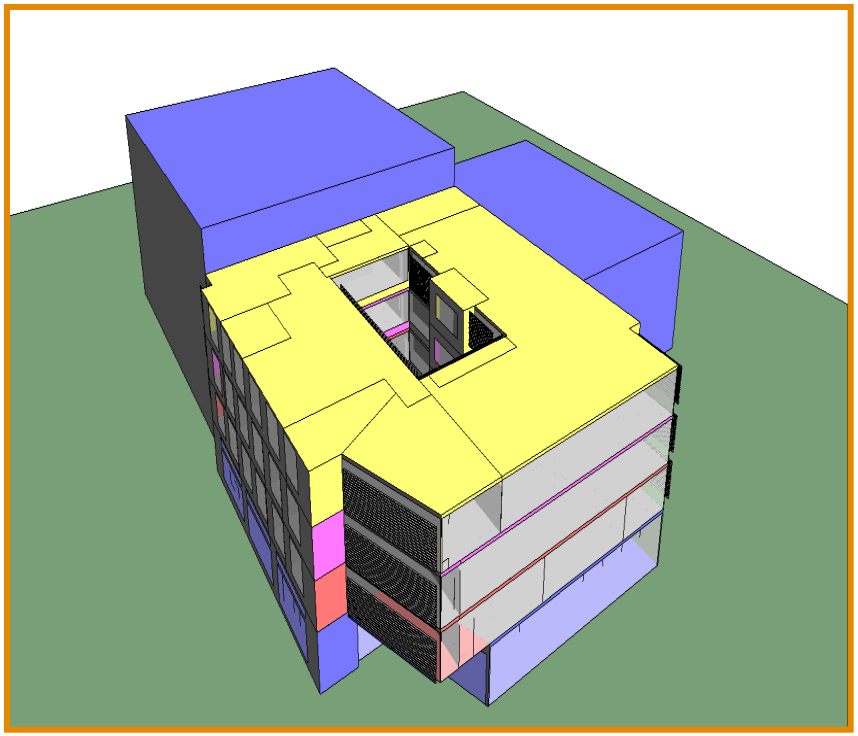
- Identify Objectives: *Use only natural ventilation to cool the building*
- Establish comfort parameters: *Use LEED comfort guidelines*
- Determine acceptable levels of comfort: *Meet LEED guidelines for all occupied spaces*

TEMPERATURE	ACCEPTABLE HOURS ANNUALLY
75º – 80º F	150 Hours
80º – 85º F	50 Hours
> 85º F	<20 Hours

LEED Comfort Parameters

Thermal Analysis

ANALYSIS

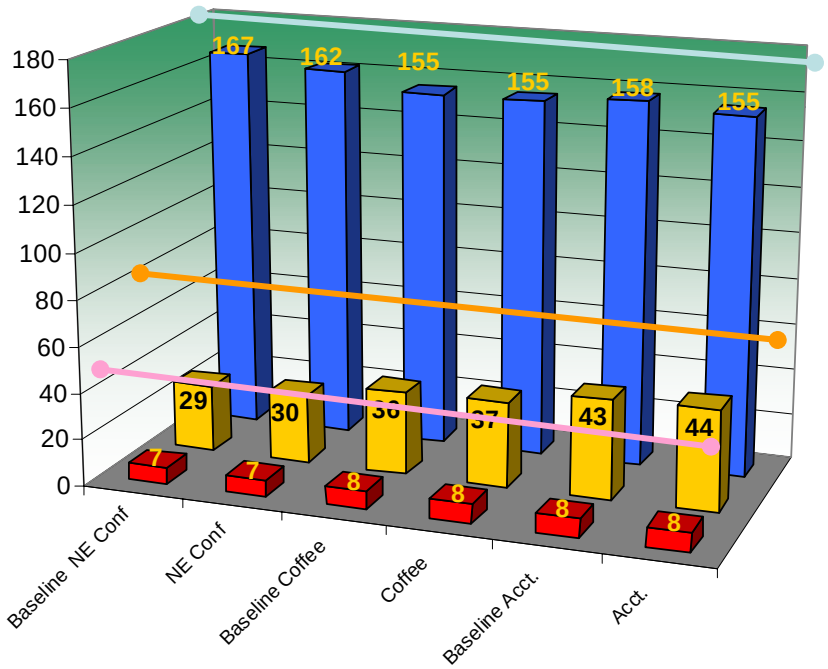


Build Model:

- Walls
- Climate data
- 3-D geometry
- Windows/openings
- Shading
- Internal loads
- Aperture schedules
- Occupant schedules

Thermal Analysis

ANALYSIS



Finesse the Model:

- Fine tune the loads
- Substitute glazing
- Increase/decrease amount of glazing
- Substitute wall constructions
- New shading options
- Increase/decrease amount of operable windows

Run iterations until satisfied with the results of the model

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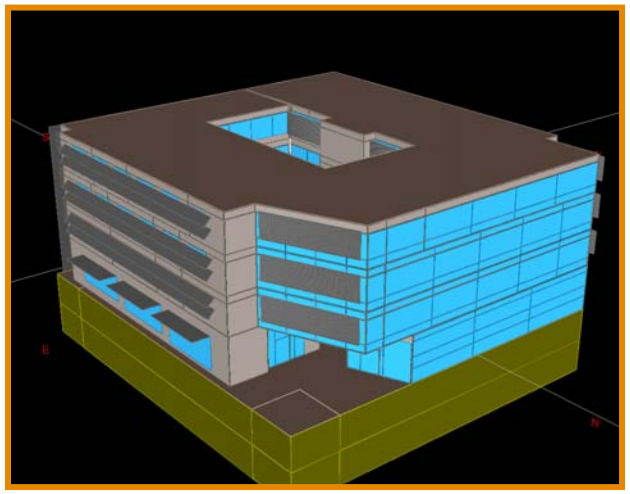
ENERGY MODELING

