Indian Valley High School
Lewistown, PA

Penn State AE Senior Capstone Project

Ryan Korona | Construction Management

Dr. David Riley – CM Advisor

Presentation Outline

I. Introduction

II. Project Background

III. Analysis #1: Photovoltaic Solar Panel Feasibility Study

IV. Analysis #2: Short Interval Production Schedule

V. Analysis #3: Geothermal Loop Conversion

VI. Summary of Conclusion

VII. Acknowledgements

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Project Background

Indian Valley High School
Lewistown, PA

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Presentation Outline

Location:

- 501 Sixth Street, Lewistown, PA
- Public High School – 35 miles South of State College

Building Parameters

- 250,000 SF
- 3 stories

Project Parameters

- ~ $60 million contract value
- Dates of Construction – 08/2008 – 12/2010
- Delivery Method – CM @ Risk

Project Background

Indian Valley High School
Lewistown, PA

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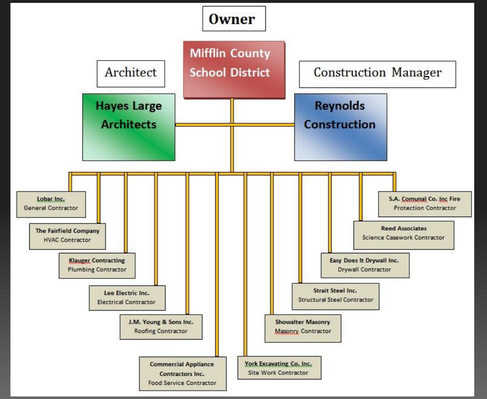
Presentation Outline

Building Systems Summary

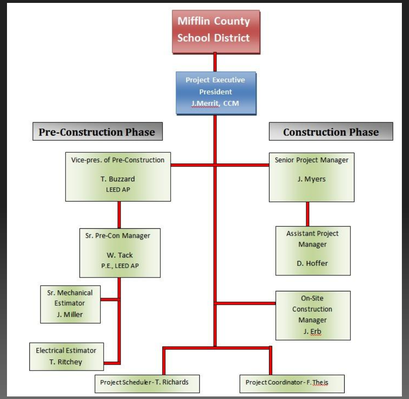
Building System Checklist		
Yes	No	Work Scope
	x	Demolition
x		Structural Steel
x		Cast-in-Place Concrete
x		Precst Concrete
x		Mechcanical System
x		Electrical System
x		Masonry
x		Curtain Wall
x		Excavation Support

MAJOR BUILDING SYSTEMS		
System	Actual	Per SF
Electrical	$5,084,613.23	$20.10
Mechanical	$9,046,322.00	$36.03
Plumbing	$1,999,304.00	$7.96
Masonry	$7,213,821.00	$28.73
Concrete	$2,449,238.00	$9.75
Structural	$4,652,897.00	$18.53

Organizational Chart



Project Staffing Chart



Photovoltaic Array System

Indian Valley High School
Lewistown, PA

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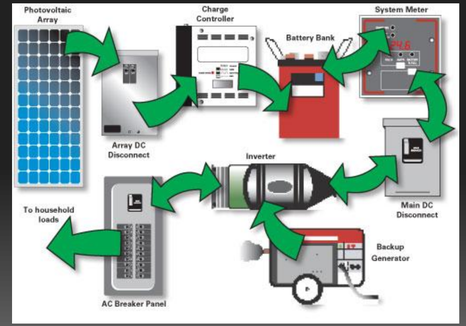
Presentation Outline

Problem Identification:

- Few sustainable techniques pursued in project
- Life span of building ideal for photovoltaic system

Research Goal:

- Perform preliminary design of a building integrated PV system
- Determine financial feasibility of system
- Maximize solar energy generation with available roof space
- Reduce energy costs for IVHS



Photovoltaic Array System

Indian Valley High School
Lewistown, PA

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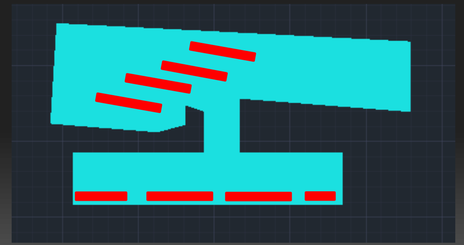
Presentation Outline



System Orientation

- Odd shape roof, multiple array design
- Front pitched roof area oriented directly south
- No shading obstructions from adjacent buildings

Design Parameters

Design Parameters For PV System	
Location	Lewistown, PA
Latitude	40.5 N
Longitude	77.5 W
Elevation	189.34 m
SF space	20262
Sun hours/day	3.65

