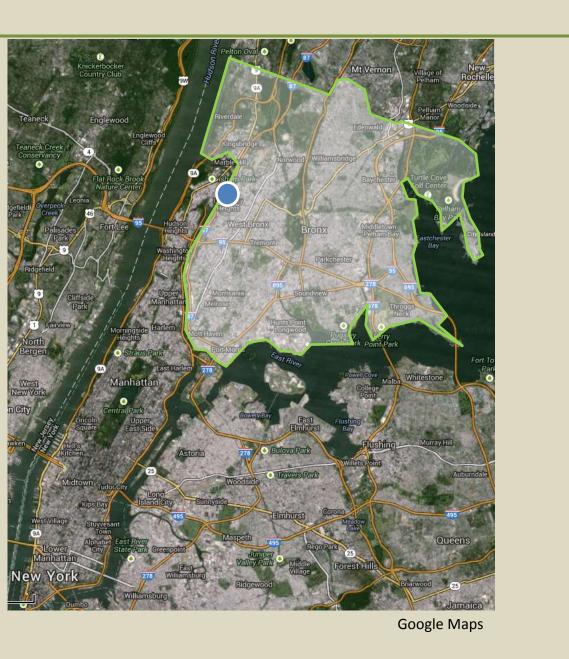


Jarret J. Clark Final Presentation 4.14.14

- ➤ Lighting Design Concept
- ➤ Law Classroom
 - ➤ Architectural Breadth
- ➤ Electrical Depth

➤ Main Lobby

- ➤ Photo-voltaic Breadth
- ➤ Conclusions





Location and Site

➤ Bronx Community College, Bronx, New York

Size

> 98,600 square feet

Building Cost

> \$74 million (\$104 million budget)

Address

➤ University Avenue West 181 Street Bronx Community
College, Bronx, New York

- > Introduction
- ➤ Main Lobby
- ➤ Law Classroom

➤ Lighting Design Concept

- > Architectural Breadth
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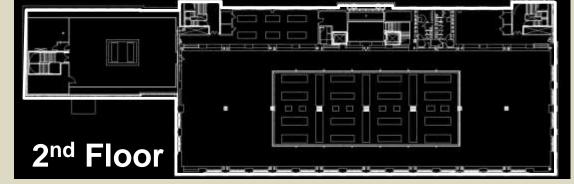
Information Lobby

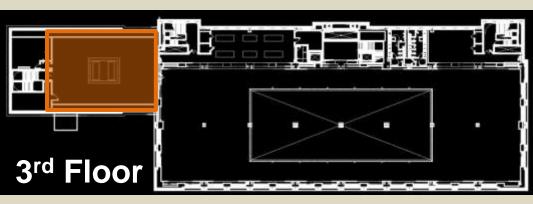
Main Lobby

Corridor

Law Classroom











The Bronx Community College North Instructional Building		
➤ Introduction	Concept	
➤ Lighting Design Concept		
> Main Lobby		
➤ Law Classroom		Overall Lighting Concept
> Architectural Breadth		
> Electrical Depth		
> Photo-voltaic Breadth		
> Conclusions		
➤ Electrical Depth ➤ Photo-voltaic Breadth		

The Bronx Community College North Instructional Building		
> Introduction	<u>Lighting Concept</u>	
➤ Lighting Design Concept		
➤ Main Lobby	Utilize Light to Create Depth and	
➤ Law Classroom	Dimension Among the	
> Architectural Breadth	Architectural Features	
➤ Electrical Depth		
> Photo-voltaic Breadth		
➤ Conclusions		



The Bronx Community College	North Instructional Building		
➤ Introduction	<u>Design Criteria</u>	<u>Lighting Concept</u>	
Lighting Design Concept	Use light to add depth and		
➤ Main Lobby	dimension to the space	Utilize Light to Create Depth and	
➤ Law Classroom	 Visual interconnection between spaces 	Dimension Among the	
> Architectural Breadth			
➤ Electrical Depth	 Guide occupants to their destination 	Architectural Features	
> Photo-voltaic Breadth	Maintain Symmetry and		
> Conclusions	 Maintain Symmetry and Visual Clarity 		

The Bronx Community College	North Instructional Building		
> Introduction	<u>Design Criteria</u>	<u>Lighting Concept</u>	
Lighting Design Concept	Use light to add depth and		
➤ Main Lobby	dimension to the space	Utilize Light to Create Depth and	
➤ Law Classroom	Visual interconnection between spaces	Dimension Among the	
> Architectural Breadth	between spaces		
➤ Electrical Depth	• Guide occupants to their destination	Architectural Features	
> Photo-voltaic Breadth	Maintain Symmetry and		
> Conclusions	Visual Clarity Visual Clarity		

The Bronx Community College	North Instructional Building		
➤ Introduction	<u>Design Criteria</u>	<u>Lighting Concept</u>	<u>Solutions</u>
➤ Lighting Design Concept	Use light to add depth and		Architectural Cove Lighting
➤ Main Lobby	dimension to the space	Utilize Light to Create Depth and	 Adds Depth and Visual Interest Creates Visually Interconnected Transition
➤ Law Classroom	• Visual interconnection between spaces	Dimension Among the	Minimalistic Lighting Fixtures to Eliminate Distraction
> Architectural Breadth	•		
➤ Electrical Depth	 Guide occupants to their destination 	Architectural Features	Decorative Fixtures unify with Architectural Style
➤ Photo-voltaic Breadth	A Nationalis Company and		
> Conclusions	 Maintain Symmetry and Visual Clarity 		

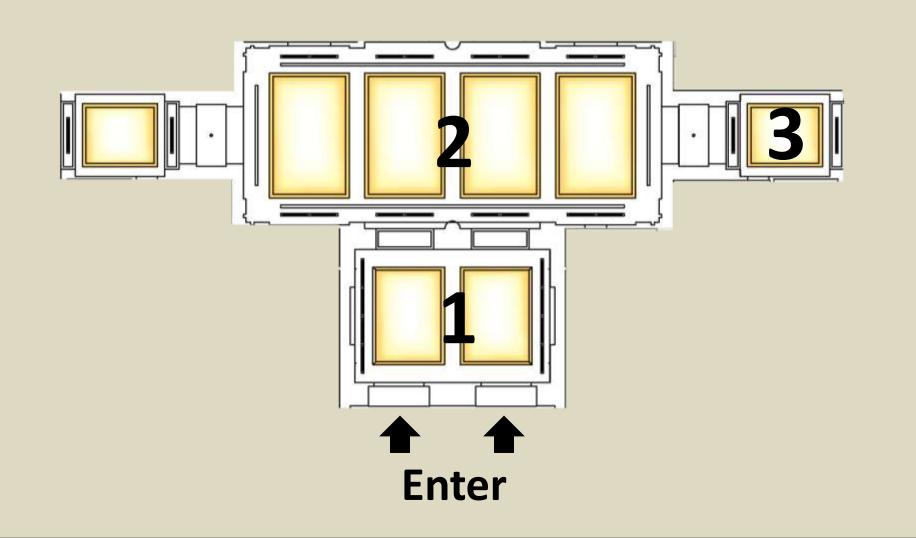
The Bronx Community College North Instructional Building				
> Introduction	<u>Design Criteria</u>	Cove Lighting Ceiling Design	<u>Solutions</u>	
➤ Lighting Design Concept	Use light to add depth and dimension to the space		 Architectural Cove Lighting Adds Depth and Visual Interest 	
➤ Main Lobby			Creates Visually Interconnected Transition	
➤ Law Classroom	• Visual interconnection between spaces		Minimalistic Lighting Fixtures to Eliminate Distraction	
> Architectural Breadth				
> Electrical Depth	• Guide occupants to their destination		Decorative Fixtures unify with Architectural Style	
➤ Photo-voltaic Breadth	Maintain Symmetry and			
> Conclusions	Visual Clarity	Enter		

- > Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- > Electrical Depth
 - ➤ Photo-voltaic Breadth
- > Conclusions

Design Criteria

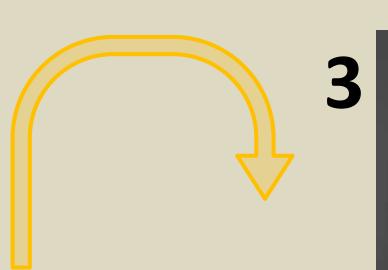
- Use light to add depth and dimension to the space
 - **Visual interconnection** between spaces
- Guide occupants to their destination
- Maintain Symmetry and Visual Clarity

