UNIVERSITY OF MICHIGAN
ARCHITECTURE, ENGINEERING AND CONSTRUCTION

ARCHITECTURE & ENGINEERING
326 East Hoover Avenue, Mail Stop B
Ann Arbor, MI 48109-1002
Phone: 734-764-3414
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Memo

Date: May 20, 2013

To: **Edward Burnett**

From: Tom Girard
Murray Jones

Subject: Trotter William Monroe House
Provide OPC to add AC
Project # P00007686

In response to your request, we have established the above referenced project. The intent of this project is to provide an opinion of probable cost regarding the replacement of window air conditioning units with Split AC units at the Trotter William Monroe House.

As you are aware, the exercise to establish the opinion of probable cost is not exhaustive, and it is based primarily on a review of existing documents and knowledge of the site and building infrastructure. The opinion of probable cost has been prepared on the basis of A&E experience and qualifications, and it represents the Estimating Team's judgment as professionals familiar with industry and U-M standards. However, in that A&E has no control over costs of labor, materials, equipment or construction methods, no guarantee can be provided that the actual construction cost will not vary from the opinion of probable cost.

Based on our analysis, the attached reflects the project scope and anticipated project costs associated with addressing the request. The following summarizes the scope of work considered in this opinion:

Add AC to Trotter House
This project will install 11 new interior wall AC units.
Pricing of the OPC was separated into 4 parts. They are grouped by floor and condensing unit.

2nd and 3rd Floors
Electrical will disconnect 2 air conditioning units for window installation. Each new wall mounted air conditioning unit (5 units) will be furnished with a local toggle type disconnect switch. There will be one condensing unit feeding the 5 wall mounted units, the condensing unit will be mounted on the roof with its own disconnect and one GFCI service receptacle. The condensing units will be fed from two new 100A panels fed from electrical panels DP-1 and DP-2. Mechanical will demolish 2 window air conditioning units. They will provide one condensing unit to supply five indoor cooling units. The indoor cooling units will be wall mounted or ceiling

mounted as necessary. Mechanical will provide line sets and condensate pipe for each of the indoor units. Route the condensate pipe to the roof for drainage.

Although our budget cap sheet indicates a cost of $90,000, we expect the work to fall in a -15% / +20% range between $70,000 and $110,000 depending on the market conditions, escalation, and other considerations that will be better understood after the due diligence of design development has occurred.
Opinion of Probable Project Cost: $70,000-$110,000

First Floor Ballroom
Electrical will disconnect 2 air conditioning units for window installation. Each new wall mounted air conditioning unit (2 units) will be furnished with a local toggle type disconnect switch. There will be one condensing unit feeding the 2 wall mounted units, the condensing unit will be mounted on the ground behind the back of the house with its own disconnect and one GFCI service receptacle. The condensing units will be fed from two new 100A panels fed from electrical panels DP-1 and DP-2. Mechanical will demolish 2 window air conditioning units. They will provide one condensing unit to supply two indoor cooling units. The indoor cooling units will be wall mounted. Mechanical will provide line sets and condensate pipe for each of the indoor units. Route the condensate pipe to the ground outside the house.

Although our budget cap sheet indicates a cost of $80,000, we expect the work to fall in a -15% / +20% range between $60,000 and $100,000 depending on the market conditions, escalation, and other considerations that will be better understood after the due diligence of design development has occurred.
Opinion of Probable Project Cost: $60,000-$100,000

First Floor Reception
Electrical will disconnect 1 air conditioning unit for window installation. The new wall mounted air conditioning unit will be furnished with a local toggle type disconnect switch. There will be one condensing unit feeding the 1 wall mounted unit, the condensing unit will be mounted on the ground behind the back of the house with its own disconnect and one GFCI service receptacle. The condensing units will be fed from two new 100A panels fed from electrical panels DP-1 and DP-2. Mechanical will demolish 1 window air conditioning unit. They will provide one condensing unit to supply one indoor cooling unit. The indoor cooling unit will be wall mounted. Mechanical will provide line sets and condensate pipe for the indoor unit. Route the condensate pipe to the ground outside the house.