	Length	Width	Area
Front Roof Section 1	73	32	2336
Front Roof Section 2	100	32	3200
Front Roof Section 3	100	32	3200
Front Roof Section 4	13	32	416
Gym Row 1	130	32	4160
Gym Row 2	100	32	3200
Row 1	75	25	1875
Row 2	75	25	1875
		Total Area	20262

Photovoltaic Array System

Indian Valley High School
Lewistown, PA

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Presentation Outline

MP² CAPITAL
RENEWABLE ENERGY

Case Study: Northwestern Regional No. 7, Winstead, Connecticut

- 250,000SF High School
- 2,000 panel, 40,000SF system
- 445.5kW system
- 3.72 Sun Hours per Day

System Benefits

- Rising Cost of Electricity
- Public/Private Partnership Agreement
- $25,000 savings in year one
- Received $1.72 million grant from Connecticut Clean Energy Fund

Photovoltaic Array System

Indian Valley High School
Lewistown, PA

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Presentation Outline

Product Selection:

- Sanyo HIT Double 195
- 13 SF per panel, 15.5 SF per module
- Florian solar mounting products

Actual System Size:

- 387 kW
- 1304 panels
- 20,262 SF

Module Calculations	
Square Foot of Array	20262
Square Foot of module	15.536
Number of Modules	1304.196704
Modules	1304

SANYO

HIT Photovoltaic Module

Photovoltaic Array System

Indian Valley High School
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Presentation Outline

PV Watts Energy Production Results @ $0.1/kWh			
Month	Solar Radiation	Energy	Energy Value
	kWh/m^2/day	kWh	$
1	1.84	17659.584	1765.9584
2	2.65	25433.64	2543.364
3	3.47	33303.672	3330.3672
4	4.36	41845.536	4184.5536
5	5	47988	4798.8
6	5.48	52594.848	5259.4848
7	5.49	52690.824	5269.0824
8	4.83	46356.408	4635.6408
9	4.07	39062.232	3906.2232
10	3.08	29560.608	2956.0608
11	1.93	18523.368	1852.3368
12	1.56	14972.256	1497.2256
		419990.976	$41,999.10

System Production:

- **~420,000 kWh per year**
- **~35,000 kWh per month**
- **~1,150 kWh per day**
- **Annual Energy Savings: ~$42,000**

Solar Energy Output	
Square Foot of Panels	20262
Output per SF (w)	19.1
kW produced	387.0042
Sun Hours per Day	3.65
kWh per day	1412.56533
80% effectiveness	1130.052264

Photovoltaic Array System

Indian Valley High School
Lewistown, PA

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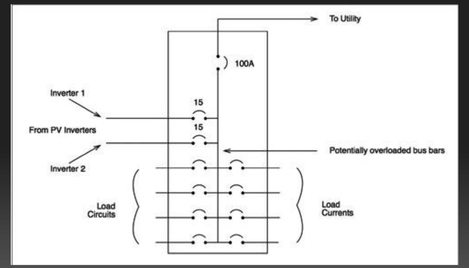
Presentation Outline



Grid Connection

- Additional 165.66A load on Main Panel for load-side connection
- Use Supply-side interconnection

Electrical Components Required

- DC Wire Run
- DC Disconnects
- Inverters
- AC Disconnects
- AC Wire Run
- Service-Tap Meter Box

Photovoltaic Array System

Indian Valley High School
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Presentation Outline

System Set-Up

- Locate Inverters on Penthouse Level
- Minimize DC Run
- Penthouse enclosure provides protection from environment

Photovoltaic Array System

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Presentation Outline

System Cost

- U.S. Department of Energy Annual Energy Report
- System > 250kW in Mid-Atlantic Region = $7.00/watt

Rebates/Incentives

- Federal Tax Credit – 30% Gross Installation Cost
- Pennsylvania Alternative Energy Credit - $0.02/kWh produced

Estimated Cost of PV System		
Size (kW)	$/W	Cost
387.0042	7	$2,709,000.00

Photovoltaic Array System

Indian Valley High School
Lewistown, PA

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Presentation Outline

System Cost

- $2.7 million installation cost
- 30% Tax credit - ~ $800,000
- ~ $42,000/year on electricity

Payback Period

- $2.7 million - $800,000 = $1.9 million
- ~ $42,000/year on electricity
- Total return on investment year 37 (without outside grant)

Photovoltaic Array System

Indian Valley High School
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Presentation Outline

Recommendation:

- Indian Valley High School Roof optimal for solar array
- 387kW, 1300 panel system
- PPA with outside firm for funding and upkeep
- Integrate with EnergySMART energy consumption

Short Interval Production Scheduling

Indian Valley High School
Lewistown, PA

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Presentation Outline

Problem Identification

- The repetitive nature of the activities associated with the classroom phase of construction provides an opportunity to implement Short Interval Production Scheduling.

