MEMORIAL VISTA

// A North Virginia Office Building

Advisor // Craig Dubler
William J. Gamble // Construction Option

Memorial Vista
// Presentation Outline

// Overview

Location //

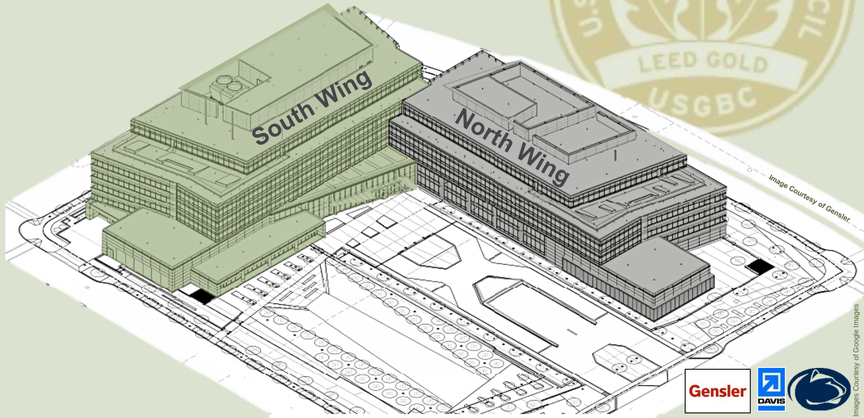
Northern Virginia, USA
Main East Coast Office

Building Parameters //

322,725 GSF Above Grade
247,530 Below Grade
5 Stories (North Wing), 6 Stories (South Wing)
2 Levels Below Grade (Parking)

Project Parameters //

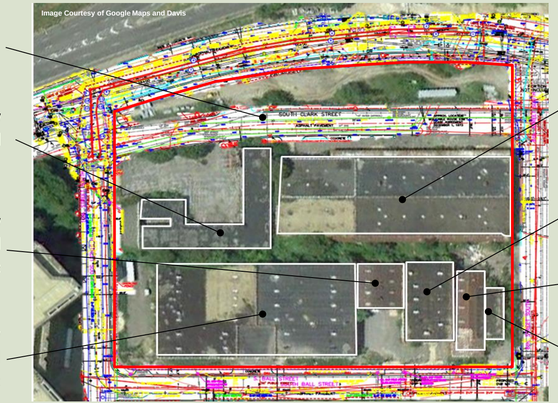
Contract Value = $78.5 Million
Dates of Construction = April 2011 – January 2014
Delivery Method = CM at Risk w/ GMP
LEED Certification = 60 Points, LEED Gold

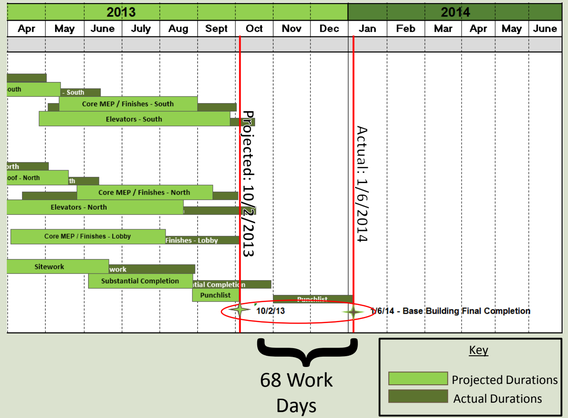


Memorial Vista
// Presentation Outline

// Existing Conditions

Durations				
Description	**Projected**		**Actual**	
PERMITS				
Issue Site Utilities Permit		9/30/2011		10/11/2011
Clearing, Grading, & Demo	9/21/2011	11/27/2011	10/6/2011	2/3/2012
Excavation, Sheeting, & Shoring	12/20/2011	2/16/2012	11/29/2011	3/16/2012
Footing to Grade	2/17/2012	5/10/2012	2/21/2012	7/26/2012
Building	12/7/2011	5/24/2012	1/17/2012	8/2/2012
CONSTRUCTION				
Mobilization of Site	11/17/2011	12/2/2011	11/21/2011	1/20/2012
Utility Relocations	11/28/2011	2/1/2012	1/16/2012	7/27/2012
Demolition/ Hardscaping	12/5/2011	2/19/2011	2/8/2012	6/14/2012
Excavation	3/5/2012	7/13/2012	5/1/2012	9/4/2012
SOUTH				
Concrete Substructure	6/13/2012	10/16/2012	8/30/2012	12/11/2012
Concrete Superstructure	10/24/2012	2/25/2013	12/6/2012	5/1/2013
Facade & Roof	1/11/2013	5/13/2013	3/25/2013	6/14/2013
Core MEP / Finishes	5/13/2013	8/29/2013	5/2/2013	10/1/2013
Elevators	4/22/2013	9/25/2013	5/8/2013	10/15/2013
NORTH				
Concrete Substructure	6/28/2012	11/14/2012	9/6/2012	1/29/2013
Concrete Superstructure	11/15/2012	3/7/2013	1/18/2013	5/3/2013
Facade & Roof	2/8/2013	5/17/2013	3/13/2013	6/10/2013
Core MEP / Finishes	5/29/2013	9/11/2013	4/12/2013	10/2/2013
Elevators	3/8/2013	9/15/2013	5/10/2013	10/16/2013
LOBBY				
Core MEP / Finishes	4/2/2013	8/5/2013	6/17/2013	10/2/2013
SITEWORK / INSPECTIONS				
Sitework	3/14/2013	6/19/2013	4/19/2013	8/29/2013
Substantial Completion	6/4/2013	8/27/2013	7/19/2013	10/30/2013
Punchlist	8/28/2013	10/2/2013	10/31/2013	1/6/2014
Base Building Final Completion		10/2/2013		1/6/2014





