NOVEMBER 2, 2011 | 8:00 AM

**SESSION #** 

POETIC NOVEMBER 2-4, 2011 LOS ANGELES, CA

# Five Principles of a **HIGH PERFORMANCE DETENTION CENTER**





### Agenda

-Five Principals of a High Performance Detention Center

- Douglas County Law Enforcement and Detention Center- Case Study

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-What is Next - A Challenge for the Future

-Discussion

A Sustainable Approach to Better Detention Projects





# HOK –JUSTICE

**Building Science - an Integrated Approach** 

**Jeff Goodale AIA** 

John Pulley PE, LEED BD+C

Gary Retel AIA, LEED BD+C

**2011 Academy of Architecture Justice National Conference** CELEBRATING CREATIVE, COST EFFECTIVE, AND FUNCTIONAL DESIGN FOR JUSTICE FACILITIES

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**Five Principals:** 

- **1. Support Efficient Operations**
- 2. Optimize Staff Environment
- **3. Reduce Life Cycle Costs**
- 4. Optimize Budget

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5. Contribute to a Sustainable Community





#### POETIC NOVEMBER 2-4, 2011 LOS ANGELES, CA PRAGMATISM

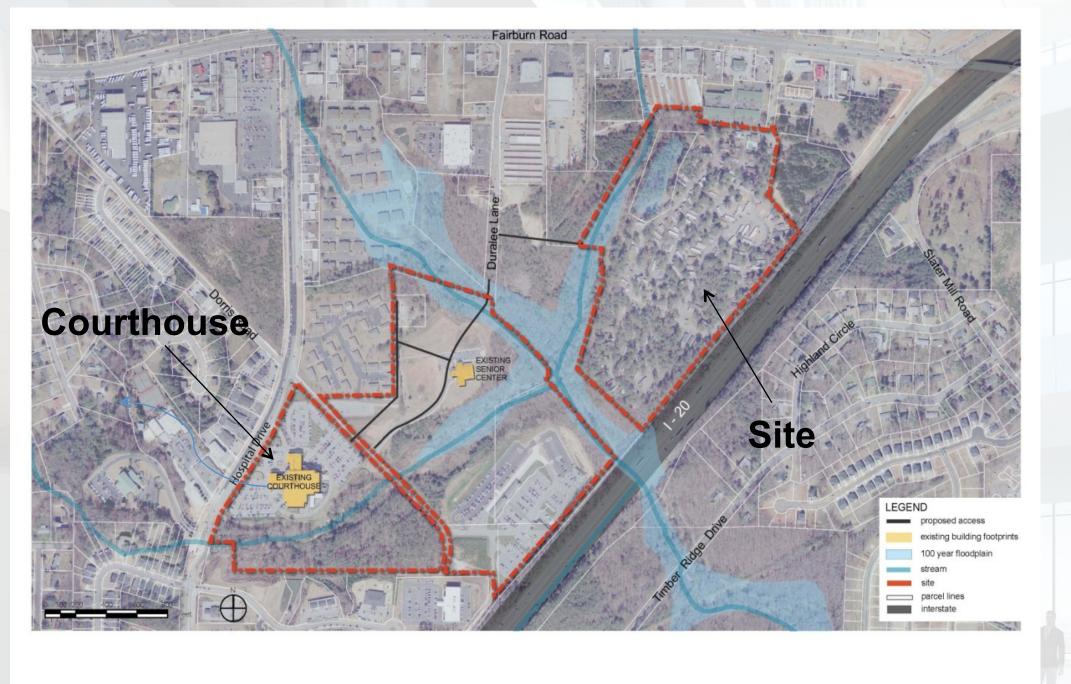
CELEBRATING CREATIVE, COST EFFECTIVE, AND FUNCTIONAL DESIGN FOR JUSTICE FACILITIES

**AIA** 

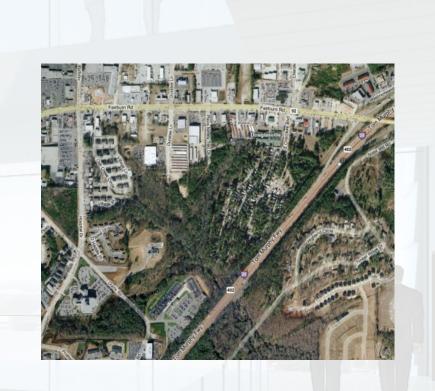
# Douglas County Law Enforcement and Detention Center







- •Suburban Atlanta



# **2011 Academy of Architecture Justice National Conference** CELEBRATING CREATIVE, COST EFFECTIVE, AND FUNCTIONAL DESIGN FOR JUSTICE FACILITIES

#### **Douglas County**

•130,000 Residents •Current Jail - Downtown •County Master Plan



### DOUGLAS COUNTY ADULT DETENTION AND LAW ENFORCEMENT CENTER

Douglas County, Georgia



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#### RFQ

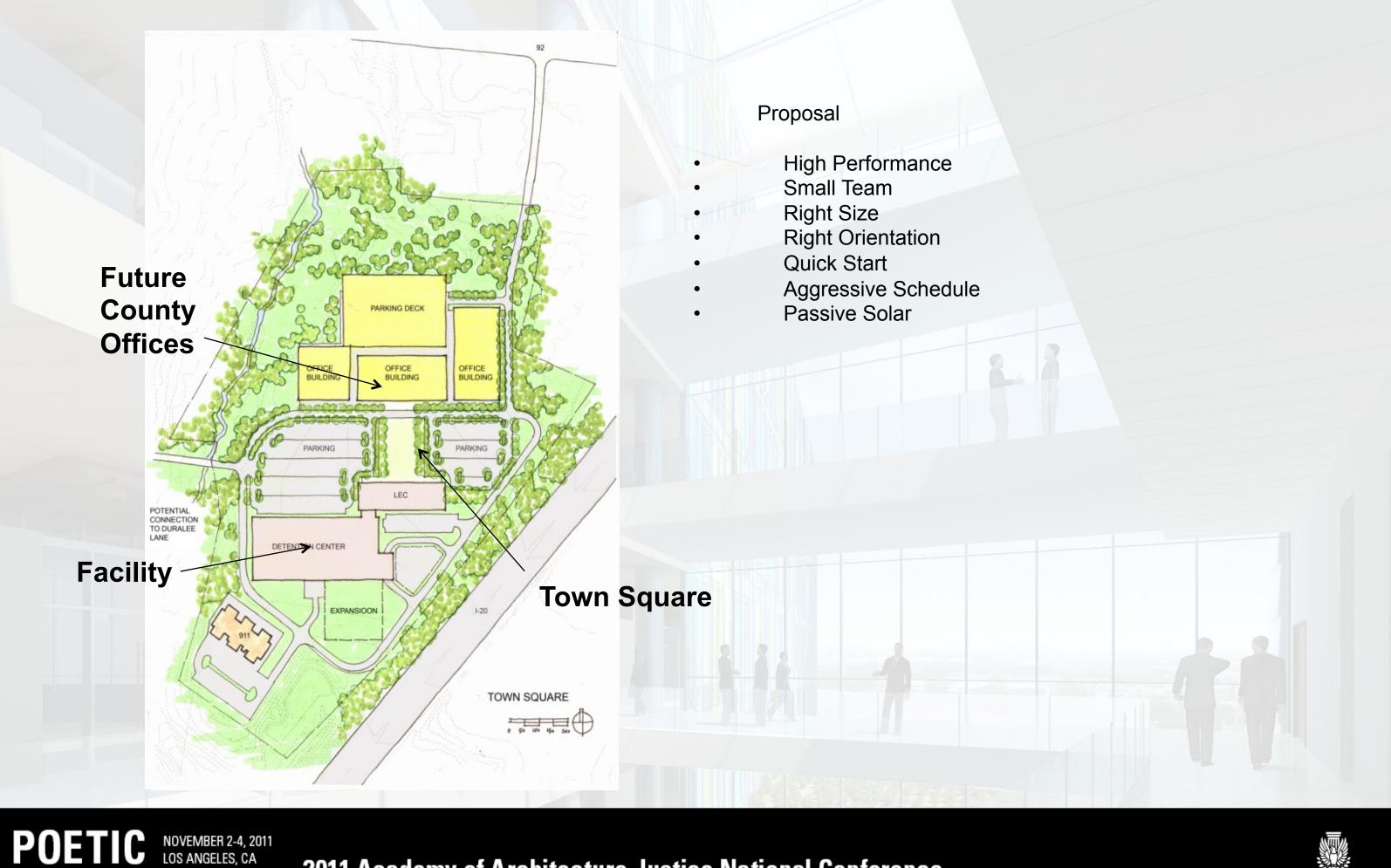
- Needs Assesment-2009
- 550,000 SF
- 107 Million Splost
- 45 Acre Site
- Program Manager
- CM at Risk
  - 30 Month Schedule

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CPS

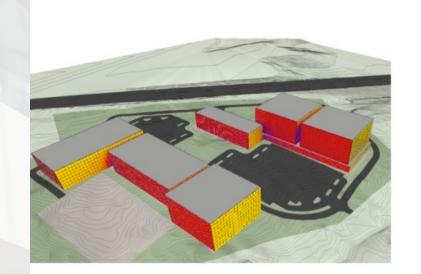




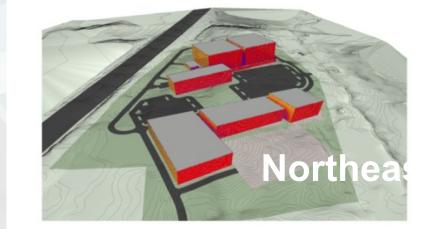




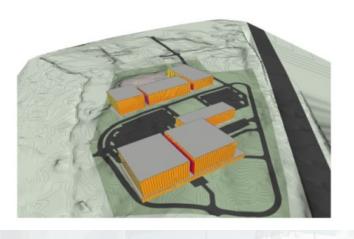
Performance Based.....



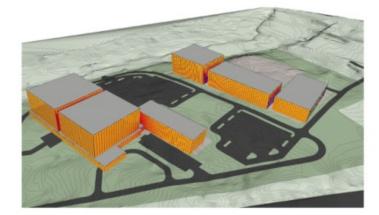
### Northwest



### Northeast

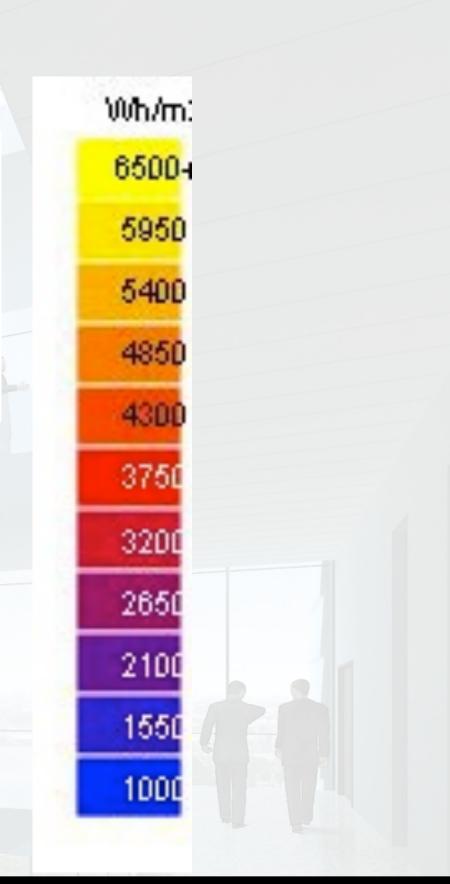


### **Southwest**



**Southeast** 







#### **Douglas County Adult Detention and Law Enforcement Center Architectural Program**

	PRO	GRAM SUN	MARY					
admin, shef	RIFF'S OFFICE AND SUPPORT							
Component No.	Component Name	Total DNSF	Net To Gioss	Total DGSF		Corr	monts	
1	SHEREPS OFFICE	1685	20%	4.717				
2.0	LAW ENFORCEMENT	72,155	20%					
	DETENTION 42 MINISTRATION	2,845	25%					
4.5	40MINISTRAT ON SUPPORT	9,415	28%					
	TRAINING	7.265	25%	9.08				
8.8	STAFF SUPPORT	16,060	25%					
	SHERI-P'S DISPATCH	1.481	26%	1 804				
8.0	CENTRAL CONTROL	1,260	30%6	1.638				
9.0	INMATE PROCESSING INTAKE/RELEASE/HEARINGS)	18,285	45%6	22 487				
10.0	VISITATION	6,180	25%					
11.9	WARRANTSICIMUTRANSPORT	7,305	40%	10 227				
12.0	MENTAL HEALTH CLINIC	1,187	30%	1 534				
13.0	MEDICAL OLINIC	4,405	30%	5,727				
14.0	INFIRMARY - CRITICAL MEDICAL AND MENTAL HEALTH	8,585	45%	12 448				
15.0	LAUNDRY	1,601	20%	1,920				
16:0	FCOD SERVICE/WAREHOUSE	25,005	15%	29.446				
17.0	MAINTENANCE	4,191	20%	5,028				
18.0	POWER PLANT	8,500	10%	9,350				
19.0	INMATE SUPPORT	4,361	28%	5,581				
	SUB-TOTAL ADMINI SHERIFF'S OFFICE AND SUPPORT	151,275		192,663			1	
	SULDING C ROLLATION FACTOR		15%	28 902				
	SUB-TCTAL GSF						221,535	_
INMATE HOU	SING							
	Component Name	Total DMSF Per Pod	Net To Gross	Total DGSF Per Pod	No. of Pads	Total DNSF	Total DGSF	No. of Beds
		Pe Poa	GROSS	Pe Poc	Pous	_	_	Deap
21.0	HOUSING - MALE GENERAL POPULATION	21,642	60%6					751
22.0	HOUGING - MALE SINGLE GELLS	25,540	50%		2			251
23.00	HOUSING FEMALE	21,641	50%		2		61,320	25
24.00	HOUSING - INWATE WORKER DORMS	19,963	40%	27 955		10,068	27,965	15
25.00	HOUGING - SUPERMAX	4,583	40%	6.423	1	4,588	£,423	11
	SUB-TOTAL INMATE HOUSING	87,583		129,365	10	198,488	387,158	1,43
	C ROLLATION FACTOR		8%				24,173	
	SUB-TOTAL HOUSING						326,331	_
						1	-	
	GRAND TOTAL DESIGN NET SF					391,171		

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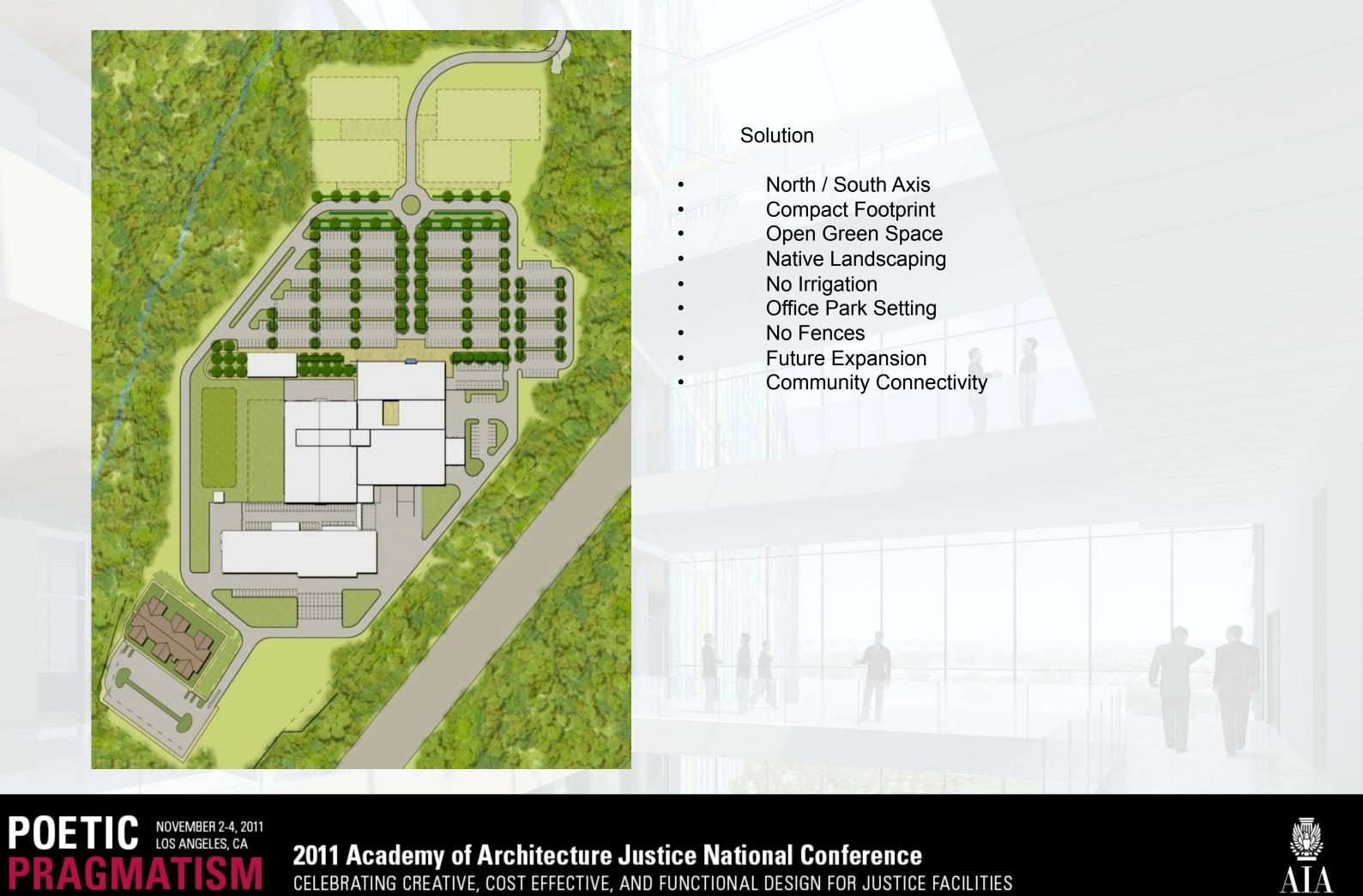
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#### Program

