



COME TOGETHER & THRIVE

REMINDER

CITY COUNCIL

NOTICE OF MEETING

Dennis Fiorelli
President
Sara Continenza
Joe Frank
Marty Gelfand
Jane Goodman
Ruth Gray
Jason Russell

MEETING OF: **FINANCE COMMITTEE**
CALLED BY: JOE FRANK, CHAIRMAN
DATE: **NOVEMBER 12, 2018**
LOCATION: COMMITTEE/JURY ROOM
TIME: 6:00 P.M.
RE: ENERGY EFFICIENCY PROJECT:
PRESENTATIONS FROM POTENTIAL
VENDORS (6:00PM- BREWER
GARRETT & 6:30PM- LEOPARDO)

COMMITTEE MEMBERS:

DENNIS FIORELLI
RUTH GRAY

COUNCIL MEMBERS:

SARA CONTINENZA
MARTY GELFAND
JANE GOODMAN
JASON RUSSELL

ADMINISTRATION:

MICHAEL LOVE, ECONOMIC DEVELOPMENT DIR.
JIM ANDERSON, SERVICE DIRECTOR
BRENDA WENDT, FINANCE DIRECTOR

Brewer Garrett Original

Project Summary City of South Euclid

Base Scope - Project Description	Fixed Project Cost ¹	ANNUAL SAVINGS					Simple Payback (Years) ⁷
		Utility (Natural Gas & Electric)	Operational ⁴	Capital Cost Avoidance ⁵	FE Experimental Program Cost	Total Project	
Lighting Upgrades							
City Wide LED Lighting Upgrades	\$142,130	\$20,318	\$1,460	\$0		\$21,778	6.53
City Wide Street Lighting (FE Experimental Program)	\$14,560	\$0	\$211,912	\$0	(\$170,833)	\$21,079	0.69
HVAC and Controls Upgrades							
City Hall RTU 1 Replacement	\$24,692	\$77	\$895	\$933		\$1,905	12.96
City Hall RTU 2 Replacement	\$27,918	\$309	\$125	\$1,750		\$2,184	12.78
Community Center Split System Replacements	\$58,043	\$1,077	\$620	\$3,000		\$4,697	12.36
Community Center Small Condensing Unit Replacement	\$17,458	\$100	\$350	\$1,000		\$1,450	12.04
Energy Rate Procurement							
City Wide Electric Rate Reduction	\$3,640	\$5,324				\$5,324	0.68
Building Envelope Improvements							
City Hall Roof Replacement (Critical: A-F)	\$589,475	\$3,962	\$0	\$20,822		\$24,784	23.78
City Hall Roof Replacement (Less Critical: G-J)	\$318,328	\$1,343	\$0	\$4,893		\$6,236	51.05
		\$32,510	\$215,362	\$32,398	(\$170,833)	\$89,437	
<i>Total Fixed Project Cost</i>	\$ 1,196,244						
<i>Cash Incentive from Utility Provider ²</i>	\$ 7,458						
<i>Net Project Cost ³</i>	\$ 1,188,786						13.29

Notes: ¹ Fixed Project Cost represents the turn-key implementation cost and shall not vary.

² Cash Incentive from Utility Provider represents the cash rebate available through the utility provider's energy reduction incentive plan.

³ Net Project Cost represents Total Fixed Project Cost less the Cash Incentive from Utility Provider.

⁴ Operational Savings represents the cost of materials and man hours that can be diverted to other tasks as a result of the energy conservation measure.

⁵ Capital Cost Avoidance represents the cost of replacing existing equipment on a "like-for-like" basis with no additional modifications or controls.

⁶ First Energy Experimental LED Lighting Program estimated total cost shown in an annual cost over 12 years.

⁷ Simple Payback represents Total Fixed Project Cost / Total Annual Savings.