Cove Lighting Ceiling Design











- ➤ Lighting Design Concept
- ➤ Main Lobby

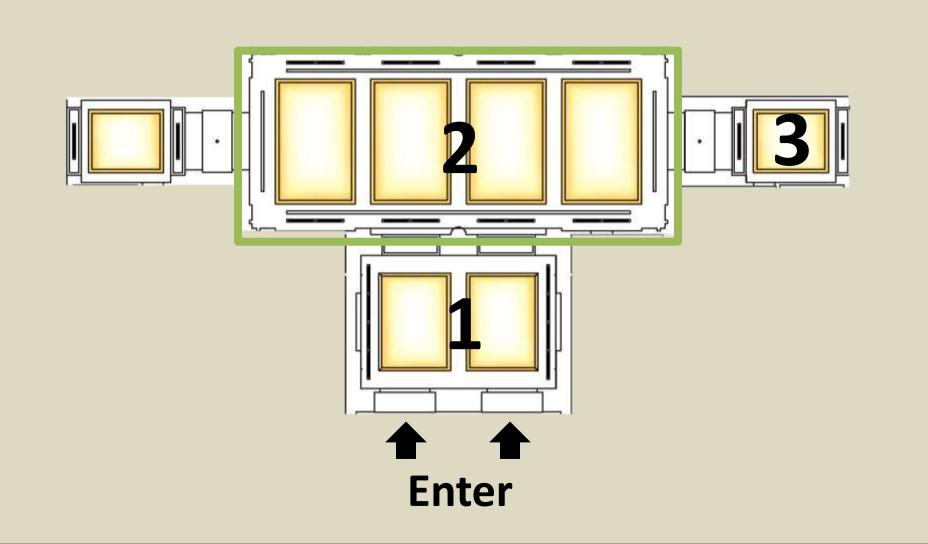
> Introduction

- ➤ Law Classroom
 - > Architectural Breadth
- > Electrical Depth
 - ➤ Photo-voltaic Breadth
- > Conclusions

Design Criteria

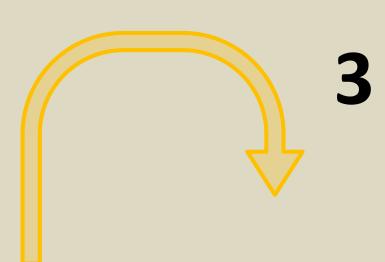
- Use light to add depth and dimension to the space
 - **Visual interconnection** between spaces
- Guide occupants to their destination
- Maintain Symmetry and Visual Clarity

Cove Lighting Ceiling Design











The Bronx Community College North Instructional Building		
➤ Introduction	Lighting Depth	
➤ Lighting Design Concept		
> Main Lobby		
➤ Law Classroom		Main Lobby
> Architectural Breadth		
> Electrical Depth		
> Photo-voltaic Breadth		
> Conclusions		

The Bronx Community College North Instructional Building		
➤ Introduction➤ Lighting Design Concept➤ Main Lobby	Space Dimensions Area – 531 sq. ft. Ceiling Height – 11' Approximate Length– 28' Approximate Width– 18'	
➤ Law Classroom	Approximate with 10	
> Architectural Breadth		
➤ Electrical Depth		
➤ Photo-voltaic Breadth		
> Conclusions	N 1st Floor	

The Bronx Community College | North Instructional Building Space Dimensions > Introduction Design Criteria Spacious Social Environment Area – 531 sq. ft. ➤ Lighting Design Concept **Bright Uniform Perimeter** Ceiling Height – 11' ➤ Main Lobby Approximate Length— 28' Way-finding Approximate Width-18' ➤ Law Classroom Clean Minimalistic Lighting > Architectural Breadth Maintain Symmetry & > Electrical Depth **Context of Architecture**

➤ Photo-voltaic Breadth

> Conclusions

<u>Additional Criteria</u>

Common Applications | Reading and Writing | Print Media | 12pt Font | Matte Paper

ecommended Maintained Illuminance Levels			
Avg. Horizontal @ 2.5' Avg: Min			
100 lux	2:1		

ANSI/ASHRAE/IES Standard 90.1-2010 Space by Space Method

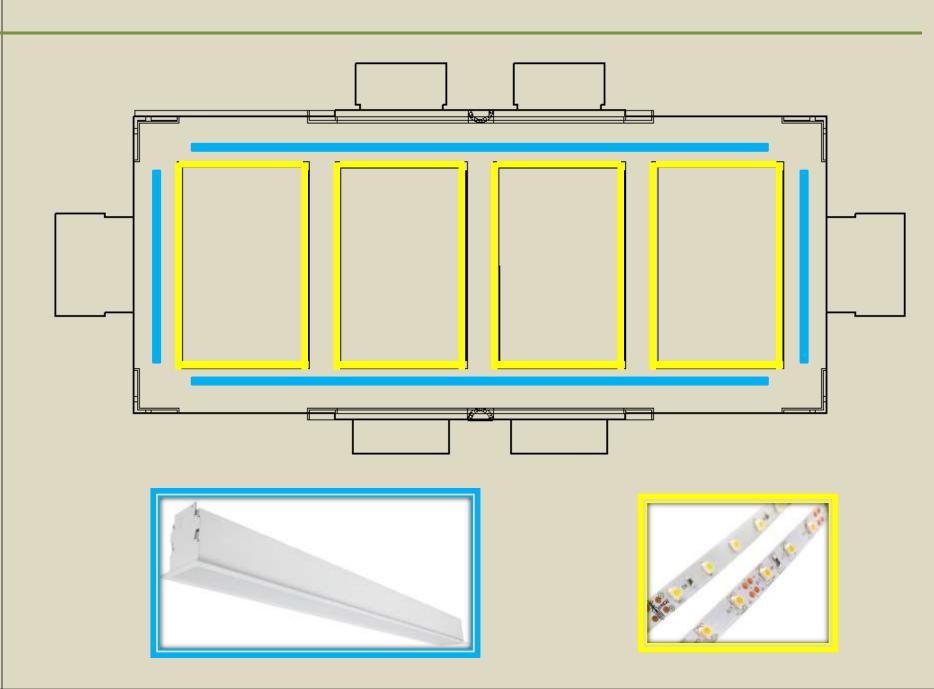
Lighting Power Density		
Space Type	Max Allowable LPD	
Lobby	0.9 W/sq.ft.	

- > Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- > Electrical Depth
 - ➤ Photo-voltaic Breadth
- > Conclusions

Design Criteria

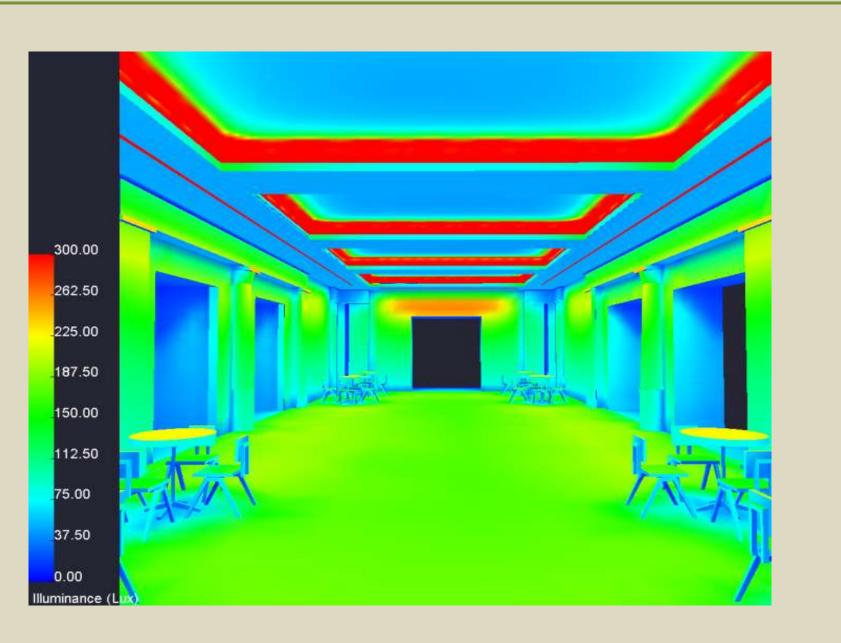
- Spacious Social Environment
 - Bright Uniform Perimeter
- **Way-finding**
- Clean Minimalistic Lighting
- Maintain Symmetry & **Context of Architecture**





- > Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- ➤ Electrical Depth
 - ➤ Photo-voltaic Breadth
- > Conclusions

- Spacious Social Environment
 - Bright Uniform Perimeter
- Way-finding
- Clean Minimalistic Lighting
- Maintain Symmetry & Context of Architecture



Illuminance Data					
Calculation Target (lux) Horizontal @ 2.5' (lux)					
verage Illuminance	100	194			
Max. Illuminance	-	233			
Min. Illuminance	-	116			
verage/Minimum	1.5	1.67			