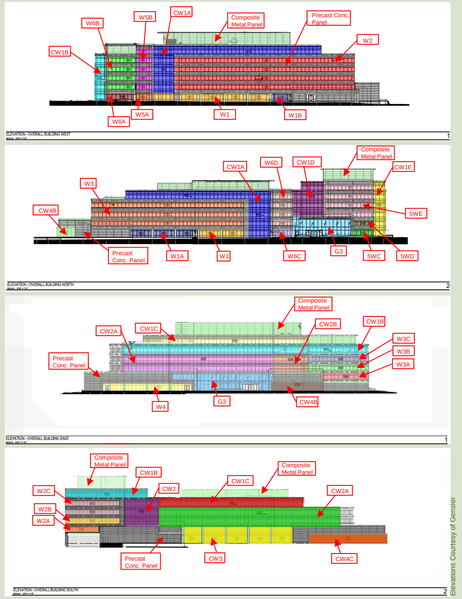
Memorial Vista
// Presentation Outline

// Analysis 1

Memorial Vista
// Presentation Outline

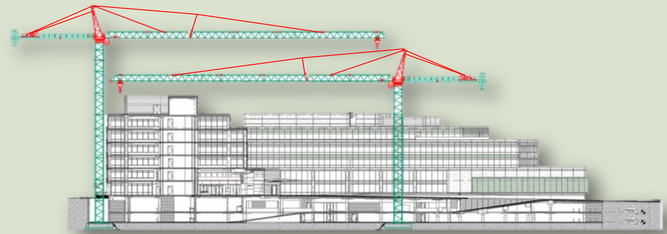
// Façade Study

// Façade Breakdown



Elevations Courtesy of Gensler

// Crane Orientation



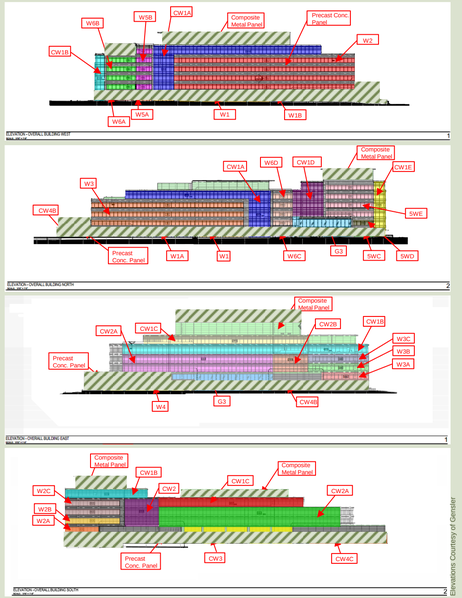
Crane Layout Courtesy of:

Facchina CONSTRUCTION COMPANY, INC.

Memorial Vista
// Presentation Outline

// Façade Study

// Façade Breakdown



Elevations Courtesy of Gensler

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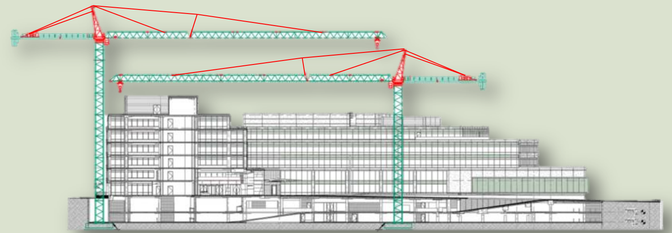


Crane Layout Courtesy of:

Facchina Construction Company

Memorial Vista
// Presentation Outline

// Building Zones

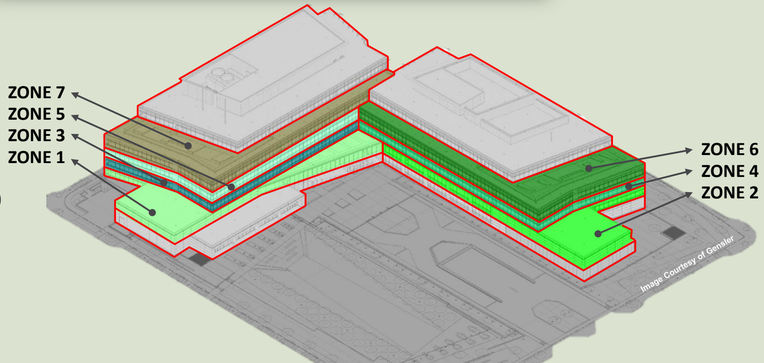
Table Courtesy of Davis

Activity ID	Activity Name	Orig Dur	Start	Finish	Total Float
Facade	**SOUTH WING**	101	02-15-13	07-26-13	87
		101	02-15-13	07-26-13	87
4200000	Begin Facade - South	0	02-15-13		101
4200010	SOUTH TOWER FACADE SUMMARY	101	02-15-13	07-26-13	87
4299000	Facade Complete - South	0		07-26-13	87
Facade	**NORTH WING**	66	03-14-13	06-26-13	106
		66	03-14-13	06-26-13	106
5200000	Begin Facade - North	0	03-14-13		87
5200010	NORTH TOWER FACADE SUMMARY	66	03-14-13	06-26-13	106
5299000	Facade Complete - North	0		06-26-13	106

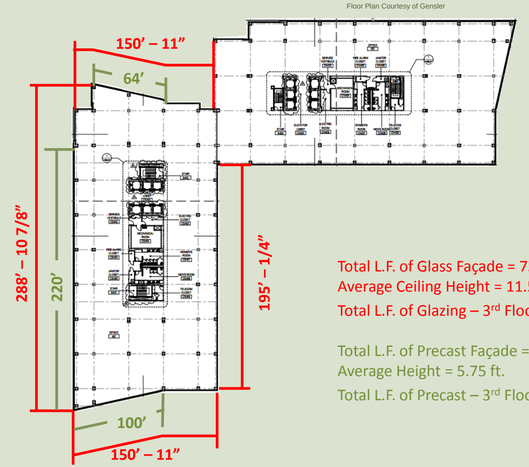
S. Wing = 101 Work Days / 6 Stories
= 16.833 Work Days / Floor

N. Wing = 66 Work Days / 5 Stories
= 13.2 Work Days / Floor

// Building Zones



Floor Plan Courtesy of Gensler



Total L.F. of Glass Façade = 759.27 L.F.
Average Ceiling Height = 11.5 ft.
Total L.F. of Glazing – 3rd Floor = (759.27)*(11.5)
= 8,731.605 S.F.

Total L.F. of Precast Façade = 384 L.F.
Average Height = 5.75 ft.
Total L.F. of Precast – 3rd Floor = (384)*(5.75)
= 2,208 S.F.

RED = Glazing
= 9.095 Days/ floor wing

GREEN = Precast Concrete Panels
= 1.15 Days / floor wing

= 10.245 days
~ 11 Days (<16.833)

Memorial Vista
// Presentation Outline

// Building Zones

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5299000	Facade Complete - North	0		06-26-13	106