Alternates							
Lighting Upgrades							
Parks Athletic Field Lighting Upgrades	\$ 488,630	\$3,283	\$23,456	\$0		\$26,739	18.27
Total Project Cost (Including Requested Alternates)	\$ 1,677,416						14.44

TOTAL PROJECT CASH FLOW

Base Scope - City of South Euclid

Total Project Investment	\$1,196,244
APR	3.75%
Period - Length	15
Electricity Rate Inflation*	2.0%
Auditing Inflation	2.0%
Operational Cost Inflation	2.0%
Total Cash Flow:	\$569,490

Year	Rebates \$	Utility Savings \$	Operational Savings \$	Capital Cost Avoidance \$	FE Experimental Program Cost ¹ \$	Annual Energy Auditing \$	Total Savings \$	Annual Program Cost \$	Cash Flow (Savings-Cost) \$	Cumulative Cash Flow (Savings-Cost) \$
1	7,458	32,510	215,362	32,398	(170,833)	(5,140)	111,755	(104,392)	7,363	7,363
2		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	10,907
3		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	14,452
4		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	17,997
5		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	21,542
6		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	25,087
7		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	28,632
8		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	32,177
9		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	35,722
10		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	39,266
11		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	42,811
12		32,510	215,362	32,398	(170,833)	(1,500)	107,937	(104,392)	3,545	46,356
13		32,510	215,362	32,398		(1,500)	278,770	(104,392)	174,378	220,734
14		32,510	215,362	32,398		(1,500)	278,770	(104,392)	174,378	395,112
15		32,510	215,362	32,398		(1,500)	278,770	(104,392)	174,378	569,490
Total		487,653	3,230,429	485,970	(2,049,996)	(26,140)	2,135,374	(1,565,884)	569,490	

Note:

¹ First Energy Experimental LED Lighting Program estimated total cost shown in an annual cost over 12 years.

Brewer Garrett

Project Summary - Revised per City Requests City of South Euclid

Base Scope - Project Description	Fixed Project Cost ¹	ANNUAL SAVINGS				Simple Payback (Years) ⁷
		Utility (Natural Gas & Electric)	Operational ⁴	Capital Cost Avoidance ⁵	Total Project	
Lighting Upgrades						
City Wide LED Lighting Upgrades	\$142,130	\$20,318	\$1,460	\$0	\$21,778	6.53
HVAC and Controls Upgrades						
City Hall RTU 1 Replacement	\$24,692	\$77	\$895	\$933	\$1,905	12.96
City Hall RTU 2 Replacement	\$27,918	\$309	\$125	\$1,750	\$2,184	12.78
Community Center Split System Replacements	\$58,043	\$1,077	\$620	\$3,000	\$4,697	12.36
Community Center Small Condensing Unit Replacement	\$17,458	\$100	\$350	\$1,000	\$1,450	12.04
City Wide Automation Upgrade with System Retro-Commissioning	\$48,228	\$8,688			\$8,688	5.55
Energy Rate Procurement						
City Wide Electric Rate Reduction	\$3,640	\$5,324			\$5,324	0.68
Building Envelope Improvements						
Roof Replacements	\$907,803	\$5,305		\$25,715	\$31,020	29.27
		\$41,198	\$3,450	\$32,398	\$77,047	
<i>Total Fixed Project Cost</i>	\$ 1,229,912					
<i>Cash Incentive from Utility Provider ²</i>	\$ 7,458					
<i>Net Project Cost ³</i>	\$ 1,222,454					15.87

Notes: ¹ Fixed Project Cost represents the turn-key implementation cost and shall not vary.

² Cash Incentive from Utility Provider represents the cash rebate available through the utility provider's energy reduction incentive plan.

³ Net Project Cost represents Total Fixed Project Cost less the Cash Incentive from Utility Provider.

⁴ Operational Savings represents the cost of materials and man hours that can be diverted to other tasks as a result of the energy conservation measure.

⁵ Capital Cost Avoidance represents the cost of replacing existing equipment on a "like-for-like" basis with no additional modifications or controls.

⁶ Simple Payback represents Total Fixed Project Cost / Total Annual Savings.

Alternates						
Lighting Upgrades						
Parks Athletic Field Lighting Upgrades	\$ 488,630	\$3,283	\$23,456	\$0	\$26,739	18.27
Total Project Cost (Including Requested Alternates)	\$ 1,711,084					16.49

TOTAL PROJECT CASH FLOW - Revised per City Requests

Base Scope - City of South Euclid

Total Project Investment	\$1,229,912
APR	3.75%
Period - Length	15
Electricity Rate Inflation	2.0%
Auditing Inflation	2.0%
Operational Cost Inflation	2.0%
Total Cash Flow:	(\$415,649)