Goal:

- Maximize workforce efficiency without sacrificing quality
- Schedule easier to track, predict and communicate

Short Interval Production Scheduling

Indian Valley High School
Lewistown, PA

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Presentation Outline

Current Project Schedule:

- **December 2009 – November 2010**
  - **47 week duration**
  - **Building Dry - December 19, 2009**

Scope of work Involved

- **Involves all interior Finish Activities for classroom areas**

Short Interval Production Scheduling

Indian Valley High School
Lewistown, PA

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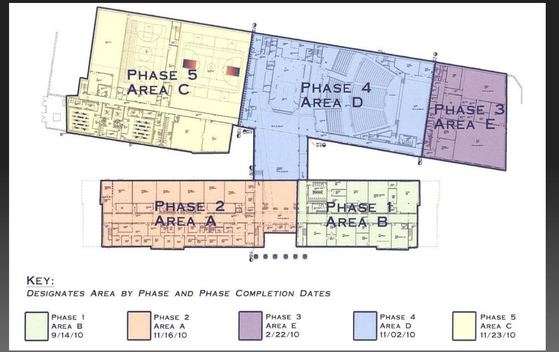
Presentation Outline

Building Zones	
Level	Units
A-1	6
B-1	7
A-2	9
B-2	14
A-3	14
B-3	11
Totals	61

Development of a SIP Schedule

- Break the Building into Zones/Unit
  - Classroom = 1 unit – 61 Classrooms considered
  - Average Classroom = 820 SF

Units/Rooms	61
SF	50155
AVG per room	822.2131148
Height	9.3333
AVG wall length	28.6
AVG wall area	266.93238
AVG wall area per Roo	1067.72952



Short Interval Production Scheduling

Indian Valley High School
Lewistown, PA

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Presentation Outline

Development of a SIP Schedule

- Break the Building into Zones/Unit
  - Classroom = 1 unit – 61 Classrooms considered
  - Average Classroom = 820 SF

Resource Leveling

- Determine the Sequence of the Critical Path
- Level Resources to Ensure Consistent Work Durations

Average Room Quantity Take-Offs									
Line Number	Material	Material Description	Quantity	Unit	Crew	Mult.	Daily Output	Total Duration	SIPS Duration
09250.015	Gypsum Wall Board	3/8" thick on wall	1068	SF	2	1	2000	0.53	1
09510.0800	Acoustical Ceiling Tile	Including Suspension System 2'x2'	800	SF	1	3	345	0.77	1
09658.7000	Vinyl Composition Tile	12"x12" x1/16"	800	SF	1 Tilf.	2	500	0.80	1
09910.1240	Paint	Primer/Finish Coat	2136	SF	1 Pord.	4	650	0.82	1
12310.5150	Casework	School 24" depth	52	LF	2	3	20	0.87	1

Short Interval Production Scheduling

Indian Valley High School
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Presentation Outline

SIP Schedule:

- Typical Zone Duration for interior finishes of classrooms
  - 3-5 days SIPS
  - 5-7 days Critical Path

December 2009 – October 2010

- ~ 44 week duration
- SIPS phase based on portion of established building phase

Average Room Quantity Take-Offs									
Line Number	Material	Material Description	Quantity	Unit	Crew	Mult.	Daily Output	Total Duration	SIPS Duration
09250.015	Gypsum Wall Board	3/8" thick on wall	1068	SF	2	1	2000	0.53	1
09510.0800	Acoustical Ceiling Tile	Including Suspension System 2'x2'	800	SF	1	3	345	0.77	1
09658.7000	Vinyl Composition Tile	12"x12" x1/16"	800	SF	1 Tilf.	2	500	0.80	1
09910.1240	Paint	Primer/Finish Coat	2136	SF	1 Pord.	4	650	0.82	1
12310.5150	Casework	School 24" depth	52	LF	2	3	20	0.87	1

Short Interval Production Scheduling

Indian Valley High School
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Presentation Outline

Conclusions and Recommendations

- Activity Durations shortened by estimated 2-3 weeks
  - •Reduces General Conditions Costs
  - •Delays and Stoppages can be accounted for
- Potential for Early Project Completion
  - Avoid Liquated Damages
- Schedule can be Utilized as Visual Tool
  - Extremely Predictable
  - Easy to Communicate
  - Easy to Track

Average Room Quantity Take-Offs									
Line Number	Material	Material Description	Quantity	Unit	Crew	Mult.	Daily Output	Total Duration	SIPS Duration
09250.015	Gypsum Wall Board	3/8" thick on wall	1068	SF	2	1	2000	0.53	1
09510.0800	Acoustical Ceiling Tile	Including Suspension System 2'x2'	800	SF	1	3	345	0.77	1
09658.7000	Vinyl Composition Tile	12"x12" x1/16"	800	SF	1 Tilf.	2	500	0.80	1
09910.1240	Paint	Primer/Finish Coat	2136	SF	1 Pord.	4	650	0.82	1
12310.5150	Casework	School 24" depth	52	LF	2	3	20	0.87	1

Geothermal Loop Conversion

Indian Valley High School
Lewistown, PA

Ryan Korona | Construction Management

Presentation Outline

Problem Identification

- The New Indian Valley High School was designed with a 220 ton vertical closed loop mechanical system that experienced installation/construction delays due to unforeseen limestone at deep vertical depths

Research Goal

- The goal of the research is to investigate the feasibility of the re-orientation of the current 2 field vertical design to a hybrid vertical-horizontal, or full horizontal design. The investigation will look into the financial benefit to alternative design scenarios along with system efficiency.

Geothermal Loop Conversion

Indian Valley High School
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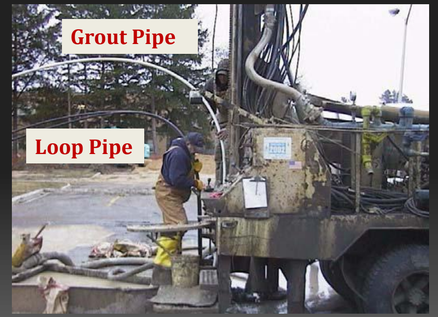
Presentation Outline



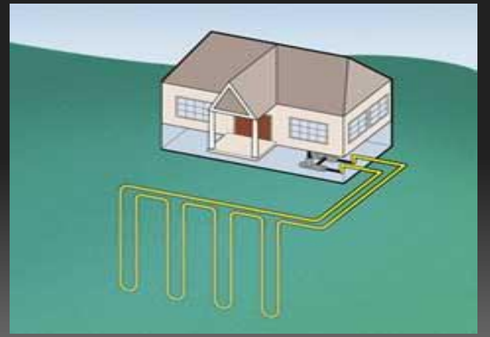
System Layout

- The current vertical loop design consists of 2 well fields (525' depth)
  - 120' x 135'
  - 120' x 100'

Vertical Installation Costs

- Vertical Close Loop Systems: ~ $2,400/ton installed based on depth
- 525' considered "deep" well depth

2400*(220) = $528,000 installed (not including delays)



Geothermal Loop Conversion

Indian Valley High School
Lewistown, PA

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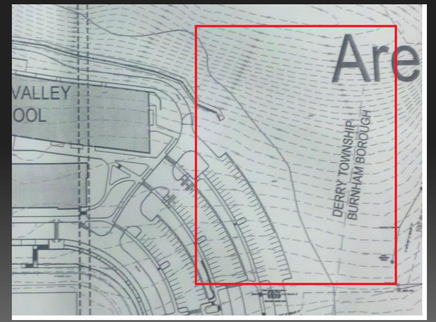
Presentation Outline



Useable Land Constraints

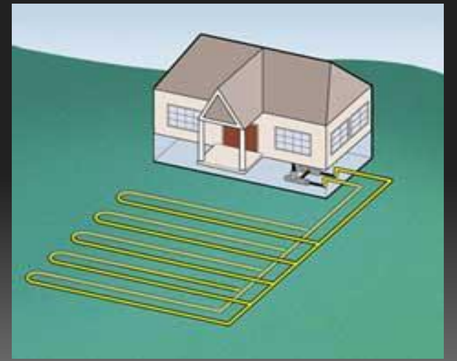
- 41 acre site
- Horizontal installation not recommended for underneath paved surfaces

Vertical System Installed Area

- 250 SF per borehole (ton), 55,000 SF @ 220 ton

Horizontal System Installed Area

- 2500 SF per ton, 550,000 SF @ 220 ton



Geothermal Loop Conversion

Indian Valley High School
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Presentation Outline

Hybrid Combination System

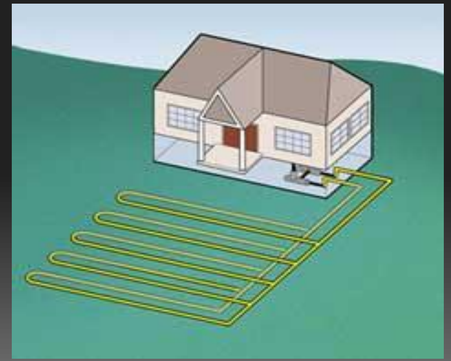
- One Vertical Well from current design
  - 120' x 100' (100 ton)
- One mini-HDD (Horizontal Directional Drilled)
  - 120' x 135' (120 ton)