Although our budget cap sheet indicates a cost of $52,000, we expect the work to fall in a -15% / +20% range between $40,000 and $70,000 depending on the market conditions, escalation, and other considerations that will be better understood after the due diligence of design development has occurred.
Opinion of Probable Project Cost: $40,000-$70,000

Ground Floor
Electrical will disconnect 2 air conditioning units for window installation. Each new wall mounted air conditioning unit (3 units) will be furnished with a local toggle type disconnect switch. There will be one condensing unit feeding the 3 wall mounted units, the condensing unit will be mounted on the ground in the well in the front of the house with its own disconnect and one GFCI service receptacle. The condensing units will be fed from two new 100A panels fed from electrical panels DP-1 and DP-2. Mechanical will demolish 2 window air conditioning units. They will provide one condensing unit to supply three indoor cooling units. The indoor cooling

units will be wall mounted. Mechanical will provide line sets and condensate pipe for each of the indoor units. Route the condensate pipe to the ground outside the house.

Although our budget cap sheet indicates a cost of $77,000, we expect the work to fall in a -15% / +20% range between $60,000 and $90,000 depending on the market conditions, escalation, and other considerations that will be better understood after the due diligence of design development has occurred.

Opinion of Probable Project Cost: $60,000-$90,000

Total Project Opinion of Probable Cost Range(sum of all four areas):

$230,000 - $370,000

Note that this project will require approval of the Exterior Elements Design Review committee before it can proceed and to verify it is acceptable.

Note: The opinion of probable cost is not a quote. Rather it is a free service intended for preliminary conceptual budget planning purposes only. If a more refined cost figure is required, please request that we reopen the project for schematic design or construction documents. If you wish to proceed with the work, contact Plant Construction Services directly.

As this concludes the project to estimate the probable cost for the Trotter House window air conditioning unit replacement, this project has been closed and filed for future use in the event that this project is prioritized and funded by your unit. If this project is approved, please contact me and we will open a project, prepare appropriate project documents for client-contact and funding-approval signatures, and assign a team to follow-up with you on the new project.

Also, please let me know if you have any other questions

Cc: Wade Fields, Dave Stockson, Tom Ritter, Eric Albert, File

Encl: Cut Sheet of Typical Ductless Split A/C Unit

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BUDGET ESTIMATING TEAM SURVEY

Project Name Provide OPC to add AC
Project Number P00007686
Your Name (optional) _____

The A&E Budget Estimating Team (BET) would like to ask for a moment of your time to complete the following survey and return it to the address or fax number noted above. If you think someone else who was close to the project should also complete the form, please forward a copy to that person. Please provide comments or explanation to assist in improving our process. Thank you in advance for your time in completing this survey.

Rating						
Strongly Disagree				Strongly Agree		
1	2	3	4	5	N/A	The BET asked appropriate questions that allowed/helped me to clearly communicate the requirements associated with this estimate.
1	2	3	4	5	N/A	The BET clearly communicated the final deliverable associated with this estimate.
1	2	3	4	5	N/A	The information provided by the BET is presented in an easily understood format.
1	2	3	4	5	N/A	The information provided by the BET was returned in a timely manner.
1	2	3	4	5	N/A	The information provided by the BET met your requirements.