Possible LEED points for EA Credit 1

ENERGY SAVINGS	LEED POINTS
10.5%	1
14%	2
17.5%	3
21%	4
24.5%	5
28%	6
31.5%	7
35%	8
38.5%	9
42%	10

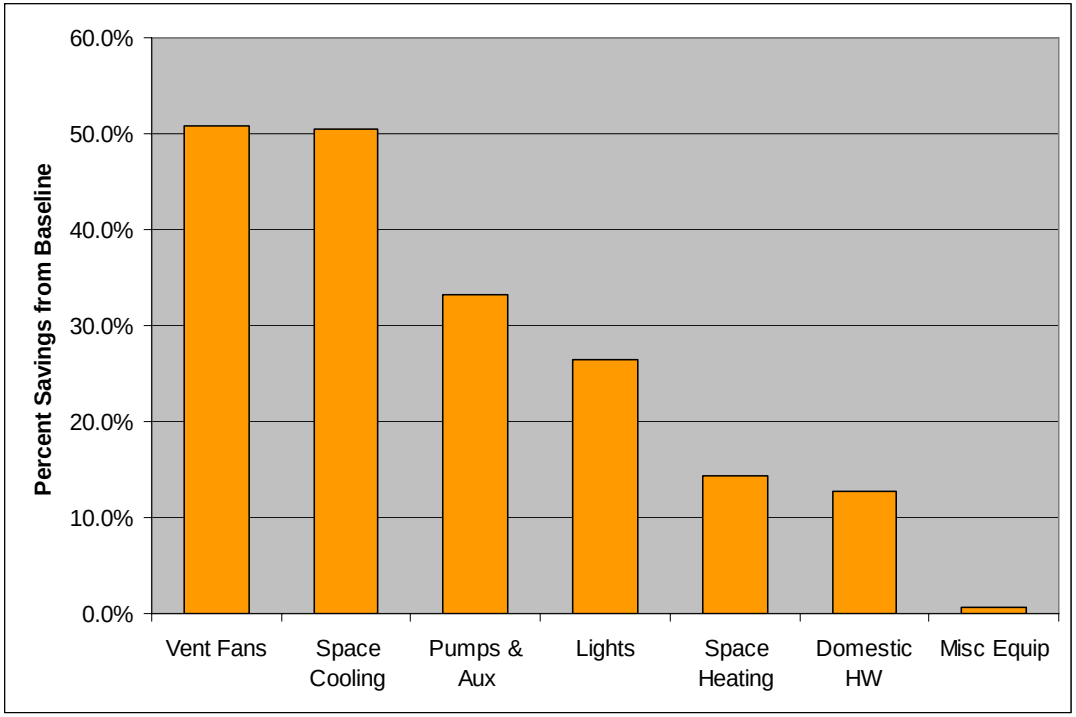
Energy Modeling Strategy:

- Identify Objectives: *Cost and Energy savings balance*
- Energy savings criteria: *LEED Energy and Atmosphere Credit 1*
- Determine energy savings goal: Achieve EA Cr 1 LEED points with reasonable cost benefits



Terry Avenue Case Study

Energy Savings per System



TOTAL ENERGY SAVINGS	LEED POINTS
10.5%	1
14%	2
17.5%	3
21%	4
24.5%	5
28%	6
31.5%	7
35%	8
38.5%	9
42%	10

5 PTS!

RECURRING DESIGN THEME IS SIMPLICITY.

•EMPLOY STRATEGIES AND BUILDING ELEMENTS THAT SERVE **MULTIPLE BENEFIT** TO OFFSET CONSTRUCTION COSTS

•USE BUILDING ELEMENTS THAT SERVE A **FUNCTIONAL PURPOSE**

•USE **REPETITIVE ELEMENTS** WHERE POSSIBLE

•FOLLOW **BASIC DESIGN PRINCIPLES** WITH INSERTION OF **MODERN COMPUTING TECHNOLOGY WHERE BENEFICIAL**

•CREATE AN **"HONEST" AND TIMELESS DESIGN** THAT IS **RESISTANT TO STYLISTIC REFERENCE** THERBY REDUCING SUSCEPTIBILITY TO PREMATURE ALTERATION OR DEMOLITION.

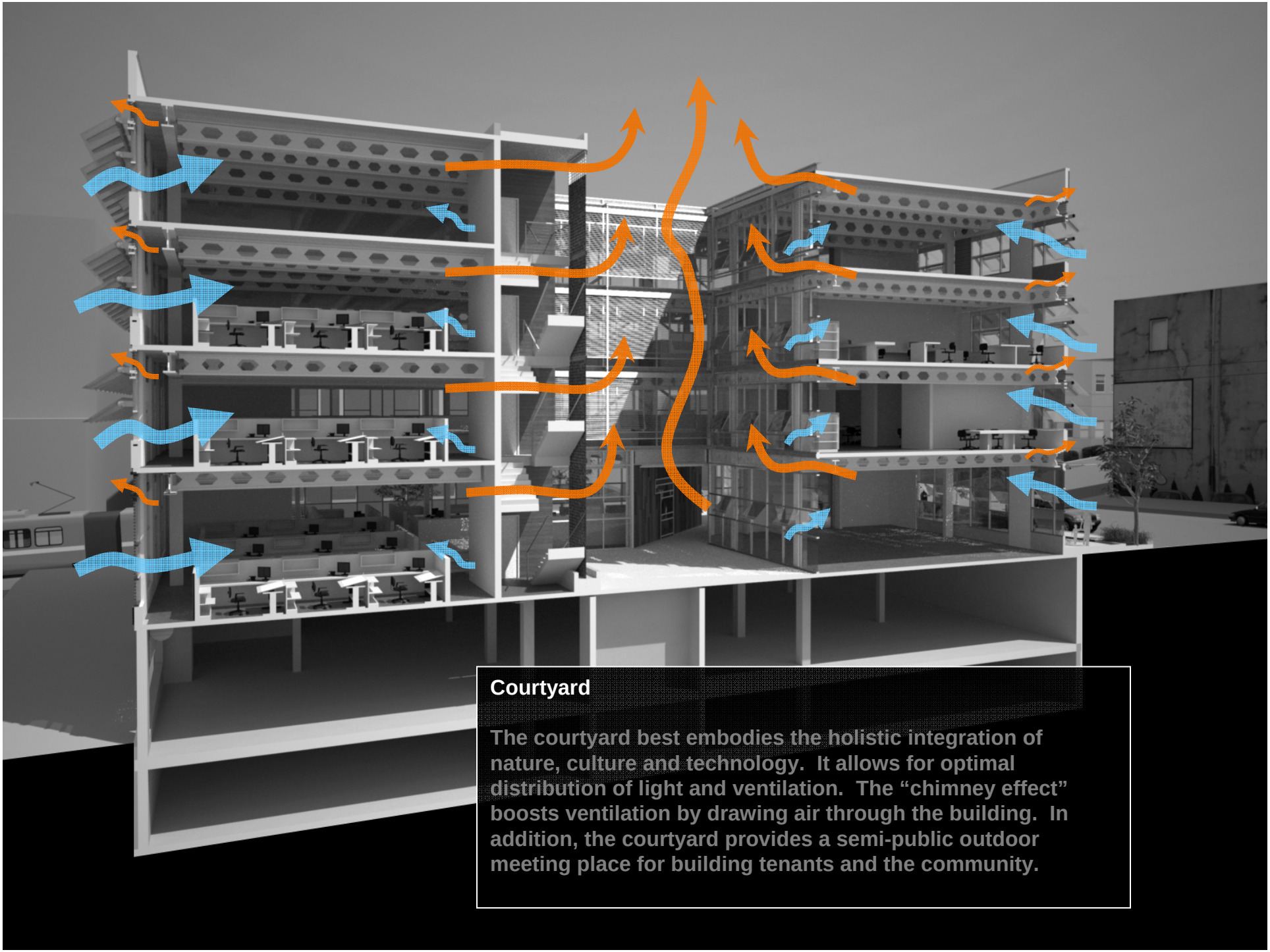
•CREATE A CANVAS FOR CAPTURING THE **EPHEMERAL**

RESULT…

A LIGHTER, LESS IMPACTFUL FOOTPRINT
BOTH FUNCTIONALLY AND

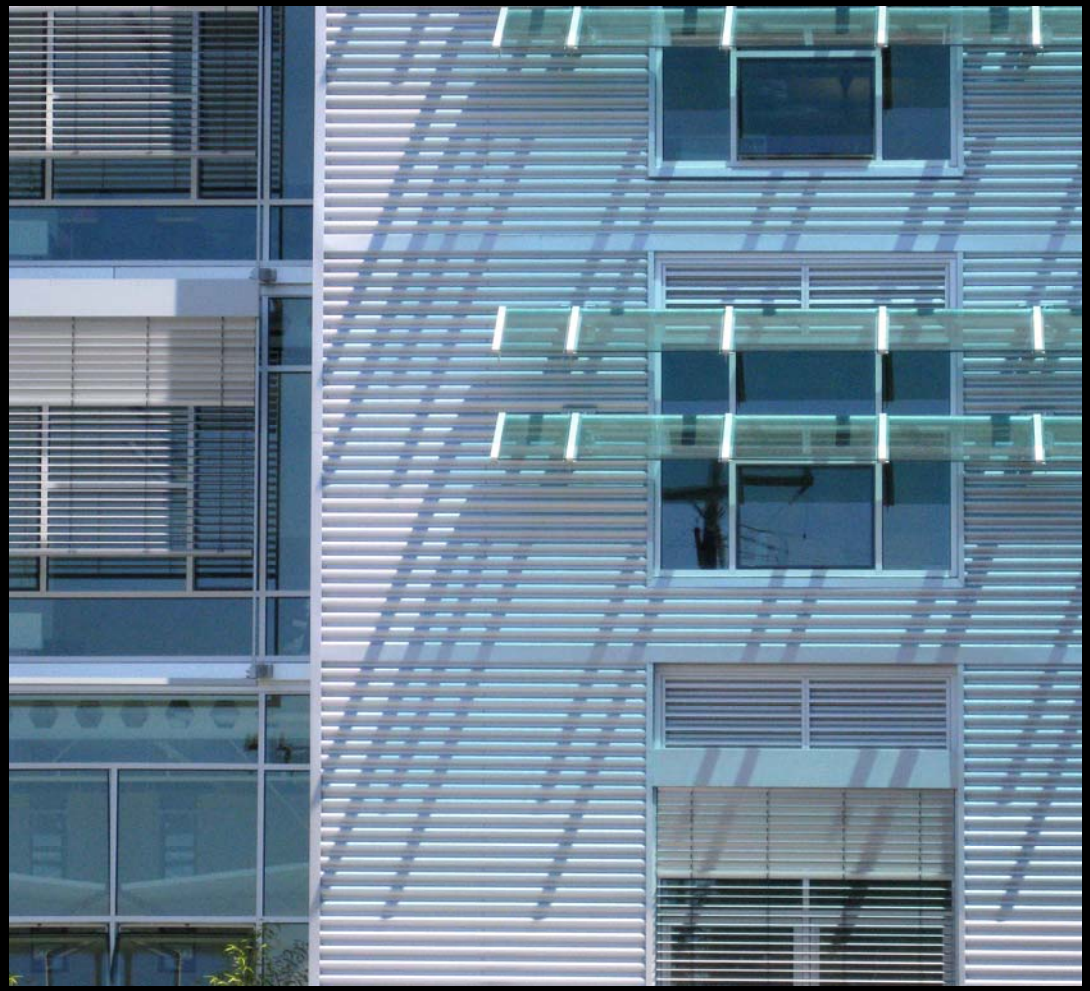
Thomas St
225
Athleti
Supply

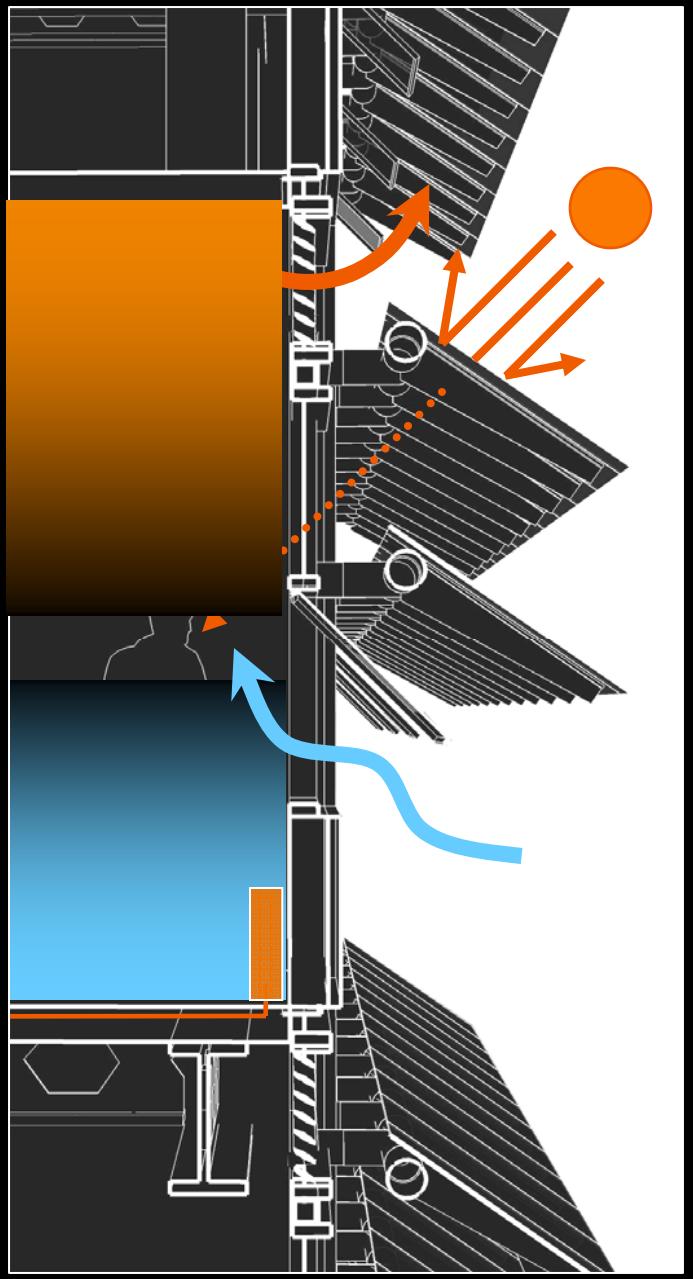
Terry Ave
225



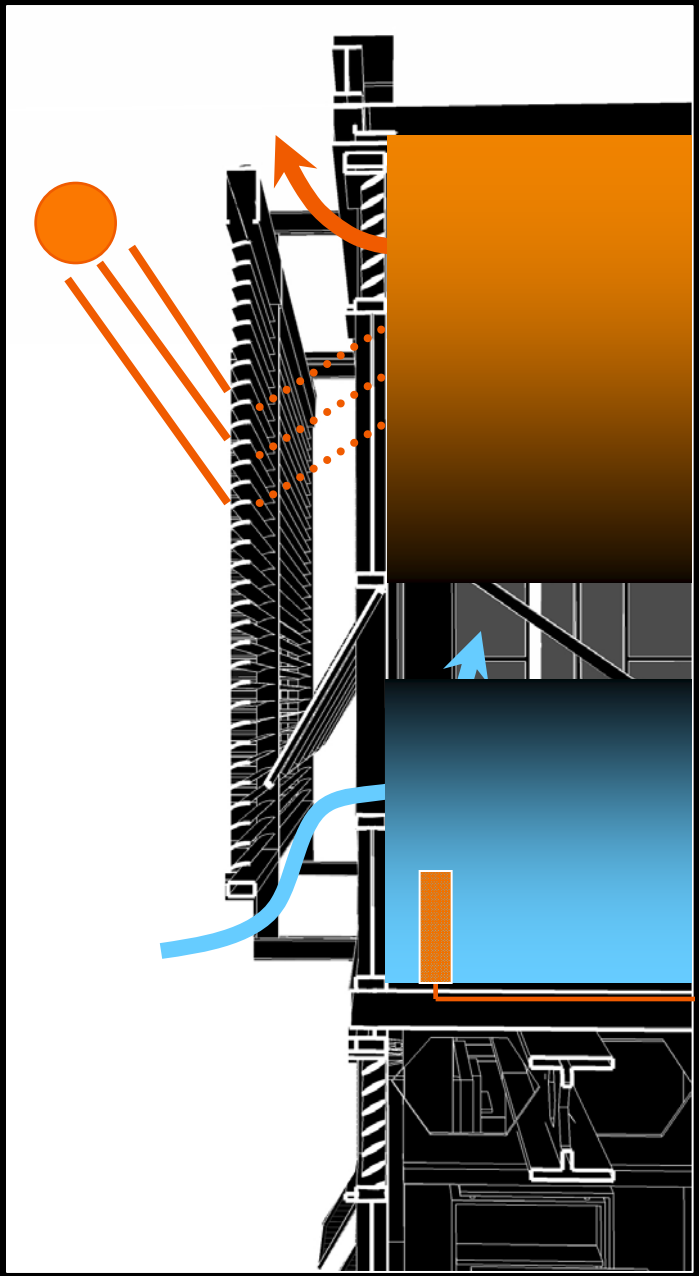
Courtyard

The courtyard best embodies the holistic integration of nature, culture and technology. It allows for optimal distribution of light and ventilation. The “chimney effect” boosts ventilation by drawing air through the building. In addition, the courtyard provides a semi-public outdoor meeting place for building tenants and the community.