Year	Rebates	Utility Savings	Operational Savings	Capital Cost Avoidance	Annual Energy Auditing	Total Savings	Annual Program Cost	Cash Flow (Savings-Cost)	Cumulative Cash Flow (Savings-Cost)
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1	7,458	41,198	3,450	32,398	(5,140)	79,364	(107,330)	(27,966)	(27,966)
2		41,723	3,451	32,398	(1,500)	76,072	(107,330)	(31,258)	(59,224)
3		42,258	3,452	32,398	(1,530)	76,578	(107,330)	(30,752)	(89,977)
4		42,803	3,453	32,398	(1,561)	77,094	(107,330)	(30,236)	(120,213)
5		43,360	3,454	32,398	(1,592)	77,621	(107,330)	(29,710)	(149,923)
6		43,928	3,455	32,398	(1,624)	78,157	(107,330)	(29,173)	(179,096)
7		44,507	3,456	32,398	(1,656)	78,705	(107,330)	(28,625)	(207,721)
8		45,097	3,457	32,398	(1,689)	79,264	(107,330)	(28,067)	(235,787)
9		45,700	3,459	32,398	(1,723)	79,833	(107,330)	(27,497)	(263,284)
10		46,314	3,460	32,398	(1,757)	80,415	(107,330)	(26,916)	(290,200)
11		46,941	3,461	32,398	(1,793)	81,007	(107,330)	(26,323)	(316,523)
12		47,581	3,462	32,398	(1,828)	81,612	(107,330)	(25,719)	(342,242)
13		48,233	3,463	32,398	(1,865)	82,228	(107,330)	(25,102)	(367,344)
14		48,898	3,464	32,398	(1,902)	82,857	(107,330)	(24,473)	(391,817)
15		49,577	3,465	32,398	(1,940)	83,499	(107,330)	(23,832)	(415,649)
Total		678,118	51,862	485,970	(29,101)	1,194,307	(1,609,955)	(415,649)	

*Note - The APR and term shown above are intended to reflect a conservative analysis of the project's financial potential. While Brewer-Garrett does not benefit from financing costs, it can facilitate financing through one of its strategic partners who will design a financial package that looks at rate, length of term, etc to best maximize the return on investment. Upon request, this option can be explored for comparison to the City's current financial strategies and options.



Self-Funding Energy Efficiency Improvements

*Presentation to City Council
Finance Committee*

south  euclid

The logo for South Euclid, featuring the word 'south' in a black, lowercase, sans-serif font, followed by a green leaf-like graphic, and the word 'euclid' in a black, lowercase, sans-serif font.

COME TOGETHER & THRIVE

November 12, 2018



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Appendix – Roof Inspection Report

1 Option 1 Project Summary from RFQ Response

a. & b. Scope Summary / Description

City of South Euclid Scope of Work | Option 1

FACILITY IMPROVEMENT MEASURES								
Reference	HVAC	Building Automation	Roof	Interior & Exterior Lighting	Street Lighting & Traffic Signals	Information Technology	Fleet Management	Fleet Alternative Fuel
City Hall-Police-Fire	✗	✗	✗	✗				
Community Center	✗	✗		✗				
Service Department	✗	✗		✗				
Bexley Park				✗				
Quarry Park North				✗				
City-Wide					✗	✗	✗	✗

CITY HALL-POLICE-FIRE

1349 Green Rd | South Euclid, OH 44121

Scope Recommendations

Lighting

- Replace the remaining interior fluorescent lighting with LED lighting.

HVAC

- Replace the older RTUs, three (3) total, with new, high-efficiency equipment.
- Install hot water unit heater in sally-port.

Building Automation Controls

- Remove all existing control systems and replace with a new comprehensive direct digital control system.

Building Envelope

- Leopardo recommends sections A-D, Q, and U-V on the map below to be completely replaced. All HVAC, and other equipment shall be temporary relocated to accommodate the roof replacement as necessary. As the general contractor, Leopardo shall handle all coordination of sub-contractors to ensure a smooth and complete transition for the City.



1 Option 1 Project Summary from RFQ Response

a. & b. Scope Summary / Description



- In addition to replacing roof sections, Leopardo recommends a comprehensive maintenance and repair plan for the non-critical areas of the roof. This would include repairing and replacing flashing, and spot-repairing leaks to extend the life of the non-critical roof areas. Doing these replacements and repairs would significantly reduce the current maintenance costs of this building. Energy savings would also be observed due to reduced infiltration.

COMMUNITY CENTER

1370 Victory Dr | South Euclid, OH 44121

Scope Recommendations

Lighting

- Replace all interior fluorescent lighting with LED lighting.
- Upgrade the exterior metal halide lighting to LED lighting.