Hybrid Combination System Costs

- 100 ton *($2,900) = $290,000
- 120 ton * ($1,900) = $228,000

$290,000 + $228,000 = $468,000

$538,000 - $468,000 = **$70,000**



Geothermal Loop Conversion

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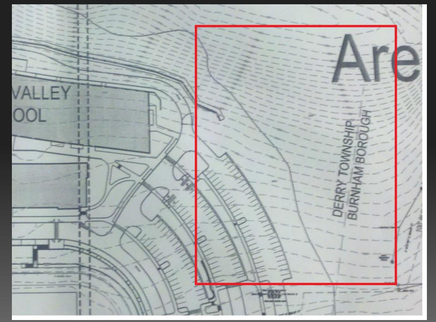
Presentation Outline



Efficiency of Vertical vs. Horizontal Loops

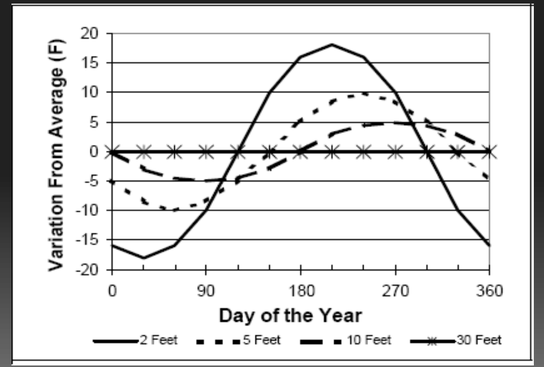
- Average Ground temperature constant after 30 feet
- Normal Horizontal trenches installed between 4-9 feet
- Ground Temperatures can fluctuate between 5-10 degrees (based on day)

Horizontal Closed Loop Systems

- Potentially require more energy input as same size vertical system

Mini-HDD

- Installed into ridge to avoid excess excavation
- Minimal loss of efficiency due to sloping ridge line



Geothermal Loop Conversion

Indian Valley High School
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Presentation Outline

Conclusions and Recommendations

- Higher mechanical system efficiency retained
- Higher energy input not significant due to mini-HDD installation
- Potential Savings of $70,000 from installation alone

Implement Hybrid Well Field Design

Lessons Learned

Indian Valley High School
Lewistown, PA

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Presentation Outline

Analysis #1: Photovoltaic Array System

- Perform Feasibility study early in design process
- Rebates/Incentives available to make systems more affordable
- PPA provide means of payment and maintenance

Analysis #2: Short Interval Production Scheduling

- Repetitive Schedules allow efficient work at high quality
- Reduction of overall project schedule and generate savings

Analysis #3: Geothermal Mechanical System Conversion

- Vertical Wells necessary where land space is limited
- Horizontal Wells nearly half the cost of installation
- Both provide highly efficient alternatives to traditional systems

Acknowledgements

Indian Valley High School
Lewistown, PA

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Presentation Outline

Special Thanks

- **Penn State Faculty**
  - Dr. David Riley
  - Prof. Ted Dannerth
  - Mr. Robert Holland
- **Reynolds Construction Management**
  - Mr. Jerry Myers
- **Mifflin County School District**
  - Mr. David S. Runk – Superintendent (ret.)
  - Mr. James A. Estep – Superintendent
  - Mrs. Carolyn Wray – Secretary to the Superindenent

Questions ?

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Lewistown, PA

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Questions ?

Photovoltaic Array System

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Presentation Outline

50 Year Financial Calculations						
Year	Cost $/kWh	Savings/Year	AECs	Total/Year	Monthly Savings	Cumulative Savings
1	0.100	$41,999.10	$923.98	$42,923.08	$3,576.92	$42,923.08
2	0.101	$42,419.09	$923.98	$43,343.07	$3,611.92	$86,266.15
3	0.102	$42,843.28	$923.98	$43,767.26	$3,647.27	$130,033.41
4	0.103	$43,271.71	$923.98	$44,195.69	$3,682.97	$174,229.10
5	0.104	$43,704.43	$923.98	$44,628.41	$3,719.03	$218,857.51
6	0.105	$44,141.47	$923.98	$45,065.45	$3,755.45	$263,922.96
7	0.106	$44,582.89	$923.98	$45,506.87	$3,792.24	$309,429.83
8	0.107	$45,028.72	$923.98	$45,952.70	$3,829.39	$355,382.53
9	0.108	$45,479.00	$923.98	$46,402.98	$3,866.92	$401,785.51
10	0.109	$45,933.79	$923.98	$46,857.77	$3,904.81	$448,643.29
11	0.110	$46,393.13	$923.98	$47,317.11	$3,943.09	$495,960.40
12	0.112	$46,857.06	$923.98	$47,781.04	$3,981.75	$543,741.44
13	0.113	$47,325.63	$923.98	$48,249.61	$4,020.80	$591,991.06
14	0.114	$47,798.89	$923.98	$48,722.87	$4,060.24	$640,713.93
15	0.115	$48,276.88	$923.98	$49,200.86	$4,100.07	$689,914.79
16	0.116	$48,759.65	$923.98	$49,683.63	$4,140.30	$739,598.42
17	0.117	$49,247.24	$923.98	$50,171.23	$4,180.94	$789,769.64
18	0.118	$49,739.72	$923.98	$50,663.70	$4,221.97	$840,433.34
19	0.120	$50,237.11	$923.98	$51,161.09	$4,263.42	$891,594.43