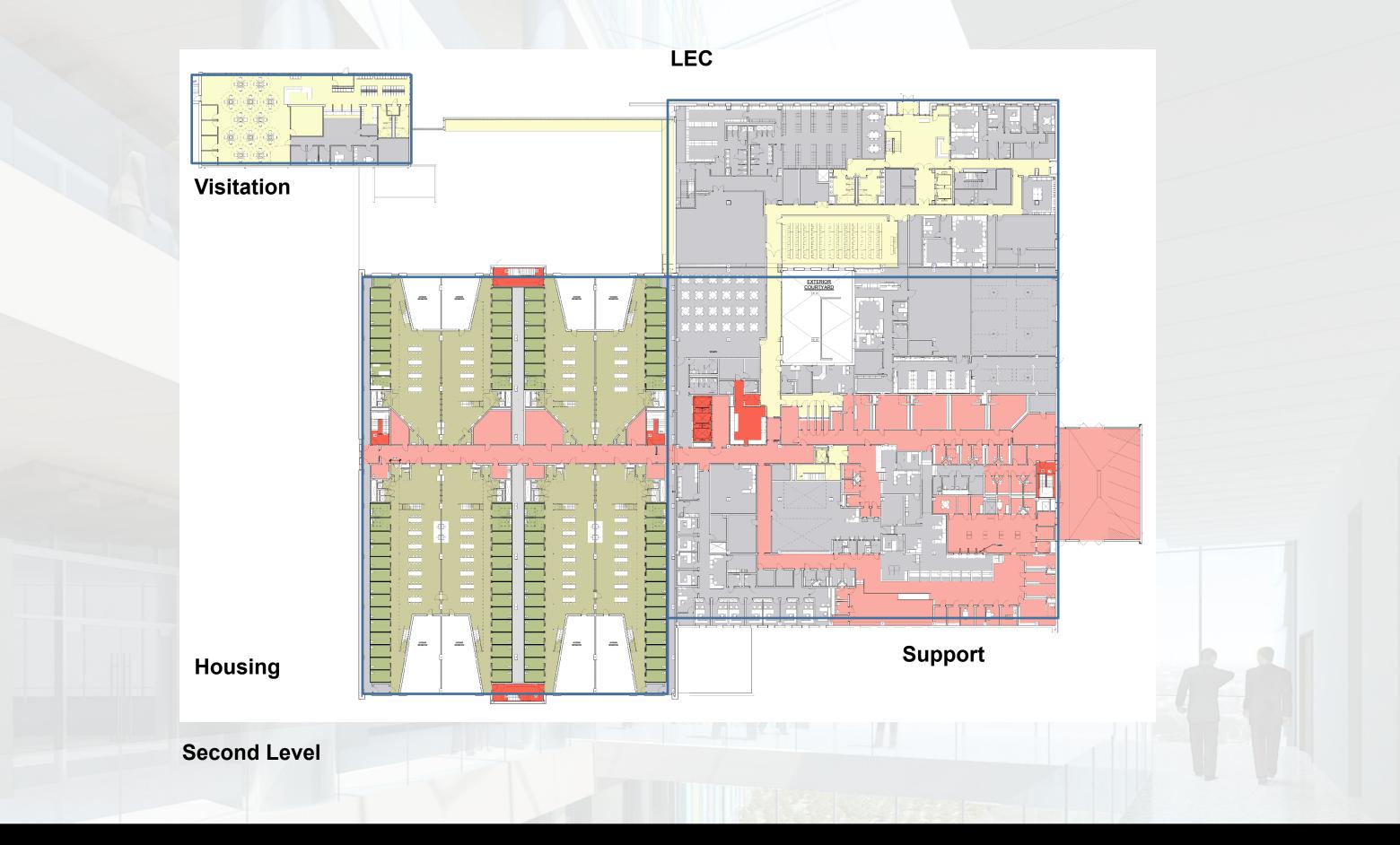
- **Right Size** 
  - **Reduced Budget**
- 10% Reduction
- Share Spaces
- No Excess
- **Operations Oriented** 
  - Staff Focused