HVAC

- Replace the two (2) split systems with new, high-efficiency models. Add a separate new unit to the community room.

Building Automation Controls

- Install a building automation system that's integrated with the proposed control system at City Hall.

SERVICE DEPARTMENT

4224 Monticello Blvd | South Euclid, OH 44121

Scope Recommendations

Lighting

- Upgrade remaining fluorescent fixtures to LED
- Upgrade remaining exterior metal halide fixtures to LED

HVAC

- Replace (1) furnace and (1) split system.

Building Automation Controls

- Install programmable communicating thermostats to schedule certain equipment during unoccupied periods



1 Option 1 Project Summary from RFQ Response

a. & b. Scope Summary / Description

PARKS

South Euclid, OH 44133

Scope Recommendations

Lighting

- Upgrade all interior and exterior lighting to LED at Bexley Park and Quarry Park North.
- Retrofit all ball field lighting to LED at Bexley Park and Quarry Park North.

STREET LIGHTING

Scope Recommendation

- Upgrade all utility-owned street lighting to LED as indicated in the table below:

Existing Fixtures					
Quantity of Fixtures	Light Type	Bulb Rating (Lumens)	Bulb Rating (Watts)	kWh per Month	Monthly Charge per Fixture
18	Cobra Head SV		400	163	\$15.16
795	Cobra Head SV		250	105	\$13.19
1459	Cobra Head SV		150	62	\$10.95
63	Cobra Head SV-UGPS		100	42	\$14.81
9	Cobra Head SV		100	42	\$10.29

Proposed Fixtures					
Quantity of Fixtures	Light Type	Bulb Rating (Lumens)	Bulb Rating (Watts)	kWh per Month	Monthly Charge per Fixture
72	Cobra Head LED	4000	50	18	7.39
1459	Cobra Head LED	7000	90	32	9.24
795	Cobra Head LED	11500	130	46	9.82
18	Cobra Head LED	24000	260	91	15.13
	Acorn LED	2500	50	18	19.44
	Acorn LED	5000	90	32	20.53
	Colonial LED	2500	50	18	11.74
	Colonial LED	5000	90	32	12.9

TRAFFIC LIGHTING

Scope Recommendation

- Upgrade all traffic lighting with LED lighting.

INFORMATION TECHNOLOGY

Scope Recommendation

- Evaluate and upgrade remaining phone systems to VOIP.
- Evaluate and consolidate IT billing and invoicing.

FLEET MANAGEMENT

Scope Recommendation

- Convert all 78 vehicles to a leasing program.



1 Option 1 Project Summary from RFQ Response

a. & b. Scope Summary / Description

FLEET ALTERNATIVE FUEL

Scope Recommendation

- Upgrade all high-mileage vehicles with propane conversion kits.
- Install one (1) propane fueling station.



1

Option 1 Project Summary from RFQ Response

c. Budget Pricing by Project Item

Option 1 Scope Summary (Pricing is Budgetary)

		Total Installed Cost
Building Name	ECM Description	
City Hall - Police - Fire	Retrofit remaining fluorescent to LED	\$168,168
	Install New DDC System	\$233,857
	Replace Older RTUs	\$62,274
	Install HW UH in Sally Port	\$11,606
	Roof Replacement - Critical Sections & Maintenance Plan	\$889,996
Community Center	Retrofit remaining fluorescent to LED	\$50,479
	Install Programmable Thermostats	\$7,691
	Replace Older Split Systems	\$194,975
Service Department	Retrofit remaining fluorescent to LED	\$47,735
	Install Programmable Thermostats	\$14,550
	Replace (1) Split System and (1) Furnace	\$33,667
Bexley Park	Retrofit Exterior Lighting to LED	\$53,177
	Retrofit Ball Field Lighting to LED	\$100,725
Quarry Park North	Retrofit Exterior Lighting to LED	\$10,648
	Retrofit Ball Field Lighting to LED	\$154,569
City-Wide Measures	Traffic signal retrofit to LED	\$118,731
	Street light & outdoor light retrofit to LED	\$797,986
Performance Bonds		\$27,545
Turn Key Total:		\$2,978,380

Note: These prices and fees are preliminary estimates. A post-selection analysis shall determine final cost and savings numbers.