Additional Comments:_____
_____
_____
_____
_____
_____
_____
_____



Mr.SLIM™

PKA-SERIES Wall-Mounted

HEAT PUMP

- Variable Compressor Speed Inverter Technology
- Ozone-Friendly R-410A Refrigerant
- Significant Energy Savings up to 30%
- Super-Quiet Technology
- Auto Change Over between Cooling & Heating
- Easy Maintenance with Self-Diagnostic Feature
- Auto Vane & Swing Mode with 3-Notch Fan Speeds
- Hot Start System to Provide Warmth in the Beginning
- External Heater Interlock Function
- Lead-Lag and Backup Function
- Auto Restart after Power Failure
- High-Performance Drain Pump (optional)
- Extra-Long Pipe Length - up to 165 ft.
- Refrigerant Pre-Charged
- Easy Installation - No Ductwork Needed
- Weekly Timer - up to 8 Patterns Each Day
- 2-Year Parts Warranty
- 7-Year Compressor Warranty



Indoor unit
PKA-A18HA



Indoor unit
PKA-A24/30/36KA



Slim Smart Remote



Outdoor unit
PUZ-A18NHA3



Outdoor unit
PUZ-A24/30/36NHA3

Indoor Unit Model / Outdoor Unit Model			PKA-A18HA / PUZ-A18NHA3	PKA-A24KA / PUZ-A24NHA3	PKA-A30KA / PUZ-A30NHA3	PKA-A36KA / PUZ-A36NHA3
Capacity (Min ~ Max)	Cooling	Btu/h	8,000 ~ 18,000	12,000 ~ 24,000	12,000 ~ 30,000	12,000 ~ 34,200
	Heating	Btu/h	8,000 ~ 20,000	12,000 ~ 28,000	12,000 ~ 34,000	12,000 ~ 38,000
Power Input	Cooling	W	2,240	2,270	4,130	5,030
	Heating	W	1,970	2,330	3,150	3,610
SEER	Cooling		15.3	17.0	15.5	14.0
EER	Cooling		8.0	10.6	7.3	6.8
HSPF	Heating		9.5	10.8	8.9	9.3
Capacity Control			Variable Compressor Speed			
Refrigerant			R-410A			
Power Supply		V, Phase, Hz	208-230, 1, 60			
Indoor	Dimension (W x D x H)	inch	35 3/8 x 9 13/16 x 11 5/8	46 1/16 x 11 5/8 x 14 3/8		
		mm	898 x 249 x 295	1170 x 295 x 365		
	Weight	lbs (kg)	29 (13)	46 (21)	46 (21)	46 (21)
	Airflow (Lo-Med-Hi)	CFM Dry	320-370-425	635-705-775	635-705-775	705-810-920
	Moisture Removal	Pints/h	5.2	5.0	8.1	9.2
	Sound (Lo-Med-Hi)	dB(A)	36-40-43	39-42-45	39-42-45	43-46-49
	Max. Fuse	A	15	15	15	15
	Min. Ampacity	A	1	1	1	1
	Field Drain Pipe Size	I.D. in. (mm)	5/8 (16)	5/8 (16)	5/8 (16)	5/8 (16)
Outdoor	Dimension (W x D x H)	inch	31 1/2 x 13 x 23 5/8	37 3/8 x 13 x 37 1/8		
		mm	800 x 330 x 600	950 x 330 x 943		
	Weight	lbs (kg)	99 (45)	165 (75)	165 (75)	165 (75)
	Sound (Cool/Heat)	dB(A)	46/47	48/50	48/50	48/50
	Max. Fuse	A	20	30	40	40
	Min. Ampacity	A	13	18	25	25
Pipe Size		Liq. x Gas in. (mm)	1/4 x 1/2 (6.35 x 12.7)	3/8 x 5/8 (9.52 x 15.88)		
Max. Height Difference		Ft. (m)	100 (30)	100 (30)	100 (30)	100 (30)
Max. Pipe Length		Ft. (m)	100 (30)	165 (50)	165 (50)	165 (50)

R-410A OZONE-FRIENDLY REFRIGERANT

VCSi TECHNOLOGY

MITSUBISHI ELECTRIC
Changes for the Better

All test conditions are based on ARI 210/240.
Rating conditions: Cooling — Indoor: D.B. 26.7°C (80°F), W.B. 19.4°C (67°F); Outdoor: D.B. 35.0°C (95°F), W.B. 23.9°C (75°F)
Heating — Indoor: D.B. 21.1°C (70°F), W.B. 15.6°C (60°F); Outdoor: D.B. 8.3°C (47°F), W.B. 6.1°C (43°F)