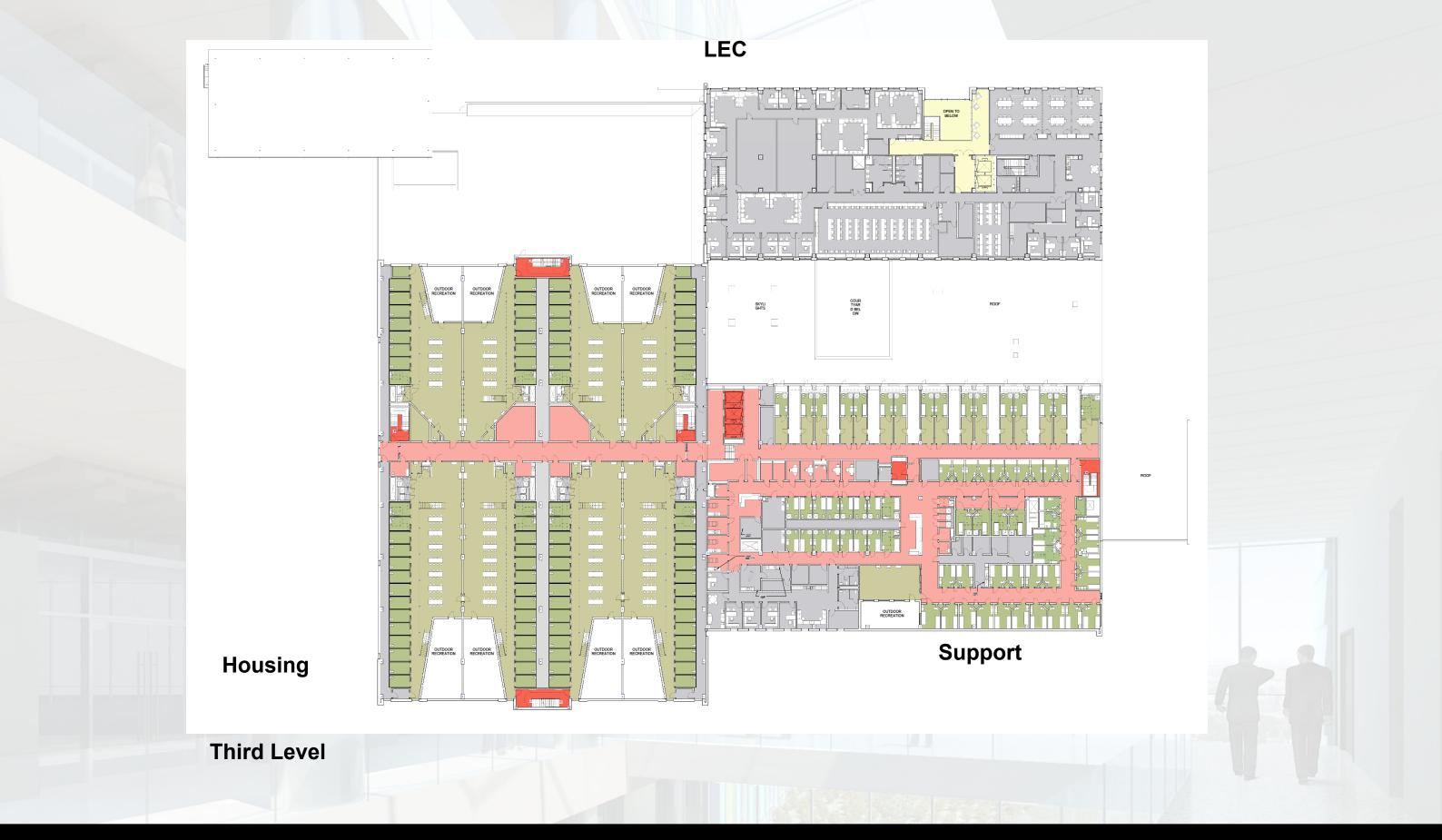




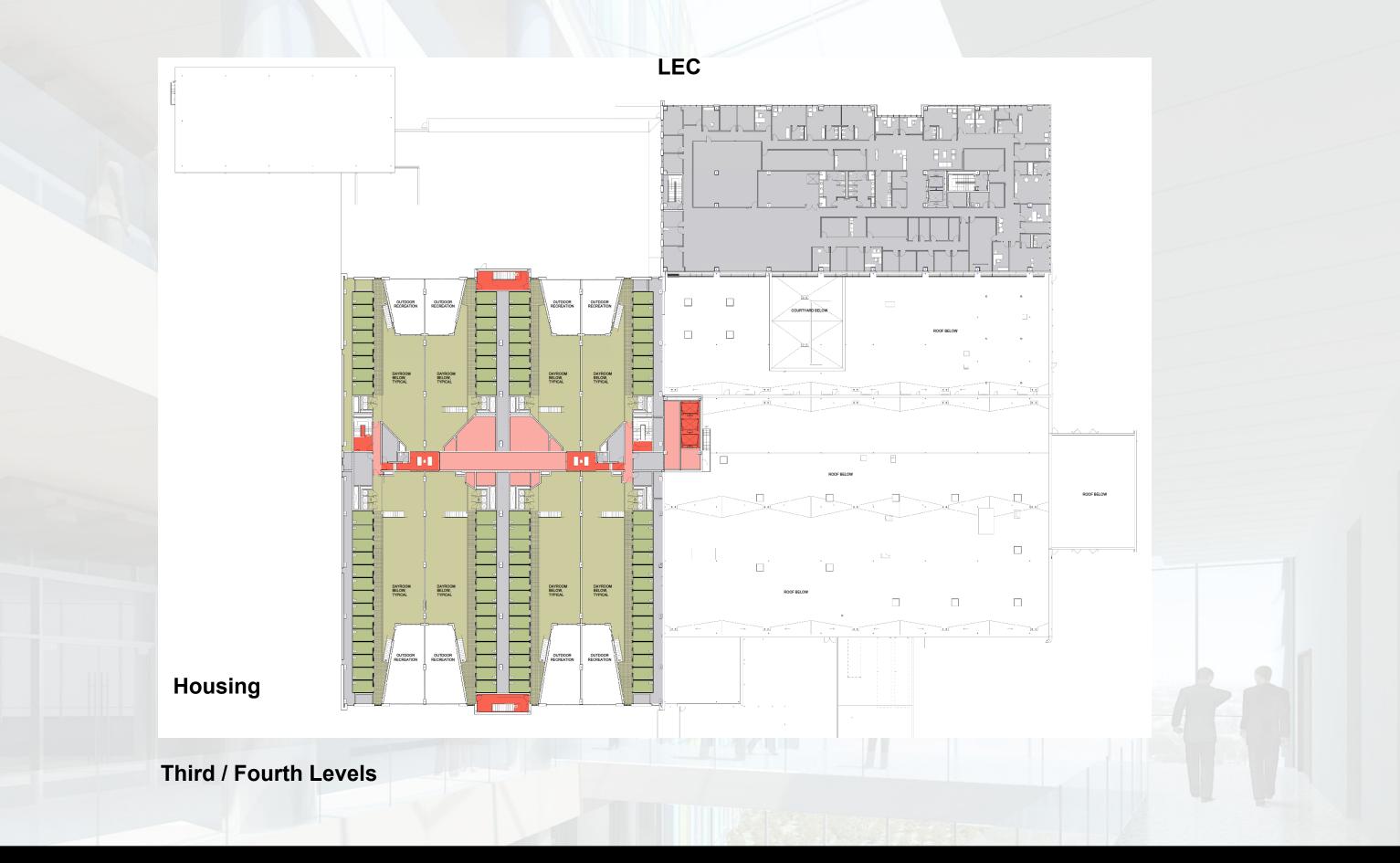




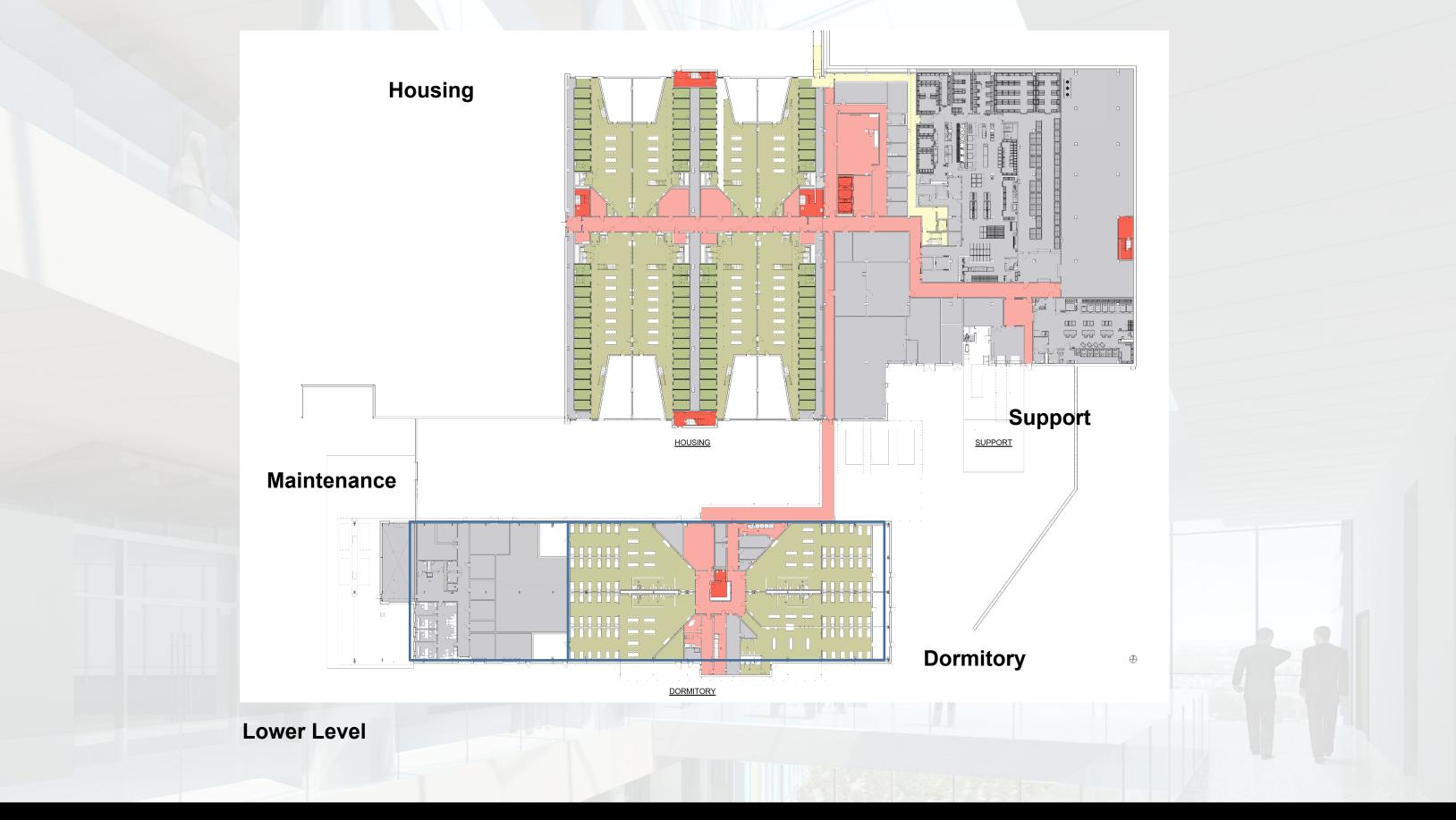




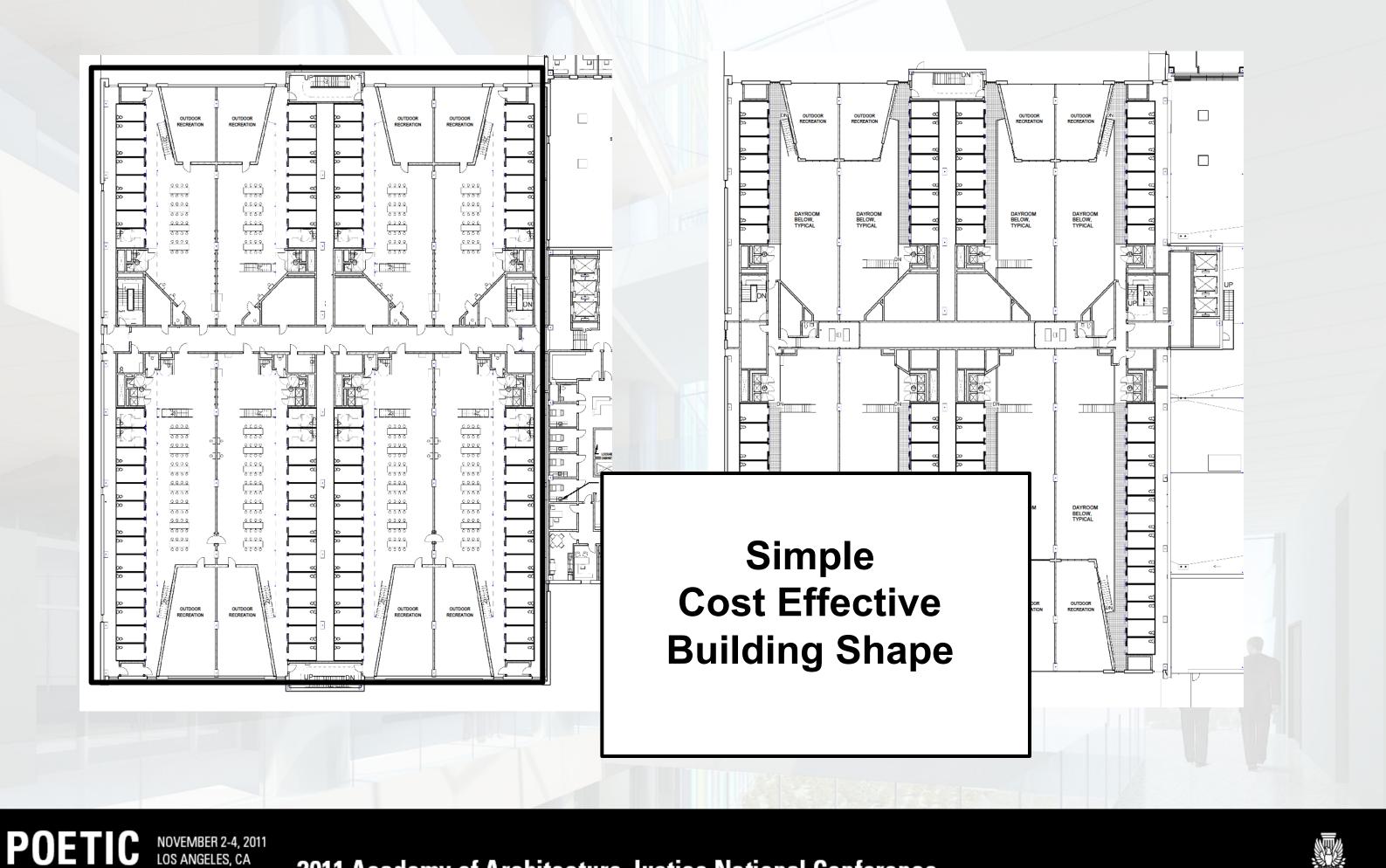




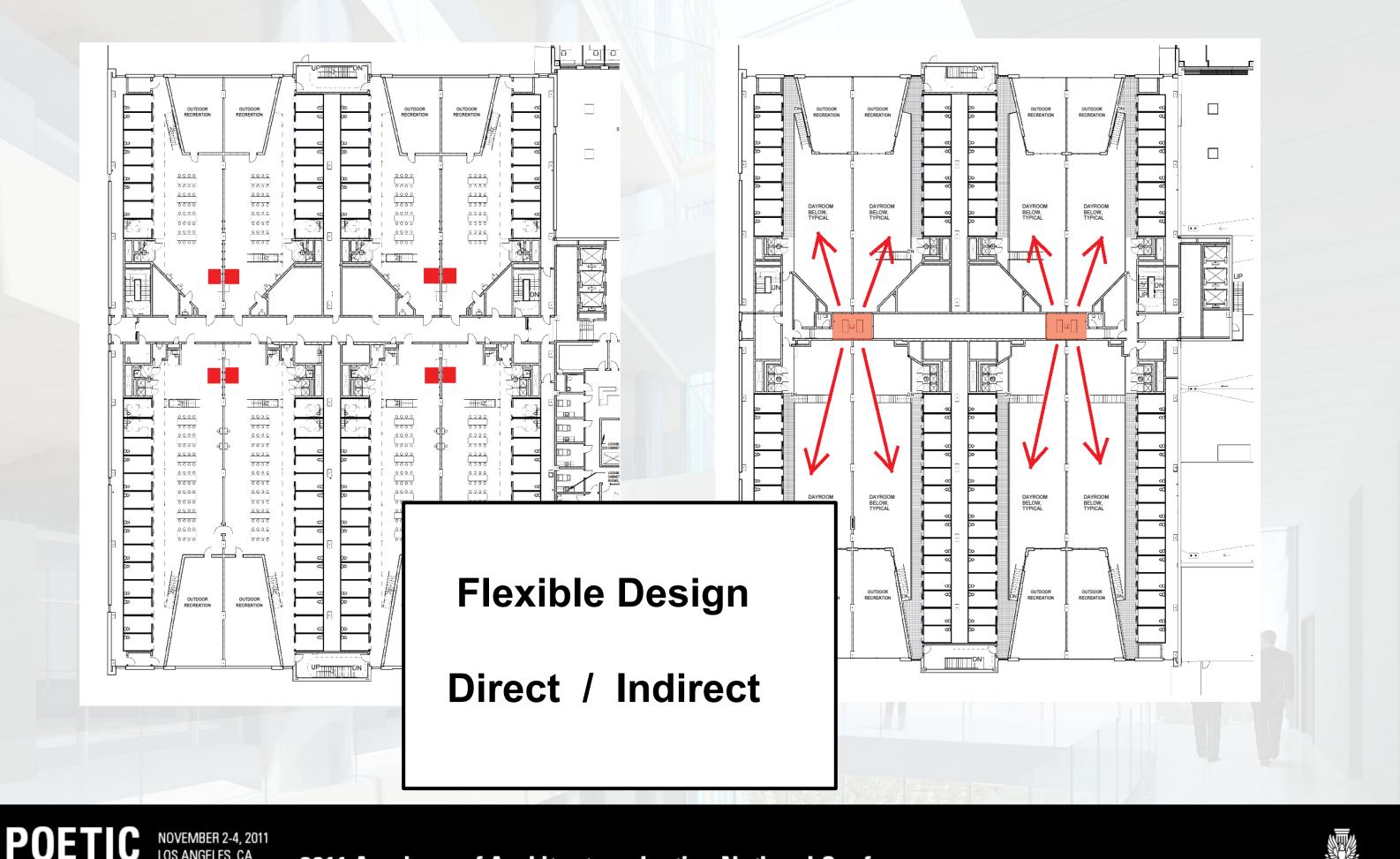








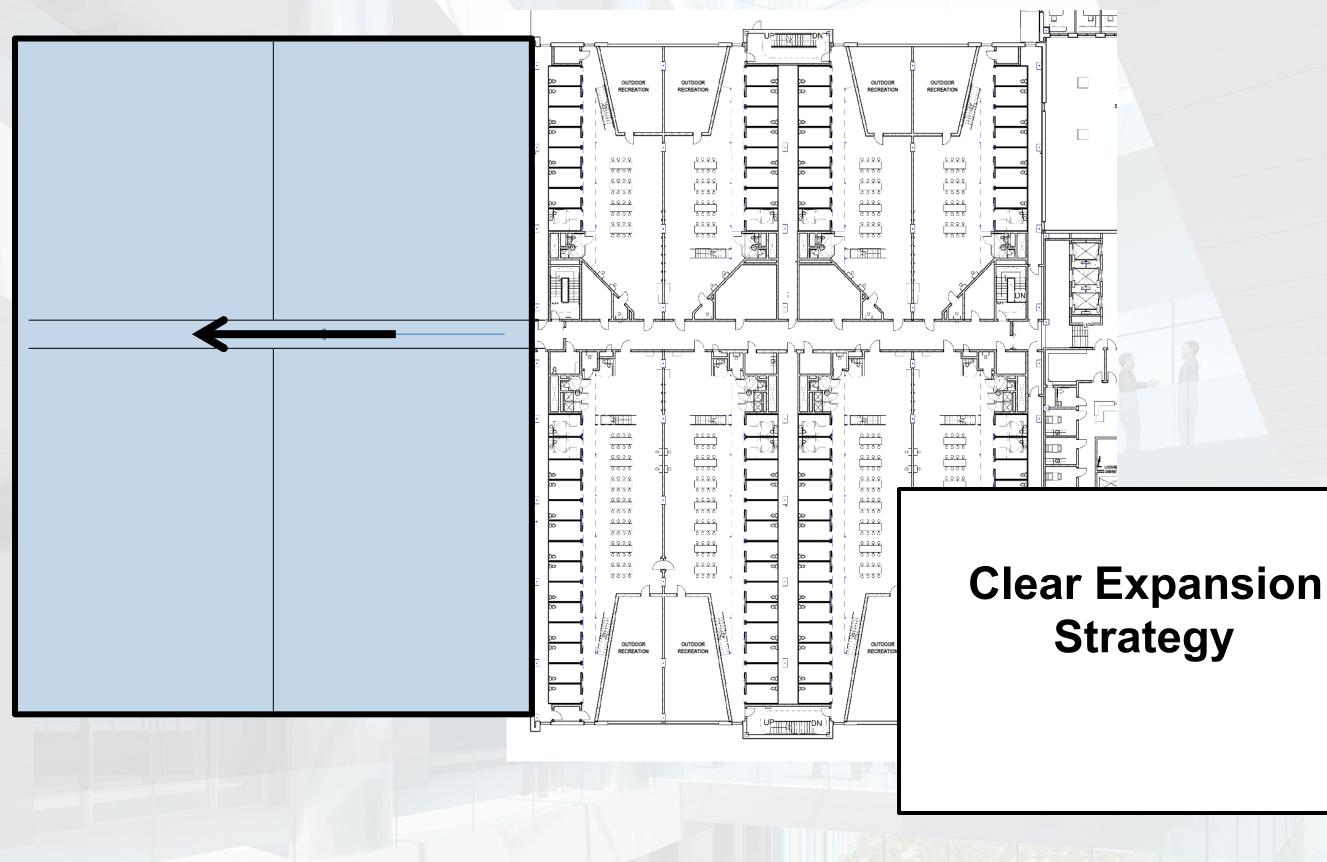




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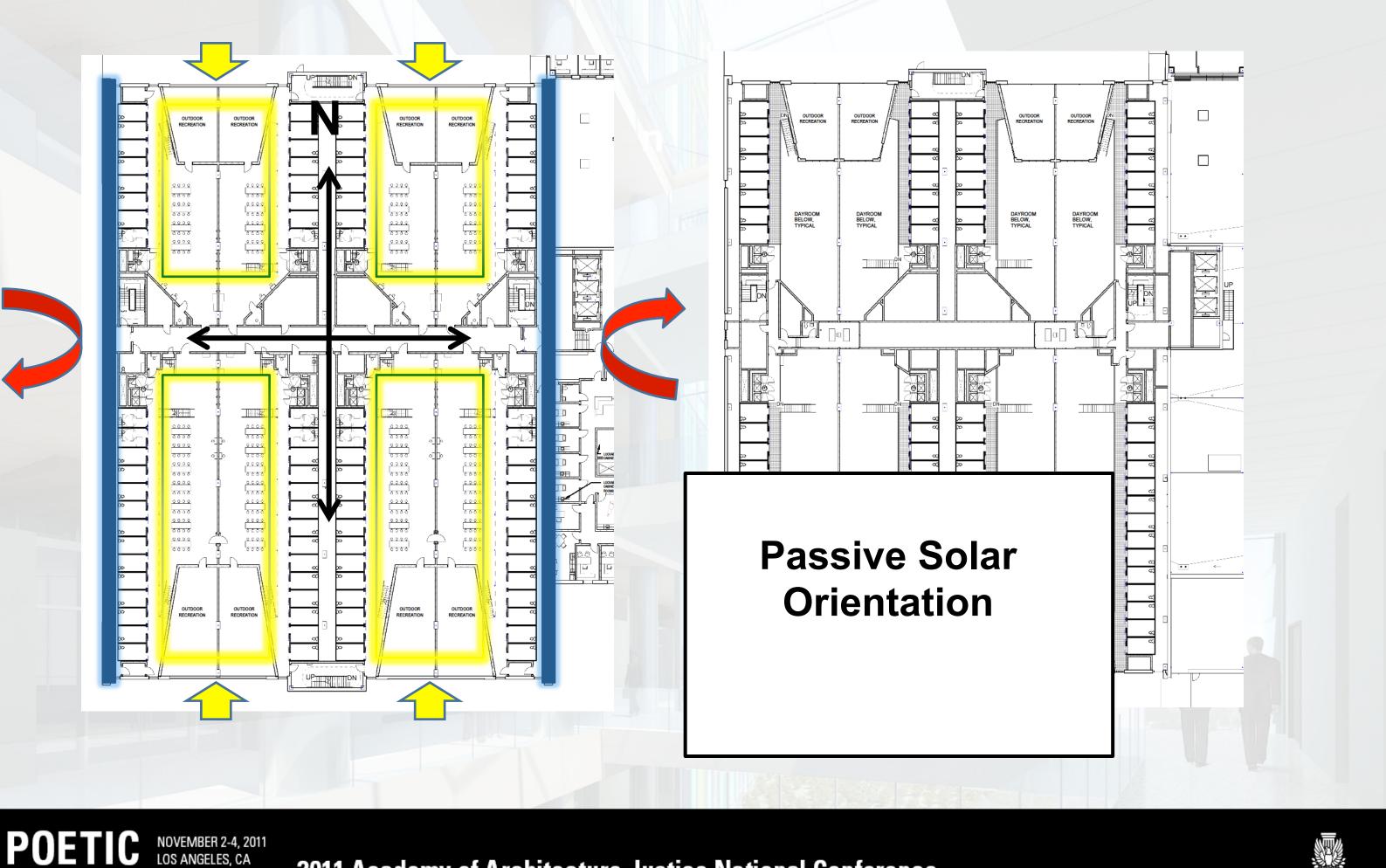