1 Option 1 Project Summary from RFQ Response

e. Project Financing Cash Flow Analysis

Option 1 Cash Flow

Total Project Cost: \$2,978,380
Amount Financed: \$2,978,380
Utility Rebates: \$11,889
Rate of Financing: 3.96%
Term of Financing: 15
Program Cash Flow: \$2,244,067

Year	Annual Program Savings	Debt Payment	Cumulative Cash Flow
0 (Const. Period)	\$89,074	\$0	\$89,074
1	\$308,741	\$267,130	\$130,685
2	\$309,040	\$267,130	\$172,595
3	\$309,350	\$267,130	\$214,815
4	\$309,673	\$267,130	\$257,358
5	\$310,008	\$267,130	\$300,236
6	\$309,659	\$267,130	\$342,765
7	\$309,324	\$267,130	\$384,959
8	\$309,002	\$267,130	\$426,832
9	\$308,694	\$267,130	\$468,395
10	\$308,397	\$267,130	\$509,663
11	\$308,113	\$267,130	\$550,645
12	\$307,839	\$267,130	\$591,354
13	\$307,577	\$267,130	\$631,801
14	\$307,325	\$267,130	\$671,997
15	\$307,084	\$267,130	\$711,950
16	\$306,851	\$0	\$1,018,802
17	\$306,629	\$0	\$1,325,430
18	\$306,415	\$0	\$1,631,845
19	\$306,209	\$0	\$1,938,055
20	\$306,012	\$0	\$2,244,067
Totals	\$6,251,018	\$4,006,951	\$2,244,067



Option 2 Project Summary with Full Roof Replacement at City Hall, and without Street Lighting, Vehicle Leasing & Alternative Fuel

a. & b. Scope Summary / Description

City of South Euclid Scope of Work | Option 2

FACILITY IMPROVEMENT MEASURES								
Reference	HVAC	Building Automation	Roof	Interior & Exterior Lighting	Traffic Signals	Information Technology	Fleet Management	Fleet Alternative Fuel
City Hall-Police-Fire	✗	✗	✗	✗				
Community Center	✗	✗		✗				
Service Department	✗	✗		✗				
Bexley Park				✗				
Quarry Park North				✗				
City-Wide					✗	✗		

CITY HALL-POLICE-FIRE

1349 Green Rd | South Euclid, OH 44121

Scope Recommendations

Lighting

- Replace the remaining interior fluorescent lighting with LED lighting.

HVAC

- Replace the older RTUs, three (3) total, with new, high-efficiency equipment.

Building Automation Controls

- Remove all existing control systems and replace with a new comprehensive direct digital control system.

Building Envelope

- Replace entire roof with new code compliant roof.

COMMUNITY CENTER

1370 Victory Dr | South Euclid, OH 44121

Scope Recommendations

Lighting

- Replace all interior fluorescent lighting with LED lighting.
- Upgrade the exterior metal halide lighting to LED lighting.

HVAC

- Replace the two (2) split systems with new, high-efficiency models. Add a separate new unit to the community room.

Building Automation Controls

- Install a building automation system that’s integrated with the proposed control system at City Hall.



Option 2 Project Summary with Full Roof Replacement at City Hall, and without Street Lighting, Vehicle Leasing & Alternative Fuel

a. & b. Scope Summary / Description

SERVICE DEPARTMENT

4224 Monticello Blvd | South Euclid, OH 44121

Scope Recommendations

Lighting

- Upgrade remaining fluorescent fixtures to LED
- Upgrade remaining exterior metal halide fixtures to LED

HVAC

- Replace (1) furnace and (1) split system.

Building Automation Controls

- Install programmable communicating thermostats to schedule certain equipment during unoccupied periods

PARKS

South Euclid, OH 44133

Scope Recommendations

Lighting

- Upgrade all interior and exterior lighting to LED at Bexley Park and Quarry Park North
- Retrofit all ball field lighting to LED at Bexley Park and Quarry Park North

TRAFFIC LIGHTING

Scope Recommendation

- Upgrade all traffic lighting with LED lighting.

INFORMATION TECHNOLOGY

Scope Recommendation

- Evaluate and upgrade remaining phone systems to VOIP.
- Evaluate and consolidate IT billing and invoicing.



