### >Personal and Building Intro

### •<u>Building Background</u>

>Building Size, Location, and Type ≻Current Budget and Schedule ➤Areas for Improvement/Client Influence

### •<u>Analysis 1: Solyndra Solar Panel Implementation</u> →Installation location

≻Sizing the Panel Layout Schedule and Labor Analysis ➤Cost Analysis >Energy Savings Analysis/Payback

#### •Analysis 2: SIP Panel Implementation

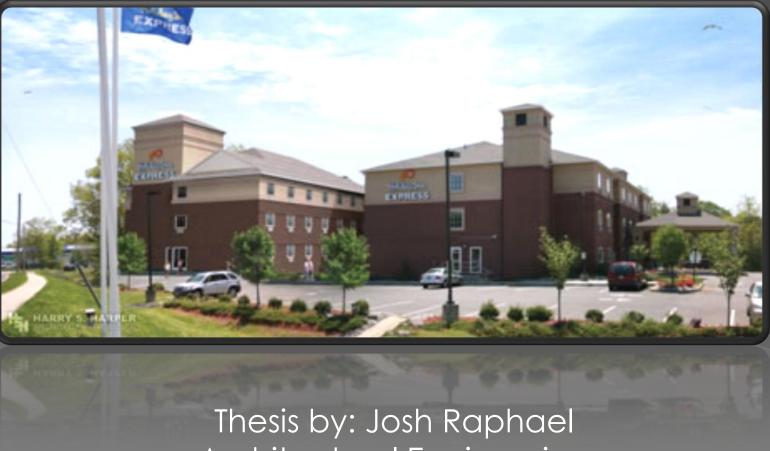
SIP Application SIP vs. Stick Built ≻Material Cost ➤Schedule and Labor Analysis >Energy Savings Analysis/Payback

### •Analysis 3: BAS Systems

➤BAS System Application ➢Bathroom Nightlight motion Sensor ➤Hallway Motion Sensor ► Motion Sensor PTAC

#### •Conclusion

≻Final Schedule and Budget ➢Final Decisions (What and What Not to Proceed With) ≽Q/A



### Holiday Inn Express



Architectural Engineering **Construction Management** 

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### •Conclusion

➢ Final Schedule and Budget ➢Final Decisions (What and What Not to Proceed With) ≽Q/A

Location - 655 White Horse Pike, Absecon, NJ

**Mixed Separate Use Group –** R-1 Residential/ A-3 Assembly

**Construction Type** – V-B

### Addition Area

•First Floor (A-3): 4,912 ft<sup>2</sup> •First Floor (R-1): 6,475 ft<sup>2</sup> •Second Floor (R-1): 7,984 ft<sup>2</sup> •Third Floor (R-1): 7,984 ft<sup>2</sup>

Total initial Cost - \$4 Million

**Date of Construction –** March 2009 – April 2010

**Owner –** Renuka Hospitality, LLC **General Contractor –** DRK Associates Architect – Harry S. Harper Architects

# Holiday Inn Express

### **Building Background**





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➤Areas for Improvement/Client Influence

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	Cost Bre	eakdown					
		Cost	Cost/SF				
Total Project Cost		\$4,000,000	\$146				
Total Hotel Cost		\$3,373,344	\$124				
Total Pool Cost		\$340,000	\$12.53				
Design Cost		\$25,000	\$0.92				
Systems							
Mecha	anical	\$257,432	\$9.42				
Electri	cal	\$367,000	\$13.42				
Plumb	bing	\$280,037	\$10.24				
Struct	ural Steel	\$95,000	\$3.47				
Fire S	uppression	\$65,000	\$2.38				
Concr	ete (Site+Building	g) \$200,000	\$7.31				
Buildir	ng Masonry	\$70,000	\$2.56				
	Square Foo	tage Cos	st				
Total Building Area	a		27355 SF				
Total Building Peri	imeter		493 LF				
Story Height			10 FT				
Interpolated RS M	eans Value		\$160.44 Cost/SF				
Total Project Cost \$4,388,836							
Means	Cost Adjust	ment & B	reakdown				
Adjustment for Sto	rv Heiaht	Add	\$1.60 Cost/FT				

Location Factor	1.05
Final RS Means SF Cost	\$171.34 Cost/ST
Total Project Cost	\$4,686,892

# •Schedule Summary •Milestones

•Cost Summary Estimate)

## Holiday Inn Express

### Current Budget & Schedule

- •Project Duration 13 Months
  - 1. Substructure Complete
  - 2. MEP Installation Complete
  - 3. Building Structure Complete

•Approximate Project Cost – \$4 Million (Owner Estimate) •Approximate Project Cost - \$4.7 Million (Square Ft

E Thesi	S				Clas	sic WBS
y ID	Activity Name	Original Duration	Start	Finish	2009 April 2009	May 2009
Procuren	nent	183	01-Sep-08	13-May-09		13-1
A1290	Design Phase		01-Sep-08	24-Nov-08		
A1000	Obtain Permits	35	26-Mar-09	13-May-09		Dobt:
A1340	a hardward waard waar		13-May-09		1	◆ NTF
ubstruc	ture	97	14-May-09	28-Sep-09		-
A1010	Provide Building Pad	3	14-May-09	18-May-09		Pr
A1020	Excavate/ Pour Ftgs. W/ Insp.	5	19-May-09	25-May-09		
A1030	Install Block Below Grade W/ Insulation	8	26-May-09	04-Jun-09		
A1040	Backfill Foundations	3	05-Jun-09	09-Jun-09		
A1060	Install Underground Elec. W/ Insp.	5	10-Jun-09	16-Jun-09		1
A1070	Excavate & Pour Conc. for Pool	15	10-Jun-09	30-Jun-09		
A1080	Install Underground Plumbing W/ Inspection	55	10-Jun-09	25-Aug-09		1
	Pour Pool Slab & 1st Flr. Pad		26-Aug-09			
	Substructure Complete Install	1	28-Sep-09			
uperstr			05-Jun-09	17-Nov-09		
A1050	Install Structural Steel at 1 st Flr.		05-Jun-09	11-Jun-09		1
	Frame & Sheath 1 st Flr. & Install Stair Towers CM		01-Sep-09	21-Sep-09		
	Install Flr. Trusses, Sheath, Gypcrete 2nd Flr.		11-Sep-09	01-Oct-09		
	Frame & Sheath 2nd Flr.		02-Oct-09	13-Oct-09		1
	Install Flr. Trusses, Sheath, Gypcrete 3rd Flr.		14-Oct-09	03-Nov-09		
	Frame & Sheath 3rd Flr.	10000	04-Nov-09			1
terior		1	22-Sep-09	The second se		
A1120	Install Steel Stairs		22-Sep-09	05-Oct-09		
	Install Sprinkler Pipes 1st Flr.		25-Sep-09	08-Oct-09		
	Rough-In Plumb. Elec. 1st Flr. W/ Insp.	1000	02-Oct-09	15-Oct-09	1	
	Install Sprinkler Pipes 2nd Flr.	10	28-Oct-09	10-Nov-09		1
	Rough-In Plumb, Elec. 2nd Flr. W/ Insp.	10	04-Nov-09	17-Nov-09		
A1250	Install Sprinkler Pipes 3rd Flr./ Attic	10	30-Nov-09	11-Dec-09		1
A1230	Rough-In Plumb. Elec. 3rd Flr.	10	07-Dec-09	18-Dec-09		
	MEP Complete Install	1000	18-Dec-09		]	
nclosur			18-Nov-09	25-Dec-09		1
A1200	Install Roof Trusses, Sheathing & Shingles		18-Nov-09			1
	Install Windows		07-Dec-09	terminal processing the state of the second by second	1	
	Install Pool Enclosure/ Glazing		07-Dec-09	and the second se	1	
	Structure Complete		25-Dec-09	and a second sec		
itework			30-Nov-09			1
A1210	Install Curbs/ Sidewalks		30-Nov-09			1
	Install Paving/ Landscaping/ Site Lights/ Signage		07-Dec-09	the second se		
inishes	and a strange Danos supring one Lights Digninge		14-Dec-09			
	Install Cultured Stone & EIFS		14-Dec-09			
	Insulate, Sheetrock, & Paint/Install RestRm. Firs.		25-Jan-10	16-Mar-10	1	+
	Install Millwork/ Elevators		23-Jan-10 24-Feb-10			
	Install Plumb. Fixtures/ Doors / Flr. Finishes		10-Mar-10	a state of the sta		
ccupan			07-Apr-10	States in the second se		
	Perform Final Cleaning/ Obtain CO		07-Apr-10	16-Apr-10		
			19-Apr-10			+
A1330	Finish & Occupancy	0	13-Abt-10,		1	1

S Layout							02-	Oct-09	15:11	
June 2009 July 2009 August 2009 S	October 2009	N	D	January 2010	F		April 2010	May 2010	June 2010	201
31 07 14 21 28 05 12 19 26 02 09 16 23 30 06 13 20 May-09, Procurement	27 04 11 18 25 0	1 08 15 22	29 06 13 20	27 03 10 17 24	31 07 14 21	28 07 14 21 2	3 04 11 18 25	02 09 16 23	30 06 13 20	27 04
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	28-Sep-09	, Substr	ucture							
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Excavate/ Pour Ftgs. W/ Insp.										
Install Block Below Grade W/ In:	ulation				1					
Backfill Foundations										
□ Install Underground Elec. W/										
Excavate & Pour Conc. f	nderground	Dlumbir	a W/Tr	inaction						
	bol Slab &			spection		1				
	Substruct			tall						
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🔲 Install Structural Steel at 1 st Fli		······		· · · · ·				•••••	+	
	Frame & Sh	eath 1 st	Flr. & It	stall Stair	Towers (	CMUs				
	📮 Install Fl	r. Trusse	s, Sheat	h, Gypcret	e 2nd Flr					
	🗖 Fram	e & She	ath 2nd 1	Fir.						
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	Install									
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	I T			lumb. Ele		W/Insp				
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				dush-In P						
			♦ M	LEP Comp	lete Insta	11				
				25-Dec-0	9, Enclos	ure				1
			🗖 Install	Roof Tru	sses, She	athing &	Shingles			
				all Windo						
				Install Po			ng			
				Structure			<u> </u>			
				Dec-09, Si						
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### •Conclusion

➢ Final Schedule and Budget ≻Final Decisions (What and What Not to Proceed With) ≽Q/A

# •lssues

•Solutions

- 3. BAS Systems

# Holiday Inn Express

### Areas for Improvement/Client Influence

•Guest Waste Energy Bathroom Night lighting 2. Lighting, Heating, & Cooling During Vacancy Heating & Cooling Loss from Stud Wall Construction •Lack of Energy Efficiency Efforts

1. Solyndra Solar Panel Installation 2. SIP Panel Implementation















#### •Introduction

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## Holiday Inn Express



# ALAIVCIC 1. ANALIJIJ I. SOLYNDRA SOLAR PANELS



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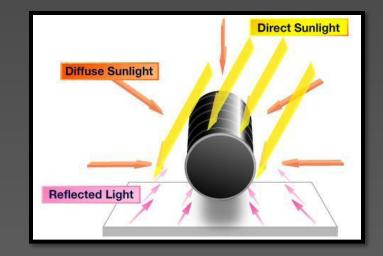
➢ Final Schedule and Budget ➢Final Decisions (What and What Not to Proceed With) ≽Q/A

•Cylindrical PV Tubes – 360° Absorption (Direct, Diffuse, & Reflected Sunlight) •Most Efficient Solar Technology •Air Flow •Withstand Wind Up to 130mph (Absecon < 120mph)

•Prevents Panel Overheating •Quick & Easy Installation – No need to mount •Greater Rooftop Coverage

# Holiday Inn Express

### About Solyndra Solar Panels

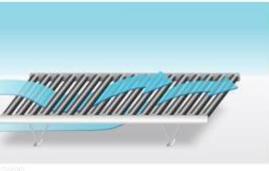






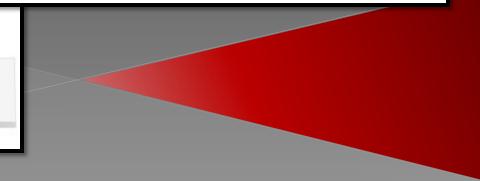
CONVENTIONAL

### **Additional Information**





CONVENTIONAL



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### •Conclusion

≻Final Schedule and Budget ≻Final Decisions (What and What Not to Proceed With) ≻Q/A

•**Panel Size** – 6' × 3.5' temperature of 25°C)

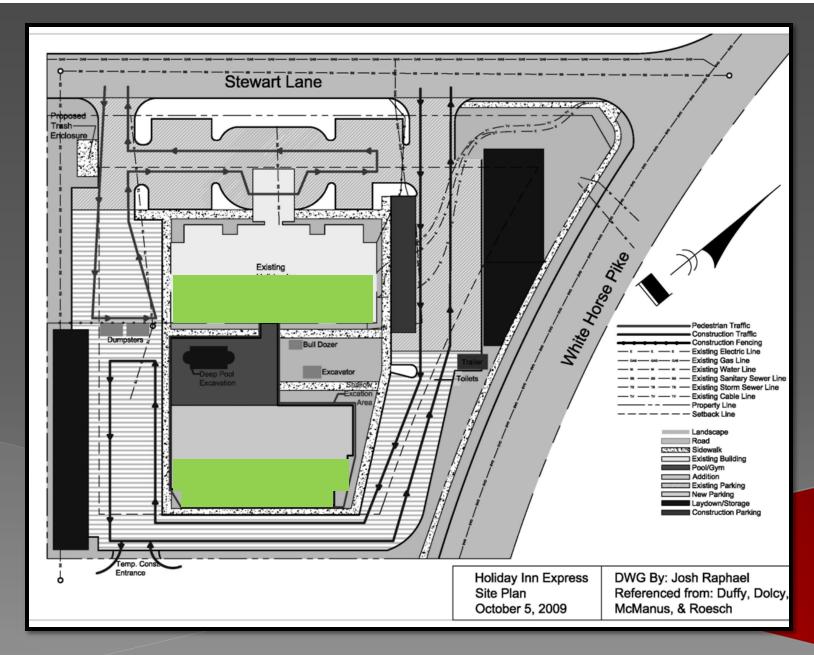
# Holiday Inn Express

### Installation Location

•Location – South East Facing Roofs of Both the New & Existing Buildings (Green Shading)

### Panel Size & Layout

- Panel Power 191Wp Standard Test Conditions (Irradiance of 1000 W/m^2, air mass 1.5, and cell
- •Availiable Roof Area 11760 ft<sup>2</sup>
- •Panel Count 500 Panels
- •System Power 95.5 kW Power



#### •Introduction

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### •Conclusion

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•Labor Rate – 10 Panels/Hr, Using a 3 Man Crew •Installation Duration – 6.25 Days •Schedule Adjustment •Panel Installation Proceeding Roof Installment Installation simultaneous with site work

•Panel Material/Installation Cost – \$5.42/W •Rebates •Federal - Investment Tax Credit(ITC) 30% of the Entire Energy System •**State –** Eliminates NJ State Tax of 7% •Final Cost per Watt - \$4.13/W •Final System Cost – \$394,041

# Holiday Inn Express

### Schedule & labor Analysis

### Cost Analysis

Description
Solyndra Solar Panels (500)
Labor Combiner Boxes Wiring
Monitoring System
100 kW Inverter (w/ 10 yr warranty)
Permitting
7% NJ State Tax
Total System Cost
System Cost per Watt
Incentives
Federal Investment Tax Credit (30%)
NJ Solar System Tax Exemption
New Total System Cost
New System Cost per Watt

Cast	
Cost	
\$517,610	
\$6,500	
\$51,215	
\$5,000	
\$40,623	
\$620,948	
\$6.50	
Savings	
\$186,284	
\$40,623	
\$394,041	
\$4.13	

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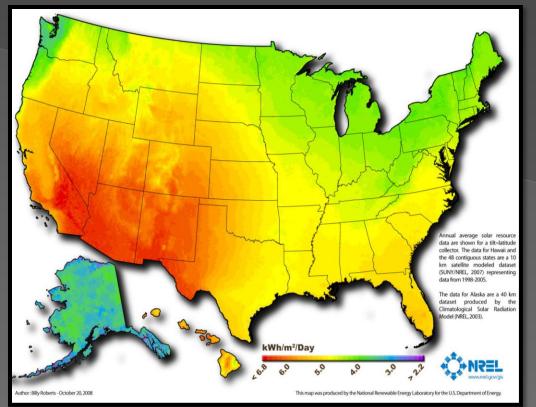
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•Absecon Electricity Cost – 13 ¢/kWh \$0.1137 /kWh •Energy Savings – 118,886 kWh •Cost Savings •No Carbon Tax - \$15,455/yr •With Carbon Tax - \$28,533/yr

Payback Period

# Holiday Inn Express

### **Energy Savings Analysis:** Electrical Breadth

•Average Solar Radiation – 4.67 kWh/m<sup>2</sup>/day •Future Carbon Tax – Increased energy cost \$0.1027 –

•Carbon Footprint – Savings of 170,007 lbs of  $CO_2/yr$ 

### Payback

## •No Carbon Tax – 25.5 years •With Carbon Tax – 13.8 Years

Location	
Array Tilt (6/12 slope)	
Array Azimuth (SE)	Τ
Avg. Solar Radiation	
Electricity Cost	
DC Power Rating	
AC Power Rating	
Annual AC Energy Produced (kWh)	
Annual Energy Savings (\$)	
Savings (lbs of CO <sub>2</sub> /yr)	

With Future Carbon	Tax
Electricity Cost	
Annual AC Energy Produced (kWh)	
Annual Energy Savings (\$)	
Savings (lbs of CO <sub>2</sub> /yr)	



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# ANDAIVELE D. ANALIJIJ Z. STRUCTURAL INSULATED PANELS

## Holiday Inn Express





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### •Conclusion

➢ Final Schedule and Budget ➢Final Decisions (What and What Not to Proceed With) ≻Q/A

•Labor – 50-70% Faster

•Exterior Wall - 6" SIP Panel vs. 2 x 6" Stud Construction •Location – 1<sup>st</sup>, 2<sup>nd</sup>, & 3<sup>rd</sup> Floor Addition Exterior Walls •Exterior Wall Area – 15,274 ft<sup>2</sup>

# Holiday Inn Express

### **About SIP Panels**

•Structurally Sound – Stronger & Straighter •R – Value – R 24.7 compared to R19 •Prefabrication – Lower on Site Labor Cost

### **SIP** Application

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### •Material Cost

than Stick Built

### •Schedule & Labor Analysis

## Holiday Inn Express

# <u>SIP vs. Stick Built</u>

•Initial Cost of SIP Panels - \$60,188 •Budget Increase - \$14,690, about 33% more expensive

•Current Framing Duration – 26 Days (All 3 Floors) •New Framing Duration – 17 Days (All 3 Floors) •Estimated Schedule Reduction – 50%, 4 Days/Floor •Schedule Reduction – 3 Days/Floor (Learning Curve) •Total Reduction – 9 Days

Description	2" x 6" Stick Built	Quantity	<b>Total Cost</b>	6 1/2" SIP Panels	Quantity	Total Cost
Material	\$520/M.B.F.	21.84 M.B.F.	\$11,357	\$3.30/SF	15,274 SF	\$50 <i>,</i> 404
<b>R-19 Insulation</b>	\$0.52/SF	15,274 SF	\$7,943			
3/8" Plywood	\$0.40/SF	30,548 SF	\$12,220			
Labor	\$640/M.B.F.	21.84 M.B.F.	\$13,978	\$0.64/SF	15,274 SF	\$9,784
Total Cost			\$45,498			\$60,188

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•Leakage

# Holiday Inn Express

### **Energy Efficiency Analysis:** Mechanical Breadth

•2 x 6" (Poor Leakage) – 857 MBTU, 251,101 kWh •2 x 6" (Avg. Leakage) – 678 MBTU, 198,654 kWh •SIP Panel – 297 MBTU, 87,021 kWh

•Energy Cost Absecon, NJ •2 x 6" (Poor Leakage) – \$32,643 •2 x 6" (Avg. Leakage) – \$25,825 •**SIP Panel –** \$11,313 •Savings (Avg. Leakage)- \$14,512/yr

### Payback

•Payback Period – 1-2 years

	Conventional 2 x 6 Construction (Poor leakage)	Conventional 2 x 6 Construction (Average leakage)	6" SIP Construction
Heating (MBTU)	775 MBTU	606 MBTU	257 MBTU
Heating Cost	\$9,525	\$7,448	\$3,306
Cooling (MBTU)	82 MBTU	72 MBTU	40 MBTU
Cooling Cost	\$1,008	\$885	\$492
Total (MBTU)	857 MBTU	678 MBTU	297 MBTU
Total Cost	\$10,533	\$8,333	\$3,798



#### •Introduction

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#### •<u>Building Background</u>

Building Size, Location, and Type
 Current Budget and Schedule
 Areas for Improvement/Client Influence

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### Conclusion

Final Schedule and Budget
 Final Decisions (What and What Not to Proceed With)
 Q/A

# ANALYSIS 3: BUILDING AUTOMATED SYSTEMS

# Holiday Inn Express









#### •Introduction

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#### •Building Background

≻Building Size, Location, and Type ≻Current Budget and Schedule ➤Areas for Improvement/Client Influence

#### •Analysis 1: Solyndra Solar Panel Implementation

≻Installation location ► Sizing the Panel Layout ► Schedule and Labor Analysis ≻Cost Analysis >Energy Savings Analysis/Payback

#### •Analysis 2: SIP Panel Implementation

► SIP Application ►SIP vs. Stick Built ≻Material Cost Schedule and Labor Analysis >Energy Savings Analysis/Payback

#### •Analysis 3: BAS Systems

►BAS System Application ▶Bathroom Nightlight motion Sensor ≻Hallway Motion Sensor ► Motion Sensor PTAC

### •Conclusion

➢ Final Schedule and Budget ➢Final Decisions (What and What Not to Proceed With) ≻Q/A

# Holiday Inn Express

### About BAS Systems

•**Product Suppliers –** Prolighting, Lutron, Watt Stoppers •**Use –** Eliminate Energy Consumption During Vacancy

### **BAS System Application**

•3 Areas for Implementation Bathroom Nightlight/Motion Sensor Switch



### **Additional Information**

### 2. Hallway Motion Sensors



### 3. Motion Sensor PTAC



#### •Introduction

➢Personal and Building Intro

#### •Building Background

≻Building Size, Location, and Type ≻Current Budget and Schedule ➤Areas for Improvement/Client Influence

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# •About

### •<u>Reasons</u>

•40% of Hotel guest use bathroom as nightlight •75% of fixture energy used when operating for more than 2 Hrs (Usually during guest vacancy)

# Initial Cost switches

### Holiday Inn Express Bathroom Nightlight/Motion Sensor Switch

•The switch shuts off energy when vacant •The switch acts as a low energy nightlight

•New Switch – \$38/each, about \$20 more than regular

•Cost Increase - \$980



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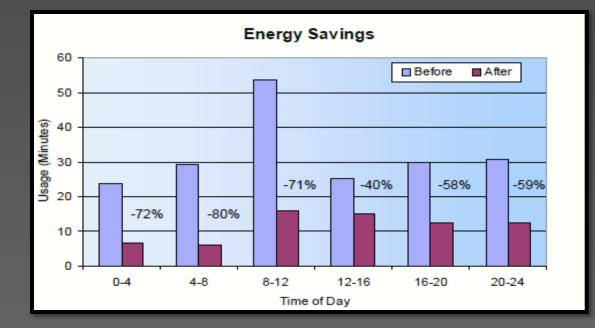
### Payback

•Payback Period - .5 years

### Holiday Inn Express Bathroom Nightlight/Motion Sensor Switch

•Energy Efficiency Analysis: Electrical Breadth

•Bathroom lighting – 3 (100W) Incandescent •Typical Energy Usage – 190 min/day •Energy Usage W/ New Switch – 68 min/day •Daily Use Reduction –122min/day/unit •Annual Energy Savings – 16,993 kWh/year •Annual Cost Savings - \$2,210/year



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# •<u>About</u>

### •Reasons/Application

•Hallway vacancy between 11PM-6AM •Excessive emergency hallway lighting •Apply to 2<sup>nd</sup> & 3<sup>rd</sup> floor hallways

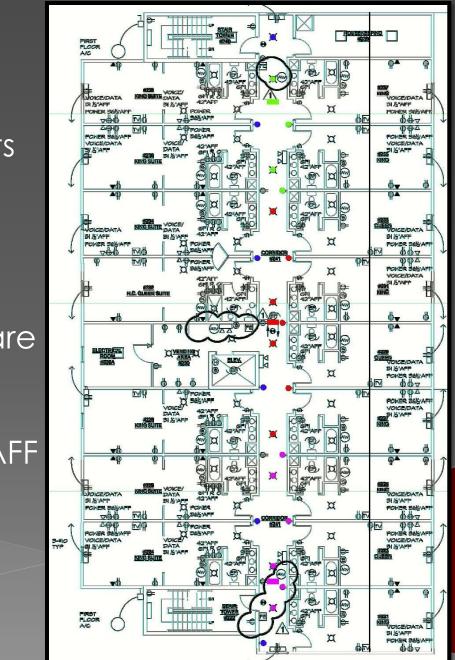
 Initial Cost •Sensor Cost – \$139/each, Total of \$834 •Labor Cost – 30\$/each, Total of \$180 •Total Cost - \$1,014

# Holiday Inn Express

### Hallway Motion Sensor

•RAB LOS2400H Smart Hallway Sensors •The sensors have a max viewing range of 16' x 80' •Can control 2400W/sensor of lighting

### •Design Layout •3 Sensors/Floor •Green - controls 4 lights •Red - controls 7 lights •Pink - controls 6 lights •Blue - 6 continuous emergency lights •Green & pink sensors are offset 46' from center sensor •Clg. Mounted – 8'-8" AFF



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#### •Analysis 3: BAS Systems

►BAS System Application ▶Bathroom Nightlight motion Sensor ➤Hallway Motion Sensor ► Motion Sensor PTAC

### •Conclusion

➢ Final Schedule and Budget ➢Final Decisions (What and What Not to Proceed With) ≻Q/A

•Hallway lighting – 23 (100W) Incandescent •Daily Use Reduction –5Hrs/day/floor •# of Lights on Sensors – 17 Lights Energy Consumption •Before – 40,296 kWh/year •After - 32,850 kWh/uear •Annual Energy Savings – 7,446 kWh/year •Annual Cost Savings - \$968/year

### Payback

# Holiday Inn Express

### Hallway Motion Sensor

•Energy Efficiency Analysis: Electrical Breadth



### •Payback Period - 1year

#### •Introduction

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#### Analysis 3: BAS Systems

►BAS System Application ▶Bathroom Nightlight motion Sensor ➤Hallway Motion Sensor ► Motion Sensor PTAC

### •Conclusion

≻Final Schedule and Budget ➢Final Decisions (What and What Not to Proceed With) ≻Q/A





# •<u>About</u>

•Reasons

 Initial Cost •PTAC Upgrade Cost – \$169/each, Total of \$8,291 •Labor Cost – Negligible

### Holiday Inn Express Motion Sensor PTAC

### Additional Information •Energy Efficiency Analysis: Mechanical Breadth

•Current System – 9000 BTU Amana PTAC unit •New System - 9000 BTU DigiSmart Amana PTAC unit w/ the DigiSmart Motion Sensor •**Typical savings –** 35% on Heating & Cooling

•Reduce Heating & Cooling Loads

•Original PTAC •Energy Usage – 4,400 kWh/year/unit •Energy Usage – 215,600 kWh/year •Energy Cost – \$28,028/year •New PTAC •Energy Usage- 3,000 kWh/year/unit •Energy Usage – 147,000 kWh/year •Energy Cost – \$19,110/year

•Annual Energy Savings – 16,993 kWh/year •Annual Cost Savings - \$8,918/year

### Payback

•Payback Period - 1year

#### •Introduction

➢Personal and Building Intro

#### •Building Background

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#### •Analysis 2: SIP Panel Implementation

►SIP Application ≻SIP vs. Stick Built ≻Material Cost Schedule and Labor Analysis >Energy Savings Analysis/Payback

#### Analysis 3: BAS Systems and Wireless Controls

►BAS System Application ➢Bathroom Nightlight motion Sensor ≻Hallway Motion Sensor ► Motion Sensor PTAC

#### Conclusion

≻Final Schedule and Budget ≻Final Decisions (What and What Not to Proceed With) ≻Q/A

### Holiday Inn Express



# CONCLUSION. FINAL BUDGET/SCHEDULE ANALYSIS

#### •Introduction

➢Personal and Building Intro

#### •Building Background

≻Building Size, Location, and Type Current Budget and Schedule ➤Areas for Improvement/Client Influence

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#### Conclusion

### ➢ Final Schedule and Budget

➢Final Decisions (What and What Not to Proceed With) ≽Q/A

# overall finish date

# reduction

# Holiday Inn Express

### Final Schedule

- •Original Finish Date April 16,2010 •New Finish Date – April 7, 2010
- •Solar Panels 6.25 day Installation period, doesn't affect
- •SIP Panel 3 day Reduction/floor, 9 day overall schedule

•BAS Systems – Negligible

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A1000	Obtain Permits	100.01	26-Mar-09	13-May-09		1070	Obtain P	1.1.1.								1			
A1010	Provide Building Pad		14-May-09	18-May-09			P rovi									1			
A1020	Excavate/Pour Ftgs.VV/		19-May-09	25-May-09															
A1030	Install Block Below Grad		26-May-09	04-Jun-09	_							- E		VW In	sulation	1			
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A1100	Frame & Sheath 1st Fir		01-Sep-09	07-Sep-09	-			1											
A1350	Install Stair Tower CMUs		01-Sep-09	21-Sep-09															
A1110	Install Fir. Trusses 2nd Fir.		08-Sep-09	14-Sep-09												1			
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A1120	Install Steel Stairs		16-Sep-09	29-Sep-09								6							
A1130	Install Sprinkler Pipes 1s		21-Sep-09	02-Oct-09				- St								1			
A1370	Install 2nd Fir. Gypcrete		21-Sep-09	25-Sep-09								4				4			
A1140	Frame & Sheath 2nd Fir		25-Sep-09	01-Oct-09	-														
A1150	Rough-In Plumb. 1st Fir		25-Sep-09	08-Oct-09															
A1380	Rough-In Elec. 1st Fir		25-Sep-09*	08-Oct-09				- 31								1			
A1160	Install Fir, Trusses 3rd Fir,		07-Oct-09*	27-Oct-09															
A1390	Install 3rd Fir. Sheathing		15-Oct-09*	21-Oct-09								1.							
A1170	Install Sprinkler Pipes 2n		21-Oct-09*	03-Nov-09	-														
A1400	Install 3rd Fir. Gypcrete		21-Oct-09*	27-Oct-09															
A1180	Frame & Sheath 3rd Fir.		27-Oct-09*	04-Nov-09				1								1			
A1190	Rough-In Plumb. 2nd Fir		27-Oct-09*	09-Nov-09	-			1								1			
A1410	Rough-In Elec. 2nd Fir		27-Oct-09*	09-Nov-09								4							
A1200	Install Roof Trusses, Sh		09-Nov-09*	25-Nov-09								2							
A1210	Install Curbs/Sidewalks		19-Nov-09*	25-Nov-09				- 3								1			
A1250	Install Sprinkler Pipes 3r		19-Nov-09*	02-Dec-09	- 1			1								1			
A1510	Solar Panel Installation		25-Nov-09*	03-Dec-09	- 1											1			
A1220	Install Paving/ Landscap		26-Nov-09*	02-Dec-09															
A1230	Rough-In Plumb. 3rd Fir		26-Nov-09*	09-Dec-09	-			1								1			
A1240	Install Windows		26-Nov-09*	02-Dec-09	-														
A1260	Install Pool Enclosure/G		26-Nov-09*	16-Dec-09	- 8							1							
A1420	Rough-In Elec. 3rd Fir		26-Nov-09*	09-Dec-09	-			- 31											
A1270	Install Cultured Stone		07-Dec-09*	18-Dec-09								4							
A1430	Install EIFS System		18-Dec-09*	12-Jan-10	-														
A1280	Insulate Walls - All Firs.		12-Jan-10*	20-Jan-10	- 3											1			
A1480	Install Restroom Flooring		12-Jan-10*	25-Jan-10				1											
A1490	Install Sheetrock - All Firs.		25-Jan-10*	12-Feb-10	- 1														
A1300 A1470	Install Millwork		12-Feb-10*	25-Feb-10 25-Feb-10				4				4				1			aradar
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A1500	Paint Walls - All Firs.		12-Feb-10* 26-Feb-10*	04-Mar-10 18-Mar-10	- 1											1			
A1310	Install Plumb, Fixtures				- 1											1			
A1450	Install Flooring Finishes		05-Mar-10*	25-Mar-10	-											1			
A1460	Install Doors & Hardware	1.0	05-Mar-10*	25-Mar-10				4.				4						10.00	
A1320	Perform Final Cleaning		26-Mar-10*	06-Apr-10	- 3			1								1			
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### Additional Information