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Budget

Building: **1000886 - Trotter William Monroe House** AEC Project #: **P00007686**

Project Name: **Provide OPC to Add AC**

Updated By: Murray Jones Date Updated: 04/29/2013 Version: Option 1 - 2nd & 3rd floor

Created By: Murray Jones Date Created: 04/29/2013 Program:

BudgetLine	Category Total	Sub Total	Sub Budget Amount	Detail	Assumptions
Construction Cost	**58,000**				
Bidpack 01/CM FLCC or GMP		58,000			
Base Bid			58,000		
General Conditions				5,000	
Architectural Trades				10,000	
Mechanical Trades				40,000	
Electrical Trades				3,000	
Related Construction Cost	**5,000**				
Asbestos		2,000			
Lead Abatement		2,000			
City/Municipal Charges		0			
Plan Review			0		$3,700 per project Estimate
DDC		1,000			
Contingencies	**12,014**				
Construction Contingency		8,700			15% of Construction Cost for renovation; 10% for new construction
User Contingency		2,900			5% of Construction Cost
Unallocated Contingency		0			5% of Construction Cost
Rounding Contingency		414			Amount not included in subtotals or calculations
Subtotal Construction & Contingencies		**75,014**			
Professional Fees	**8,502**				
External A/E Design		0			
Internal Design		7,756			
Basic Fee			7,756		Based on Fee Curve
Consultants		0			
Testing Consultant			0		1% of Construction Cost
Inspections		746			
Internal Inspection			746		< $500k 1%; =>$500k .5% +$5,000 of Construction & Contingencies
External Site Inspection			0		10% External Design
Interior Design		0			
Commissioning		0			
Internal Design Phase Commissioning			0		.5% of Construction Cost
External Construction Phase Commissioning			0		<= $2.5m 2.5%;>$2.5m .95% -$2.5m +$65,000 of Construction Cost
Internal Construction Phase Commissioning			0		1% of Construction Cost
State of Michigan		0			
Printing/Drawing Reproduction		0			
Architecture Engineering & Construction	**2,984**				
AEC Project Management		2,984			< $500k 4%;=>$500k 2% -500K + $20,000 of Construction & Contingencies
Telecommunications	**0**				
Other Orders	**3,500**				
Other Orders		3,500			
Furnishings and Equipment	**0**				
Moving	**0**				
AEC Managed Total		**90,000**			
Unfunded Contingency	**0**				
User Managed Items	**0**				
Non-AEC Managed Total		**0**			
Budget Total	**90,000**				

Building: **1000886 - Trotter William Monroe House** AEC Project #: **P00007686**

Project Name: **Provide OPC to Add AC**

Updated By:	Murray Jones	Date Updated:	04/29/2013	Version:	Option 1 - 2nd & 3rd floor
Created By:	Murray Jones	Date Created:	04/29/2013	Program:	

Budget Notes:

Building: **1000886 - Trotter William Monroe House** AEC Project #: **P00007686**

Project Name: **Provide OPC to Add AC**

Updated By: Murray Jones Date Updated: 04/29/2013 Version: Option 2 - First floor large room

Created By: Murray Jones Date Created: 04/29/2013 Program:

BudgetLine	Category Total	Sub Total	Sub Budget Amount	Detail	Assumptions
Construction Cost	**50,000**				
Bidpack 01/CM FLCC or GMP		50,000			
Base Bid			50,000		
General Conditions				5,000	
Architectural Trades				20,000	
Mechanical Trades				20,000	
Electrical Trades				5,000	
Related Construction Cost	**5,000**				
Asbestos		2,000			
Lead Abatement		2,000			
City/Municipal Charges		0			
Plan Review			0		$3,700 per project Estimate
DDC		1,000			
Contingencies	**10,352**				
Construction Contingency		7,500			15% of Construction Cost for renovation; 10% for new construction
User Contingency		2,500			5% of Construction Cost
Unallocated Contingency		0			5% of Construction Cost
Rounding Contingency		352			Amount not included in subtotals or calculations
Subtotal Construction & Contingencies		**65,352**			
Professional Fees	**7,548**				
External A/E Design		0			
Internal Design		6,898			
Basic Fee			6,898		Based on Fee Curve
Consultants		0			
Testing Consultant			0		1% of Construction Cost
Inspections		650			
Internal Inspection			650		< $500k 1%; =>$500k .5% +$5,000 of Construction & Contingencies
External Site Inspection			0		10% External Design
Interior Design		0			
Commissioning		0			
Internal Design Phase Commissioning			0		.5% of Construction Cost
External Construction Phase Commissioning			0		<= $2.5m 2.5%;>$2.5m .95% -$2.5m +$65,000 of Construction Cost
Internal Construction Phase Commissioning			0		1% of Construction Cost
State of Michigan		0			
Printing/Drawing Reproduction		0			
Architecture Engineering & Construction	**2,600**				
AEC Project Management		2,600			< $500k 4%;=>$500k 2% -500K + $20,000 of Construction & Contingencies
Telecommunications	**0**				
Other Orders	**4,500**				
Other Orders		4,500			
Furnishings and Equipment	**0**				
Moving	**0**				
AEC Managed Total		**80,000**			
Unfunded Contingency	**0**				
User Managed Items	**0**				
Non-AEC Managed Total		**0**			
Budget Total	**80,000**				

Building: **1000886 - Trotter William Monroe House** AEC Project #: **P00007686**

Project Name: **Provide OPC to Add AC**

Updated By:	Murray Jones	Date Updated:	04/29/2013	Version:	Option 2 - First floor large room
Created By:	Murray Jones	Date Created:	04/29/2013	Program:	

Budget Notes:

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ARCHITECTURE, ENGINEERING AND CONSTRUCTION

Budget

Building: **1000886 - Trotter William Monroe House** AEC Project #: **P00007686**

Project Name: **Provide OPC to Add AC**

Updated By: Murray Jones Date Updated: 04/29/2013 Version: Option 3 - First floor reception

Created By: Murray Jones Date Created: 04/29/2013 Program:

BudgetLine	Category Total	Sub Total	Sub Budget Amount	Detail	Assumptions
Construction Cost	**29,500**				
Bidpack 01/CM FLCC or GMP		29,500			
Base Bid			29,500		
General Conditions				5,000	
Architectural Trades				8,000	
Mechanical Trades				13,000	
Electrical Trades				3,500	
Related Construction Cost	**5,000**				
Asbestos		2,000			
Lead Abatement		2,000			
City/Municipal Charges		0			
Plan Review			0		$3,700 per project Estimate
DDC		1,000			
Contingencies	**6,362**				
Construction Contingency		4,425			15% of Construction Cost for renovation; 10% for new construction
User Contingency		1,475			5% of Construction Cost
Unallocated Contingency		0			5% of Construction Cost
Rounding Contingency		462			Amount not included in subtotals or calculations
Subtotal Construction & Contingencies		**40,862**			
Professional Fees	**5,022**				
External A/E Design		0			
Internal Design		4,618			
Basic Fee			4,618		Based on Fee Curve
Consultants		0			
Testing Consultant			0		1% of Construction Cost
Inspections		404			
Internal Inspection			404		< $500k 1%; =>$500k .5% +$5,000 of Construction & Contingencies
External Site Inspection			0		10% External Design
Interior Design		0			
Commissioning		0			
Internal Design Phase Commissioning			0		.5% of Construction Cost
External Construction Phase Commissioning			0		<= $2.5m 2.5%;>$2.5m .95% -$2.5m +$65,000 of Construction Cost
Internal Construction Phase Commissioning			0		1% of Construction Cost
State of Michigan		0			
Printing/Drawing Reproduction		0			
Architecture Engineering & Construction	**1,616**				
AEC Project Management		1,616			< $500k 4%;=>$500k 2% -500K + $20,000 of Construction & Contingencies
Telecommunications	**0**				
Other Orders	**4,500**				
Other Orders		4,500			
Furnishings and Equipment	**0**				
Moving	**0**				
AEC Managed Total		**52,000**			
Unfunded Contingency	**0**				
User Managed Items	**0**				
Non-AEC Managed Total		**0**			
Budget Total	**52,000**				