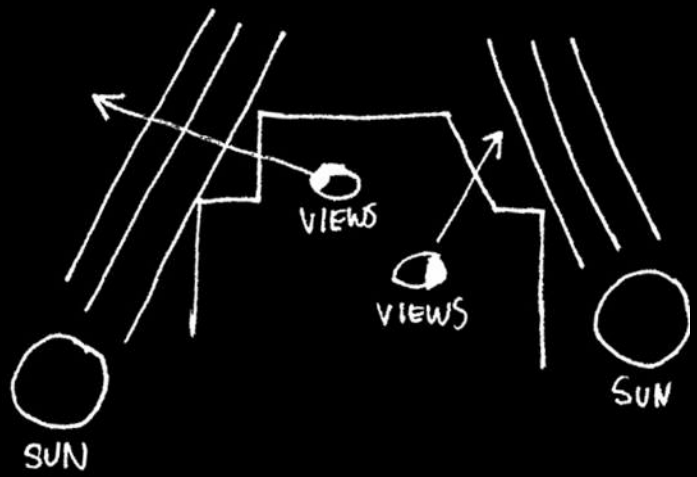


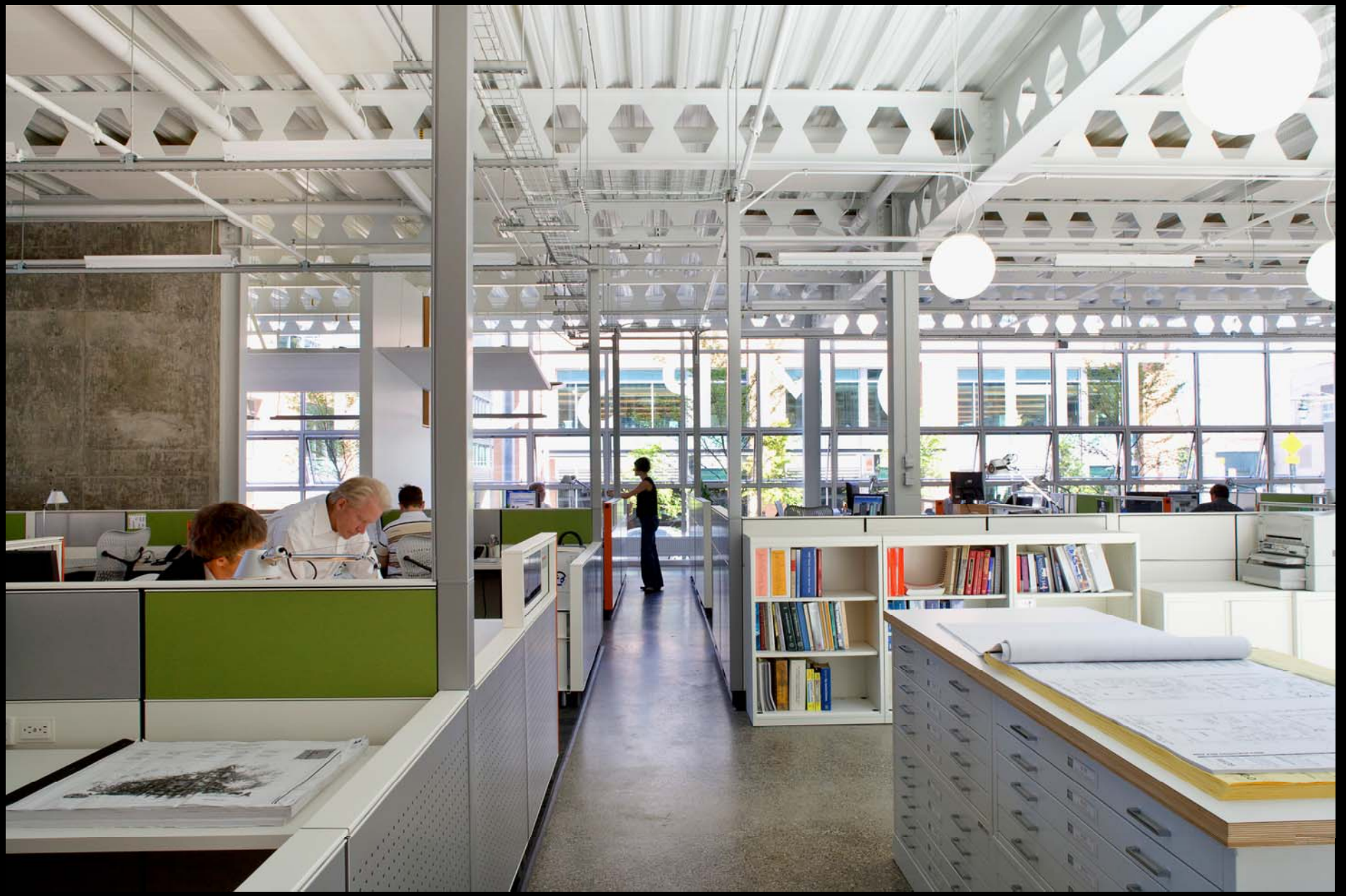


FIXED GLASS SUNSHADES



DAYLIGHT GUIDANCE SYSTEM


VIEWS
VIEWS
SUN
SUN



WHERE DO WE GO FROM HERE…?

- **GENERATE EMPRICAL DATA** AND **FEEDBACK FROM BUILDING OCCUPANT EXPERIENCES**

- DO NOT REPLICATE BUT STRIVE TOWARD THE **CONTINUED REFINEMENT OF ENVIRONMENTALLY SENSITIVE BUILDINGS**.