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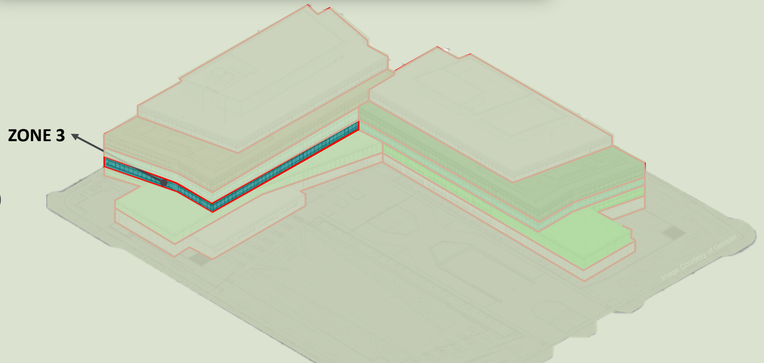
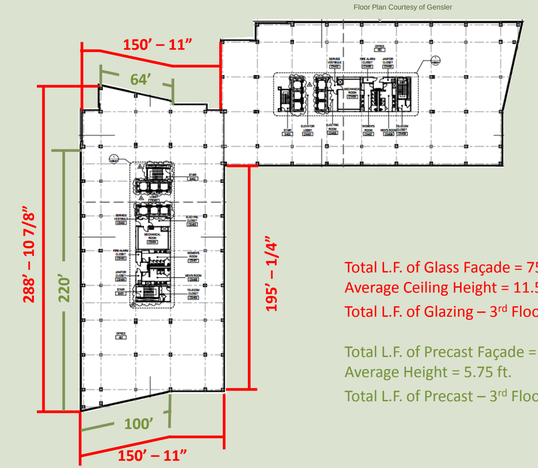
// Building Zones



Floor Plan Courtesy of Gensler



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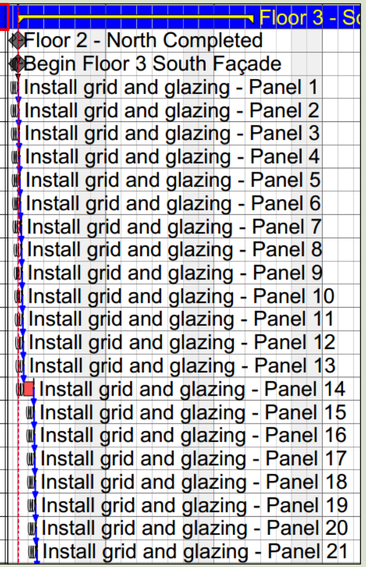
~ 11 Days (<16.833)

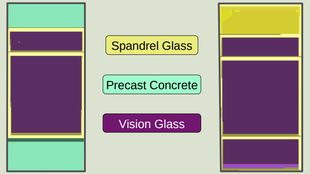
Memorial Vista
// Presentation Outline

// Building Zones

1		Floor 3 - South Wing Façade	11d, 4h, 35m
2	ST00020	Floor 2 - North Completed	0 Days
3	ST00030	Begin Floor 3 South Façade	0 Days
4	ST00040	Install grid and glazing - Panel 1	35m
5	ST00050	Install grid and glazing - Panel 2	35m
6	ST00060	Install grid and glazing - Panel 3	35m
7	ST00070	Install grid and glazing - Panel 4	35m
8	ST00080	Install grid and glazing - Panel 5	35m
9	ST00090	Install grid and glazing - Panel 6	35m
10	ST00100	Install grid and glazing - Panel 7	35m
11	ST00110	Install grid and glazing - Panel 8	35m
12	ST00120	Install grid and glazing - Panel 9	35m
13	ST00130	Install grid and glazing - Panel 10	35m
14	ST00140	Install grid and glazing - Panel 11	35m
15	ST00150	Install grid and glazing - Panel 12	35m
16	ST00160	Install grid and glazing - Panel 13	35m
17	ST00170	Install grid and glazing - Panel 14	35m
18	ST00180	Install grid and glazing - Panel 15	35m
19	ST00190	Install grid and glazing - Panel 16	35m
20	ST00200	Install grid and glazing - Panel 17	35m
21	ST00210	Install grid and glazing - Panel 18	35m
22	ST00220	Install grid and glazing - Panel 19	35m
23	ST00230	Install grid and glazing - Panel 20	35m
24	ST00240	Install grid and glazing - Panel 21	35m

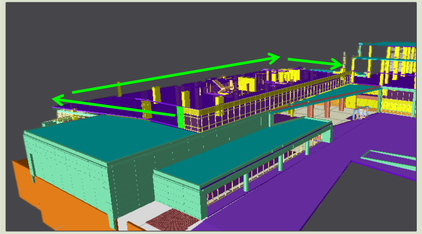


Zone 3 = Level 3
South Wing → 152 Panels
28 Min [Precast]
35.86 min [Glazing]

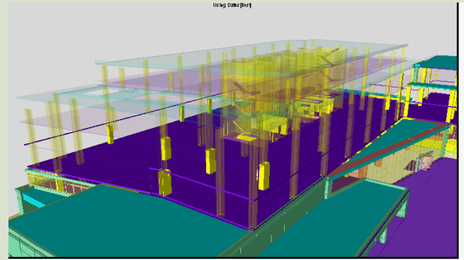


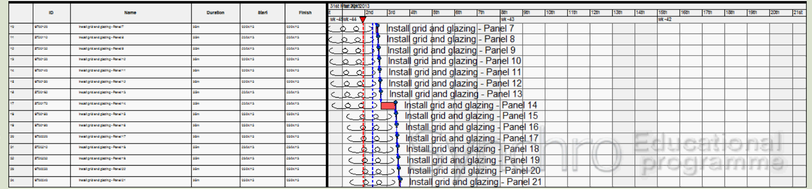
Typical Precast Panel

Typical Glazing Panel



// 4-D Synchro Model





Memorial Vista
// Presentation Outline

// Impact

// Interpolation

11d, 4h, 35m

11d, 4h, 35m ← Total Installation Time for Zone 1, 3, 5, & 7

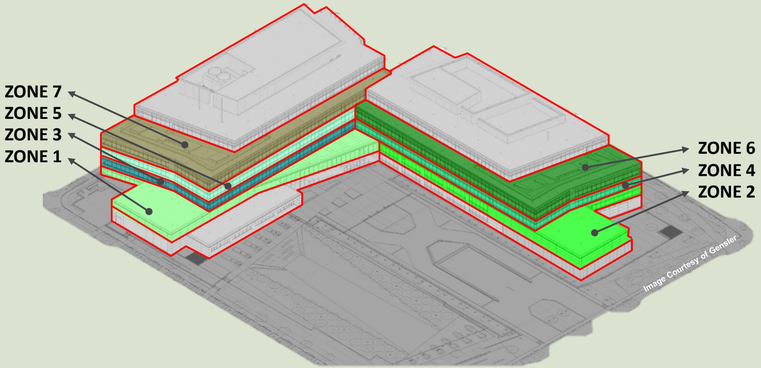
Interpolate for Zones in N. Wing

$$\frac{S.Wing}{N.Wing} = \frac{16.833\frac{\text{days}}{\text{floor}}\,(original\ duratation)}{13.2\frac{\text{days}}{\text{floor}}\,(original\ duration)} = \frac{11.573\frac{days}{floor}\,(calculated\ schedule\ duration)}{X\ (schedule\ duration\ for\ North\ Wing)}$$