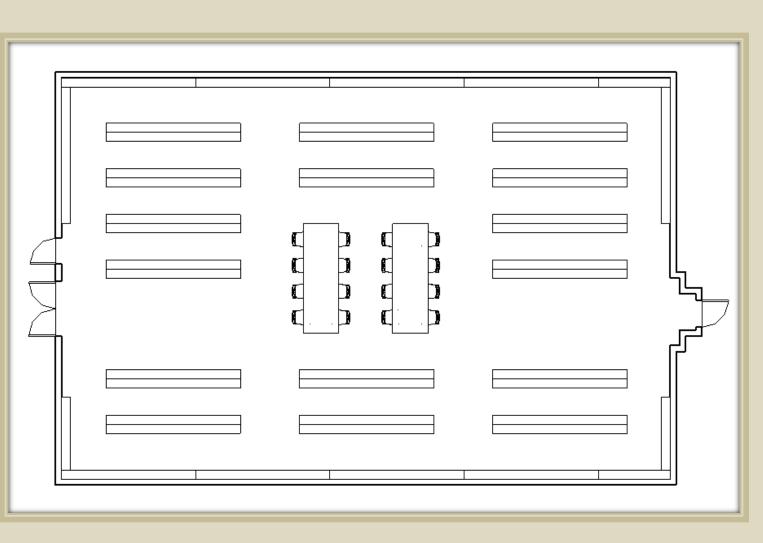
Туре	Lamp/Fixture	Fixture Quantity	Input Watts	Total Watts
L3	LED Rec.Linear	128 ft	7 W/ft	896
L6	Cove Ribbon	208 ft	1.5 W/ft	312

ANSI/ASHRAE/IESNA 90.1 - 2010					
Category Allowable Actual					
Area (ft²)	-	1533			
Input Watts (W)	-	1208			
Power Density (W/ ft²)	0.9	0.79			

The Bronx Community College North Instructional Building		
> Introduction	Architectural Breadth	
➤ Lighting Design Concept		
➤ Main Lobby		
> Law Classroom		Law Classroom and Stacks
> Architectural Breadth		
> Electrical Depth		
> Photo-voltaic Breadth		
> Conclusions		

- > Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- ➤ Electrical Depth
 - ➤ Photo-voltaic Breadth
- > Conclusions





Existing Floor Plan

- <u>Inspirational Quotes</u>
- ➤ Lighting Design Concept

 debate, and ted

 learning and pro
- ➤ Main Lobby

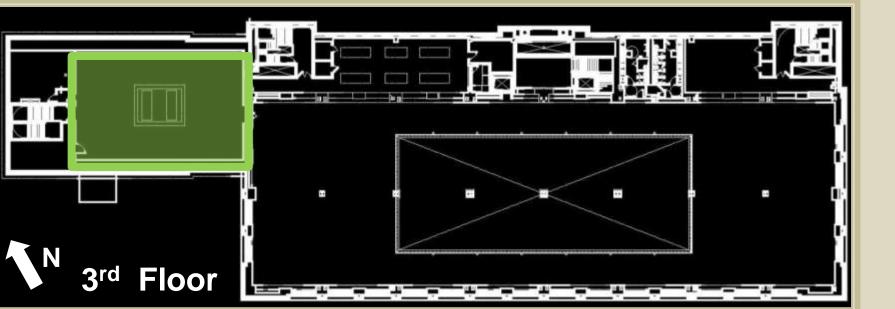
> Introduction

- ➤ Law Classroom
 - > Architectural Breadth
- ➤ Electrical Depth
 - ➤ Photo-voltaic Breadth
- ➤ Conclusions

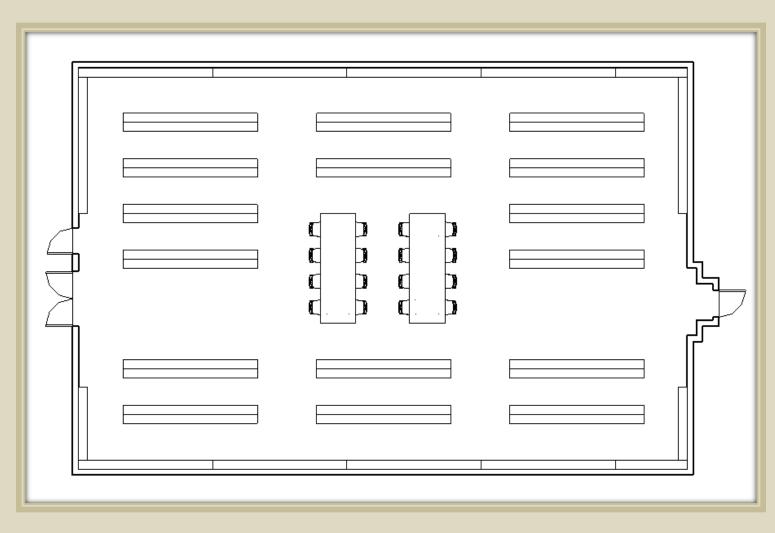
"Social interactions, discussion, debate, and teamwork encourage learning and prompt a design requirement for rooms that can be reconfigured quickly"

"Natural motivation to learn can be rekindled by supportive environments, meaningful activities, by being freed of anxiety, fear, and other negative mental states."

"Intrinsic motivation... is assisted by a level of familiarity and absence of distraction."

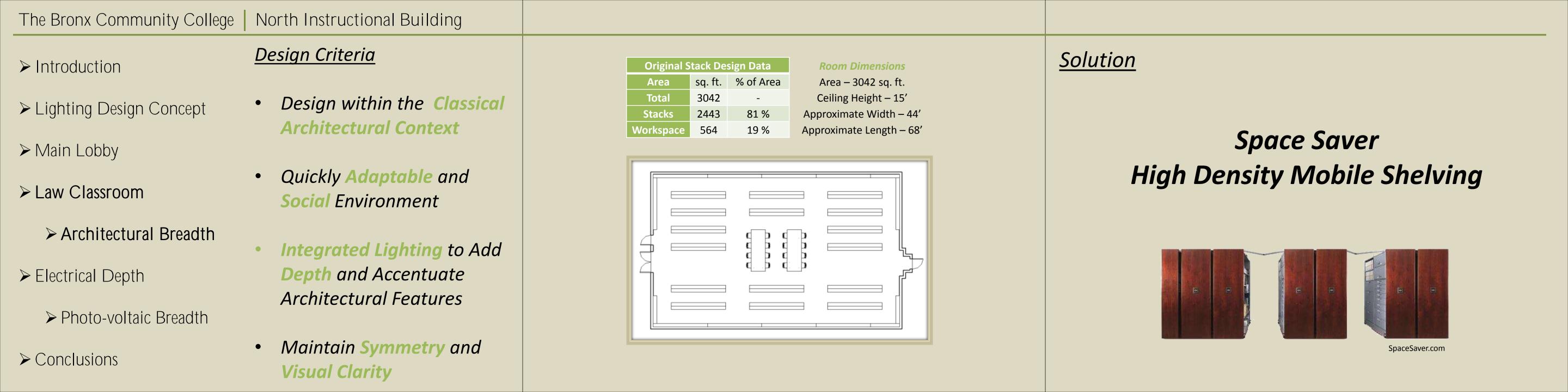






Existing Floor Plan

The Bronx Community College | North Instructional Building Design Criteria > Introduction Design within the Classical ➤ Lighting Design Concept **Architectural Context** ➤ Main Lobby Quickly Adaptable and ➤ Law Classroom **Social** Environment > Architectural Breadth Integrated Lighting to Add **Depth** and Accentuate > Electrical Depth Architectural Features ➤ Photo-voltaic Breadth Maintain Symmetry and **Existing Floor Plan** > Conclusions **Visual Clarity**



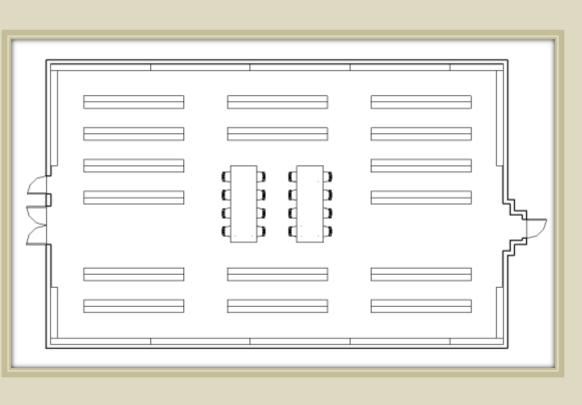
- > Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- > Electrical Depth
 - ➤ Photo-voltaic Breadth
- > Conclusions