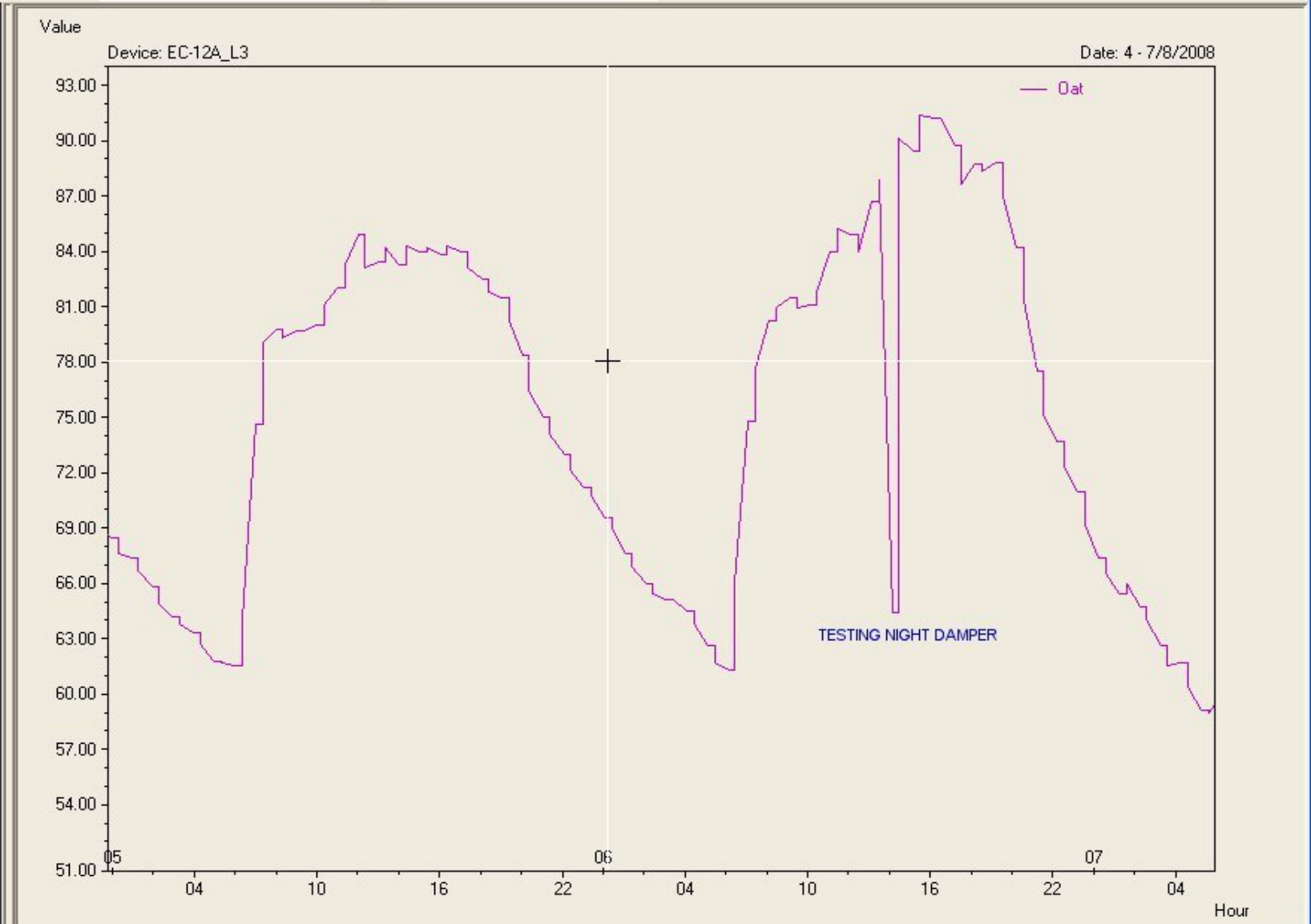
10.0.2.10 - Remote Desktop

Log Manager - Auto uploading will start in 04:23:45 ! - [Graph]

File Window Settings Help

Thursday , July 31, 2008 | Thursday , August 07, 2008

- TerryAveBuilding
  - Subsystem 1
  - Level_ M
  - Level_ 2
  - Level_ 3
    - EC-12A_L3
    - EC-67_L3
  - Level_ 4
    - EC-12A_L4
    - EC67_L4
  - Level_ P1



78.05 - Date: 08-06-2008 00:13:26 | 8/7/2008 | 3:37 PM

10.0.2.10 - Remote Desktop

Londisplay 3.1 - Project: TERRY AVE

File Edit Functions Mode Settings Applications Windows Help

Ventilation Dampers Zone 3
0 % Final Setpoint 955

Boiler Fail Alarm

HWT Over Temp Alarm

HWT Low Temp Alarm

Z-1 79.1 °F

Z-3 77.7 °F

CO/2 509 PPM

0 % DAMPERS

Z-2 77.3 °F

76.6 °F

Z-4

LEVEL ONE

AVERAGE FLOOR TEMP 77.0

0 % DAMPERS

77.7 °F

CO/2 497 PPM

Z-8

STAIR

77.3 °F

Z-5 75.5 °F

Z-6

CO/2 540 PPM

75.5 °F

Z-7

NORTH

Ventilation Dampers Zone 1 _2
0 % Final Setpoint 956

EF-2 Status
Command On
Status On

Flow Alarm

HWS 100.5 °F
HWR 99.6 °F

Logs

L-4
L-3
L-2
P-1
BOILER RM

Outside
82.4 °F
355 PPM

OCCUPIED MODIFY SCHEDULE

Setpoint adjust Valve position _Unnocc Setpt

Z-1	70.0 °F	0 %	60.0 °F
Z-2	70.0 °F	0 %	60.0 °F
Z-3	70.0 °F	0 %	60.0 °F
Z-4	70.0 °F	0 %	60.0 °F
Z-5	70.0 °F	0 %	60.0 °F
Z-6	70.0 °F	0 %	60.0 °F
Z-7	70.0 °F	0 %	60.0 °F
Z-8	70.0 °F	0 %	60.0 °F
Z-	70.0 °F		60.0 °F
Z-	70.0 °F		60.0 °F