Where $X =$ **$9.075\ days/floor$** ← Total Installation Time for Zone 2, 4, & 6

South Wing
- Floors being taken into account: 2, 3, 4, & 5 (4 floors total)
- Actual duration to do these floors = (16.833 days/floor)*(4 floors) = 67.332 days
- SIPS duration = (11.573 days/floor)*(4 floors) = 46.292 days
- Difference of 21.04 days ~~ **21 days**

North Wing
- Floors being taken into account: 2, 3, 4, & 5 (3 floors total)
- Actual duration to do these floors = (13.2 days/floor)*(3 floors) = 39.6 days
- SIPS duration = (9.075 days/floor)*(3 floors) = 27.225 days
- Difference of 12.375 days ~~ **12 days**



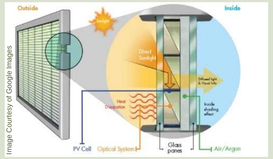
33 Days Saved Total

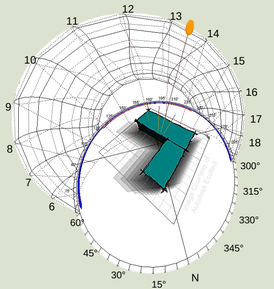
Memorial Vista
// Presentation Outline

// Analysis 2

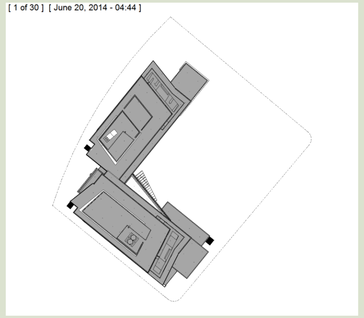
Memorial Vista
// Presentation Outline

// Solar Study





// PV Glass Location



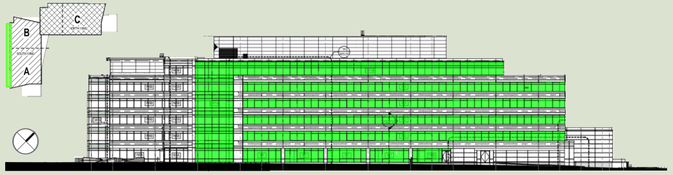
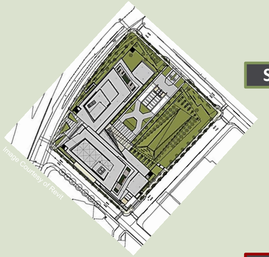
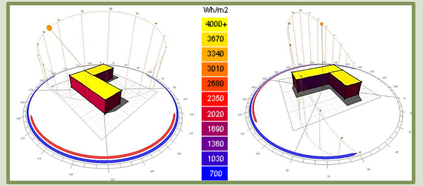
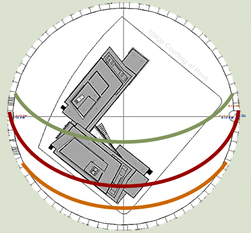


Image Courtesy of Gensler

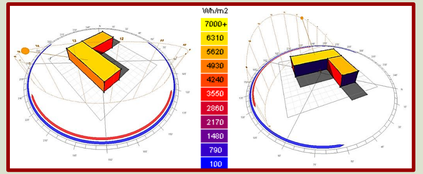


Summer Solstice





Vernal & Autumnal Equinox



Winter Solstice

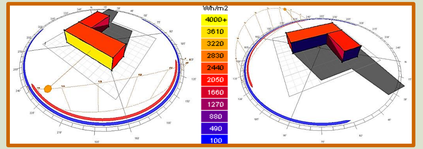


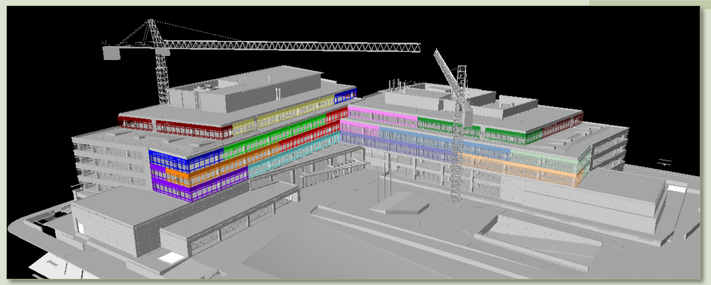
Image Courtesy of Autodesk Ecotect 2011

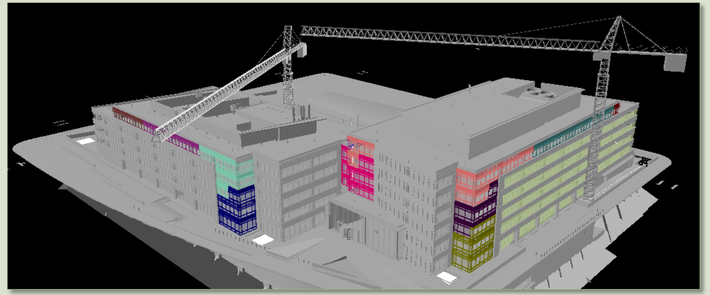
Memorial Vista
// Presentation Outline

// Prefabrication Process

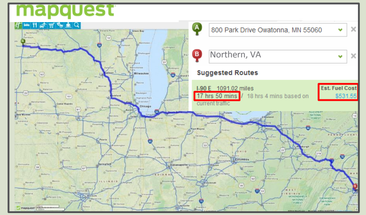
Task Name	Duration
South Wing	**35.19 days**
Install panels 1-27 (S Wing - SW corner)	13.5 hrs
Install Strip Windows 28 - 54 (S Façade)	13.5 hrs
Install Strip Windows 55 - 81 (S Façade)	13.5 hrs
Install Strip Windows 82 - 108 (S Façade)	13.5 hrs
Install Strip Windows 109 - 135 (S Façade)	13.5 hrs
Install Strip Windows 136 - 162 (S Façade)	13.5 hrs
Install Strip Windows 163 - 189 (S Façade)	13.5 hrs
Install panels 190 -216 (SW corner)	13.5 hrs
Install Strip Windows 217 - 243 (S Façade)	13.5 hrs
Install Strip Windows 244 - 266 (S Façade)	11.5 hrs
Install panels 267 -293 (NE Facade)	13.5 hrs
Install panels 294 -320 (E Corner)	13.5 hrs
Install panels 321 -347 (NE Façade)	13.5 hrs
Install panels 348 -374 (N Façade)	13.5 hrs
Install panels 375 -401 (N corner)	13.5 hrs
Install panels 402 -428 (N Façade)	13.5 hrs
Install panels 429 -455 (N Façade)	13.5 hrs
Install panels 456 -482 (N Façade)	13.5 hrs
Install panels 483 -509 (SE Façade)	13.5 hrs
Install panels 510 -536 (S Façade)	13.5 hrs
Install panels 537 -563 (NW Façade)	13.5 hrs
North Wing	**16.88 days**
Install panels 564 -590 (E Corner)	13.5 hrs
Install panels 591 -617 (E Corner)	13.5 hrs
Install panels 618 -644 (S Corner)	13.5 hrs
Install panels 645 -671 (E Corner)	13.5 hrs
Install panels 672 -698 (E Corner)	13.5 hrs
Install panels 699 -725 (SE Facade)	13.5 hrs
Install panels 726 -752 (S Corner)	13.5 hrs
Install panels 753 -779 (E Corner)	13.5 hrs
Install panels 780 -806 (N Corner)	13.5 hrs
Install panels 807 -833 (NW Facade)	8.5 hrs
Prefabricated Façade Complete	0 days

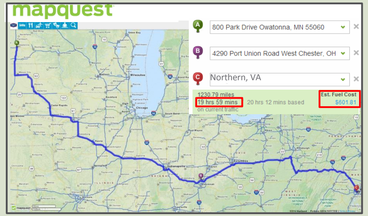
// Façade Prefabrication



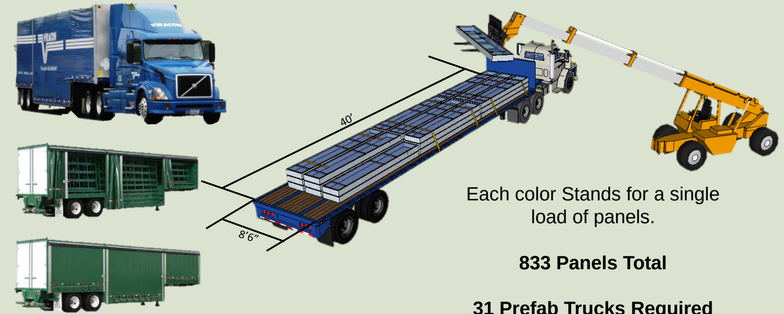


// Prefab Delivery





Maps Courtesy of MapQuest



Images Courtesy of Google Images

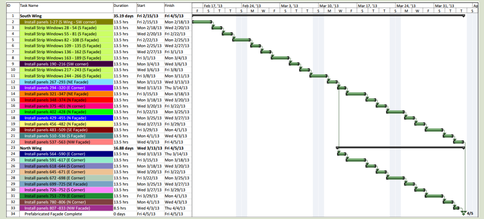
Each color Stands for a single load of panels.

833 Panels Total

31 Prefab Trucks Required

Memorial Vista
// Presentation Outline

// Impact



ID	Task Name	Duration	Start	Finish
1	**South Wing**	**35.19 days**	**Fri 2/15/13**	**Fri 4/5/13**
2	Install panels 1-27 (L-Wing + SW corner)	13.5 hrs	Fri 2/15/13	Mon 2/18/13
3	Install Strip Windows 28 - 54 (S Façade)	13.5 hrs	Mon 2/18/13	Wed 2/20/13
4	Install Strip Windows 55 - 81 (S Façade)	13.5 hrs	Wed 2/20/13	Fri 2/22/13
5	Install Strip Windows 82 - 108 (S Façade)	13.5 hrs	Fri 2/22/13	Mon 2/25/13
6	Install Strip Windows 109 - 135 (S Façade)	13.5 hrs	Mon 2/25/13	Wed 2/27/13
7	Install Strip Windows 136 - 162 (S Façade)	13.5 hrs	Wed 2/27/13	Fri 3/1/13
8	Install Strip Windows 163 - 189 (S Façade)	13.5 hrs	Fri 3/1/13	Mon 3/4/13
9	Install panels 190 - 216 (SW corner)	13.5 hrs	Mon 3/4/13	Wed 3/6/13
10	Install Strip Windows 217 - 243 (S Façade)	13.5 hrs	Wed 3/6/13	Fri 3/8/13
11	Install Strip Windows 244 - 266 (S Façade)	13.5 hrs	Fri 3/8/13	Mon 3/11/13
12	Install panels 267 - 293 (NE Façade)	13.5 hrs	Mon 3/11/13	Wed 3/13/13
13	Install panels 294 - 320 (NE Façade)	13.5 hrs	Wed 3/13/13	Fri 3/15/13
14	Install panels 321 - 347 (NE Façade)	13.5 hrs	Fri 3/15/13	Mon 3/18/13
15	Install panels 348 - 374 (N Façade)	13.5 hrs	Mon 3/18/13	Wed 3/20/13
16	Install panels 375 - 401 (N Corner)	13.5 hrs	Wed 3/20/13	Fri 3/22/13
17	Install panels 402 - 428 (N Façade)	13.5 hrs	Fri 3/22/13	Mon 3/25/13
18	Install panels 429 - 455 (N Façade)	13.5 hrs	Mon 3/25/13	Wed 3/27/13
19	Install panels 456 - 482 (N Façade)	13.5 hrs	Wed 3/27/13	Fri 3/29/13
20	Install panels 483 - 509 (N Façade)	13.5 hrs	Fri 3/29/13	Mon 4/1/13
21	Install panels 510 - 536 (N Façade)	13.5 hrs	Mon 4/1/13	Wed 4/3/13
22	Install panels 537 - 563 (NW Façade)	13.5 hrs	Wed 4/3/13	Fri 4/5/13
23	**North Wing**	**10.69 days**	**Wed 3/13/13**	**Fri 4/5/13**
24	Install panels 564 - 590 (E Corner)	13.5 hrs	Wed 3/13/13	Thu 3/14/13
25	Install panels 591 - 617 (E Corner)	13.5 hrs	Fri 3/15/13	Mon 3/18/13
26	Install panels 618 - 644 (E Corner)	13.5 hrs	Mon 3/18/13	Wed 3/20/13
27	Install panels 645 - 671 (E Corner)	13.5 hrs	Wed 3/20/13	Fri 3/22/13
28	Install panels 672 - 698 (E Corner)	13.5 hrs	Fri 3/22/13	Mon 3/25/13
29	Install panels 699 - 725 (SE Façade)	13.5 hrs	Mon 3/25/13	Wed 3/27/13
30	Install panels 726 - 752 (S Corner)	13.5 hrs	Wed 3/27/13	Fri 3/29/13
31	Install panels 753 - 779 (S Corner)	13.5 hrs	Fri 3/29/13	Mon 4/1/13
32	Install panels 780 - 806 (N Corner)	13.5 hrs	Mon 4/1/13	Wed 4/3/13
33	Install panels 807 - 833 (NW Corner)	13.5 hrs	Wed 4/3/13	Thu 4/4/13
34	Prefabricated Façade Complete	0 days	Fri 4/5/13	Fri 4/5/13