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#### •Introduction

➢Personal and Building Intro

#### •Building Background

≻Building Size, Location, and Type Current Budget and Schedule ➤Areas for Improvement/Client Influence

#### •Analysis 1: Solyndra Solar Panel Implementation

≻Installation location ► Sizing the Panel Layout ► Schedule and Labor Analysis ≻Cost Analysis >Energy Savings Analysis/Payback

#### •Analysis 2: SIP Panel Implementation

► SIP Application ►SIP vs. Stick Built ➤Material Cost ► Schedule and Labor Analysis >Energy Savings Analysis/Payback

#### •Analysis 3: BAS Systems

►BAS System Application ➢Bathroom Nightlight motion Sensor ≻Hallway Motion Sensor ► Motion Sensor PTAC

#### Conclusion

#### ➢ Final Schedule and Budget

➢Final Decisions (What and What Not to Proceed With) ≽Q/A

solar panels

•The annual savings is 37% less w/o solar panels •The initial cost is 94% cheaper w/o solar panels

# Holiday Inn Express

### Final Budget

•Two final budget analysis were made, with/without

### Final Payback

•Payback Period (w/ Solar Panels) – 10 years •Payback Period (w/o Solar Panels) – 1 year

Analysis	Initial Budget Increase	Energy Savings (kWh/year)	Energy Savings (\$/year)	Energy Savings (lbs of CO <sub>2</sub> /year)
Solyndra Solar Panels	\$394,041	118,886 kWh	\$15,455	170,007 lbs of CO <sub>2</sub>
6" SIP Panels	\$14,690	111,633 kWh	\$14,512	159,635 lbs of CO <sub>2</sub>
Motion Sensor Nightlight Switch	\$980	16,993 kWh	\$2,210	24,300 lbs of $CO_2$
Hallway Occupancy Sensor	\$1,014	7,446 kWh	\$968	10,648 lbs of $CO_2$
Motion Sensor PTAC	\$8,291	68,600 kWh	\$8,918	98,098 lbs of CO <sub>2</sub>
Totals w/o Solar Panels	\$24,975	204,672 kWh	\$26,608	292,681 lbs of CO <sub>2</sub>
Totals	\$419,016	323,558 kWh	\$42,063	462,688 lbs of CO <sub>2</sub>

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#### •<u>Analysis 2: SIP Panel Implementation</u>

SIP Application ► SIP vs. Stick Built ➤Material Cost ► Schedule and Labor Analysis >Energy Savings Analysis/Payback

#### •Analysis 3: BAS Systems

▷BAS System Application ≻Bathroom Nightlight motion Sensor ➤Hallway Motion Sensor ► Motion Sensor PTAC

#### Conclusion

≻Final Schedule and Budget ≻Final Decisions (What and What Not to Proceed With) ≽Q/A

### •Solyndra Solar Panels

•Produces about 22% of Entire Building Energy •Long Payback Period about 26 years Almost 10% Increase in Initial Budget •More Beneficial for Owner to Wait (Carbon Tax, Solar Panel  $\downarrow$  Cost, &  $\uparrow$  Efficiency)

### •SIP Panels

- •Easy Installation
- Faster installation, 9 day Schedule Reduction •55% More energy Efficient Than Stick Built •Quick Payback, 1 Year

- •Plausible for Owner

# Holiday Inn Express

### **Final Decisions**

•Stronger, Quieter, & Straighter

### **Additional Information**

### •BAS Systems

 Reasonable Reduction in Vacant Energy Consumption •Cheap Initial Cost •About \$12,000/year Annual Savings •Easy Installation •Quick Payback, 1 year •Plausible for Owner

#### •Introduction

➢Personal and Building Intro

### •<u>Building Background</u>

Building Size, Location, and Type
 Current Budget and Schedule
 Areas for Improvement/Client Influence

### •Analysis 1: Solyndra Solar Panel Implementation

Installation location
 Sizing the Panel Layout
 Schedule and Labor Analysis
 Cost Analysis
 Energy Savings Analysis/Payback

#### •Analysis 2: SIP Panel Implementation

SIP Application
 SIP vs. Stick Built
 Material Cost
 Schedule and Labor Analysis
 Energy Savings Analysis/Payback

#### •Analysis 3: BAS Systems and Wireless Controls

BAS System Application
 Bathroom Nightlight motion Sensor
 Hallway Motion Sensor
 Motion Sensor PTAC

#### •Conclusion

Final Schedule and Budget
 Final Decisions (What and What Not to Proceed With)
 Q/A

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### Additional Information

# **QUESTION?**

Thesis by: Josh Raphael Architectural Engineering Construction Management