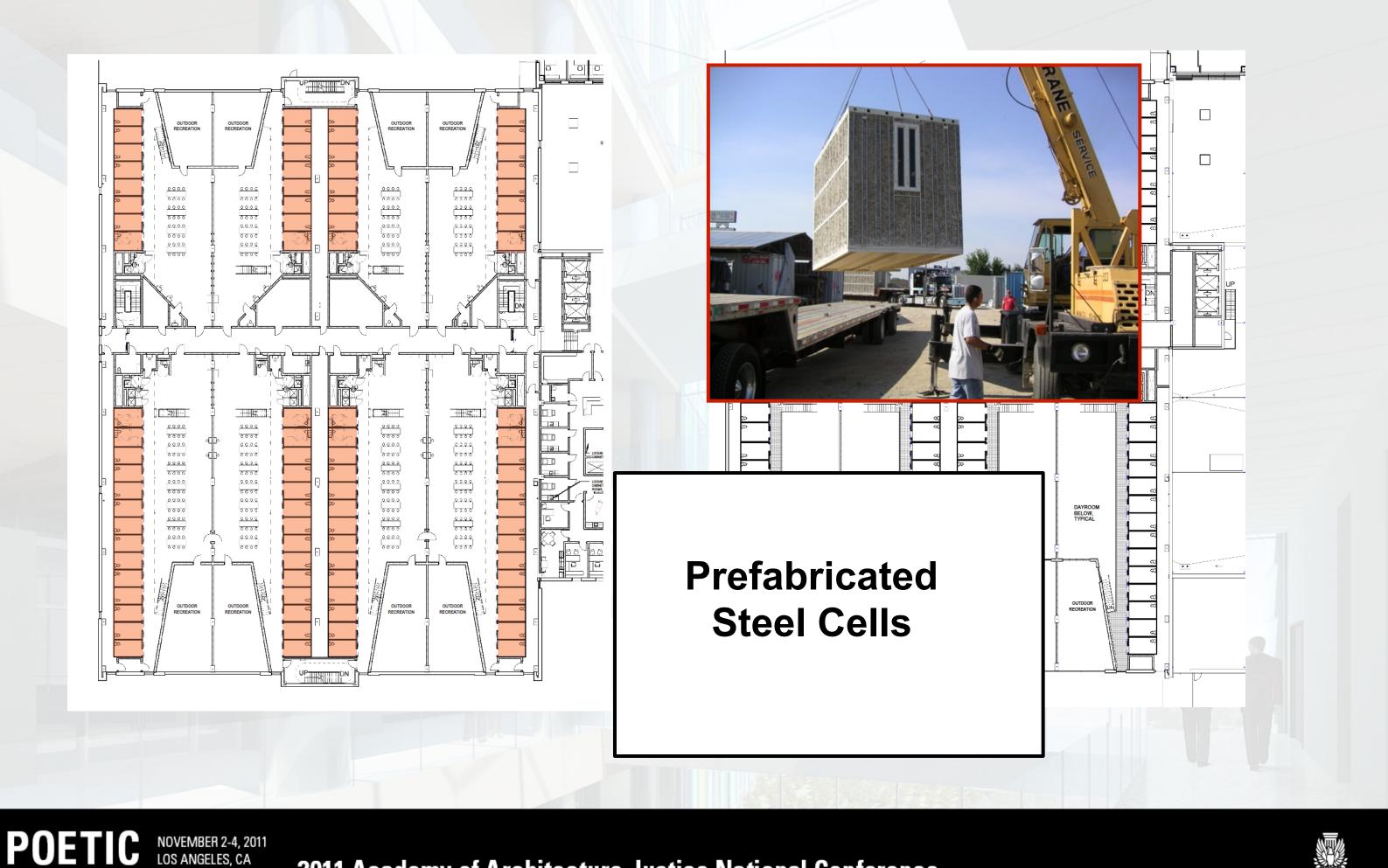
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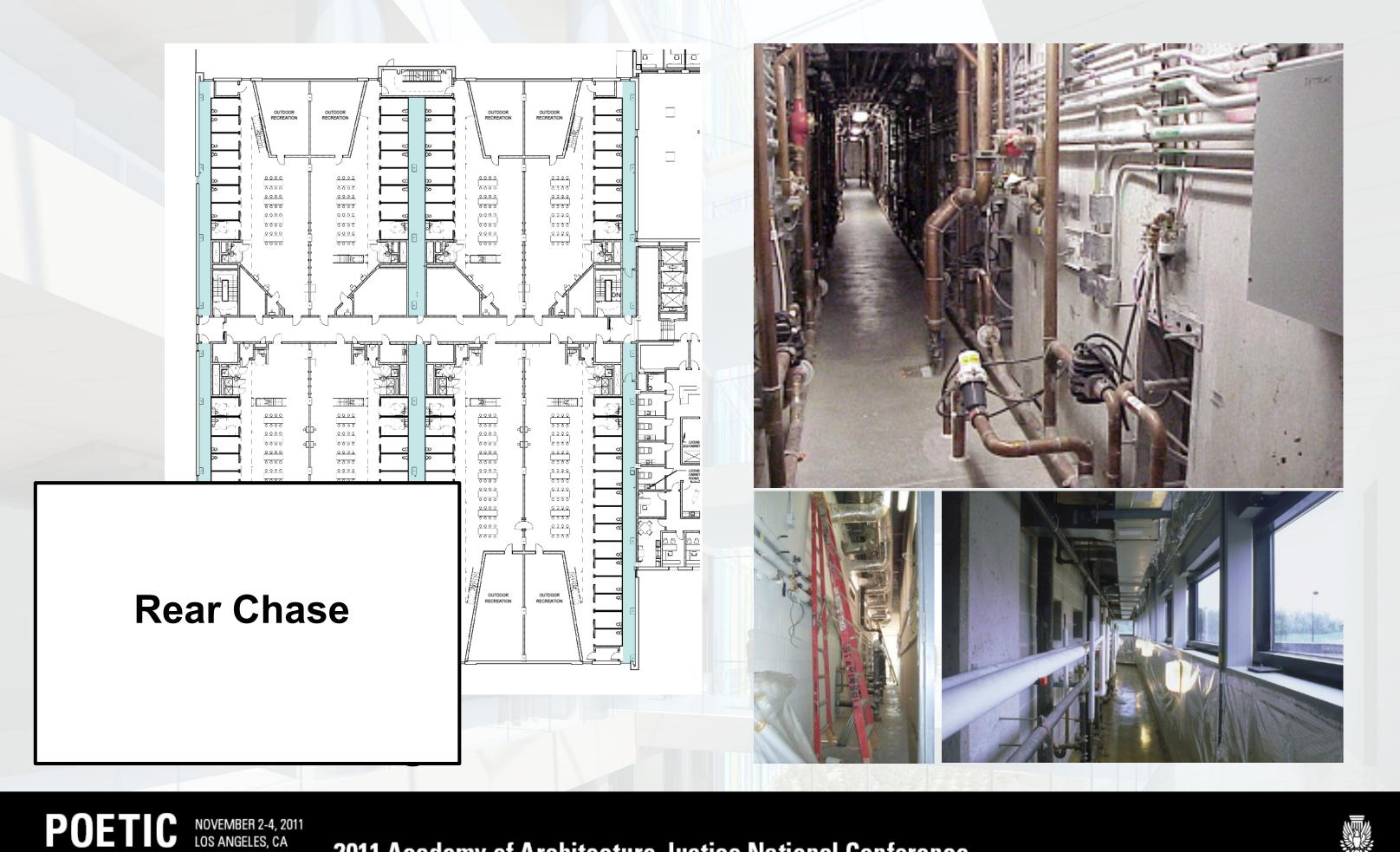




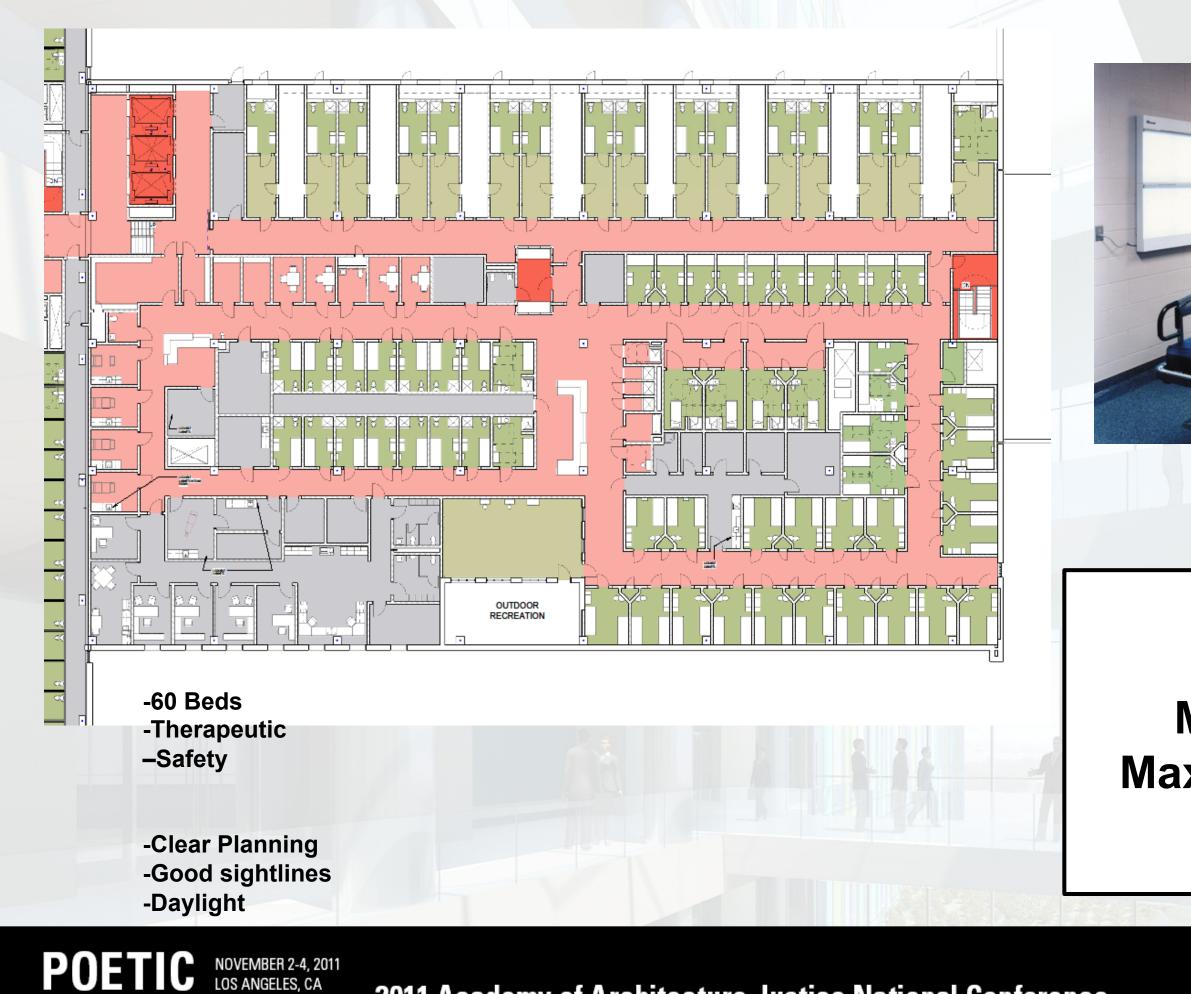














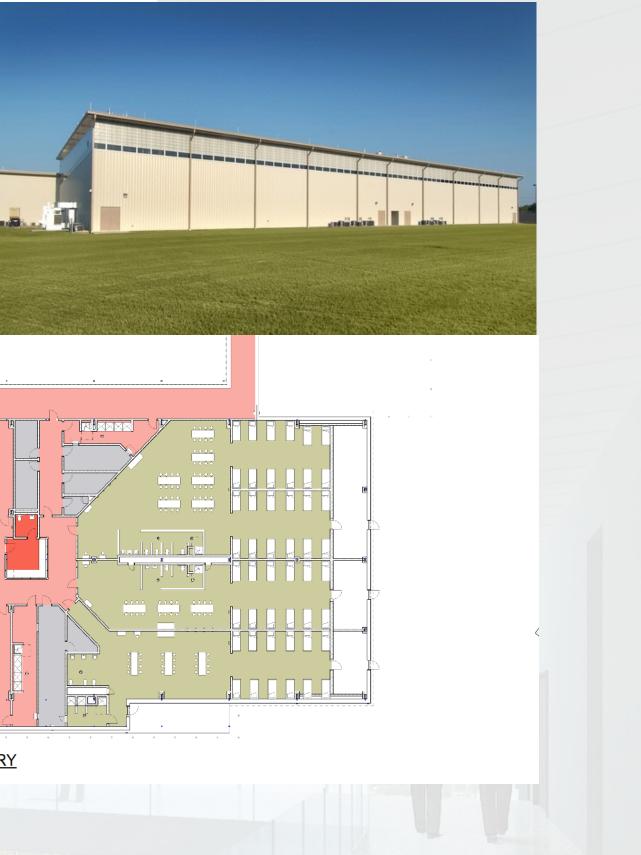
## Medical / **Mental Health Maximum Security**

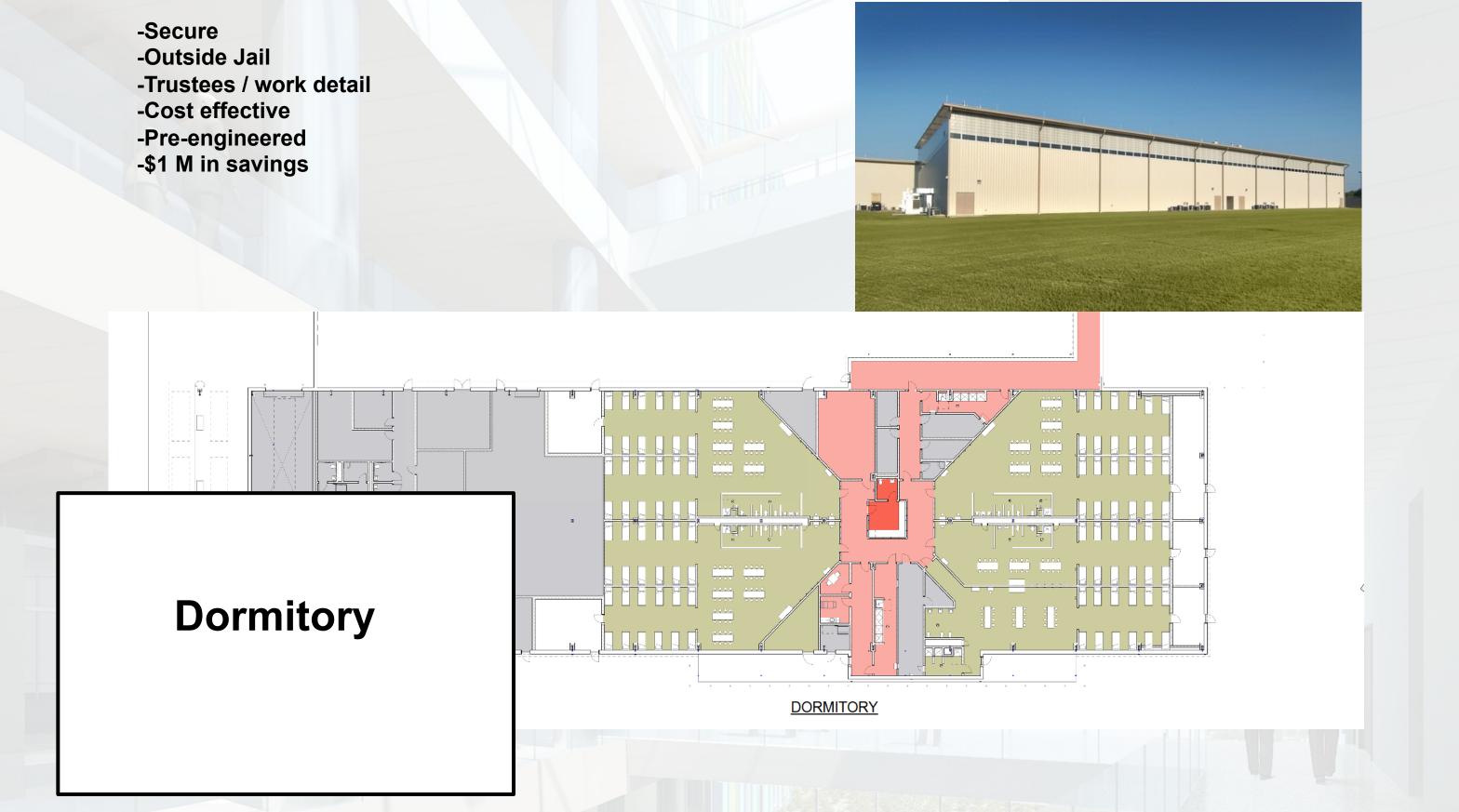




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#### **BUILDING SUSTAINABILITY**

•North / South Axis

- Passive Solar Orientation
- Insulated Rear Chase to East and West
- Major windows to North and South
- •Narrow floor plate for LEC
- Maximize Daylight Throughout
- •Code Minimum Building

Result

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•Energy Model –18% improvement over baseline •Potentially \$250,000 annual utility savings •Minimal MEP Enhancements •\$200 SF