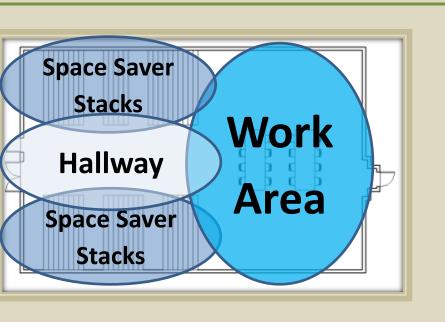
Design Criteria

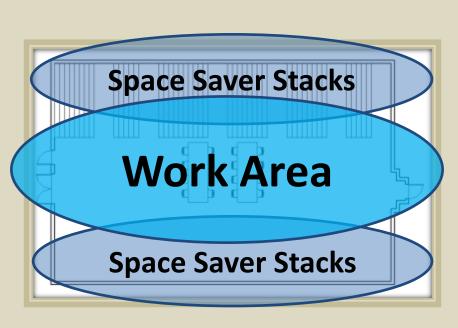
- Design within the Classical **Architectural Context**
- Quickly Adaptable and **Social** Environment
- **Integrated Lighting to Add Depth** and Accentuate Architectural Features
- Maintain Symmetry and Visual Clarity

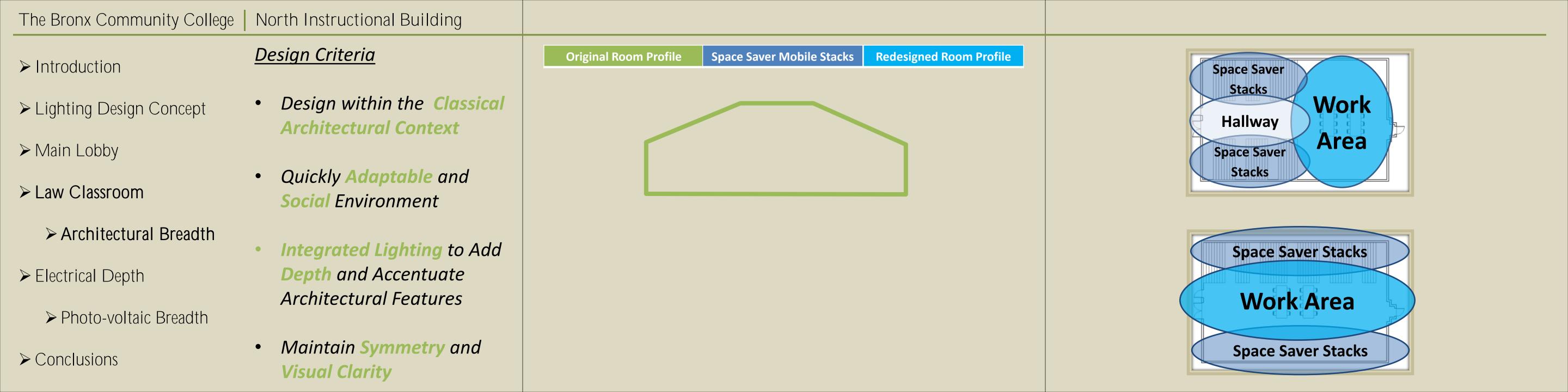
Original Stack Design Data			Room Dimensions			
Area	sq. ft.	% of Area	Area – 3042 sq. ft.			
Total	3042	-	Ceiling Height – 15'			
tacks	2443	81 %	Approximate Width – 44'			
rkspace	564	19 %	Approximate Length – 68'			

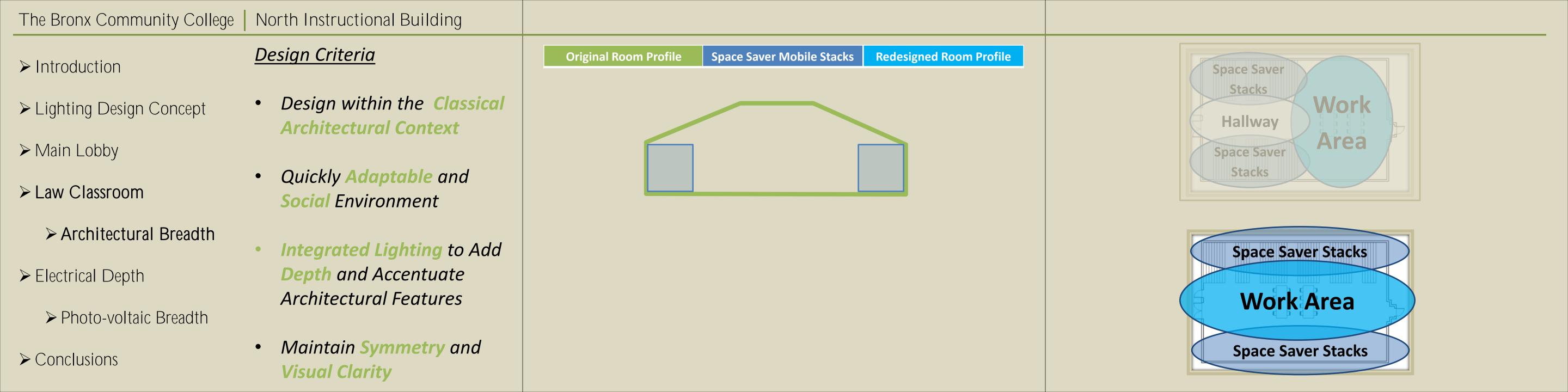
Room Dimensions Area – 3042 sq. ft. Ceiling Height – 15' Approximate Width – 44'