NIGHT PURGE ENABLE
On

NIGHT PURGE SETPT
68

FLOOR COOL SETPT
74

HI OSA COOL LOCKOUT
78

FLOOR AVRGE OFFSET TEMP
2.0 °F

Damper Control Override
-1=Auto/1-100 Forced

VENT ZONE 1_2 -1 %
VENT ZONE 3 -1 %

SEASON SWITCH
1=HEAT MAN/0=AUTO 0
COOL MODE

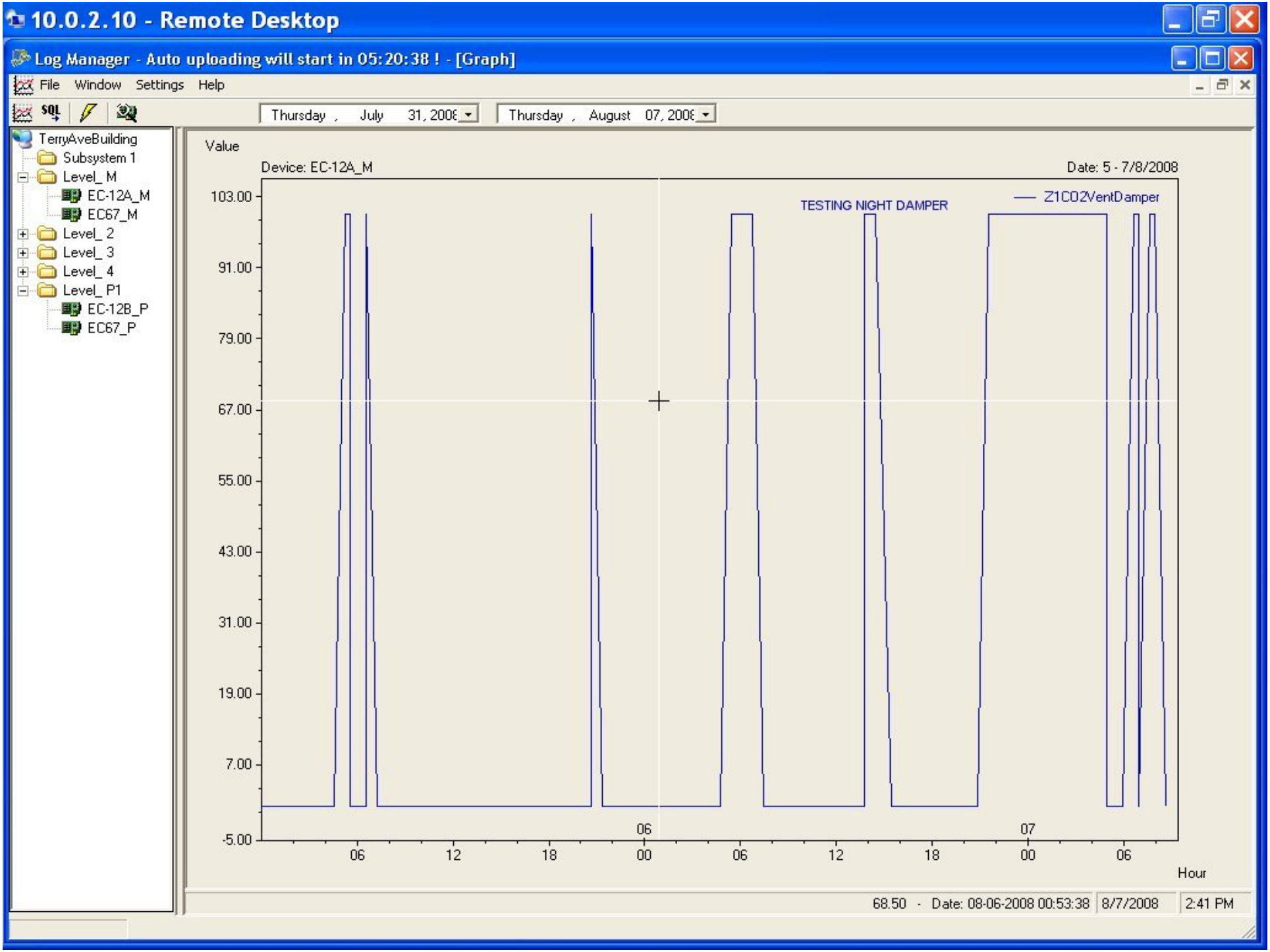
MANUAL SWITCH
AUTO=0/HEAT=1/COOL2 0

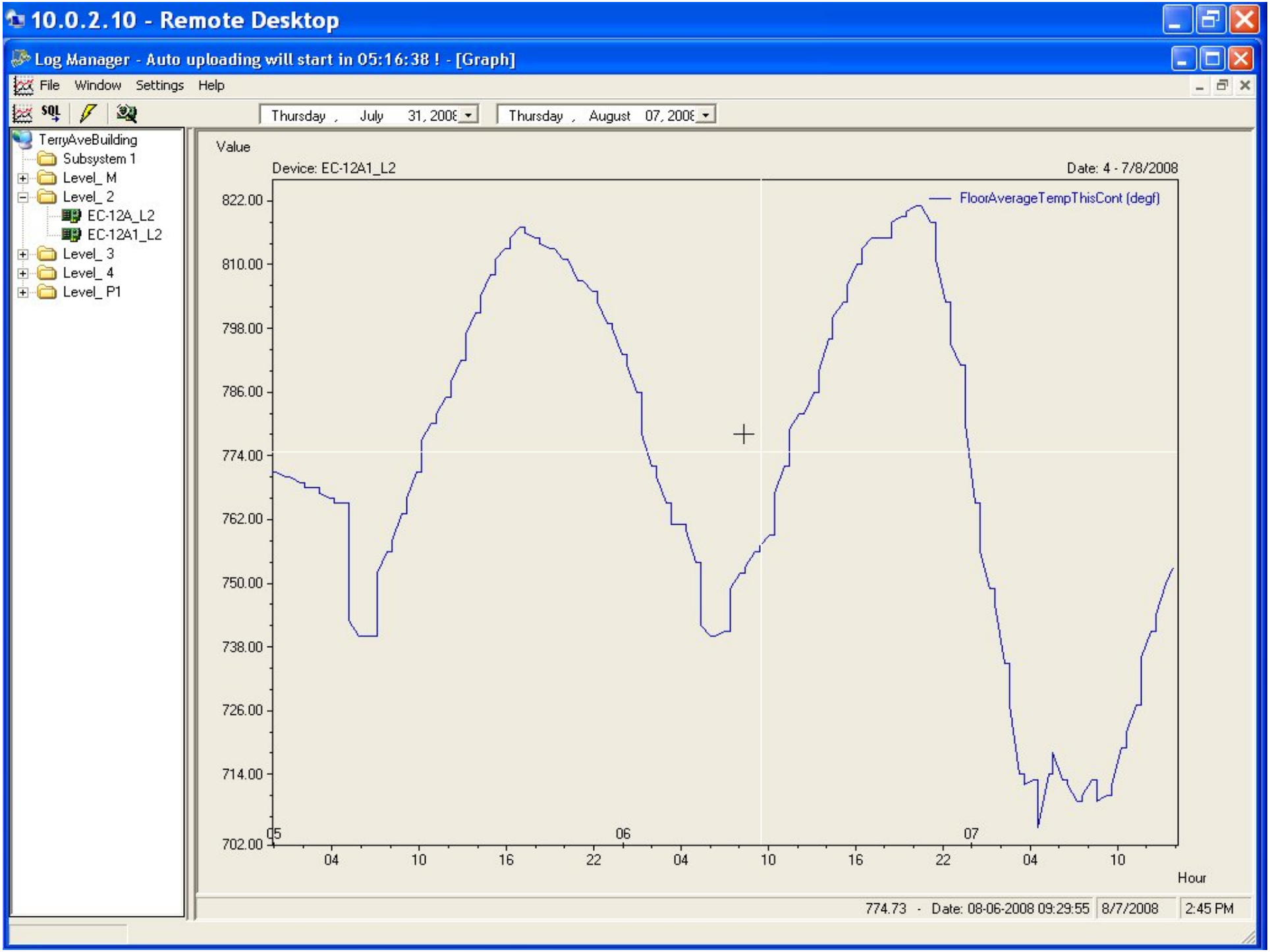
OSA CHANGEOVER SETPT 60.0 °F

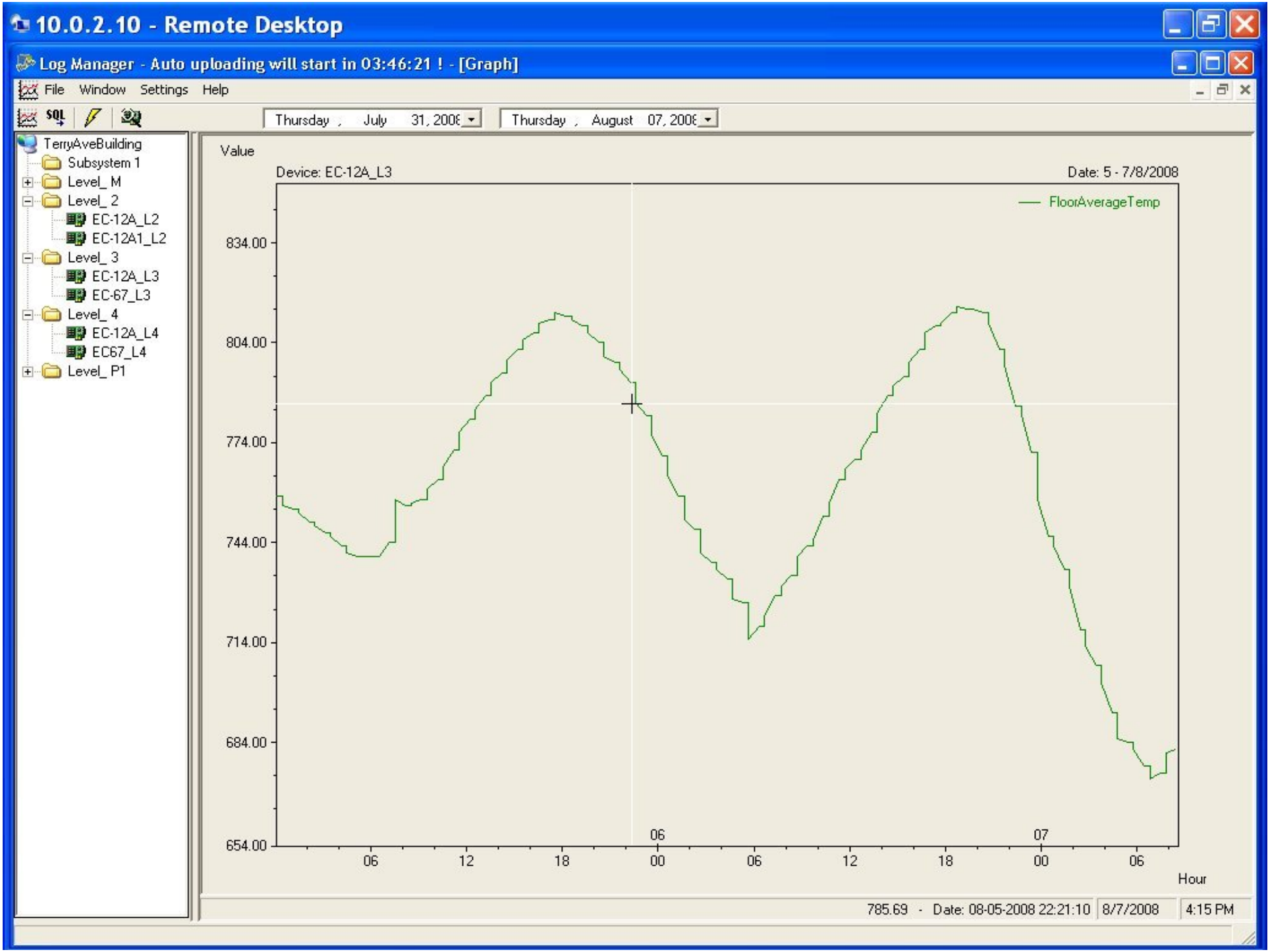
Cannot communicate with the device. (Subsystem: NS, #26) (Level_ P1\EC67_P)

TerryAveBuilding LON1 - OnNet Local Client

10.0.2.10 - Remote Desktop
Log Manager - Auto uploading will start in 05:33:53 ! - [Graph]
File Window Settings Help
Thursday , July 31, 2008
Thursday , August 07, 2008
TerryAveBuilding
Subsystem 1
Level_ M
EC-12A_M
EC67_M
Level_ 2
Level_ 3
Level_ 4
Level_ P1
EC-12B_P
EC67_P
Value
Date: 4 - 7/8/2008
FloorAverageTemp
796.00
787.00
778.00
769.00
760.00
751.00
742.00
733.00
724.00
715.00
05
06
07
04
10
16
22
04
10
16
22
04
10
Hour
777.78 - Date: 08-05-2008 21:17:10
8/7/2008
2:27 PM


10.0.2.10 - Remote Desktop
Log Manager - Auto uploading will start in 05:20:38 ! - [Graph]
File Window Settings Help
Thursday , July 31, 2008
Thursday , August 07, 2008
TerryAveBuilding
Subsystem 1
Level_ M
EC-12A_M
EC67_M
Level_ 2
Level_ 3