2

Option 2 Project Summary with Full Roof Replacement at City Hall, and without Street Lighting, Vehicle Leasing & Alternative Fuel

c. Budget Pricing by Project Item

Option 2 Scope Summary (Pricing is Budgetary)

		Total Installed Cost
Building Name	ECM Description	
<i>City Hall - Police - Fire</i>	Retrofit remaining fluorescent to LED	\$168,168
	Install New DDC System	\$233,857
	Replace Older RTUs	\$62,274
	Install HW UH in Sally Port	\$11,606
	Full Roof Replacement	\$2,160,737
<i>Community Center</i>	Retrofit remaining fluorescent to LED	\$50,479
	Install Programmable Thermostats	\$7,691
	Replace Older Split Systems	\$194,975
<i>Service Department</i>	Retrofit remaining fluorescent to LED	\$47,735
	Install Programmable Thermostats	\$14,550
	Replace (1) Split System and (1) Furnace	\$33,667
<i>Bexley Park</i>	Retrofit Exterior Lighting to LED	\$53,177
	Retrofit Ball Field Lighting to LED	\$100,725
<i>Quarry Park North</i>	Retrofit Exterior Lighting to LED	\$10,648
	Retrofit Ball Field Lighting to LED	\$154,569
<i>City-Wide Measures</i>	Traffic signal retrofit to LED	\$118,731
<i>Performance Bonds</i>		\$31,393
Turn Key Total:		\$3,454,982

Note: These prices and fees are preliminary estimates. A post-selection analysis shall determine final cost and savings numbers.



2

Option 2 Project Summary with Full Roof Replacement at City Hall, and without Street Lighting, Vehicle Leasing & Alternative Fuel

e. Project Financing Cash Flow Analysis

Option 2 Cash Flow

Total Project Cost: \$3,454,982
Amount Financed: \$3,454,982
Utility Rebates: \$11,889
Rate of Financing: 3.96%
Term of Financing: 15
Program Cash Flow: **(\$2,406,187)**

Year	Annual Program Savings	Debt Payment	Annual Cash Flow
0 (Const. Period	\$39,580	\$0	\$39,580
1	\$110,763	\$309,876	-\$199,113
2	\$111,061	\$309,876	-\$198,815
3	\$111,372	\$309,876	-\$198,505
4	\$111,694	\$309,876	-\$198,182
5	\$112,030	\$309,876	-\$197,846
6	\$111,681	\$309,876	-\$198,195
7	\$111,346	\$309,876	-\$198,530
8	\$111,024	\$309,876	-\$198,852
9	\$110,715	\$309,876	-\$199,161
10	\$110,419	\$309,876	-\$199,457
11	\$110,134	\$309,876	-\$199,742
12	\$109,861	\$309,876	-\$200,015
13	\$109,599	\$309,876	-\$200,278
14	\$109,347	\$309,876	-\$200,529
15	\$109,105	\$309,876	-\$200,771
16	\$108,873	\$0	\$108,873
17	\$108,650	\$0	\$108,650
18	\$108,437	\$0	\$108,437
19	\$108,231	\$0	\$108,231
20	\$108,034	\$0	\$108,034
Totals	\$2,241,958	\$4,648,145	-\$2,406,187



Appendix

Roof Inspection Report

Roof Inspection / Repair Report

Client: The City of South Euclid

Facility: Municipal Center

Title: Roof Inspection Report, Sections A-V

Roof Section: Various



PHOTO 1

Overall roof photo. There are approximately 19 different roof sections; many of which are varying in age and condition. This is a very complex roof, meaning there is a significant amount of equipment present (HVAC and telecommunications). Many are very difficult to access.

Replacing numerous sections over the next 5 to 10 years needs to be seriously considered. A number of sections have well surpassed their life expectancy and if nothing is done, will turn into an emergency situation. Other sections have the ability to be restored. A roof restoration will cost a fraction of price versus a replacement and can add 10 years or more of life expectancy. The key factor is to act before the roof passes the point of no return.



PHOTO 2

Many of the roof areas appear to be from the 1977 renovation. These have well surpassed their life expectancy and need to be replaced.



PHOTO 3

Section A – The perimeter is in need of maintenance.



PHOTO 4

Section B – The perimeter is in need of repair and the roof has surpassed its life expectancy.

Unprotected Flashing Membrane: The flashing system of this roof is lacking a protective coating. The purpose of this protective coating is to extend the life of the roof by preventing UV deterioration. UV rays dry out the protective properties which cause the membrane to shrink and crack. Overtime, cracks will develop down into the depths of the felts, especially during the freeze thaw cycle. These cracks will eventually allow water to

enter the roofing system resulting in permanent damage.