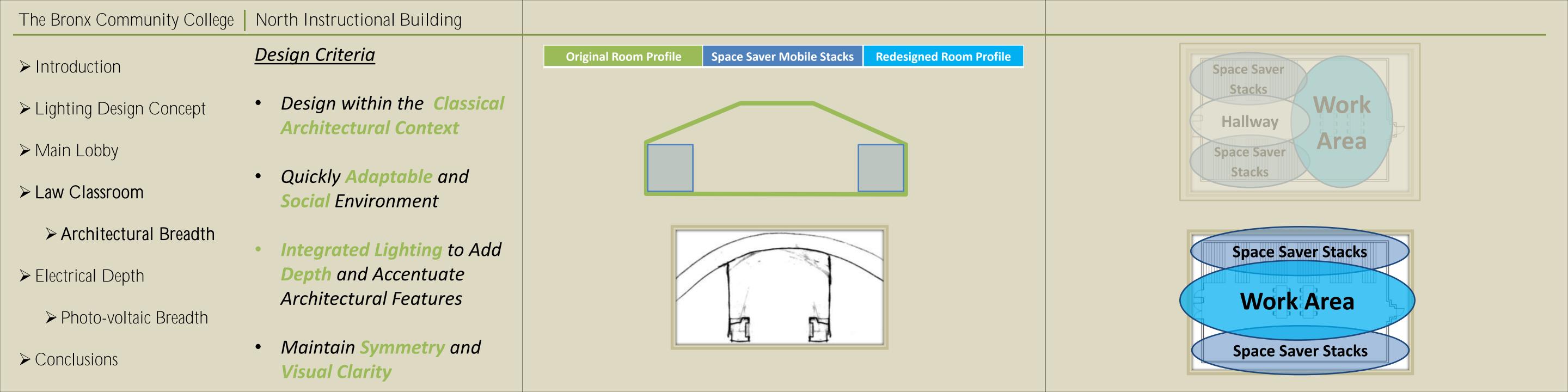


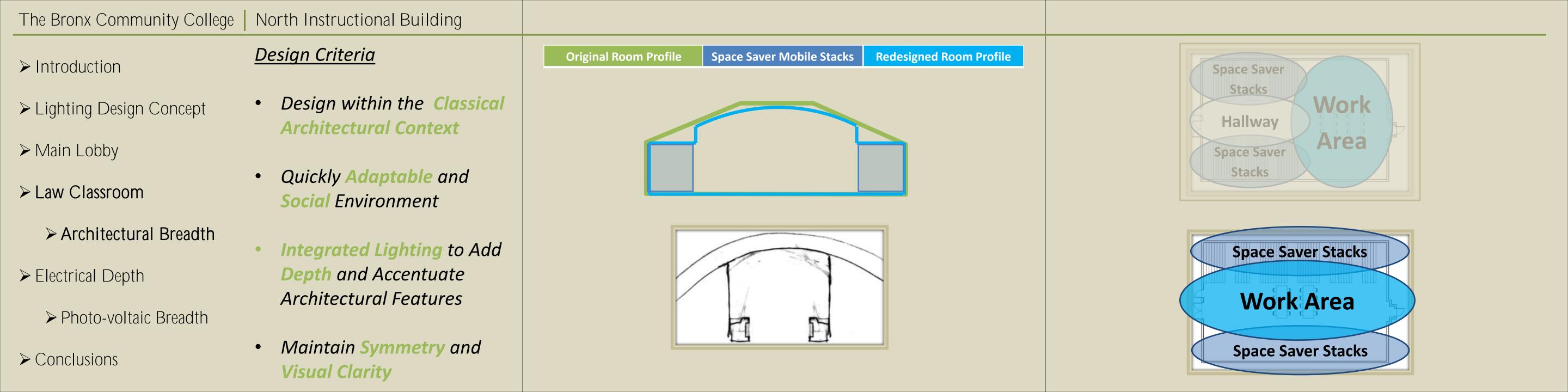


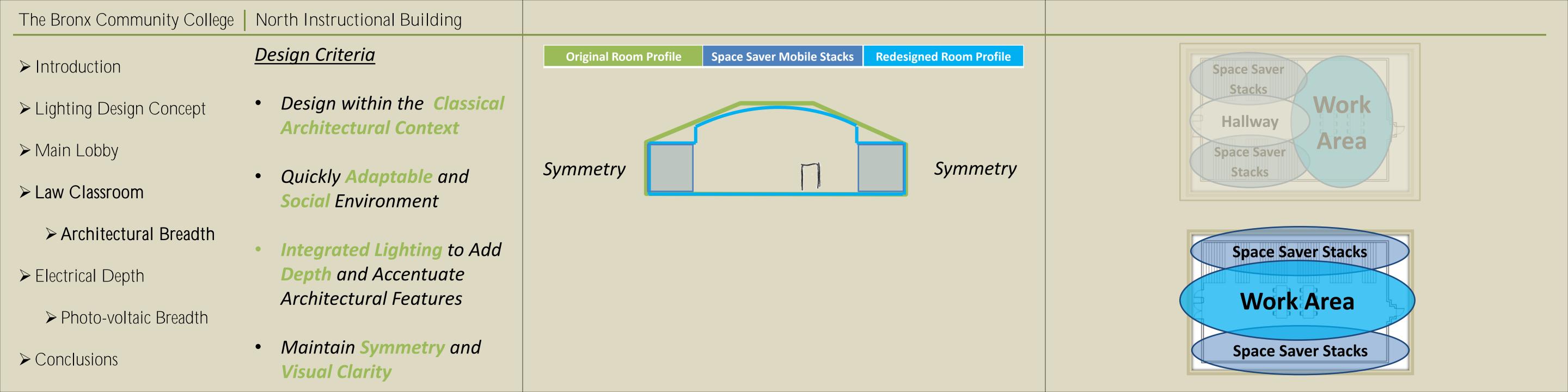


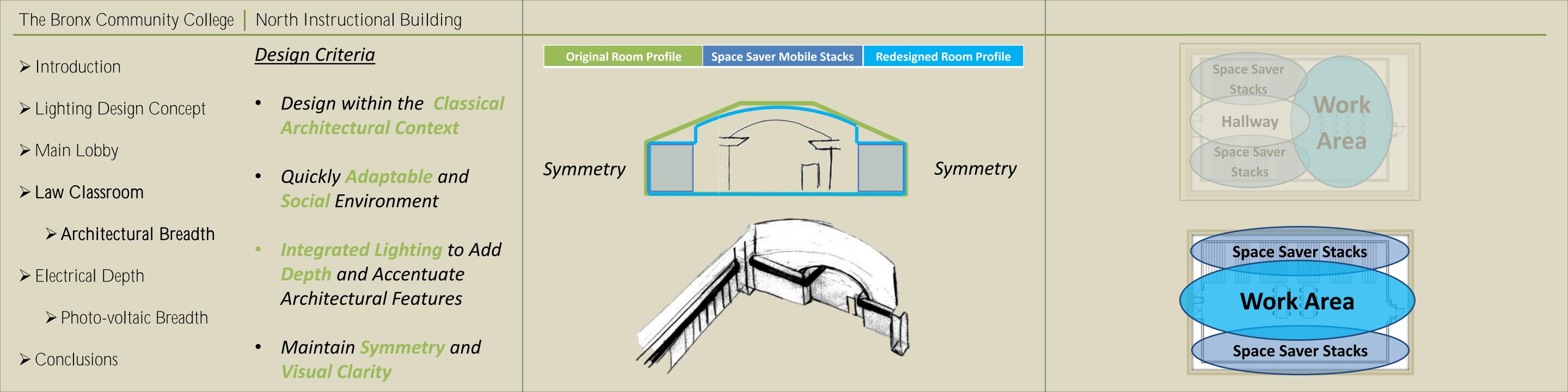






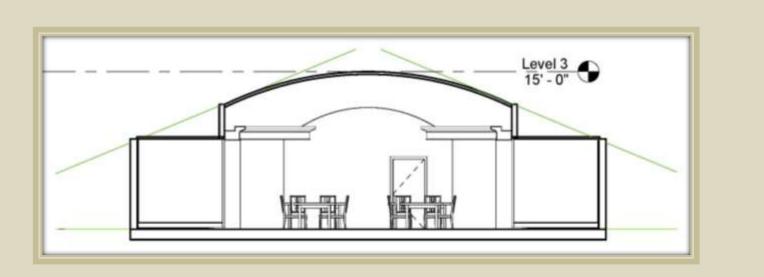


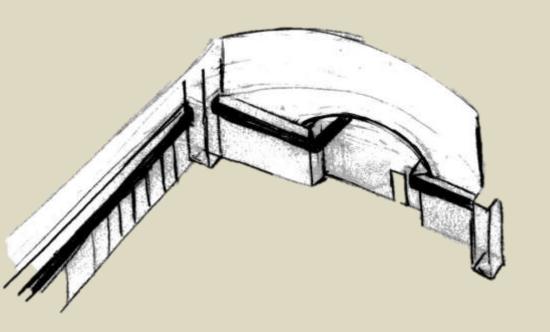


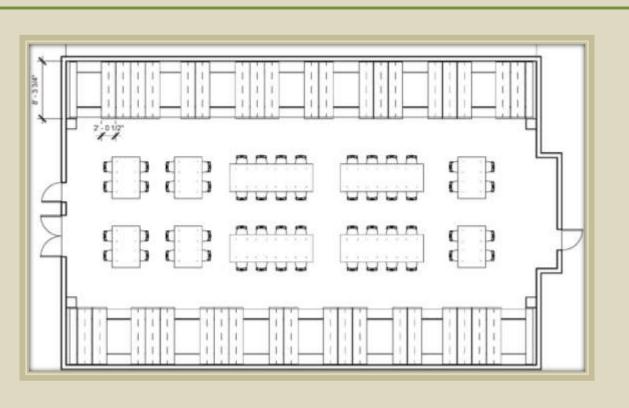


- ➤ Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- ➤ Electrical Depth
 - ➤ Photo-voltaic Breadth
- ➤ Conclusions

- Design within the Classical Architectural Context
- Quickly Adaptable and Social Environment
- Integrated Lighting to Add Depth and Accentuate Architectural Features
- Maintain Symmetry and Visual Clarity





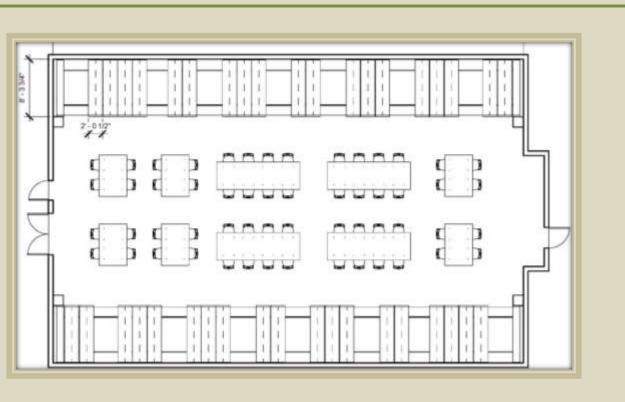


Original Design vs. Space Saver Design Data						
Original Design Space Saver Design						
Area	Ft ²	% of Area	Ft ²	% of Area		
Total 3042 -		-	3042	-		
Stacks 2443 83		81 %	1130	38 %		
Workspace	564	19 %	1862	62 %*		
* 12% more workspace						

- > Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- ➤ Electrical Depth
 - ➤ Photo-voltaic Breadth
- ➤ Conclusions

- Design within the Classical Architectural Context
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Original Design vs. Space Saver Design Data							
Original Design Space Saver Design							
Area Ft ²		% of Area Ft ²		% of Area			
Total	3042	-	3042	-			
Stacks	2443	81 %	1130	38 %			
Workspace	564	19 %	1862	62 %*			
* 43% more workspace							

The Bronx Community College North Instructional Building		
> Introduction	Lighting Depth	
➤ Lighting Design Concept		
> Main Lobby		
> Law Classroom		Law Classroom and Stacks
> Architectural Breadth		
➤ Electrical Depth		
> Photo-voltaic Breadth		
> Conclusions		

The Bronx Community College	North Instructional Building	
➤ Introduction	<u>Design Criteria</u>	
➤ Lighting Design Concept	• Design within the Classical Architectural Context	
➤ Main Lobby		
> Law Classroom	 Quickly Adaptable and Social Environment 	
> Architectural Breadth	 Integrated Lighting to Add 	
> Electrical Depth	Depth and Accentuate Architectural Features	
➤ Photo-voltaic Breadth	7 II CITICCCCAT AT T CACAT CS	
➤ Conclusions	• Maintain Symmetry and Visual Clarity	