Level_ 4
Level_ P1
EC-12B_P
EC67_P
Value
Device: EC-12A_M
Date: 5 - 7/8/2008
TESTING NIGHT DAMPER
Z1CO2VentDamper
103.00
91.00
79.00
67.00
55.00
43.00
31.00
19.00
7.00
-5.00
06
07
06
12
18
00
06
12
18
00
06
Hour
68.50 - Date: 08-06-2008 00:53:38
8/7/2008
2:41 PM


10.0.2.10 - Remote Desktop
Log Manager - Auto uploading will start in 05:16:38 ! - [Graph]
File Window Settings Help
Thursday , July 31, 2008
Thursday , August 07, 2008
TerryAveBuilding
Subsystem 1
Level_ M
Level_ 2
EC-12A_L2
EC-12A1_L2
Level_ 3
Level_ 4
Level_ P1
Value
Device: EC-12A1_L2
Date: 4 - 7/8/2008
FloorAverageTempThisCont (degf)
822.00
810.00
798.00
786.00
774.00
762.00
750.00
738.00
726.00
714.00
702.00
05
06
07
04
10
16
22
04
10
16
22
04
10
Hour
774.73 - Date: 08-06-2008 09:29:55
8/7/2008
2:45 PM


10.0.2.10 - Remote Desktop
Log Manager - Auto uploading will start in 03:46:21 ! - [Graph]
File Window Settings Help
Thursday , July 31, 2008
Thursday , August 07, 2008
TerryAveBuilding
Subsystem 1
Level_ M
Level_ 2
EC-12A_L2
EC-12A1_L2
Level_ 3
EC-12A_L3
EC-67_L3
Level_ 4
EC-12A_L4
EC67_L4
Level_ P1
Value
Device: EC-12A_L3
Date: 5 - 7/8/2008
FloorAverageTemp
834.00
804.00
774.00
744.00
714.00
684.00
654.00
06
07
06
12
18
00
06
12
18
00
06
Hour
785.69 - Date: 08-05-2008 22:21:10
8/7/2008
4:15 PM