Saves 5.9 Minutes/ Panel
833 Panels

= 10.239 days

10 Days Saved Total

Cost of Each Panel	# of Panels	Total Cost of Panels	Cost Savings/Yr.	# of years until payoff
$405.00	382	$154,710.00	$6,649.84	**23.26522142**

Cost for Memoiral Vista to Run in January $= (\$3{,}022.85) * (31 \text{ days}) = \mathbf{\$93,708.29}$

// Savings

Total SF of Glazing = 96599.94
Total kW = 96.60

Cost Savings per Year = 6,649.84

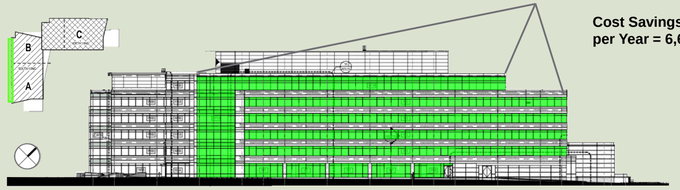
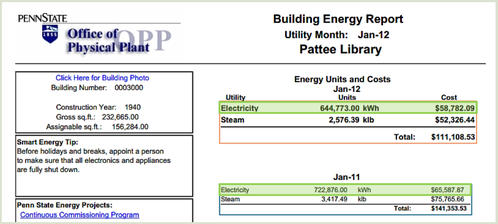


Image Courtesy of Gensler



PENNSTATE Office of Physical Plant

Building Energy Report
Utility Month: Jan-12
Pattee Library

Click Here for Building Photo
Building Number: 0003000

Construction Year: 1940
Gross sq.ft.: 232,665.00
Assignable sq.ft.: 156,284.00

Smart Energy Tip:
Before holidays and breaks, appoint a person to make sure that all electronics and appliances are fully shut down.

Penn State Energy Projects:
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Energy Units and Costs
Jan-12

Utility	Units	Cost
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Jan-11

Electricity	722,876.00	kWh	$65,587.87
Steam	3,417.49	klb	$75,765.66
		Total:	$141,353.53

Image Courtesy of PSU's OPP

Cost for Memorial Vista to Run per Year $= \mathbf{\$1,103,340.25}$

Memorial Vista
// Presentation Outline

// Analysis 3

Memorial Vista
// Presentation Outline

// Soil Mitigation

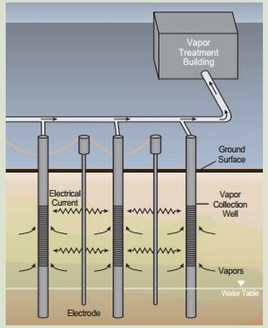
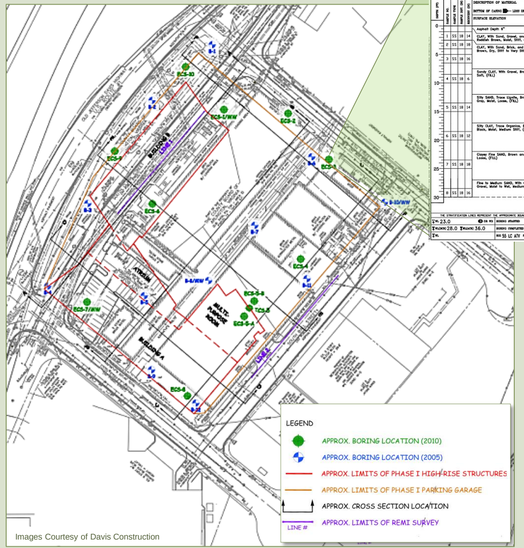
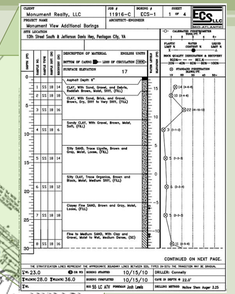


Image Courtesy of Google Images

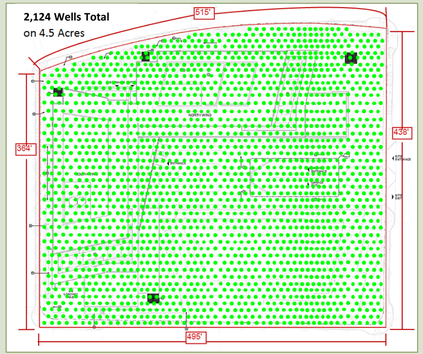
// Test Bore Samples



Images Courtesy of Davis Construction



// In-Situ Electrical Thermal Treatment



US EPA estimates $32 to $73 per cubic yard

Memorial Vista = 4.7 Acres at 29.17 foot minimum excavation
= 47,061 CY

US EPA Estimates Contaminant Mediation to be between **$1,505,952** and **$3,435,453**

Originally 115 Days for excavation / Soil contaminant mitigation

Process would start on November 8th (of 2013) and take 45 days to drill and mitigate the contamination

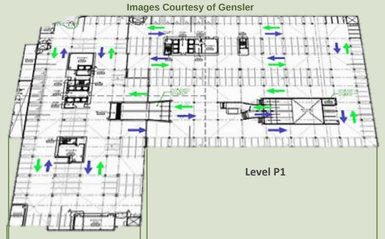
Leaving 70 days to excavate to be on schedule

Memorial Vista
// Presentation Outline

// Redesign

// Original Design

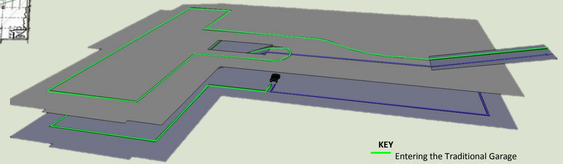
Images Courtesy of Gensler

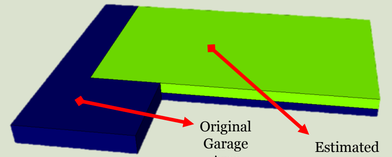


556 Total Parking Spaces

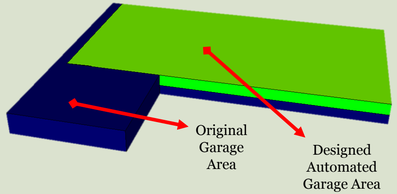
247,530 SF

430 SF per Space





Automated Garage Estimated to be 60% of the area and 50% of the Depth



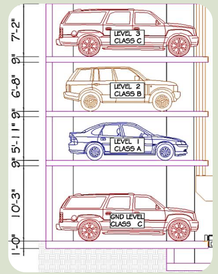
Actual Design Tailored to Memorial Vista