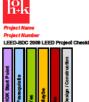
#### LEED

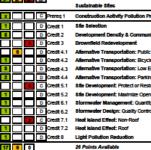
- Energy Model 18% = 3 pts.
- Community Connectivity = 5 pts.
- Site = 17 out of 26 available
- 20% Regional Materials
- 20% Recycled Materials
- 90% + Waste diverted from land fills
- Education
- Pilot Program -**Enabled Energy in Structure**

**Project Upgrades** 

- Enhanced Filters, Copy Rooms,
- Parking signage

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I		C Prereq 1	Water U
4		D Credit 1	Water E
	X	D Credit 2	Innovat
		D Credit 3	Water U
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		x			C Prereq 1
		x			D Prereq 2
		x			D Prereq 3
11		3			D Credit 1
				х	D Credit 2
				ж	C Credit 3
2		2			D Credit 4
				х	C Credit 5
				x	C Credit 6
13	0	6	0	0	

	D Prereq 1
	C Credit 1.1
	C Credit 1.2
2 1	C Credit 2
	X C Credit 3
2 2	C Credit 4
1 2	C Credit 5
	x C Credit 6
	C Credit 7
6 0 8	0 0

		TO 21 POSSIDIO POINS
	Suctainable Sifes	
1	Construction Activity Pollution Prevention	
	Sife Selection	1
2	Development Density & Community Connectivity	5
8	Brownfield Redevelopment	1
	Atlemative Transportation: Public Transportation Access ( Regional Priority)	6
	Alfemative Transportation: Bicycle Storage & Changing Rooms	1
	Atomative Transportation: Low Emiting & Fuel Efficient Vehicles	3
	Atlemative Transportation: Parking Capacity	2
	Site Development: Protector Restore Habitat	1
		-
	Site Development: Maximize Open Space	1
	Stormwater Management: Quantity Control ( Regional Priority)	1
	Stormwater Design: Quality Control	1
	Heat Island Effect: Non-Roof	1
7.2	Heat Island Effect: Roof	1
В	Light Pollution Reduction	1
	26 Points Available	28
	Water Efficiency	
1	Water Use Reduction	
1	Water Efficient Landscaping	4
2	Innovative Wastewater Technologies	2
3	Water Use Reduction (30% = 2 points; 35% = 3 points; 40% = 4 points) (Regional Priority)	4
-	10 Points Available	10
	Energy & Almosphere	
1	Fundamental Commissioning of the Building Energy Systems	
2	Minimum Energy Performance	
3	Fundamental Refrigerant Management	
1	Optimize Energy Performance (Regional Priority)	19
2	On-Site Renewable Energy (1% = 1 Point; 3% = 2 Points; 5% = 3 Points; 7% = 4 Points; 9% = 5 Points; 11% = 6 Points; 13% = 7 Points)	7
3	Enhanoed Commissioning	2
4	Enhanced Retrigerant Management	2
5	Neasurement & Verification	3
5	Green Power	2
	35 Points Available	35
	35 POINTS AVAILABLE	36
	Materials & Resources	
1	Storage & Collection of Recyclables	
1.1	Building Reuse: Maintain Existing Walls, Floors & Roof (55% = 1 Point; 75% = 2 Points; 95% = 3 Points)	3
		1
2	Construction Waste Management (50% = 1 Point; 75% = 2 Points)	2
3	Materials Reuse (5% = 1 Point 10% = 2 Points)	2
4	Recycled Content (10% = 1 Point; 20% = 2 Points)	2
5	Regional Materials (10% - 1 Point, 20% - 2 Points)	2
5	Rapidly Renewable Materials	1
7	Certified Wood	1
	14 Points Available	14
	Indoor Environmental Guality	
1	Minimum IAQ Performance	
2	Environmental Tobacco Smoke (ETS) Control	
1	Outdoor Air Deilvery Moniforing	1
2	Inoreased Ventilation	1
	Construction IAQ Management Plan: During Construction	1
	Construction IAQ Management Plan: Before Occupancy	1
	Low-Emitting Materials: Adhesives & Sealants	1
	Low-Emitting Materials: Paints & Coatings	1
	Low-Emitting Materials: Flooring Systems	1
	Low-Emitting Materials: Composite Wood & Agrifiber Products	1
5	Indoor Chemical & Pollutant Source Control	1
	Controllability of Systems: Lighting	1
	Controllability of Systems: Thermal Comfort	1
	Thermal Comfort: Design	1
7.2	Thermal Comfort: Verification	1
8.1	Daylight & Views: Daylight	1
8.2	Daylight & Views: Views	1
	15 Points Available	16
	Innovation & Design Process	
1	Innovation in Design	1
	Innovation in Design	1
1	Innovation in Decign	1
1	Innovation In Design - LEED Educational Signage	1
1	Innovation In Design - LEED Pliot Credit - Building Assemblies Life Cycle Assessment	1
2	LEED Accredited Professional	1
	6 Points Available	6
		•
	Regional Priority	
1	Regional Priority	1
	4 Points Available	4
		110

								Indoor E
		X			D	Prereq	1	Minimur
		X			D	Prereq	2	Environ
				х	D	Credit 1		Outdoor
				х	D	Credit 2	2	Increase
1		1			C	Credit 3	1	Constru
		1			C	Credit 3	2	Constru
1				x	¢	Credit 4	и.	Low-Em
1		1			¢	Credit 4	2	Low-Em
1		1			¢	Credit 4	3	Low-Em
1		1			C	Credit 4	.4	Low-Em
		1			D	Credit 5	5	Indoor C
1				x	D	Credit 6	.1	Controls
				х	D	Credit 6	.2	Controls
1				х	D	Credit 7	6	Thermal
				x	D	Credit 7	2	Thermal
1				х	D	Credit 8	11	Daylight
				x	D	Credit 8	2	Daylight
8	0	8	0	0				15 Point
			_					

	In
DC Credit 1	In
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DIC Credit 1	h
1 D/C Credit 1	h
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1 C Credit 2	U
	-







**2011 Academy of Architecture Justice National Conference** CELEBRATING CREATIVE, COST EFFECTIVE, AND FUNCTIONAL DESIGN FOR JUSTICE FACILITIES

#### •498,000 SF

- •1500 Beds - expandable to 2250
- •\$101 Million
- •\$200 SF
- •LEED Pending
- •Direct / Indirect
- Design Start -March 2010
- Construction Complete -December 2012





PRA





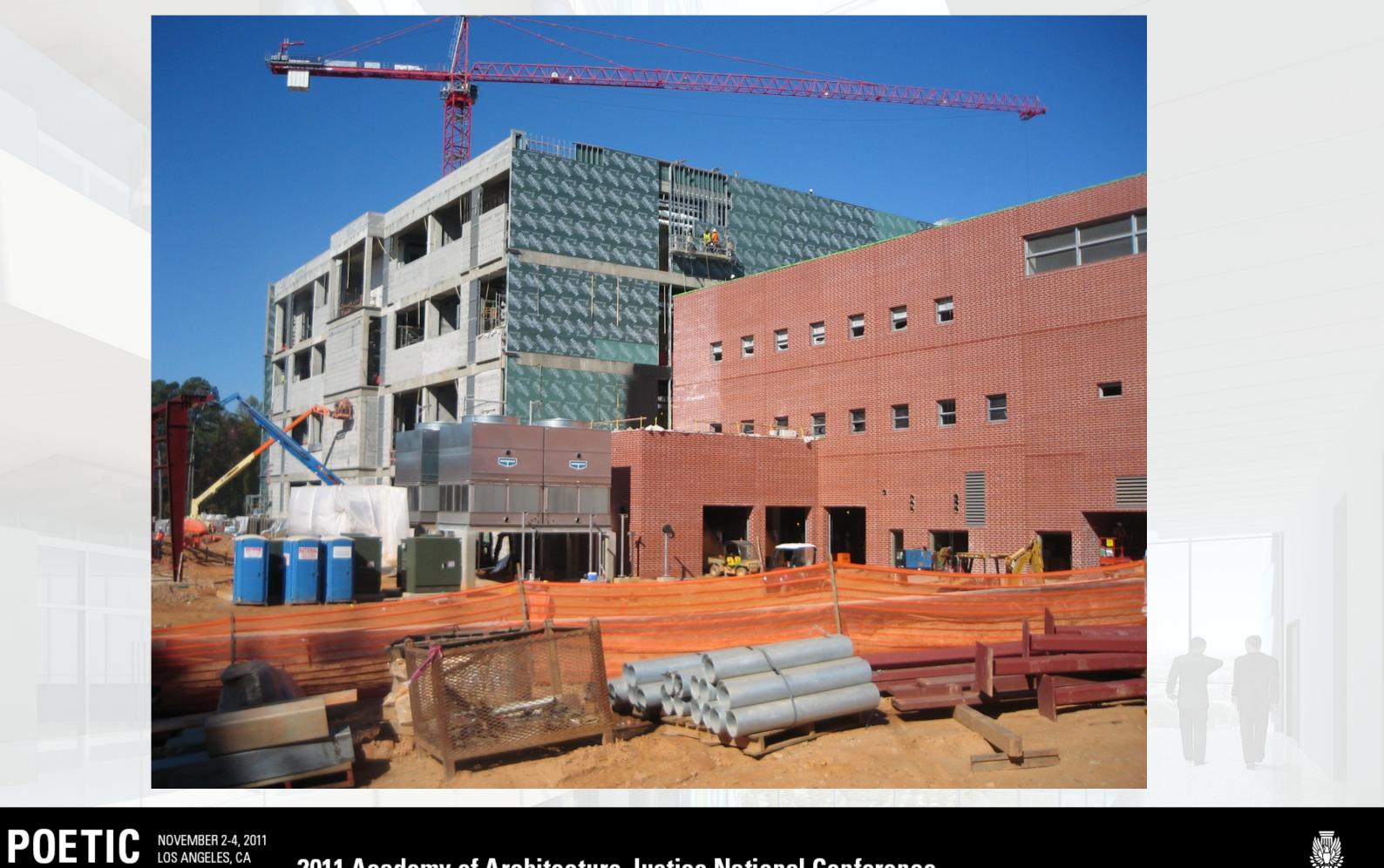
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# POETIC NOVEMBER 2-4, 2011 LOS ANGELES, CA PRAGMATISM







#### POETIC NOVEMBER 2-4, 2011 LOS ANGELES, CA PRAGMATISM

CELEBRATING CREATIVE, COST EFFECTIVE, AND FUNCTIONAL DESIGN FOR JUSTICE FACILITIES

**ATA** 

# Support Efficient Operations



#### Design

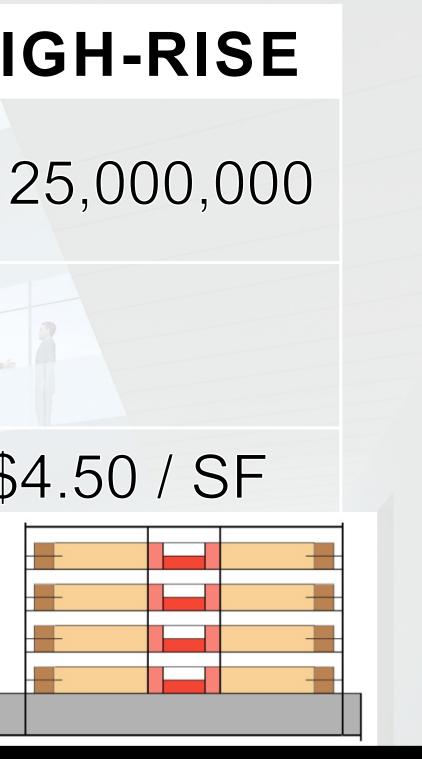
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- •Support Current Style
- •Allow Flexibility
- •Bring Other Thoughts to the Table •"Right Size Facility"
- •Master Plan For Future
- •Straight Forward Solution
- •Simplify, Simplify, Simplify....





	<b>MID-RISE</b>	HI
Construction Cost	\$106,250,000	\$12
Operational Costs	- 5%	
Energy Costs	\$3.00 / SF	\$





# **Douglas County Adult Detention and Law Enforcement Center**

1	1500	beds @	\$	83,333	=	\$ 124,999,995
Annual E Capital Co						
		r. Bond @		4.5%	=	\$ (10,030,323)
<u>Staffing</u>	400	FTE @	\$	40,000	=	\$ 16,000,000
<u>Inmate Ex</u> 1	<u>xpenses</u> 1500	x 365/ yr	\$	8	=	\$ 4,380,000
<u>Misc. Ove</u> 1	e <u>rhead</u> 1500	x 365/ yr	\$	12	=	\$ 6,570,000
				TOTAL	=	\$ 36,980,323
		\$ per in	mat	e per day	=	\$ 67.54

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### Considerations:

- Medical & Mental Health •
- **Borrowed Light** ٠
- **Perimeter Chase** •
- Video Visitation/Arraignment •
- Open Booking ٠
- **Energy Management** ٠
- Sustainability ٠

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Law Enforcement •





### Less is More

- **Clear Planning** 
  - **Direct Sightlines**
  - Better Way finding
  - Improved Security
- Easier To Build
- Less Expensive

= Improved Operations

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ALTERNA RECORDERS

# POETIC NOVEMBER 2-4, 2011 LOS ANGELES, CA PRAGMATISM

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**AIA** 

# Optimize Staff Environment

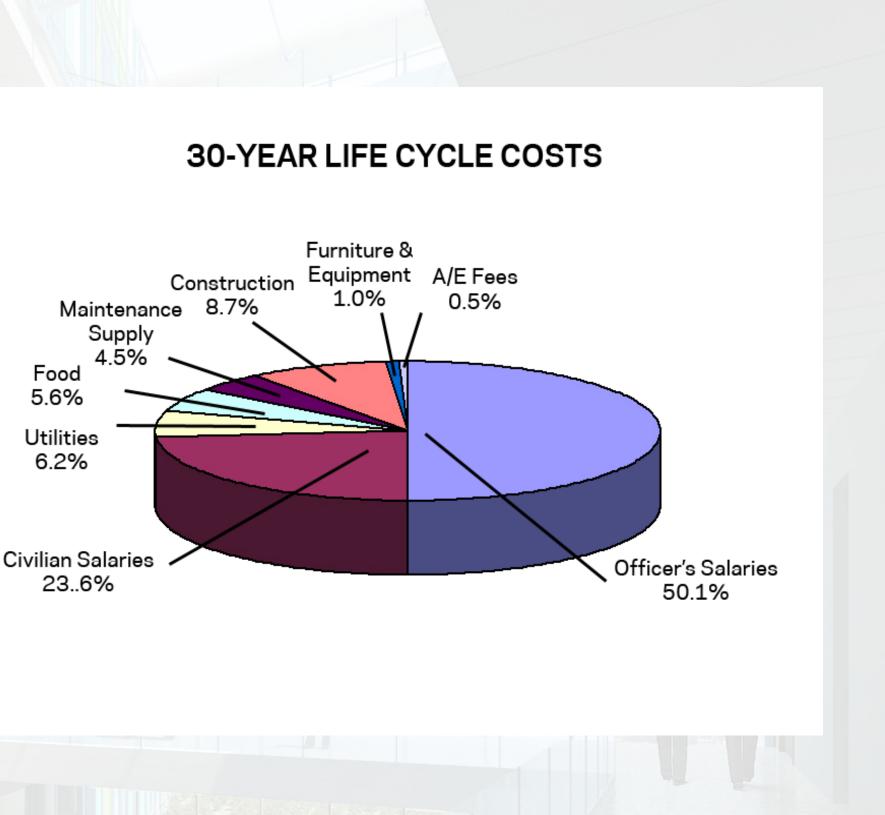


### Staff – A 30 Year Sentence

Single greatest investment

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- Detention / Retention
- Positive Environment
- •Convenience
- Security
- Interaction
- •Training
- •Normalize`
- •Invest in People





### Improve Daily Life

- Staff / Public / Detainees
  - **Translates into Savings**
  - **Improved Moral**
  - **Clear Expectations**
- Efficiency

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TIME









### Natural Light

•Reduces Stress Improves Well-Being •Saves Energy •Creates Better Environment •Proven

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### DAYLIGHT, DAYLIGHT, DAYLIGHT.....