Perimeter Flashing Deterioration: Most roof failures start at perimeter and penetration locations. Metal edge conditions that are poorly designed and improperly installed fail due to the extreme expansion and contraction that is typical with metal. Perimeter wall flashing can also be damaged due to normal seasonal building movement and thermal shock. Additional damage can also be seen from UV degradation as well. At all of these deteriorated or failed points, moisture can gain direct access to the roof system insulation and the building's interior.



PHOTO 5

Section B – The core cut revealed tapered insulation and a flat roof deck. The roof is approximately 6.5" near the roof edge.



PHOTO 6

Section B – Approximately 2" near the drain.



PHOTO 7

Section C-Overall this roof has well surpassed its life expectancy and needs to be replaced immediately. More expensive repairs will be needed if nothing is done. The following conditions exist:

Blisters: Soft sponge-like pockets or swellings in the roofing material. They occur between layers of felt or between the roof membrane and substrate. Air or moisture vapor entrapped within a blister expands as the roof and outside air temperatures rise. This results in sufficient pressure to push the roofing upwards and apart. Blisters may be ruptured by roof traffic, expanding frozen water, or hail (especially during colder weather). Some blisters may become so large where they affect drainage, which may cause ponding water. Laps could also be pulled apart, resulting in leakage. A ruptured blister will immediately allow water to penetrate and damage the roof system.

Perimeter Flashing Deterioration – Raised Metal Edge: Expansion and contraction movement of the metal edge causes a sawing action that cuts into the perimeter flashing. Moisture can then enter the roofing system and building. Moisture entry will cause damage to the insulation and reduce its insulating properties. It will also allow water to enter the building causing internal damage.



PHOTO 8

Section C- This is an immediate area for water to enter

Perimeter Flashing Deterioration: Most roof failures start at the perimeter and penetration locations. Metal edge conditions that are poorly designed and improperly installed fail due to the extreme expansion and contraction that is typical with metal. Perimeter wall flashings can also be damaged due to normal seasonal building movement and thermal shock. Additional damage can also be seen from UV degradation as well. At all of these deteriorated or failed points, moisture can gain direct

access to the roof system insulation and the building's interior.



PHOTO 9

Section D-This roof has surpassed its life expectancy and needs immediate replacement. If nothing is done, more expensive repairs will be needed. The following conditions exist:

Perimeter Flashing Deterioration: Most roof failures start at the perimeter and penetration locations. Metal edge conditions that are poorly designed and improperly installed fail due to the extreme expansion and contraction that is typical with metal. Perimeter wall flashings can also be damaged due to normal seasonal building movement and thermal shock. Additional damage can also be seen from UV degradation as well. At all of

these deteriorated or failed points, moisture can gain direct access to the roof system insulation and the building's interior.

Blisters: Soft sponge-like pockets or swellings in the roofing material. They occur between layers of felt or between the roof membrane and substrate. Air or moisture vapor entrapped within a blister expands as the roof and outside air temperatures rise. This results in sufficient pressure to push the roofing upwards and apart. Blisters may be ruptured by roof traffic, expanding frozen water, or hail (especially during colder weather). Some blisters may become so large where they affect drainage, which may cause ponding water. Laps could also be pulled apart, resulting in leakage. A ruptured blister will immediately allow water to penetrate and damage the roof system.



PHOTO 10

Section D

Unprotected Flashing Membrane: The flashing system of this roof is lacking a protective coating. The purpose of the protective coating is to extend the life of the roof by preventing UV deterioration. UV rays dry out the protective properties which cause the membrane to shrink and crack. Over time cracks will develop down into the depths of the felts especially during the freeze/thaw cycle. These cracks will eventually allow water to enter the roofing system resulting in permanent damage.



PHOTO 11

Section D – Close up of conditions

Perimeter Flashing Deterioration: Most roof failures start at the perimeter and penetration locations. Metal edge conditions that are poorly designed and improperly installed fail due to the extreme expansion and contraction that is typical with metal. Perimeter wall flashings can also be damaged due to normal seasonal building movement and thermal shock. Additional damage can also be seen from UV degradation as well. At all of these deteriorated or failed points, moisture can gain direct

access to the roof system insulation and the building's interior.

Unprotected Flashing Membrane: The flashing system of this roof is lacking a protective coating. The purpose of the protective coating is to extend the life of the roof by preventing UV deterioration. UV rays dry out the protective properties which cause the membrane to shrink and crack. Over time cracks will develop down into the depths of the felts especially during the freeze/thaw cycle. These cracks will eventually allow water to enter the roofing system resulting in permanent damage.