Photovoltaic Array System

Indian Valley High School
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Presentation Outline

18	0.118	$49,739.72	$923.98	$50,663.70	$4,221.97	$840,433.34
19	0.120	$50,237.11	$923.98	$51,161.09	$4,263.42	$891,594.43
20	0.121	$50,739.49	$923.98	$51,663.47	$4,305.29	$943,257.90
21	0.122	$51,246.88	$923.98	$52,170.86	$4,347.57	$995,428.76
22	0.123	$51,759.35	$923.98	$52,683.33	$4,390.28	$1,048,112.09
23	0.124	$52,276.94	$923.98	$53,200.92	$4,433.41	$1,101,313.01
24	0.126	$52,799.71	$923.98	$53,723.69	$4,476.97	$1,155,036.71
25	0.127	$53,327.71	$923.98	$54,251.69	$4,520.97	$1,209,288.40
26	0.128	$53,860.99	$923.98	$54,784.97	$4,565.41	$1,264,073.36
27	0.130	$54,399.60	$923.98	$55,323.58	$4,610.30	$1,319,396.94
28	0.131	$54,943.59	$923.98	$55,867.57	$4,655.63	$1,375,264.51
29	0.132	$55,493.03	$923.98	$56,417.01	$4,701.42	$1,431,681.52
30	0.133	$56,047.96	$923.98	$56,971.94	$4,747.66	$1,488,653.46
31	0.135	$56,608.44	$923.98	$57,532.42	$4,794.37	$1,546,185.88
32	0.136	$57,174.52	$923.98	$58,098.50	$4,841.54	$1,604,284.38
33	0.137	$57,746.27	$923.98	$58,670.25	$4,889.19	$1,662,954.63
34	0.139	$58,323.73	$923.98	$59,247.71	$4,937.31	$1,722,202.34
35	0.140	$58,906.97	$923.98	$59,830.95	$4,985.91	$1,782,033.29

Photovoltaic Array System

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Presentation Outline

34	0.139	$58,323.73	$923.98	$59,247.71	$4,937.31	$1,722,202.34
35	0.140	$58,906.97	$923.98	$59,830.95	$4,985.91	$1,782,033.29
36	0.142	$59,496.04	$923.98	$60,420.02	$5,035.00	$1,842,453.30
37	0.143	$60,091.00	$923.98	$61,014.98	$5,084.58	$1,903,468.28
38	0.145	$60,691.91	$923.98	$61,615.89	$5,134.66	$1,965,084.17
39	0.146	$61,298.83	$923.98	$62,222.81	$5,185.23	$2,027,306.98
40	0.147	$61,911.82	$923.98	$62,835.80	$5,236.32	$2,090,142.77
41	0.149	$62,530.93	$923.98	$63,454.91	$5,287.91	$2,153,597.69
42	0.150	$63,156.24	$923.98	$64,080.22	$5,340.02	$2,217,677.91
43	0.152	$63,787.81	$923.98	$64,711.79	$5,392.65	$2,282,389.69
44	0.153	$64,425.68	$923.98	$65,349.66	$5,445.81	$2,347,739.36
45	0.155	$65,069.94	$923.98	$65,993.92	$5,499.49	$2,413,733.28
46	0.156	$65,720.64	$923.98	$66,644.62	$5,553.72	$2,480,377.90
47	0.158	$66,377.85	$923.98	$67,301.83	$5,608.49	$2,547,679.72
48	0.160	$67,041.62	$923.98	$67,965.60	$5,663.80	$2,615,645.33
49	0.161	$67,712.04	$923.98	$68,636.02	$5,719.67	$2,684,281.35
50	0.163	$68,389.16	$923.98	$69,313.14	$5,776.10	$2,753,594.49
	TOTAL	$2,707,395.48	$46,199.01	$2,753,594.49		