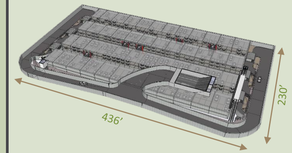
Memorial Vista
// Presentation Outline

// Redesign

Dimensions	Class A	Class B	Class C
Length	197"	212"	228"
Width	86"	86"	86"
Height	63"	72"	78"
Weight	6,600 lbs	6,600 lbs	6,600 lbs

Images Courtesy of Unitronics



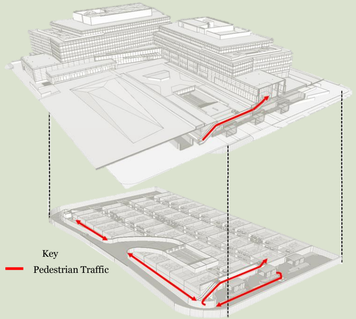


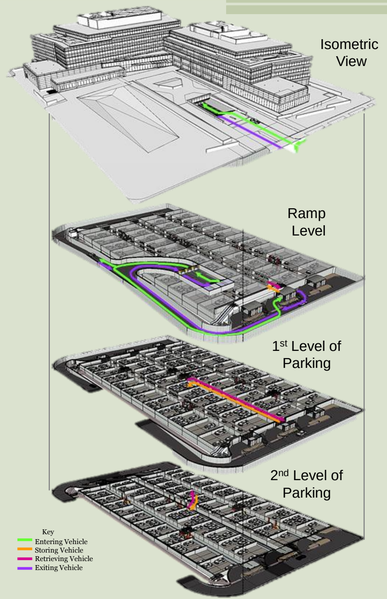
// Automated Garage Layout

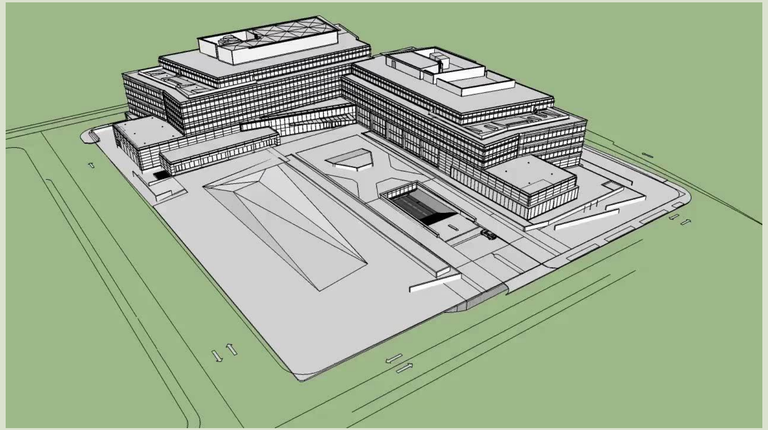
2 Level Garage (Level P1 & P2)

Level P1 = 7'2" Floor to Floor Height
(Class A, B, & C Cars)
Level P2 = 6'10" Floor to Floor Height
(Class A & B Cars)

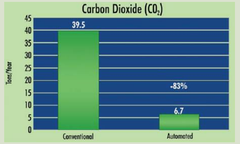
560 Parking Spaces

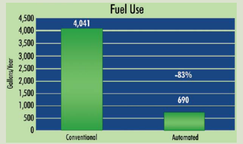


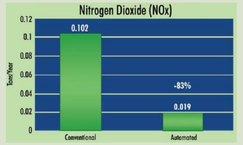




// Impact







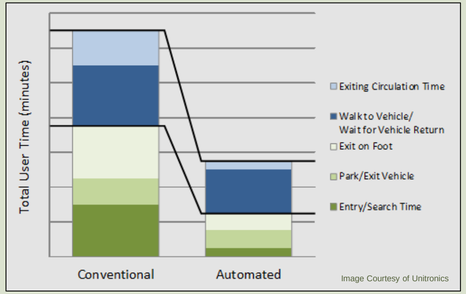
Graphs Courtesy of Unitronics

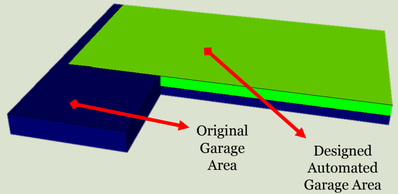
// Cost & Time Comparison

Type	Unit Cost ($/SF)	X	Efficiency (SF/ Stall)	=	Cost Per Stall	+	Automated Machinery Cost($/Stall)	=	Total Cost ($/Stall	X	Number of Stalls	=	Total Garage Cost
Ramp Garage	$105	X	430	=	$45,150	+	$0	=	**$45,150**	X	556	=	$25,103,400
Automated Garage	$85	X	225	=	$19,125	+	$12,000	=	**$31,125**	X	560	=	$17,430,000

Actual Cost of Garage for Memorial Vista = $24.8 Million

Automated Garage = 36% Cost Decrease





Original Excavation Area = 132,650 CY
115 Days to Excavate Originally
Yielding 1,153 CY/ Day

New Automated Garage Area = 59,426 CY
70 Days Remaining for Excavation
Constant 1,153 CY/ Day

Yielding a total of 52 days to excavate the site

Automated Garage & In-Situ Soil Contaminant Mitigation saves 18 days

18 Days Saved Total

Memorial Vista
// Presentation Outline

// Conclusions & Recommendations

Analysis 1 //
SIPS on the Façade ✓ — **33 Days Saved**

Analysis 2 //
Photovoltaic Glazing Units ✗ (24 yr. Payback Period)

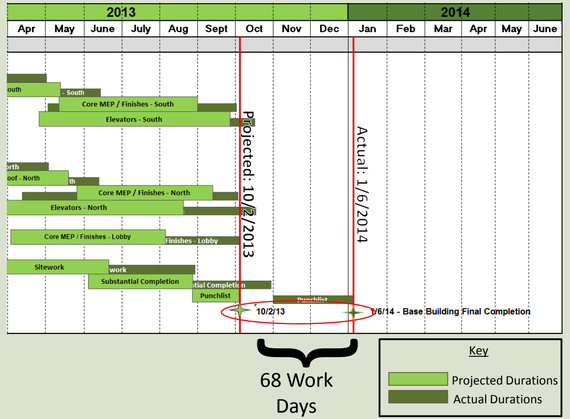
Prefabrication ✓ — **10 Days Saved**

Analysis 3 //
Soil Contaminant Mitigation ✓

Automated Parking Structure ✓ — **18 Days Saved**

\+

61 Days Saved Total



68 – 61 = 7 Work Days off Original Schedule

Memorial Vista
// Presentation Outline

// Acknowledgements

Images Courtesy of Google

Image Courtesy of Gensler

Acknowledgements //

Penn State Architectural Engineering Faculty
James G. Davis Construction Corporation

Special Tanks To //

Dr. Craig R. Dubler – Senior Thesis Advisor
Chris Voros – Davis Project Manager
Todd Povell – Davis Virtual Construction Manager
Bill Moyer – Davis Executive Vice President
Fred Gorove – Unitronics Parking Development Assistant
Patrick Hartford – Harmon Inc. Estimator
Family & Friends

Memorial Vista
// Presentation Outline

// Thank You

// Questions?