PHOTO 12

Section D – Area of a large repair

PHOTO 13



Section D – Close up of perimeter flashing deterioration. The protective flashing piles have completely worn away in this area.



PHOTO 14

Section B, C, D - Significant leaks have been reported.



PHOTO 15

Section F - The telecommunications are located in this area.



PHOTO 16

Section L – This roof might be a candidate for restoration. A thermal scan is required which will detect areas of wet insulation.

Unprotected Roof Membrane: The cap sheet of this roof is lacking a protective coating. The purpose of the protective coating is to extend the life of the roof by preventing UV deterioration. UV rays dry out the protective properties which cause the membrane to shrink and crack. Overtime, cracks will develop down into the depths of the felts especially during the

freeze / thaw cycle. These cracks will eventually allow water to enter the roofing system resulting in permanent damage. **Alligatoring:** A result of the drying out and shrinking of the asphalt surface resulting in a “mud-cracking” pattern. The pattern is most pronounced in areas of exposed asphalt. It is caused by the heat and UV rays of the sun beating down on the exposed asphalt surface. If left untreated, the Alligatoring condition can develop into splits in the roof membrane. As the surface continues to shrink and dry out, cracks will develop down to the depth of felts and may stress-crack the membrane in cold weather. These crack channels will allow water to penetrate and damage the roof system.

Bare or Exposed Felts: Weathering causes the roof’s surfacing materials to oxidize and wear away after a period of time. Loss of protection from the surfacing material results in accelerated deterioration of the primary water proofed asphalt, along with the system’s reinforcement piles which provide the strength for the system. Heat and UV rays dry out unprotected asphalt which then leave the bare reinforcement piles exposed to the elements. The exposed reinforcement will begin to absorb and wick moisture into the built-up layers of the roof system. This condition leads to accelerated damage via blisters and interlayer delamination. Roof system damage occurs when these weakened areas of the roof system are affected by thermal shock, typical roof traffic and normal seasonal conditions.



PHOTO 17

Section L – Close up of the Alligatoring.



PHOTO 18

Section P – This roof might be a candidate for restoration. A thermal scan is required, which will detect the areas of wet insulation.



PHOTO 19

Section N – This roof might be a candidate for restoration. A thermal scan is required, which will detect the areas of wet insulation.



PHOTO 20

Section O – This will be a difficult roof area due to access and then HVAC equipment.



PHOTO 21

Section Q – Numerous leaks have been reported and the roof has surpassed its life expectancy. This will be a difficult roof area due to access and the HVAC equipment.

Unprotected Flashing Membrane: The flashing system of this roof is lacking a protective coating. The purpose of the protective coating is to extend the life of the roof by preventing UV deterioration. UV rays dry out the protective properties which cause the membrane to shrink and crack. Over time cracks will develop down into the depths

of the felts especially during the freeze/thaw cycle. These cracks will eventually allow water to enter the roofing system resulting in permanent damage.



PHOTO 22

Section Q – Numerous leaks have been reported and the roof has surpassed its life expectancy. This will be a difficult roof area due to access and the HVAC equipment.

Unprotected Flashing Membrane: The flashing system of this roof is lacking a protective coating. The purpose of the protective coating is to extend the life of the roof by preventing UV deterioration. UV rays dry out the protective properties which cause the membrane to shrink and crack. Over time cracks will develop down into the depths of the

felts especially during the freeze/thaw cycle. These cracks will eventually allow water to enter the roofing system resulting in permanent damage.



PHOTO 23

Section Q – A core cut revealed wet insulation.



PHOTO 24

Section V – The skylights have leaked and continue to be a maintenance item. A ceiling has been added so they are no longer serving their intended purpose. The recommendation is to install metal panels to the lower section.



PHOTO 25

Interior Leak



PHOTO 26

Interior Leak



PHOTO 27

Section U – This will be a difficult roof area due to access. The roof might be a candidate for restoration. A thermal scan is required which will detect areas of wet insulation.



PHOTO 28

Section T – Close up of the metal roof panels that have been installed over the skylight. This roof might be a candidate for restoration. A thermal scan is required which will detect the areas of wet insulation.



PHOTO 29

Section J & K- This roof might be a candidate for restoration. A thermal scan is required which will detect the areas of wet insulation.



PHOTO 30

Section S – This roof might be a candidate for restoration. A thermal scan is required which will detect the areas of wet insulation.