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### Support Spaces

- Training
- Lockers / Work-out
- Parking
- **Break Areas**
- Daylight
- Security







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### **Clean Air**

- •Better Attitude
- •Code Requirements
- •Air Flow
- Showers

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- •Odor Control *Housing / Property*
- Improved Environment





### **Noise Control**

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- •Acoustics
- •Ceiling / Wall Panels
- •Costs
- •Staff and Inmate Benefits
- •Sound Level "Driving Me Crazy"







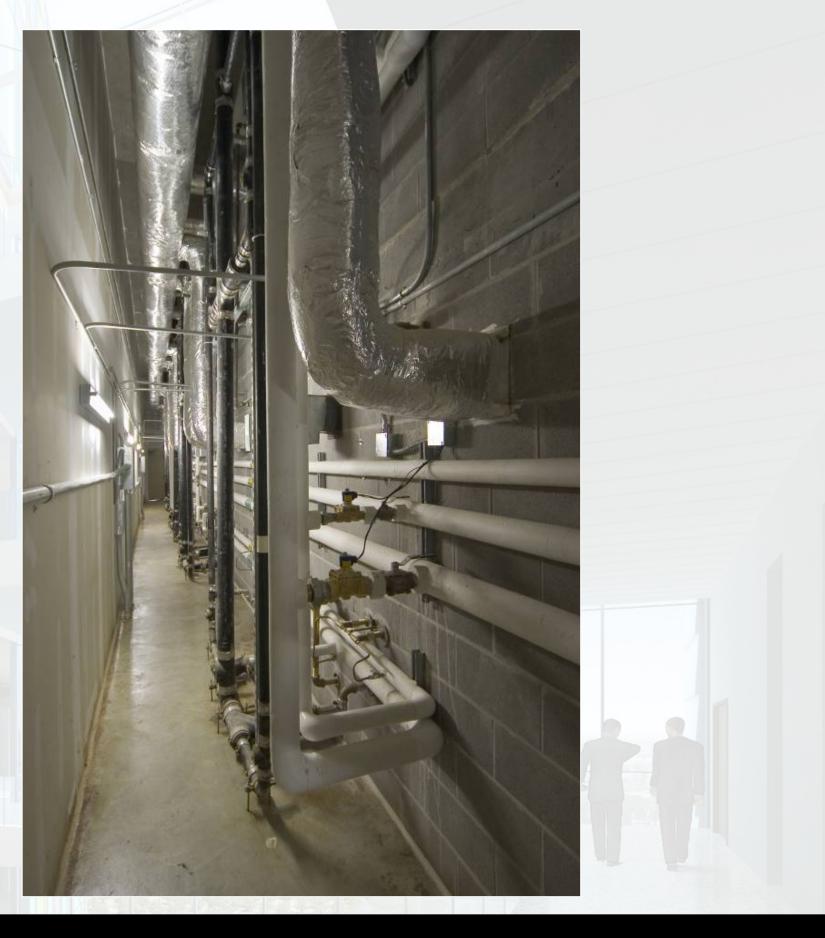


### Sanitation

Cleaning

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- Products Green
- **Inmate Trustees**
- Garbage
- Recycling





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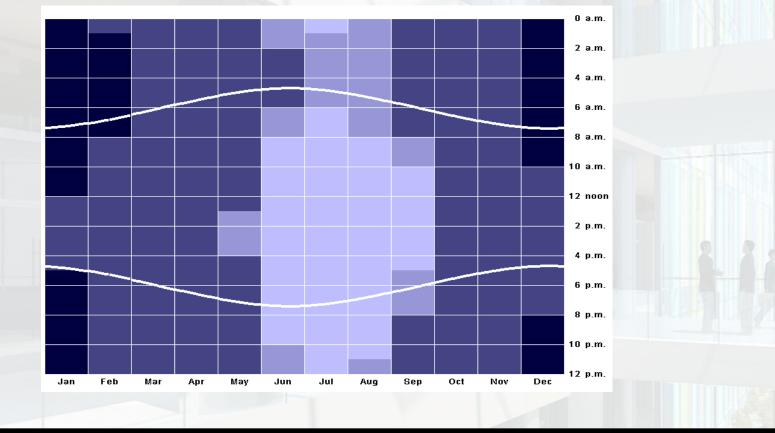
**AIA** 

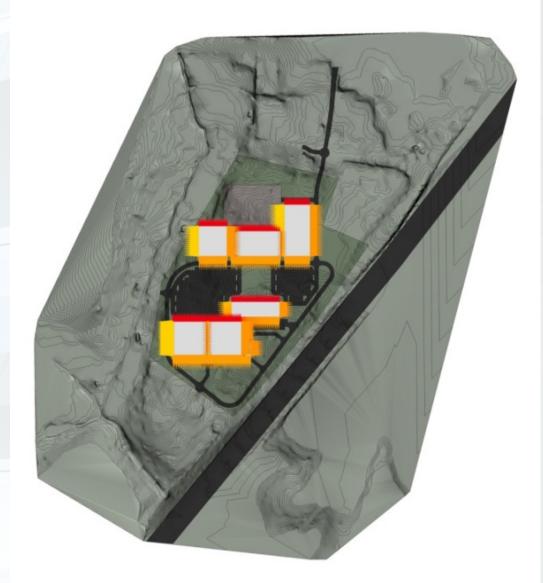
# Reduce Life-Cycle Costs



### **Reduce Load**

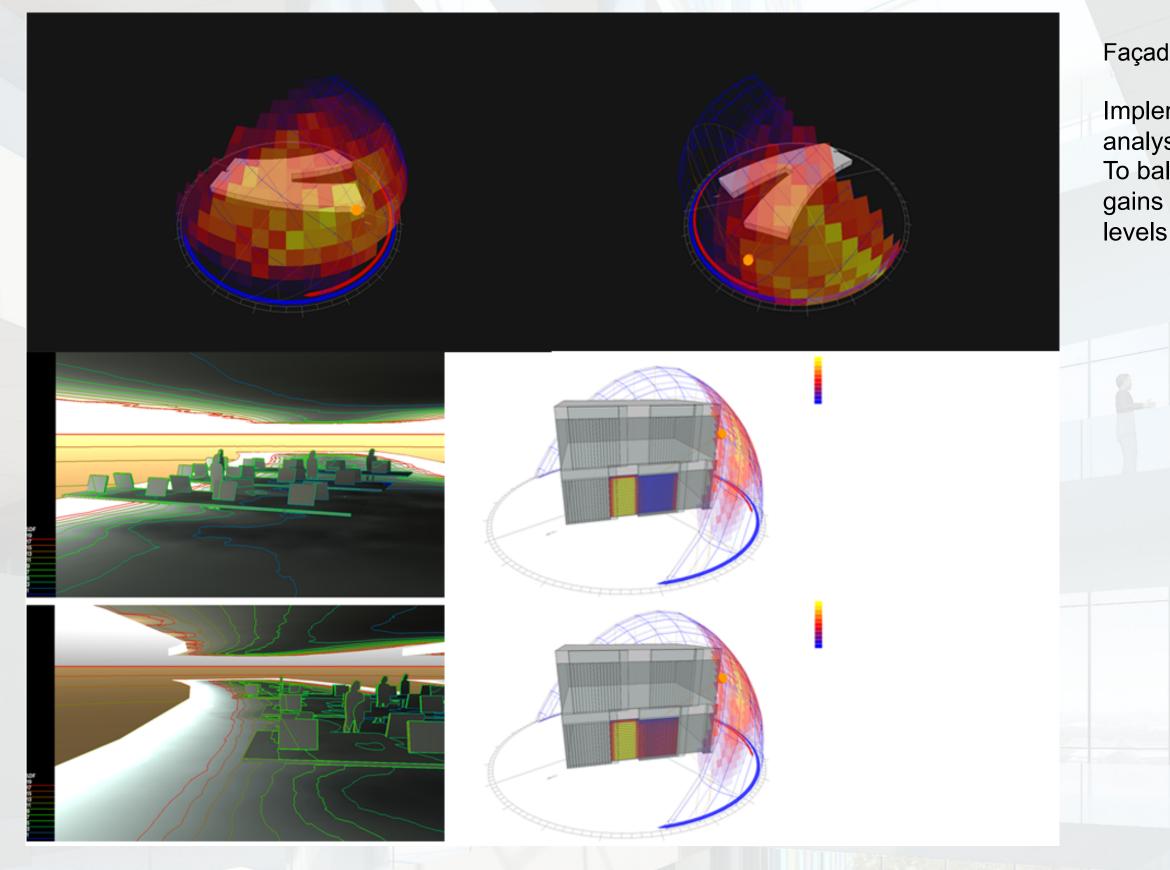
- **Right size** 
  - Orientation
- Local Climate
- **Correct Building Orientation**
- **Energy Model** 
  - Code Minimum and Efficient





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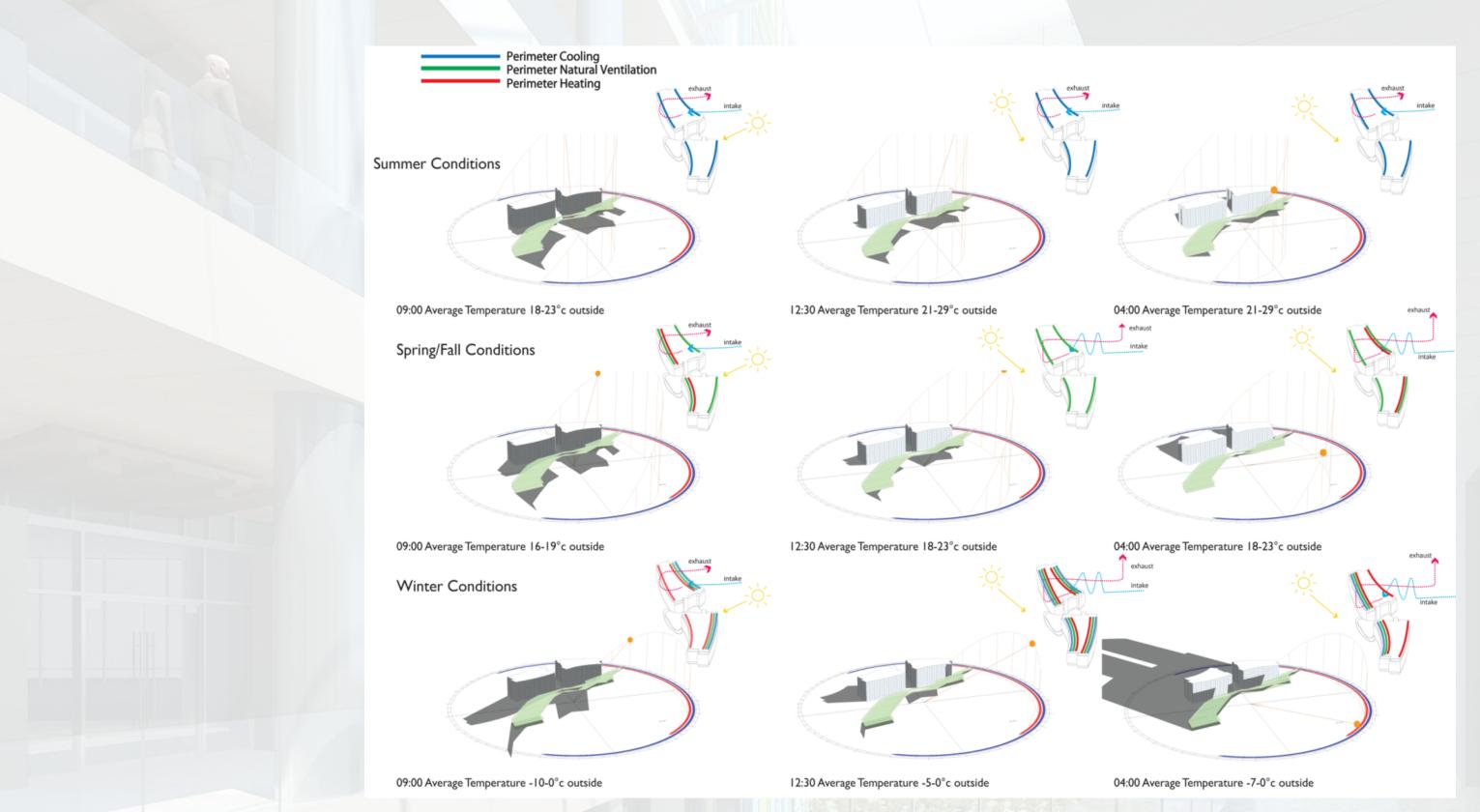
Façade and Orientation

Implementing several parallel analyses To balance glare, perimeter heat gains and day lighting at optimal



### **Detailing Specific Conditioning Strategy**

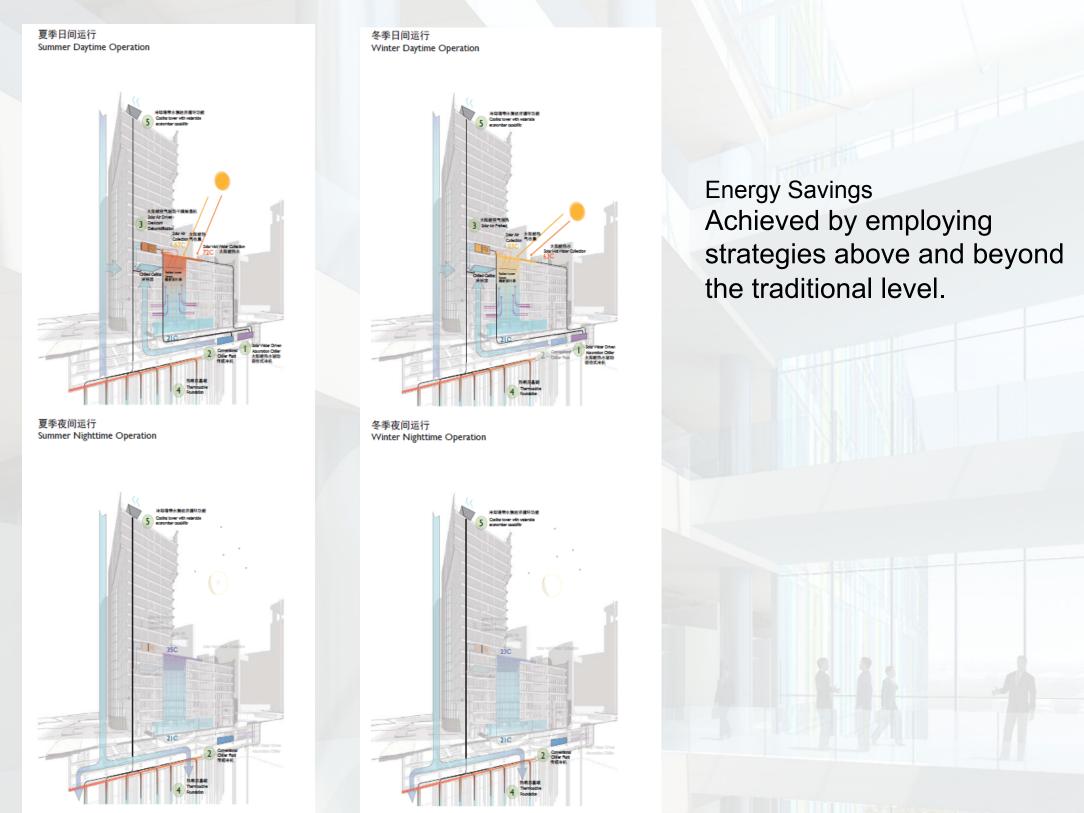
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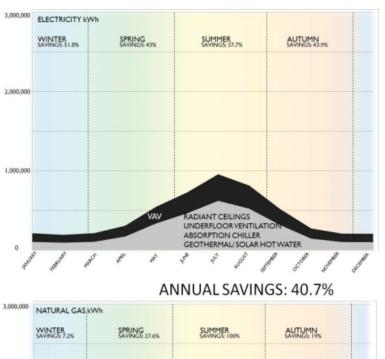


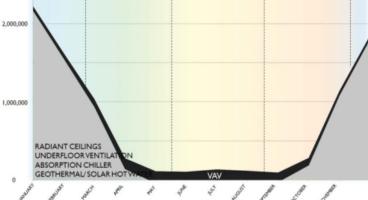
### **Detailing Specific Conditioning Strategy**

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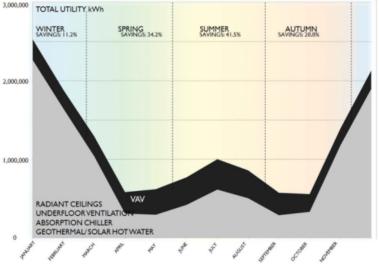