<u>Additional Criteria</u>

Educational Facilities | Classrooms | Study Halls

Recommended Maintained Illuminance Levels				
Avg. Horizontal @ 2.5'	Avg: Min			
100 lux	2:1			

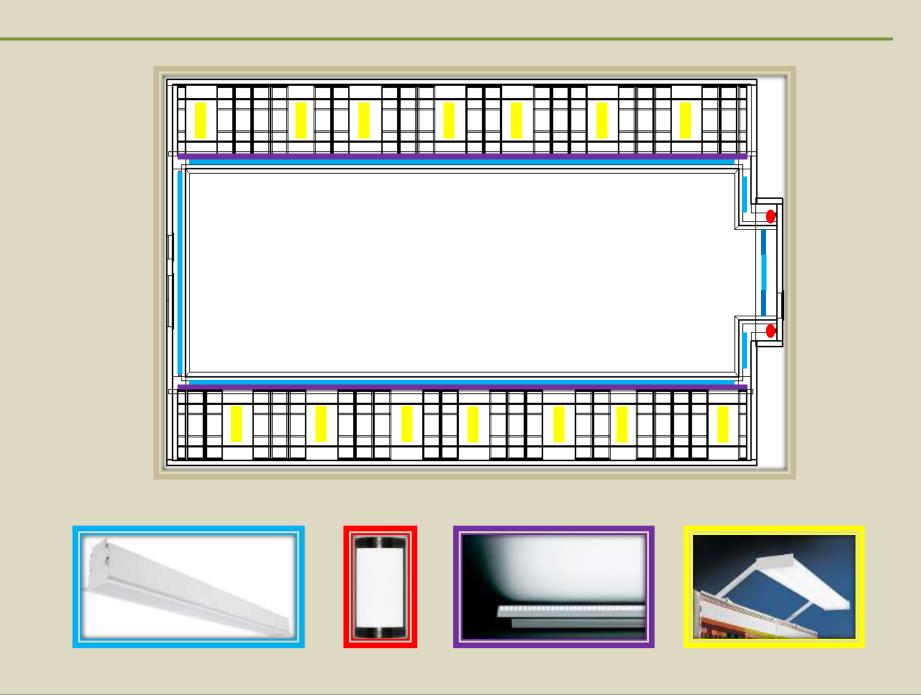
ANSI/ASHRAE/IES Standard 90.1-2010 Space by Space Method

Lighting Power Density	
Space Type	Max Allowable LPD
Classroom/Lecture/Training	1.23 W/sq.ft.

- > Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- ➤ Electrical Depth
 - ➤ Photo-voltaic Breadth
- ➤ Conclusions

- Design within the Classical Architectural Context
- Quickly Adaptable and Social Environment
- Integrated Lighting to Add
 Depth and Accentuate
 Architectural Features
- Maintain Symmetry and Visual Clarity





- Design Criteria
 - Design within the Classical **Architectural Context**

Quickly Adaptable and

Depth and Accentuate

Architectural Features

Maintain Symmetry and

Visual Clarity

Social Environment

➤ Law Classroom

➤ Lighting Design Concept

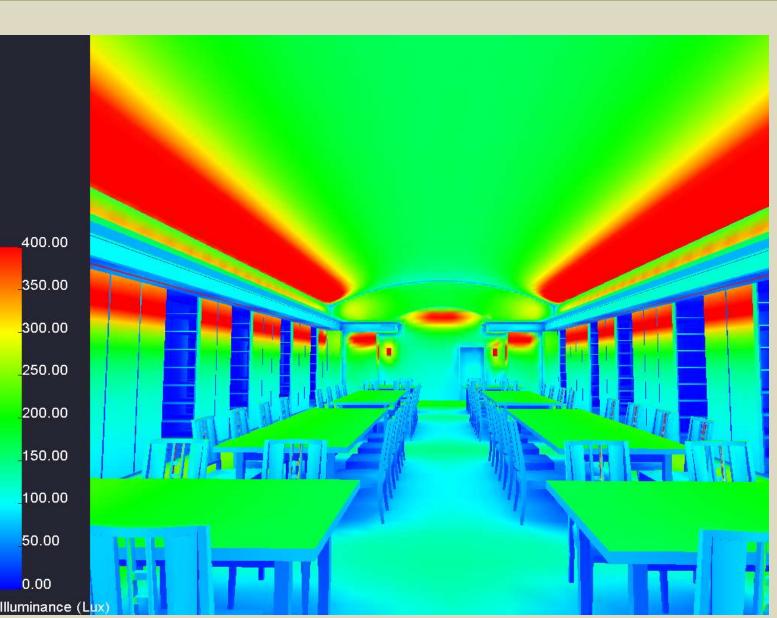
- > Architectural Breadth
- > Electrical Depth

> Introduction

> Main Lobby

- ➤ Photo-voltaic Breadth
- ➤ Conclusions





Illuminance Data						
Calcu	ılation	Т	arget (lux)	Horizontal @ 2' 6" (lu		
age III	uminance		150-250	232		
. Illum	inance		-		348	
Illumi	inance	-		158		
rage/Minimum 2			1.47			
			Fixture			
/pe	Lamp/I	ixture	Quantity	Input Watts	Total Watts	
_3	LED Re	ec. Linear	41	28	1148	
3A	LED R	ec. Linear	2	21	42	

32

32

1440

1036

L10	FL. Stack Light			14	4 (of 40)
ANSI/ASHRAE/IESNA 90.1 - 2010					
Catego	ory	Allowable	Ac	tual	
Area (sqft)		-	30)42	
put Watts (W)		-	36	598	
Power De	ensity				
(W/sq	ft)	1.23	1.	.21	

LED Wall Sconce

LED Linear Cove

L9

The Bronx Community College | North Instructional Building Electrical Depth > Introduction ➤ Lighting Design Concept ➤ Main Lobby Branch Circuit Analysis ➤ Law Classroom > Architectural Breadth > Electrical Depth ➤ Photo-voltaic Breadth > Conclusions

- > Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- ➤ Electrical Depth
 - ➤ Photo-voltaic Breadth
- > Conclusions

Amps	Voltage	VA	Cont. Load X 1.25	Max kVA/ Ckt	Target kVA / Ckt X 0.8 Growth Factor
20	277	5540	4432	4.432	3.546

CATION:	GROUN	D FLOOR	ELEC CLO	OSET B		REMAR	KS:		PANEL DESIGNATION:			
RVICE:	480/277	VOLTS, 3	PHASE, 4	WIRE		22KAIC,:	SIEMENS	TYPE I3 PA				
AINS:	225 AMP	S				MAIN O	VERCUF	RENT PE	OTECTI	ON		LP-GB
DUNTING TYPE:	SURFAC	E				M.C.B.:	175 AMP	S				
ROUNDING:	GROUNE	BUS: YE	3			M.L.O.:	NO					EXISTING
	ISOLATE	D GRD. BL	JS: NO			POLES:	30					LAISTING
SERVICE TO:	Α	В	С	SIZE	NO.		NO.	SIZE	Α	В	С	SERVICE TO:
ASSROOM 130, 131, 133 LTG	3.95			20	1	-	2	125 /	19.84			
ASSROOM 141, 137 LTG		3.05		20	3		4] / [20.72		RP-GB VIA TRANSFORMER
ID FLR VEST & CORR LTG			1.95	20	5		6	/ 3P			20.64	
ID FLR DISPLAY LTG	1.45			20	7	_	8	20	2.91			FAN POWERED VAV BOXES
FÉLTG		0.47		20	9		10	20		3.82		FAN POWERED VAV BOXES
ASSROOM 136 LTG			1.72	20	11		12	20			3.82	FAN POWERED VAV BOXES
ARE				20	13	-	14	20				SPARE
ARE				20	15		16	20				SPARE
ARE				20	17		18	20				SPARE
ARE				20	19	-	20	20				SPARE
ARE				20	21		22	20				SPARE
ARE				20	23		24	20				SPARE
ARE				20	25	-	26	20				SPARE
ARE				20	27		28	20				SPARE
ARE				20	29		30	20				SPARE
SUBTOTALS	5.40	3.52	3.67						22.75	24.54	24.46	

SPARE				20	29	30	20				SPARE	
SUBTOTALS	5.40	3.52	3.67					22.75	24.54	24.46		
TOTAL LOADS:		KVA PH KVA PH			A PHA			CTED LO D FACTO	•	-	84.34 100%	KVA
TOTAL CONNECTED LOAD:		KVA PH			A PHA		DEMANI DEM. LO	D LOAD:	1.25	SPARE	84.34 105.425	KVA KVA
							AMP:	(at	480	V)	127	Α