Memorial Vista
// Presentation Outline

I. Project Background

II. Analysis 1 // SIPS

III. Analysis 2 // Prefab & PV Windows

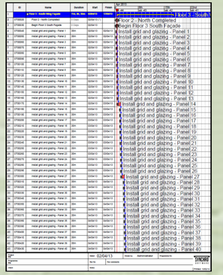
IV. Analysis 3 // Automated Parking Garage

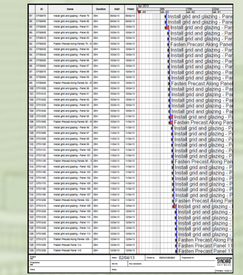
V. Conclusions & Recommendations

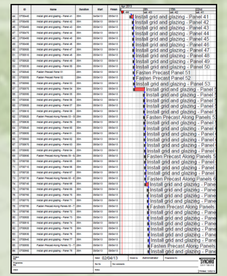
VI. Acknowledgements

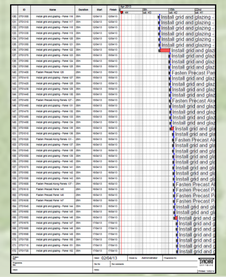
// Analysis 1

// Appendix









Duration per Panel Installed

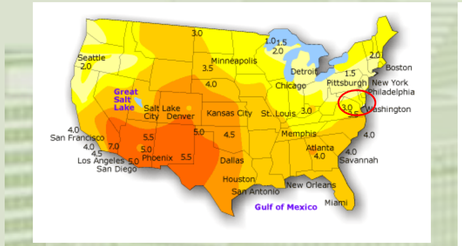
11 days to construct a floor (Where there are 8 work hours/day) = 88 work hours per floor wing
(88 hours) / (152 Panels) = 34.73 minutes per panel – Installation
This value takes into account crane operation or hoisting material to the proper bay.

Therefore:
It takes 34.73 minutes on average to complete one panel around the perimeter of the building.
There are 130 panels of glazing.
There are 22 precast pieces.

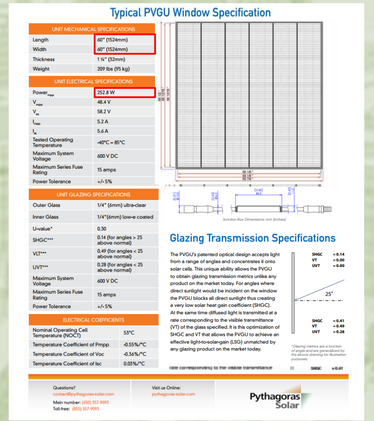
It is assumed that 28 minutes is assigned for the precast panels. This allows the left over 6.73 minutes of each of the concrete panels (or 148.06 minutes total)
Each of the 130 glazing panels of the third floor facade then gain 1.13 minutes of additional installation time, yielding a total installation time to be 35.86 minutes.

// Appendix

Watts/Panel	Width (ft.)	Height (ft.)	SF/Panel	Watts/SF	Total SF of Glazing	Total Watts	Total kW	Days/Yr	Hrs/Day of Sunlight in VA (kWh/day)	Hrs/Yr	Total kWh/Yr	Cost/kWh in VA	Cost Savings/Yr
252.8	5.00	5.00	25.00	10.11	9553.00	96599.94	96.60	365	2.3	839.5	81,096	$0.08	$6,649.84



Map found at Solar Direct 2014 to get Kilowatt hours of sunlight per day in Northern Virginia



Spec for PV window from Pythagoras Solar

2 Switchboards at 4,000 A = 3,2072 kW

$$\frac{\text{Energy}}{\text{Day}} = (3{,}072\ \text{kW}) * (\text{Time that Building is in Use})$$

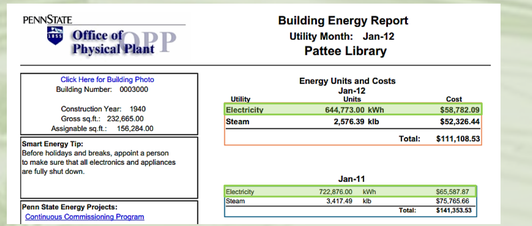
**7 A.M. to 7 P.M. would be the typical time frame

$$\frac{\text{Energy}}{\text{Day}} = (3{,}072\ \text{kW}) * (12\ \text{hrs.}) = 36{,}864\ \text{kW - h}$$

8.2 Cents/ kWh in Northern VA

$$\frac{\text{Cost}}{\text{Day}} = (36{,}864\ \text{kWh}) * \left(8.20\frac{\text{Cents}}{\text{kWh}}\right) = (302{,}284.8\ \text{cents}) * \left(\frac{1\text{dollar}}{100\text{cents}}\right) = \$3{,}022.85$$

$$\frac{\text{Cost}}{\text{Month}} = (\$3{,}022.85) * (\#\text{of days in January}) = (\$3{,}022.85) * (31\ \text{days}) = \mathbf{\$93{,}708.29}$$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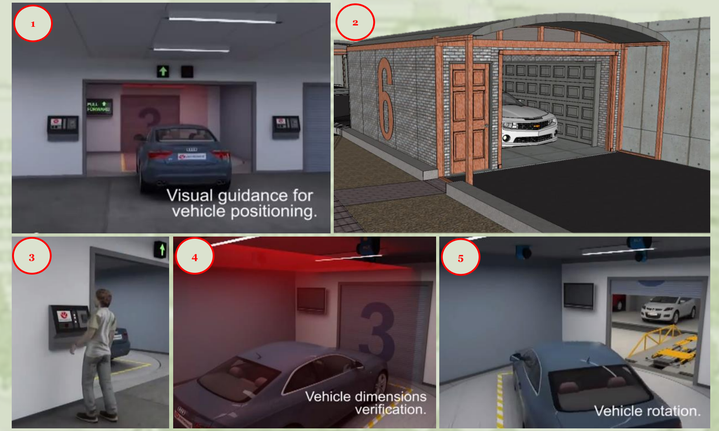
$$\frac{\text{Cost}}{\text{Year}} = (\$3{,}022.85) * (\#\text{of days in a year}) = (\$3{,}022.85) * (365\ \text{days}) = \mathbf{\$1{,}103{,}340.25}$$

// Appendix



Entering the Garage

All images courtesy of Unitronics

Exiting the Garage