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#### ANNUAL SAVINGS: 13%

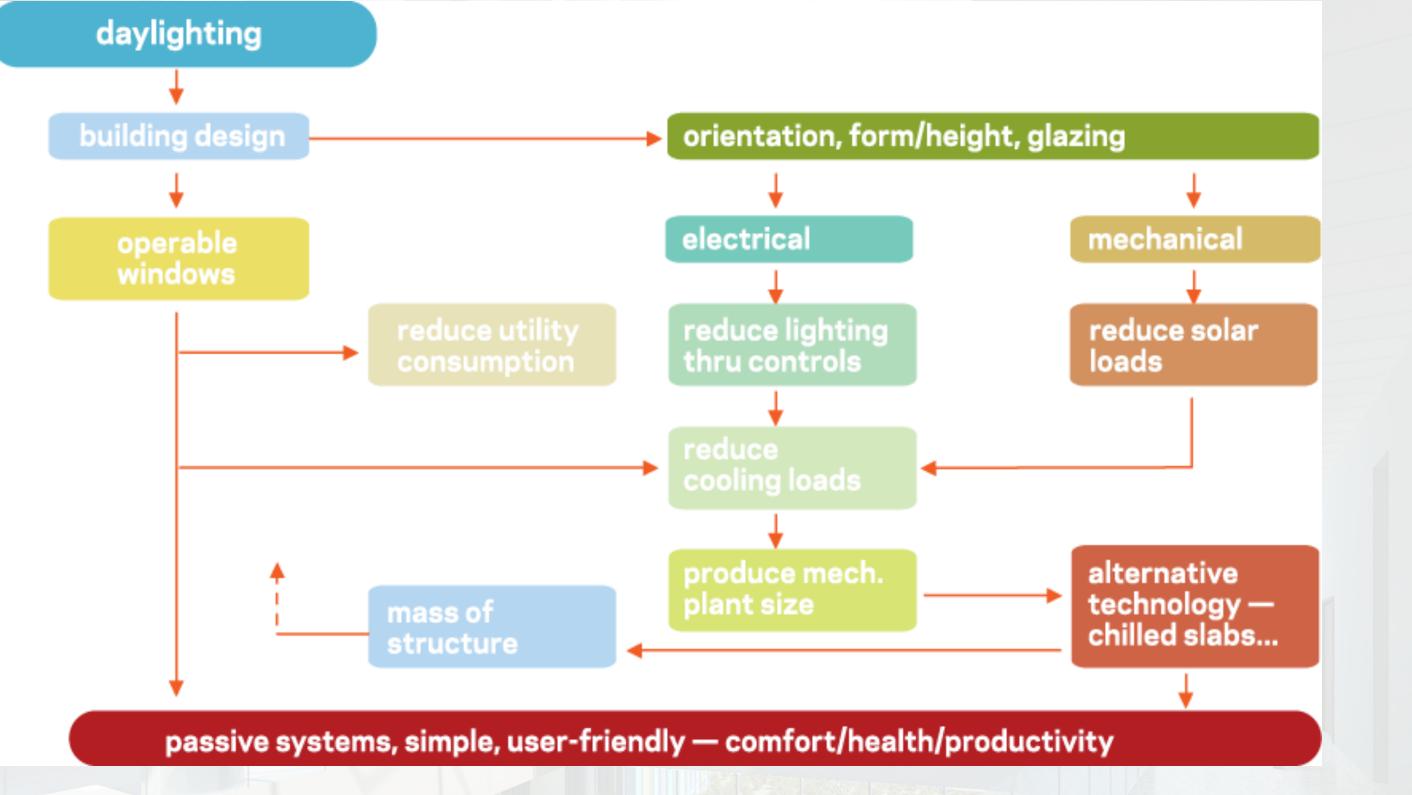


ANNUAL SAVINGS: 24%



Multiple benefits from singular activities.....

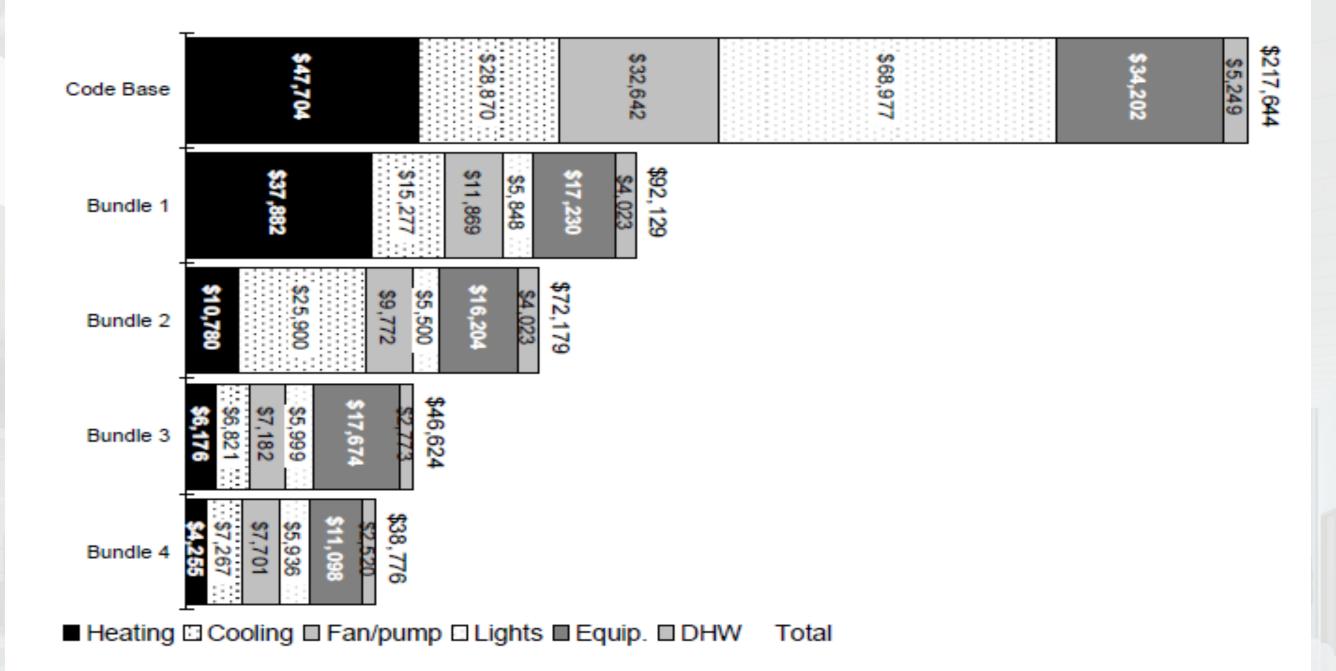
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### Figure 1 Annual Energy Costs for Bundles by End Use



**FINDING OUR BALANCE – INTEGRATED SYSTEMS** 

### RENEWABLE **ENERGY**

### **TONS OF CO2 SAVINGS**

Solar Thermal System **Photovoltaic electrical** 

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High Perf. Envelope Day lighting/Controls High Efficiency Lighting **Operable Windows/ Fans** Radiant Systems/ DOAS Reduced Equipment Load



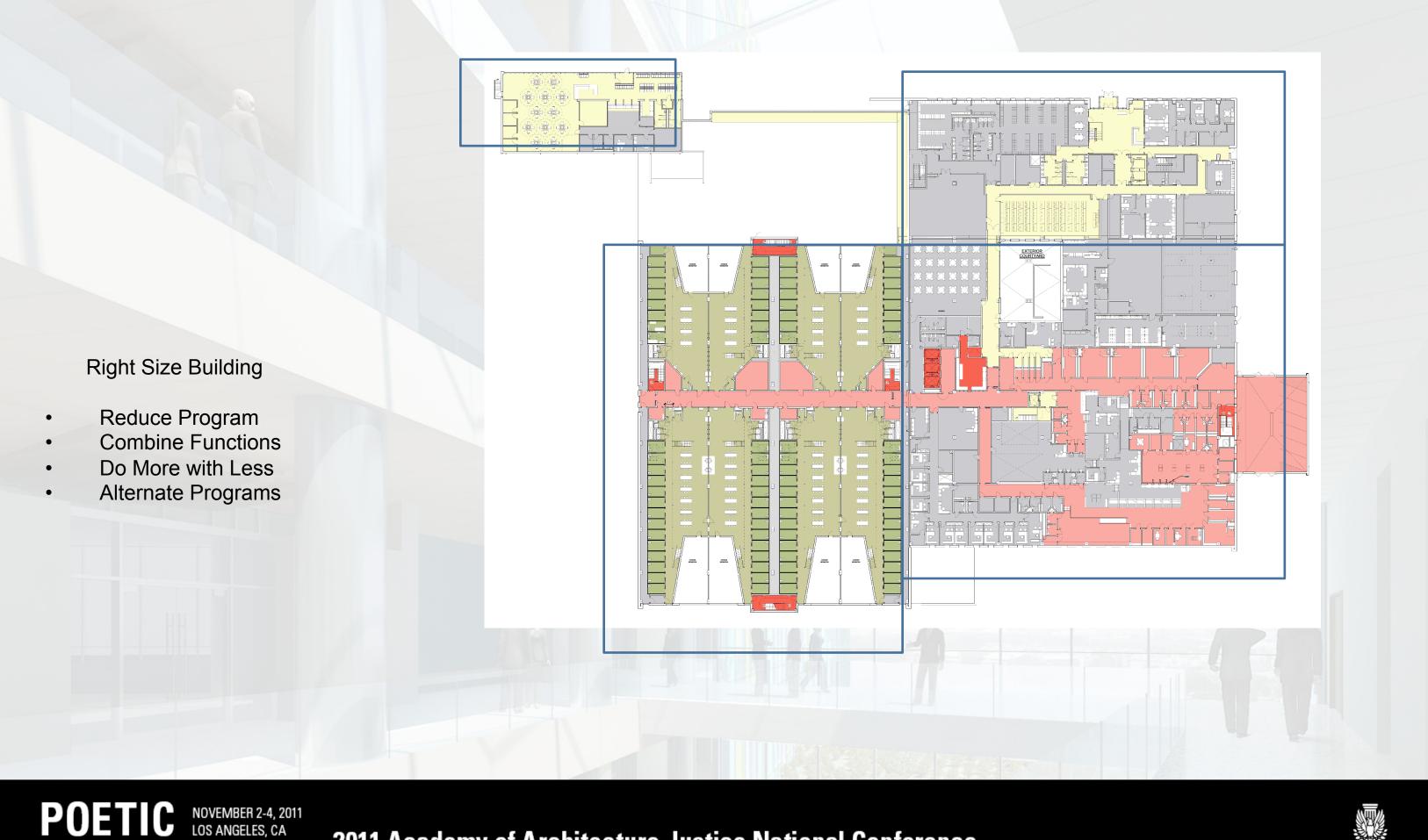
# Optimize Budget

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**AIA** 







### Suitability of Materials

- Durability
- Cost

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PRAG

- Regional
- Recycled
  - Maintenance









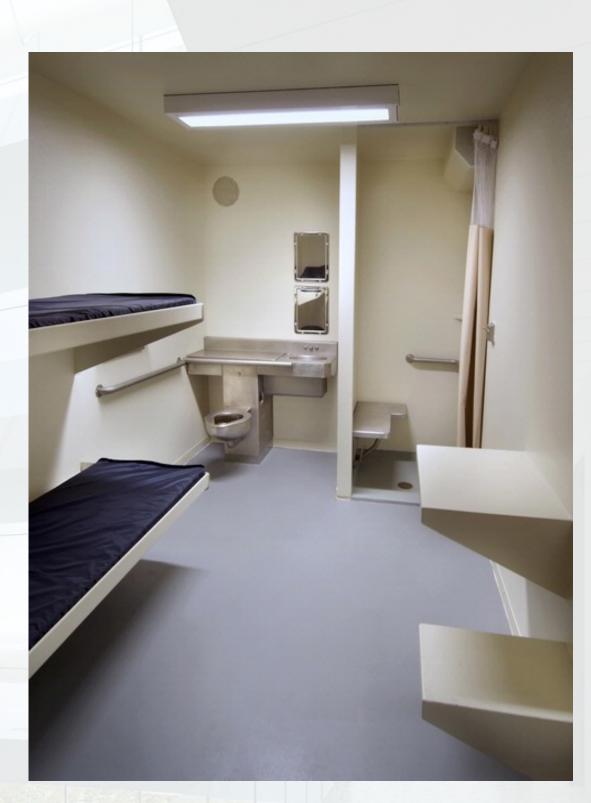
### WATER – An Emergency

 Landscaping •Cisterns •Showers •Penal Toilets - 1.28GPF •42,000 gal/day

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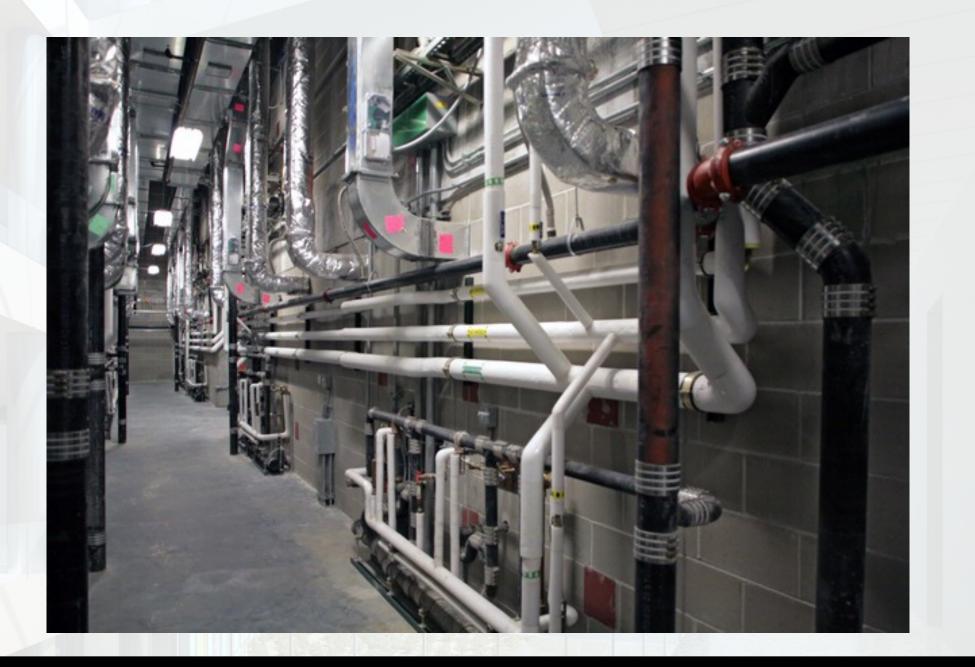


### Systems

- Durability
- Materials
- **Staff Abilities**
- **Trustee Abilities**
- Service
- Maintenance

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Life Cycle Costs





### Market

- Move Quickly to
- Capitalize
- Keep Field Open
- **Consider Trends**
- in Market
- **Design Flexibility**
- Add Alternates
- Estimates

#### Douglas County Adult Dtn & Law Enforcement Ctr Douglasville, GA

#### BCR #005 06/23/2010

			Direct Work Subtotal w/o Subgd & CCIP	General Conditions	Construction Contingency	Fee	Project Total	
Concept Estimat								Action List
gst= 511	1,410							
Concept Estimat	ite- 6/2/2010							
get= 511	1,410							
423,650 st H0	DUSING & DETENTION		\$79,607,976	5,244,724	2,388,239	1,871,358	89,112,297	
87,760 st LE	C & VISITOR		\$15,243,119	1,004,245	457,294	358,323	17,062,981	
60	acept Estimate - 6/2/2010							
		TOTAL COST	94,851,095	6,248,969	2,845,538	2,229,681	108,175,278	
		SF COST	\$ 185.47	\$ 12.22	\$ 5.58	\$ 4.38	\$ 207.61	
Г		TOTAL ESTMATE			T	OTAL ESTIMATE	108,175,278	
		SF COST				SF COST	\$ 207.61	
		CURRENT OWNER'S BUDGET			CURRENT OF	WNER'S BUDGET	101,000,000	
		SAVINGS (-) / OVERRUN (+) TO BUDGET		SAV	NGS (-) WERRUN	(+) TO BUDGET	5,175,278	5.12%
			•				-	