Photovoltaic Array System

Indian Valley High School
Lewistown, PA

Ryan Korona | Construction Management

Presentation Outline

PV POWERED™ RESIDENTIAL/COMMERCIAL INVERTERS | SOLARON® COMMERCIAL/UTILITY INVERTERS

PROJECT SPECIFICATIONS

Module Manufacturer: Sanyo
Module Model #: HIT-195
Mounting Type: Roof / Ground / Pole
Filter Inverter List: Current / Discontinued
Temperature Scale: Fahrenheit / Celsius
Correction Factor: NEC (2008)
Local Temperature Range: from 0 to 110
Inverter: PVP 100K-480V

MODULE SPECIFICATIONS

Manufacturer: Sanyo
Model: HIT-195

STC Watts	195 watts	VOC Temp Coefficient	-0.17V/Deg C
PTC Watts	185.3 watts	Max Power Temp Coefficient	n/a
VOC	68.1 VDC	Coldest Day VOC	80.4 VDC
VMP	55.3 VDC	Warmest Day VMP	106.2 VDC
IMP	3.53 A		

INVERTER SPECIFICATIONS:

Maximum DC Input Voltage	600 V	Continuous Power Output	100000 W
DC Peak Power Tracking Range	295 - 500 V	Weighted CEC Efficiency	96 %
DC IMP Nominal Current	356 A	AC Nominal Voltage	480 V
		AC Operating Range	422 - 528 V
		AC Frequency	60 Hz
		AC Maximum Continuous Current	120 A

STC Watts	PTC Watts	Inverter AC Watts	STC VOC	Coldest Day VOC	STC VMP	Warmest Day VMP	STC IMP
64,155 W	60,963 W	58,525 W	477 VDC	563 VDC	388 VDC	335 VDC	165.91 A

Short Interval Production Scheduling

Indian Valley High School
Lewistown, PA

Ryan Korona | Construction Management

Presentation Outline

First Floor

	Room Name	Room #	Floor	Base	Wall	Ceiling Type	Casework LF	Room SF	Ceiling Height (FT)
1	Business Classroom	A120	VCT	Rubber	Gypsum Wall Board	ACT	45	965	9.3333
1	Business Classroom	A119	VCT	Rubber	Gypsum Wall Board	ACT	49	954	9.3333
1	Business Classroom	A115	VCT	Rubber	Gypsum Wall Board	ACT	50	971	9.3333
1	Business Classroom	A112	VCT	Rubber	Gypsum Wall Board	ACT	45	798	9.3333
1	Business Classroom	A106	VCT	Rubber	Gypsum Wall Board	ACT	42	803	9.3333
1	IPC	A111	Carpet	Rubber	Gypsum Wall Board	ACT	20	512	8
1	Art Classroom	B113	Conc	Rubber	Gypsum Wall Board	ACT	40	713	9.3333
1	Art Classroom	B115	Conc	Rubber	Gypsum Wall Board	ACT	40	740	9.3333
1	Art Classroom	B123	Conc	Rubber	Gypsum Wall Board	ACT	45	813	9.3333
1	Child Development	B124	Linoleum	Integral	Gypsum Wall Board	ACT	20	588	9.3333
1	Food Lab	B125	Linoleum	Integral	Gypsum Wall Board	ACT	60	1095	9.3333
1	Home Econ	B122	Linoleum	Integral	Gypsum Wall Board	ACT	65	1098	9.3333
1	Media	B114	Carpet	Rubber	Gypsum Wall Board	ACT	60	1082	9.3333