LP-GB						
CKT 5	QTY	VOLTAGE	VA	1.25 CONT. LOAD FACT.	kVA	TOTAL
NEW						
L4	4	277	16	20	0.08	
L5	4	277	16	20	0.08	
L3	13	277	7	8.75	0.11375	
L6	196	277	1.5	1.875	0.3675	
L5	4	277	16	20	0.08	
EXISTING						
L8	4	277	128	160	0.64	
L16	2	277	18	22.5	0.045	
L3	2		32	40	0.08	
L4	6		32	40	0.24	1.73
REMOVED						
L8	3	277	128	160	0.48	
C KT 7	QTY	VOLTAGE	VA	1.25 CONT. LOAD FACT.	kVA	TOTAL
NEW						
L3	128	277	7	8.75	1.12	
EXISTING						
L3	2	277	32	40	0.08	1.2
REMOVED						
L3	8	277	32	40	0.32	
L8	8	277	128	160	1.28	
CKT 13	QTY	VOLTAGE	VA	1.25 CONT. LOAD FACT.	kVA	TOTAL
NEW						
L1	8	277	5	6.25	0.05	0.05

- ➤ Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- ➤ Electrical Depth
 - ➤ Photo-voltaic Breadth
- > Conclusions

Amps	Voltage	VA	Cont. Load X 1.25	Max kVA/ Ckt	Target kVA / Ckt X 0.8 Growth Factor
20	277	5540	4432	4.432	3.546

OCATION:	GROUNI	D FLOOR	ELEC CLC	OSET B		REMAR	KS:					PANEL DESIGNATION:
SERVICE:	480/277	VOLTS, 3	PHASE, 4	WIRE		22KAIC,:	SIEMENS	TYPE I3 PA				
IAINS:	225 AMP	S				MAIN O	VERCUR	RENT PE	ROTECTI	ON		LP-GB
OUNTING TYPE:	SURFAC	E				M.C.B.:	175 AMP	S				
ROUNDING:	GROUNE	BUS: YES	3			M.L.O.:	NO					NEW
	ISOLATE	D GRD. BL	JS: NO			POLES:	: 30					IVEVV
SERVICE TO:	Α	В	С	SIZE	NO.		NO.	SIZE	Α	В	С	SERVICE TO:
:LASSROOM 130, 131, 133 LTG	3.95			20	1	-	2	125 /	19.84			
:LASSROOM 141, 137 LTG		3.05		20	3		4] / [20.72		RP-GB VIA TRANSFORMER
ND FLR VEST & CORR LTG			1.73	20	5		6	/ 3P			20.64	
:AFÉ LTG	0.47			20	7	-	8	20	2.91			FAN POWERED VAV BOXES
SND FLR DISPLAY LTG		1.20		20	9		10	20		3.82		FAN POWERED VAV BOXES
:LASSROOM 136 LTG			1.72	20	11		12	20			3.82	FAN POWERED VAV BOXES
IEW EXT. CANOPY LTG	0.05			20	13	-	14	20				SPARE
PARE				20	15		16	20				SPARE
PARE				20	17		18	20				SPARE
PARE				20	19	-	20	20				SPARE
PARE				20	21		22	20				SPARE
PARE				20	23		24	20				SPARE
PARE				20	25	-	26	20				SPARE
PARE				20	27		28	20				SPARE
PARE				20	29		30	20				SPARE
SUBTOTALS	4.47	4.25	3.45						22.75	24.54	24.46	

TOTAL LOADS:	27.22 KVA PHASE A 28.79 KVA PHASE B	98.3 A PHASE A 103.9 A PHASE B	CONNECTED LOAD (LTG): DEMAND FACTOR (LTG):	83.92 KVA 100%
	27.91 KVA PHASE C	100.8 A PHASE C	DEMAND LOAD:	83.92 KVA
TOTAL CONNECTED LOAD:	83.92 KVA		DEM. LOAD x 1.25 SPARE	104.9 KVA
			AMP: (at 480 V)	126 A

LP-GB						
CKT 5	QTY	VOLTAGE	VA	1.25 CONT. LOAD FACT.	kVA	TOTAL
NEW						
L4	4	277	16	20	0.08	
L5	4	277	16	20	0.08	
L3	13	277	7	8.75	0.11375	
L6	196	277	1.5	1.875	0.3675	
L5	4	277	16	20	0.08	
EXISTING						
L8	4	277	128	160	0.64	
L16	2	277	18	22.5	0.045	
L3	2		32	40	0.08	
L4	6		32	40	0.24	1.73
REMOVED						
L8	3	277	128	160	0.48	
C KT 7	QTY	VOLTAGE	VA	1.25 CONT. LOAD FACT.	kVA	TOTAL
NEW						
L3	128	277	7	8.75	1.12	
EXISTING						
L3	2	277	32	40	0.08	1.2
REMOVED						
L3	8	277	32	40	0.32	
L8	8	277	128	160	1.28	
CKT 13	QTY	VOLTAGE	VA	1.25 CONT. LOAD FACT.	kVA	TOTAL
NEW						
L1	8	277	5	6.25	0.05	0.05

- > Introduction
- ➤ Lighting Design Concept
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- > Conclusions

Amps	Voltage	VA	Cont. Load X 1.25	Max kVA/ Ckt	Target kVA / Ckt X 0.8 Growth Factor
20	277	5540	4432	4.432	3.546

LOCATION:	GROUNI	D FLOOR	ELEC CLC	OSET B		REMARKS:					PANEL DESIGNATION:	
SERVICE:	480/277	VOLTS, 3	PHASE, 4	WIRE		22KAIC,:	SIEMENS	TYPE I3 PA	ANEL			
MAINS:	225 AMP	S				MAIN O	VERCUF	RENT PR	OTECTI	DN		LP-GB
MOUNTING TYPE:	SURFAC	E				M.C.B.:	175 AMP	S				
GROUNDING:	GROUNE	BUS: YES	3			M.L.O.:	NO					NEW
	ISOLATE	D GRD. BL	JS: NO			POLES:	30					14544
SERVICE TO:	Α	В	С	SIZE	NO.		NO.	SIZE	Α	В	С	SERVICE TO:
CLASSROOM 130, 131, 133 LTG	3.95			20	1	-	2	125 /	19.84			
CLASSROOM 141, 137 LTG		3.05		20	3		4] / [20.72		RP-GB VIA TRANSFORMER
GND FLR VEST & CORR LTG			1.73	20	5		6	/ 3P			20.64	
CAFÉLTG	0.47			20	7	-	8	20	2.91			FAN POWERED VAV BOXES
GND FLR DISPLAY LTG		1.20		20	9		10	20		3.82		FAN POWERED VAV BOXES
CLASSROOM 136 LTG			1.72	20	11		12	20			3.82	FAN POWERED VAV BOXES
NEW EXT. CANOPY LTG	0.05			20	13	-	14	20				SPARE
SPARE				20	15		16	20				SPARE
SPARE				20	17		18	20				SPARE
SPARE				20	19	-	20	20				SPARE
SPARE				20	21		22	20				SPARE
SPARE				20	23		24	20				SPARE
SPARE				20	25	-	26	20				SPARE
SPARE				20	27		28	20				SPARE
SPARE				20	29		30	20				SPARE
SUBTOTALS	4.47	4.25	3.45						22.75	24.54	24.46	

TOTAL LOADS:

TOTAL CONNECTED LOAD:

28.79 KVA PHASE B 27.91 KVA PHASE C 100.8 A PHASE C

27.22 KVA PHASE A 98.3 A PHASE A

83.92 100% DEMAND FACTOR (LTG): KVA 104.9 126 1.25 **SPARE** KVA

*Balanced Phase Loads *Equivalent Demand Loads

LP-GB CKT 5 kVA **VOLTAGE** 1.25 CONT. LOAD FACT. NEW 0.08 20 20 0.08 8.75 0.11375 1.875 0.3675 277 20 0.08 **EXISTING** 277 128 160 0.64 22.5 0.045 0.08 0.24 REMOVED 277 128 160 0.48 CKT7 VOLTAGE 1.25 CONT. LOAD FACT. kVA VA 8.75 277 1.12 EXISTING 0.08 277 REMOVED 0.32 160 1.28 **CKT 13** VOLTAGE VA 1.25 CONT. LOAD FACT. kVA 277 6.25 0.05

TOTAL

1.73

TOTAL

TOTAL

0.05

The Bronx Community College | North Instructional Building Electrical Depth > Introduction ➤ Lighting Design Concept ➤ Main Lobby ➤ Law Classroom Photo-Voltaic Breadth > Architectural Breadth > Electrical Depth ➤ Photo-voltaic Breadth > Conclusions

<u>Orientation</u>

Goal:

Maximize the Solar Utility for a client in a

➤ Main Lobby

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➤ Photo-voltaic Breadth

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Onentation



PV Panel Roof Location

Sloped Roof on South-Southwest Facade

given locale

- 31.5 ° Tilt (Ideal for NY)
- No Surrounding Shading Structures

The Bronx Community College	North Instructional Building		
➤ Introduction	<u>Design Criteria</u>	<u>Orientation</u>	<u>Goal</u> :
Lighting Design Concept	Aesthetic Value		Maximize the Solar Utility for a client in a given locale
➤ Main Lobby	Aestrictic value		given locale
➤ Law Classroom	• Avoid Panel Shading		PV Panel Roof Location
> Architectural Breadth	• DV Danal Cast /Matt		 Sloped Roof on South-Southwest Facade
> Electrical Depth	 PV Panel Cost/Watt 		• 31.5 ° Tilt (Ideal for NY)
➤ Photo-voltaic Breadth	 PV Panel Efficiency 		 No Surrounding Shading Structures
> Conclusions		Image from Google Earth	

The Bronx Community College	North Instructional Building		
> Introduction	<u>Design Criteria</u>	PV Array Design	<u>PV Array Details</u>
➤ Lighting Design Concept	Aesthetic Value		• (12) 3x4 & (2) 3x3 panel arrays
➤ Main Lobby ➤ Law Classroom	 Avoid Panel Shading 		• (162) Total Panels and (5) Inverters
> Architectural Breadth	 PV Panel Cost/Watt 		Assessment Maximizes Performance
➤ Electrical Depth			to Aesthetic Value
Photo-voltaic Breadth	 PV Panel Efficiency 		Aligned with Large Library Windows
> Conclusions			

The Bronx Community College	North Instructional Building		
> Introduction	<u>Design Criteria</u>	<u>PV Panel Type</u>	<u>PV Array Details</u>
 ➤ Lighting Design Concept ➤ Main Lobby ➤ Law Classroom ➤ Architectural Breadth ➤ Electrical Depth ➤ Photo-voltaic Breadth ➤ Conclusions 	 Aesthetic Value Avoid Panel Shading PV Panel Cost/Watt PV Panel Efficiency 	 Mono-Crystalline Solar Panel Aesthetic Design Black Cell Color Highest Efficiency 	 (12) 3x4 & (2) 3x3 panel arrays (162) Total Panels and (5) Inverters Assessment Maximizes Performance to Aesthetic Value Aligned with Large Library Windows
/ Outloidstotts			

The Bronx Community College	North Instructional Building				
> Introduction	<u>Design Criteria</u>	Equipment Selection	PV Array Details		
Lighting Design ConceptMain Lobby	Aesthetic Value	Solar Panel Selection Data Manufacturer Product Code Watts \$/Panel \$/Watts Efficiency Canadian Solar CS6P-255M 255 259 1.02 15.85	• (12) 3x4 & (2) 3x3 panel arrays		
➤ Law Classroom	 Avoid Panel Shading 	Suniva OPT255-60-4-100 255 256 1.00 15.71 Eoplly EP156MB-60-240W 240 260 1.08 14.75 Eoplly EP156M-60-250W 250 275 1.10 15.37 SolarWorld SW250 265 285 1.08 14.91	• (162) Total Panels and (5) Inverters		
> Architectural Breadth	 PV Panel Cost/Watt 	Inverter Selection Data	Assessment Maximizes Performance		
> Electrical Depth		Manufacturer Product Code System Capacity(W) Max Units W(DC) \$/Unit Cost Total Cost SunnyBoy 7000US 41310 8750 5 2770 \$13,850 96 SunnyBoy 8000US 41310 10000 5 3000 \$15,000 96	to Aesthetic Value		
➤ Photo-voltaic Breadth ➤ Conclusions	• PV Panel Efficiency	SunnyBoy 6000US 41310 7500 6 2550 \$15,300 95.5 SunnyBoy 5000US 41310 6250 7 2300 \$16,100 95.5	Aligned with Large Library Windows		

The Bronx Community College	North Instructional Building									
> Introduction	<u>Design Criteria</u>	Equipment Selection								
Lighting Design Concept		Solar Panel Selection Data								
	Aesthetic Value		Manut	facturer	Product Code	Watts	\$/Pane	l \$/Watts	Efficien	су
➤ Main Lobby	ricstrictic varac		Canadi	an Solar	CS6P-255M	255	259	1.02	15.85	,
rviairi Lobby			Su		OPT255-60-4-100		256	1.00	15.71	
				1 /	P156MB-60-240V		260	1.08	14.75	
➤ Law Classroom	 Avoid Panel Shading 			<u> </u>	P156M-60-250W		275	1.10	15.37	
			Solar	·World	SW250	265	285	1.08	14.91	
Architectural Breadth					Investor Co	alastian	Doto			
	 PV Panel Cost/Watt 				Inverter Se				Total	
➤ Electrical Depth		Man	ufacturer	Product Cod	System e Capacity(W)	Max W(DC)	Units Seq.	/Unit	Total Cost	Efficiency
		Sur	nyBoy	7000US	41310	8750	-	2770 \$:	13,850	96
➤ Photo-voltaic Breadth	 PV Panel Efficiency 		nnyBoy	8000US	41310	10000	5		15,000	96
Filoto-voltate breautif		Sui	nnyBoy	6000US	41310	7500	6	2550 \$	15,300	95.5
		Sur	nnyBoy	5000US	41310	6250	7	2300 \$	16,100	95.5
➤ Conclusions										

<u>Tax Incentives</u>

Solar Tax Incentives (New York)

Federal

30% Tax Credit

State Rebate Program

\$1.00/W for first 50kW of installed capacity per meter

Sales Tax Incentive

100% exemption from sales tax

Property Tax Incentive (local option)

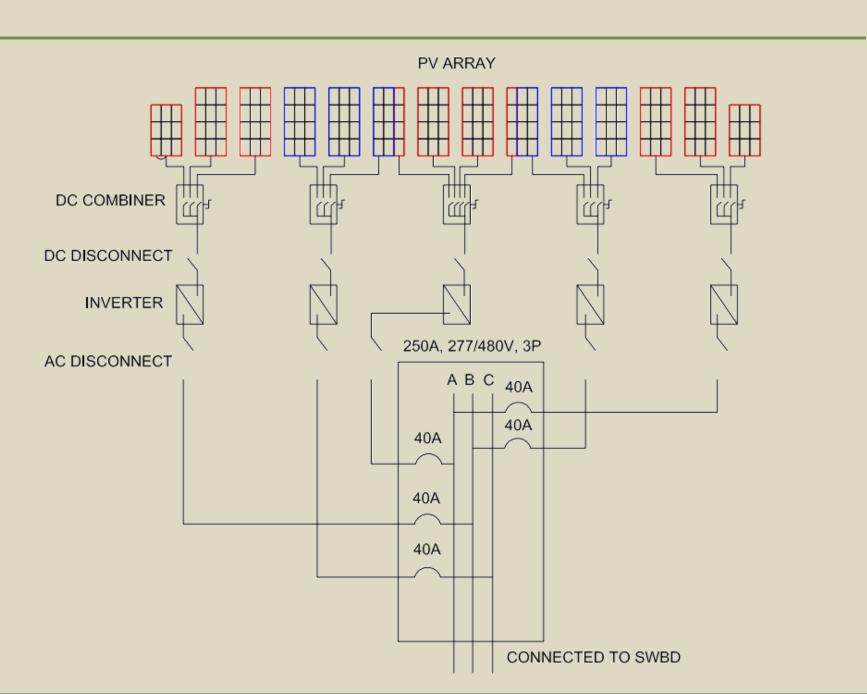
100% exemption for 15 years



NREL System Advisory Model

SAM Model Assumptions			
Annual Panel Performance Depreciation	1% compounded yearly		
Avg. Cost of Commercial Electricity (NY)	\$0.1637 / kWh		
Analysis Period	20 years		

Performance Results			
First Year Annual Energy	57,627 kWh		
Capacity Factor	15.4%		
System Performance Factor	0.86		
Net Savings with System	\$9,433.21		
Payback	4.27 years		



- ➤ Introduction
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Conclusion





The Bronx Community College North Instructional Building		
> Introduction	I would like to thank	
	The Audience	
➤ Lighting Design Concept	The Penn State AE Department	
> Main Lobby	Professors:	
➤ Law Classroom	Dr. Kevin Houser	
	Dr. Richard Mistrick	
➤ Architectural Breadth	Dr. Jefferey Brownson	
➤ Electrical Depth	Leslie Beahm	
➤ Photo-voltaic Breadth	Cline Bettridge Bernstein Lighting Design	
	RAMSA Architects	
> Conclusions	Ismael Leyva Architects	

- ➤ Introduction
- ➤ Lighting Design Concept
- ➤ Main Lobby
- ➤ Law Classroom
 - > Architectural Breadth
- > Electrical Depth
 - ➤ Photo-voltaic Breadth
- ➤ Conclusions

Questions?