#### Accepted - Owner & Designer

		SAVINGS (-) (OVERRUN (+) TO BUDGET				
		SF COST				
		TOTAL ESTIMATE WITH ACCEPTED REVISIONS	91,682,748	8,248,989	2,750,483	
		TOTAL ACCEPTED REVISIONS	(3,168,340)		(95,050	
_	8 6. M. 200	side at HOK's direction.	(159(500)		(40 GI)	
	VE-SE	Delete Sunscreen Byebrow at top of LEC, add 3' wide airfoil sunshade at 4th floor south	(159,360)		(4,781)	1
A	VE-58	Adjust Visitation Stations based on HOK new count (145 total was 172).	(122,222)		(3,667)	1
A	VE-46	Double bunk all general Housing cells and delete 16 double cells from larger Dayrooms (- 64 dblas total nets = 1,616 beds including SuperMax).	(1,515,858)		(45,476)	1
	VE-41.01	Reduce Housing, Support and LEC roof parapets to 3'-0" (from roof structure) maximum in leu of 3'-6".	(21,888)		(657)	
A	VE-38	Delete LEC Ribbed Metal Panel Screen Wall	(48,050)		(1,442)	1
A	VE-32	Change 2nd Classification Housing Level to 4 Man Cells 4 Pods x 16 ea + 4 Pods x 8 ea. (96 ea 4 Man Cells) in lieu of 192 ea 2 Man Cells.	(296,146)		(8,884)	b.
A	VE-27	Fire Alarm to NFPA 72 - Style 4 Class B standards	(94,981)		(2,849)	
A	VE-09	Delete Space Saver System, turnish on Owner's FF&E Budget.	(909,844)		(27,295)	1

#### Accepted - Owner Pending Design Verification

VE-16	Balance Site grading to eliminate spoils haui-off.	(333,450)		(10,004)	
VE-37	Reduce Cell Size to 6'8' wide (delete ~10,000 st structure)	(737,612)		(22,128)	
	TOTAL OWNER ACCEPTED REVISIONS PENDING DESIGN	(1,071,082)		(32,132)	
	TOTAL ESTIMATE WITH ACCEPTED REVISIONS	90,611,684	6,248,989	2,718,351	
	SF COST	\$ 177.18	\$ 12.22	\$ 5.32	\$
	SAVINGS (-)/OVERRUN (+) TO BUDGET				

2010-06-23 Douglas CADLEC BCR 05 Mtg Update

2 of 4

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# Turner NEW SOUTH

#### Action List

(21,388)	(958,527)
(2,233)	(100,063)
(6,962)	(311,992)
(1,130)	(50,621)
(515)	(23,053)
(35,634)	(1,596,967)
(2,873)	(128,762)
(3,746)	(167,887)
(74,479)	(3,337,878)
2,155,202	102,837,400
421	\$ 201.09
	1,837,400

May be able to price as Alternate or Owner purchase.
Owner Approved, HOK & N&B.
Maintain for LEC Roottop HVAC units.
Owner Approved, HOK confirms this meets code compliance.
New assumes 6'-8" clear cells confirm wHOK
Visit Bidg (33 Active, 32 Future), Housing (2 Wall, 1 Atty ea
Dayrm, 3 Mobile Carts for Infirmary/Mental Health/SuperMax)

#### Action List

(7,838)	(351,292)	
(17,339)	(777,080)	4
(25,178)	(1,128,372)	
(25,178) 2,130,024	(1,128,372) 101,709,028	
	101,709,028	
2,130,024	101,709,028	

	Owner Approved, HOK CMI to provide design layout to confirm.
	HOK needs confirmation, approval from Authority Having
1	Jurisdiction (AHJ).

#### Printed: 6/23/2010, 2:32 PM



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# Contribute To A Sustainable Community



### Invest in People

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- Justice Third Largest Employer in Nation
- STAFF FIRST Single Greatest Expense
- Community Contribute, Employ, Visit ٠
  - Detainees Safety, Due Process, Rehabilitate
    - Net positive Influence





**Design Community** 

•Staff / Operations Focus

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Understand Actual Costs – Staff / Life Cycle

•Develop Clearing House of Information

•Challenge Your Clients -What can your Facility achieve?







# What's

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**Building Science** – Integrated Approach

Performance based future for detention.....

✓ Consider the environment ✓ Systems focused ✓ People centric ✓ Establish metrics

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# **1** Discovery + Definition

Climate and Place Analysis Benchmarking Renewable Energy Opportunities Finding the Right Balance

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# **REDUCING THE LOAD** - FINDING THE RIGHT BALANCE





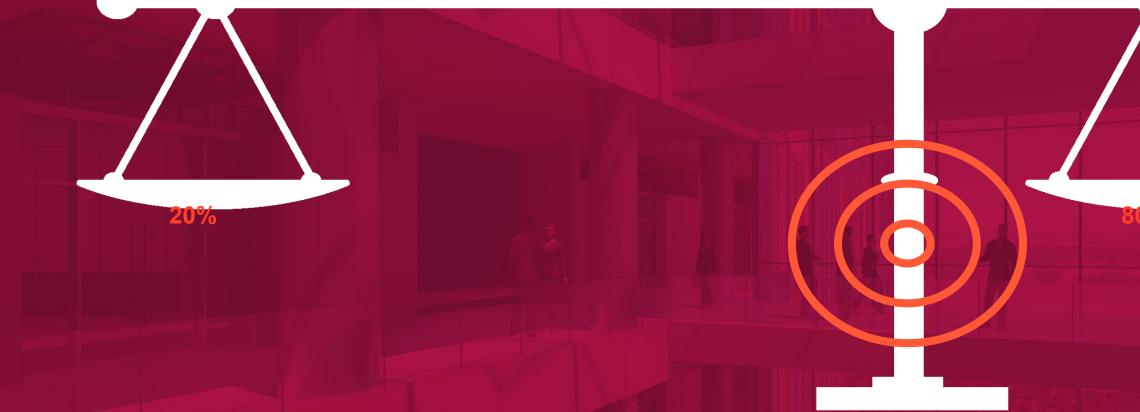




# **EXCHANGING EFFICIENCIES FOR RENEWABLES:** THE 80-20 BALANCE

Reducing the load by 80 percent using today's technology will require a whole new type of architecture."

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# **2** Macro-Scale Strategies

# Massing and Orientation Site and Planning Concepts

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2





# **3** Passive Strategies

2

3

- Final plan and Section
- Site Development Improve envelope thermal efficiency
- Redefine comfort standards
- Implement passive heating and cooling strategies
- Solar energy and solar thermal sources
- Natural light for day lighting and sunlight for heating
- Shading of glass to reduce cooling loads
- Locate energy supply close to point of use

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Selective glass and composite glazing systems





# **5** Renewable Systems

**5** Renewable Systems Solar Wind Hydropower **Biomass Biofuels Cellulosic Ethanol** Artificial Photosynthesis

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2

3

4

5





# **Realization: REGIONAL ISSUES DICTATE OUTCOMES**

- 1. Cost of electricity
- 2. Source of electricity
- 3. Climate
- 4. Incentives

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Some states are more advantaged than others!





# What did we learn? PROCESS

# **FORM FOLLOWS PERFORMANCE:**

Model, Measure, Manage

Cost Trading

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Every BTU counts: No silver bullet

Integrated role of team players is essential

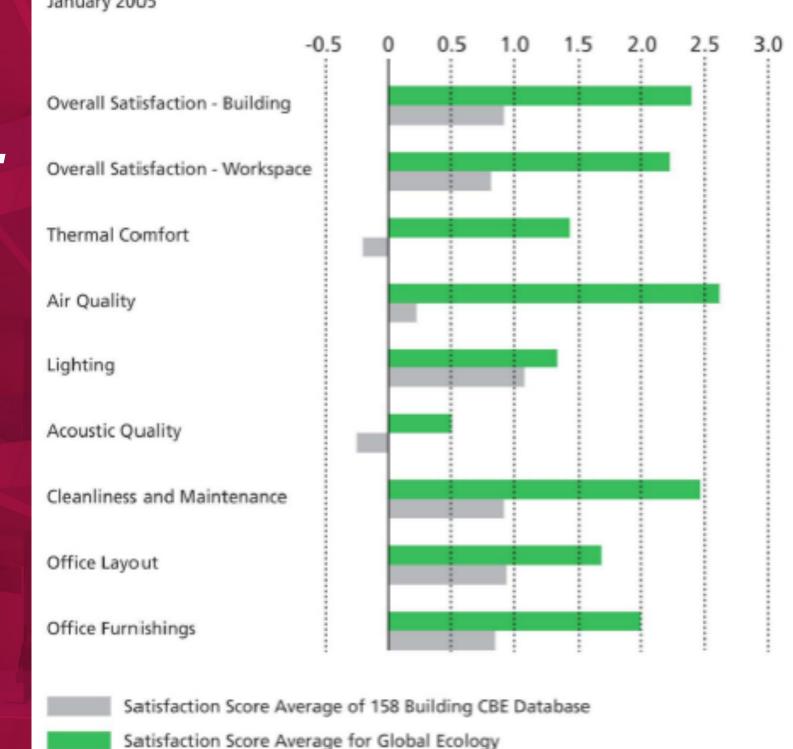




# What did we learn?

# It's About People....

Post-Occupancy Evaluation Survey (prepared by Center for the Built Environment) GLOBAL ECOLOGY RESEARCH CENTER January 2005



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# Buildings do not use energy

# -People do...

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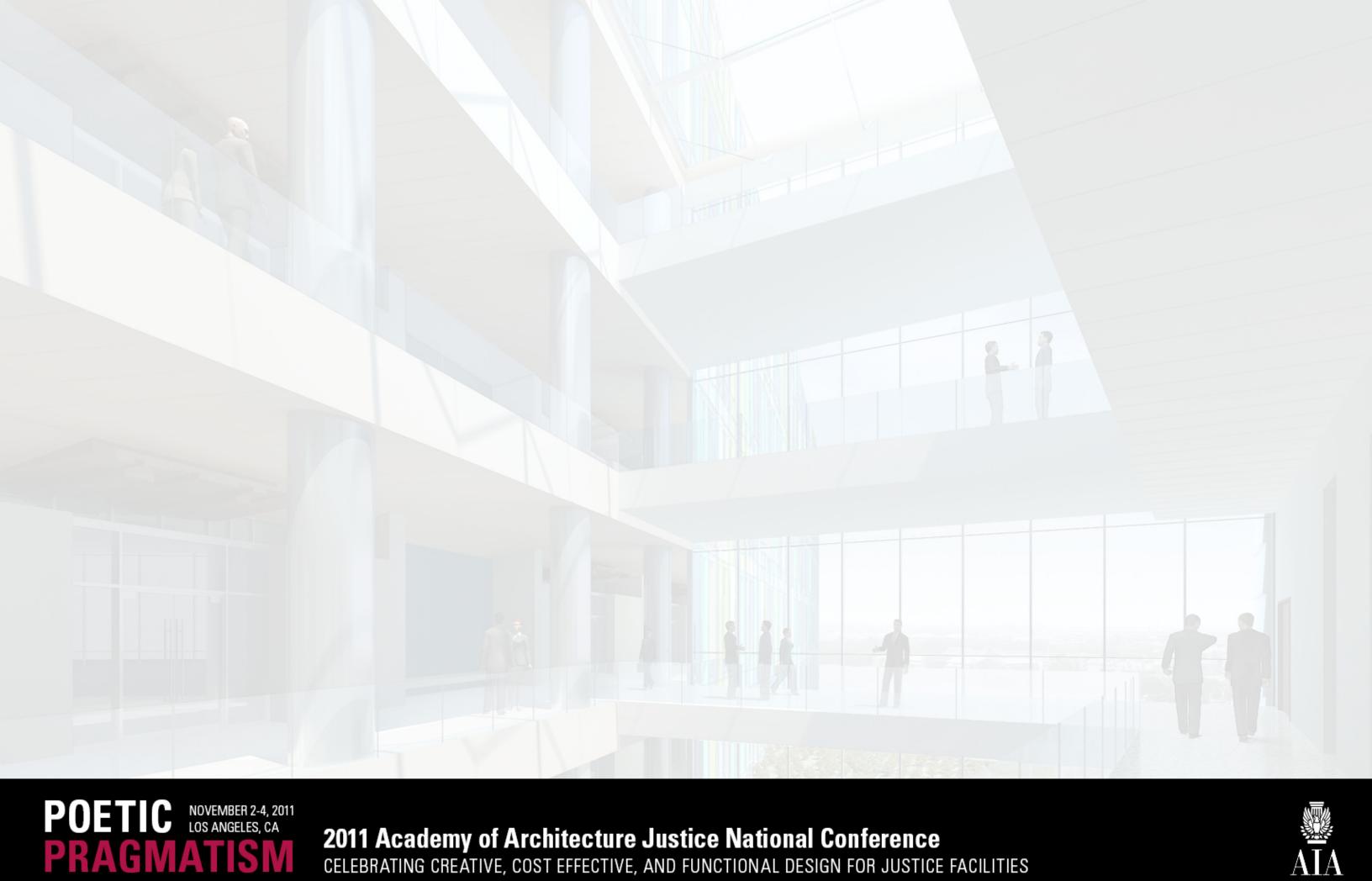
# AND VOUP

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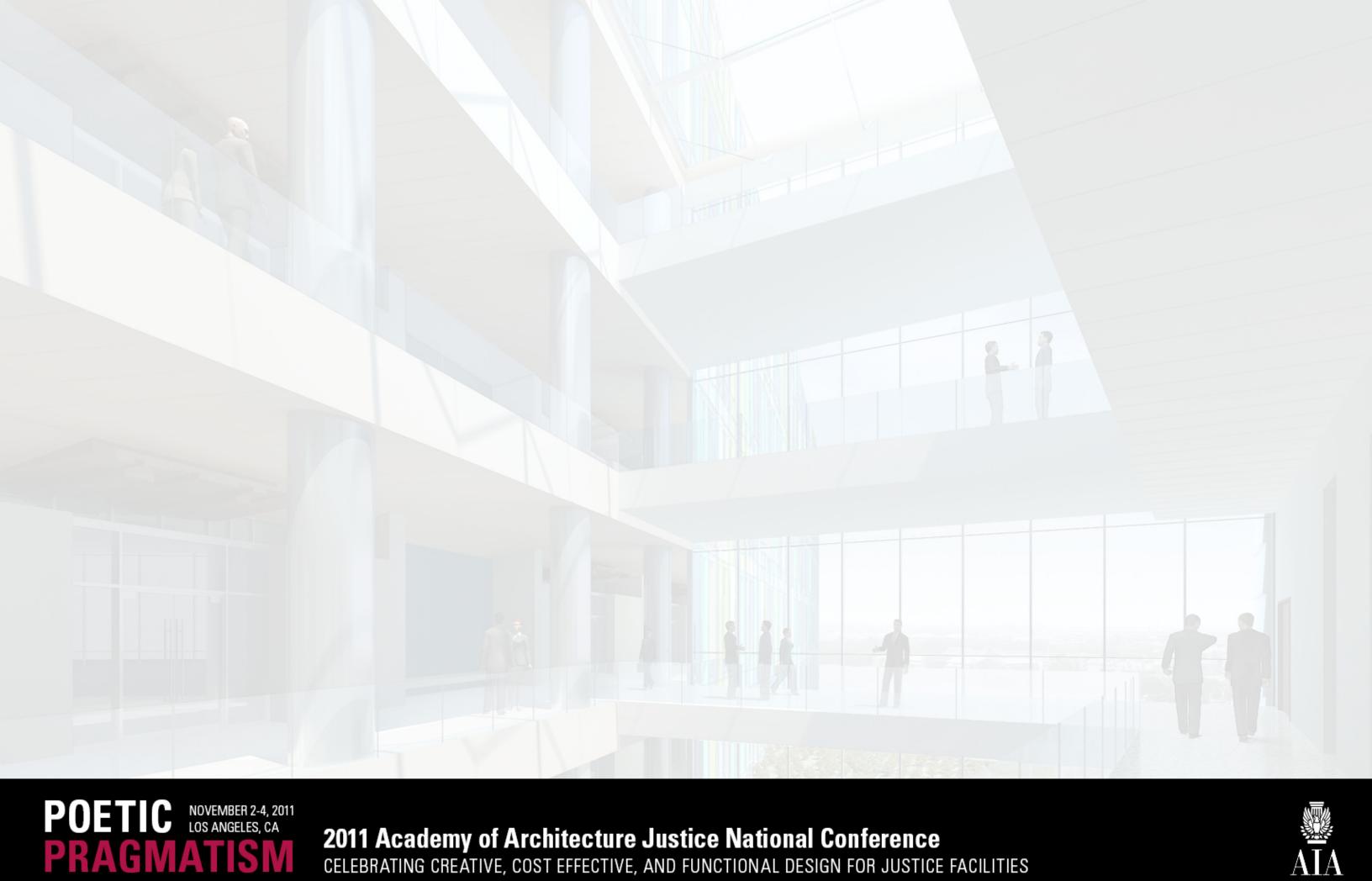
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# Triple Net Zero.....

Zero Turnover Staff First • Zero Waste

• Site

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- Building ullet
- Construction •
- **Zero Energy Consumption** 
  - Reduce Load •
  - Create Energy  $\bullet$