Short Interval Production Scheduling

Indian Valley High School
Lewistown, PA

Ryan Korona | Construction Management

Presentation Outline

Second Floor

	Room Name	Room #	Floor	Base	Wall	Ceiling Type	Casework LF	Room SF	Ceiling Height (FT)
1	General Science	A217	VCT	Rubber	Gypsum Wall Board	ACT	70	1075	9.3333
1	General Science	A216	VCT	Rubber	Gypsum Wall Board	ACT	70	1025	9.3333
1	General Science	A212	VCT	Rubber	Gypsum Wall Board	ACT	75	1138	9.3333
1	General Science	A214	VCT	Rubber	Gypsum Wall Board	ACT	75	1099	9.3333
1	Chem	A211	VCT	Rubber	Gypsum Wall Board	ACT	75	1087	9.3333
1	Chem	A208	VCT	Rubber	Gypsum Wall Board	ACT	65	1045	9.3333
1	Bio	A210	VCT	Rubber	Gypsum Wall Board	ACT	65	1025	9.3333
1	Bio	A202	VCT	Rubber	Gypsum Wall Board	ACT	65	1025	9.3333
1	Physics	A203	VCT	Rubber	Gypsum Wall Board	ACT	40	838	9.3333
1	Computer Lab	B208	VCT	Rubber	Gypsum Wall Board	ACT	40	791	9.3333
1	Office	B207	Carpet	Rubber	Gypsum Wall Board	ACT	10	184	8
1	IPC	B214	Carpet	Rubber	Gypsum Wall Board	ACT	15	423	8
1	Math	B205	VCT	Rubber	Gypsum Wall Board	ACT	35	692	9.3333
1	Math	B212	VCT	Rubber	Gypsum Wall Board	ACT	40	763	9.3333
1	Math	B209	VCT	Rubber	Gypsum Wall Board	ACT	40	799	9.3333
1	Math	B215	VCT	Rubber	Gypsum Wall Board	ACT	40	799	9.3333
1	Math	B217	VCT	Rubber	Gypsum Wall Board	ACT	35	711	9.3333
1	Math	B216	VCT	Rubber	Gypsum Wall Board	ACT	40	799	9.3333
1	Math	B222	VCT	Rubber	Gypsum Wall Board	ACT	40	799	9.3333
1	Math	B226	VCT	Rubber	Gypsum Wall Board	ACT	45	807	9.3333
1	Math	B223	VCT	Rubber	Gypsum Wall Board	ACT	40	799	9.3333
1	SG1	B211	VCT	Rubber	Gypsum Wall Board	ACT	20	415	9.3333
1	SG1	B219	VCT	Rubber	Gypsum Wall Board	ACT	20	448	9.3333

Short Interval Production Scheduling

Indian Valley High School
Lewistown, PA

Ryan Korona | Construction Management

Presentation Outline

Third Floor

	Room Name	Room #	Floor	Base	Wall	Ceiling Type	Casework LF	Room SF	Ceiling Height (FT)
1	Special Ed	B312	VCT	Rubber	Gypsum Wall Board	ACT	30	599	9.3333
1	Special Ed	B318	VCT	Rubber	Gypsum Wall Board	ACT	30	660	9.3333
1	Special Ed	A323	VCT	Rubber	Gypsum Wall Board	ACT	40	754	9.3333
1	Special Ed	A302	VCT	Rubber	Gypsum Wall Board	ACT	40	771	9.3333
	English	A327	VCT	Rubber	Gypsum Wall Board	ACT	45	799	9.3333
1	English	A326	VCT	Rubber	Gypsum Wall Board	ACT	45	803	9.3333
1	English	A321	VCT	Rubber	Gypsum Wall Board	ACT	40	768	9.3333
1	English	A318	VCT	Rubber	Gypsum Wall Board	ACT	45	802	9.3333
1	English	A320	VCT	Rubber	Gypsum Wall Board	ACT	45	826	9.3333
1	English	A314	VCT	Rubber	Gypsum Wall Board	ACT	45	811	9.3333
1	English	A317	VCT	Rubber	Gypsum Wall Board	ACT	45	803	9.3333
1	English	A311	VCT	Rubber	Gypsum Wall Board	ACT	45	803	9.3333
1	Language	A313	VCT	Rubber	Gypsum Wall Board	ACT	40	767	9.3333
1	Language	A307	VCT	Rubber	Gypsum Wall Board	ACT	35	769	9.3333
1	Language	A310	VCT	Rubber	Gypsum Wall Board	ACT	40	799	9.3333
1	Language	A305	VCT	Rubber	Gypsum Wall Board	ACT	40	810	9.3333
1	IPC	A309	Carpet	Rubber	Gypsum Wall Board	ACT	35	534	9.3333
1	Social Studies	B308	VCT	Rubber	Gypsum Wall Board	ACT	45	797	9.3333
1	Social Studies	B309	VCT	Rubber	Gypsum Wall Board	ACT	45	803	9.3333
1	Social Studies	B315	VCT	Rubber	Gypsum Wall Board	ACT	45	802	9.3333
1	Social Studies	B316	VCT	Rubber	Gypsum Wall Board	ACT	45	802	9.3333
1	Social Studies	B324	VCT	Rubber	Gypsum Wall Board	ACT	40	801	9.3333
1	Social Studies	B325	VCT	Rubber	Gypsum Wall Board	ACT	40	807	9.3333
1	Social Studies	B321	VCT	Rubber	Gypsum Wall Board	ACT	45	875	9.3333
1	Social Studies	B319	VCT	Rubber	Gypsum Wall Board	ACT	45	800	9.3333
1	LG1	B306	VCT	Rubber	Gypsum Wall Board	ACT	70	1072	9.3333