Building: **1000886 - Trotter William Monroe House** AEC Project #: **P00007686**

Project Name: **Provide OPC to Add AC**

Updated By:	Murray Jones	Date Updated:	04/29/2013	Version:	Option 3 - First floor reception
Created By:	Murray Jones	Date Created:	04/29/2013	Program:	

Budget Notes:

UNIVERSITY OF MICHIGAN
ARCHITECTURE, ENGINEERING AND CONSTRUCTION

Budget

Building: **1000886 - Trotter William Monroe House** AEC Project #: **P00007686**

Project Name: **Provide OPC to Add AC**

Updated By: Murray Jones Date Updated: 04/29/2013 Version: Option 4 - Ground floor

Created By: Murray Jones Date Created: 04/29/2013 Program:

BudgetLine	Category Total	Sub Total	Sub Budget Amount	Detail	Assumptions
Construction Cost	**48,000**				
Bidpack 01/CM FLCC or GMP		48,000			
Base Bid			48,000		
General Conditions				5,000	
Architectural Trades				10,000	
Mechanical Trades				30,000	
Electrical Trades				3,000	
Related Construction Cost	**5,000**				
Asbestos		2,000			
Lead Abatement		2,000			
City/Municipal Charges		0			
Plan Review			0		$3,700 per project Estimate
DDC		1,000			
Contingencies	**9,689**				
Construction Contingency		7,200			15% of Construction Cost for renovation; 10% for new construction
User Contingency		2,400			5% of Construction Cost
Unallocated Contingency		0			5% of Construction Cost
Rounding Contingency		89			Amount not included in subtotals or calculations
Subtotal Construction & Contingencies		**62,689**			
Professional Fees	**7,307**				
External A/E Design		0			
Internal Design		6,681			
Basic Fee			6,681		Based on Fee Curve
Consultants		0			
Testing Consultant			0		1% of Construction Cost
Inspections		626			
Internal Inspection			626		< $500k 1%; =>$500k .5% +$5,000 of Construction & Contingencies
External Site Inspection			0		10% External Design
Interior Design		0			
Commissioning		0			
Internal Design Phase Commissioning			0		.5% of Construction Cost
External Construction Phase Commissioning			0		<= $2.5m 2.5%;>$2.5m .95% -$2.5m +$65,000 of Construction Cost
Internal Construction Phase Commissioning			0		1% of Construction Cost
State of Michigan		0			
Printing/Drawing Reproduction		0			
Architecture Engineering & Construction	**2,504**				
AEC Project Management		2,504			< $500k 4%;=>$500k 2% -500K + $20,000 of Construction & Contingencies
Telecommunications	**0**				
Other Orders	**4,500**				
Other Orders		4,500			
Furnishings and Equipment	**0**				
Moving	**0**				
AEC Managed Total		**77,000**			
Unfunded Contingency	**0**				
User Managed Items	**0**				
Non-AEC Managed Total		**0**			
Budget Total	**77,000**				

Building: **1000886 - Trotter William Monroe House** AEC Project #: **P00007686**

Project Name: **Provide OPC to Add AC**

Updated By:	Murray Jones	Date Updated:	04/29/2013	Version:	Option 4 - Ground floor
Created By:	Murray Jones	Date Created:	04/29/2013	Program:	

Budget Notes: