PUBLIC WORKS DEPARTMENT
MEMORANDUM # 2016 – 44

DATE: June 27, 2016

TO: Honorable Mayor Joyce Downing and City Council Members

FROM: James A. Hayes, AICP – City Manager
David H. Willett – Director of Public Works
James S. May – ~~Chief of~~ Police

SUBJECT: **Council Study Session**
Northglenn Justice Center (NJC) Design Update

BACKGROUND

The City Project Team provides an update to Council on design and project status of the Northglenn Justice Center at the end of every month. This is the June 2016 update.

DISCUSSION

Project Cost Update: No changes to design budget.

Project Design Update: 100% Design Development scheduled for July 25, 2016.

Project Schedule Update:

- A design review with the Architect and the City Team was conducted June 23, 2016; topics review included mechanical system alternatives, site planning, and material selection.
- Public Presentation – TBD.
- Design Development 100% - July 25, 2016.
- CMAR Contract Award – Anticipated end of Q3 2016.
- Construction Documentation (95%) – Anticipated end of Q4 2016.
- CMAR Addendum #1 Guaranteed Maximum Price – Anticipated end of Q1 2017.

Construction Contractor Procurement:

- RFP posted June 14, 2016.
- Pre-solicitation conference conducted June 23, 2016.
- Bids due August 2, 2016.

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Alternatives – Mechanical Systems:

During the June 13, 2016 Council Meeting, the City Project team offered to provide four specific alternatives for the NJC's mechanical system. They would provide initial and lifecycle costs, including payback periods, for a base system (forced air electric heat and direct expansion cooling); a system using chilled beam cooling and hot water heating; a system using radiant floor heating without chilled beams; and a hybrid system that combined the chilled beams and the radiant heat. Attachment 1 provides a comparative summary of these options. The following conclusions may be drawn:

- Option 1: The lowest up-front cost is the **base system**, but that system has a substantially higher lifecycle cost over the first 20 years.

- Option 2: The **chilled beam** option provides greater efficiency than the base system, with an approximately eight year payback period.

- Option 3: The lowest lifecycle cost is the **radiant heat** option, with an estimated five year payback.

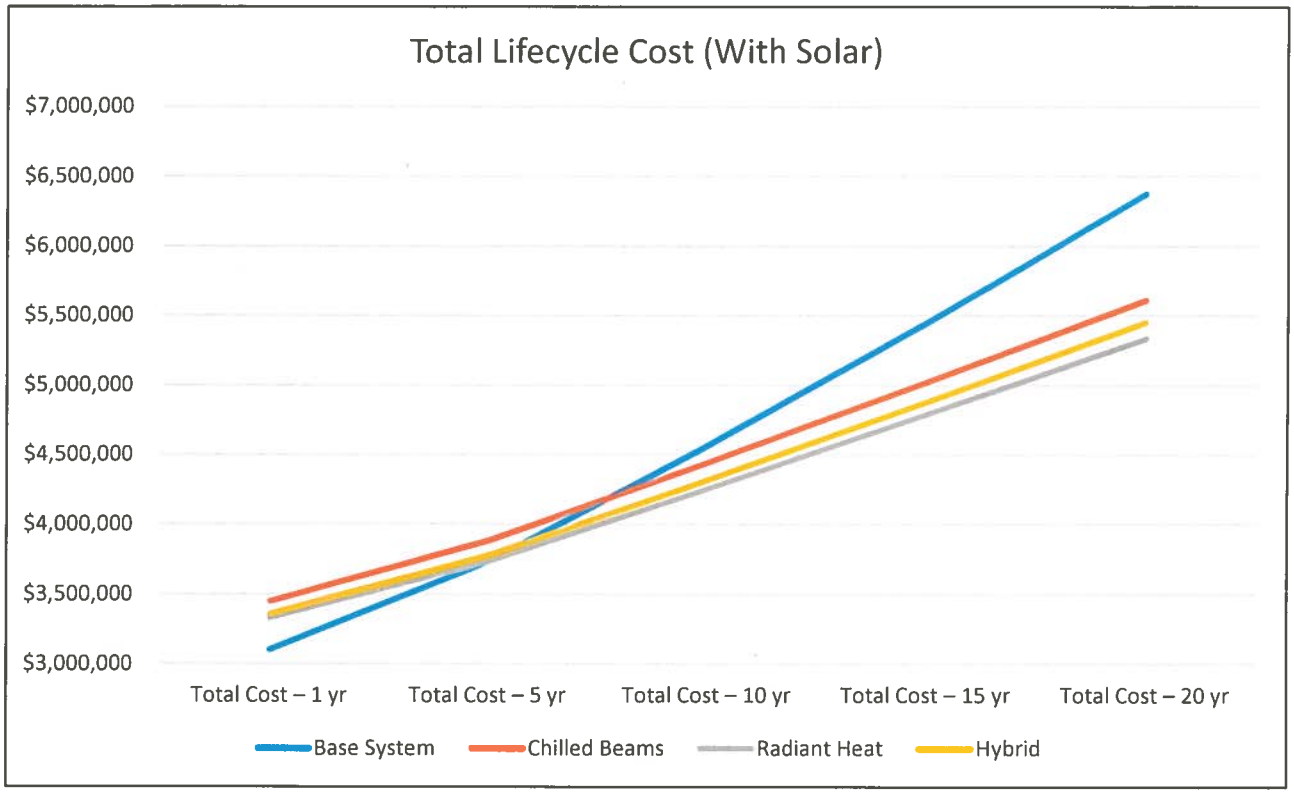
- Option 4: The option that provides the greatest thermal comfort and responsiveness to building residents is the **hybrid**. Although it requires an additional $27,000 when compared to the radiant-alone system, its payback is similar (six years), and it still provides a substantial lifecycle savings as compared to the base system. It also provides tailored heating and cooling "on demand" and appropriate to the specific building areas.

RECOMMENDATION
While all three of the upgraded MEP systems offer a relatively short payback period, and provide a more energy efficient system for decades to come, staff recommends that Council approve the **hybrid MEP** option for design and construction. Although this option is slightly more expensive ($27,000) over the first 20 years than the radiant system, the improvement in thermal comfort to the Police and Court staff, along with customers and the public, was a factor in staff's decision.

STAFF REFERENCE
Steve Grace, PE, Operations Manager sgrace@northglenn.org 303.450.4077

ATTACHMENTS
Attachment 1 – MEP Alternatives

	Base System	Chilled Beams	Radiant Heat	Hybrid
Total Cost – 1 yr	$3,101,050	$3,448,087	$3,330,452	$3,357,155
Total Cost – 5 yr	$3,735,468	$3,885,146	$3,735,101	$3,779,235
Total Cost – 10 yr	$4,569,287	$4,445,329	$4,253,831	$4,320,975
Total Cost – 15 yr	$5,448,437	$5,020,910	$4,786,914	$4,878,424
Total Cost – 20 yr	$6,372,916	$5,611,890	$5,334,352	$5,451,582



	Chilled Beams	Radiant Heat	Hybrid
Comparison to Base System (1 Yr) - Cost Premium	($347,037)	($229,403)	($256,105)
Comparison to Base System (10 Yr) - Cost Savings	$123,959	$315,456	$248,313
Comparison to Base System - Payback Period (Years)	8.5	5.2	6.1

Estimated Cost	Electric Heat and Direct Expansion (Base System)	Notes
First Cost HVAC	$1,628,640	
First Cost Generator	$547,698	
First Cost Solar	$770,640	
Energy Cost / yr	$38,415	
% Elec vs Gas Usage (Elec shown)	100%	Average Electrical Inflation rate 2.36%, average gas inflation rate is 1.57%
Projected Energy Inflation (%/yr)	2.36%	Sources include Xcel energy historic data, and future projections on electrical data, and United States Energy Information Administration and Xcel energy for historical gas data.
Maintenance Cost / yr	$19,200	
Replacement Cost / yr	$95,550	
Total Cost – 1 yr	$3,101,050	Inflation included
Total Cost – 5 yr	$3,735,468	
Total Cost – 10 yr	$4,569,287	
Total Cost – 15 yr	$5,448,437	
Total Cost – 20 yr	$6,372,916	

Estimated Cost	Chilled Beams	Notes
First Cost HVAC	$2,201,556	$45.866
First Cost Generator	$368,165	
First Cost Solar	$770,640	
Energy Cost / yr	$15,067	
% Elec vs Gas Usage (Elec shown)	60%	Average Electrical Inflation rate 2.36%, average gas inflation rate is 1.57%
Projected Energy Inflation (%/yr)	2.04%	Sources include Xcel energy historic data, and future projections on electrical data, and United States Energy Information Administration and Xcel energy for historical gas data.
Maintenance Cost / yr	$20,850	
Replacement Cost / yr	$71,500	
Total Cost – 1 yr	$3,448,087	Inflation included
Total Cost – 5 yr	$3,885,146	
Total Cost – 10 yr	$4,445,329	
Total Cost – 15 yr	$5,020,910	
Total Cost – 20 yr	$5,611,890	
Initial Cost Comparison to Option 1	($347,037)	Cost Premium
10 year Cost Comparison to Option 1	$123,959	Cost Savings
Calculated Payback Period (With Option 1 as Baseline)	8.49	

Estimated Cost	Radiant System	Notes
First Cost HVAC	$2,091,920	$43.582
First Cost Generator	$368,165	
First Cost Solar	$770,640	
Energy Cost / yr	$14,045	$1.135
% Elec vs Gas Usage (Elec shown)	60%	Average Electrical Inflation rate 2.36%, average gas inflation rate is 1.57%
Projected Energy Inflation (%/yr)	2.04%	Sources include Xcel energy historic data, and future projections on electrical data, and United States Energy Information Administration and Xcel energy for historical gas data.
Maintenance Cost / yr	$18,835	
Replacement Cost / yr	$66,560	
Total Cost – 1 yr	$3,330,452	Inflation included
Total Cost – 5 yr	$3,735,101	
Total Cost – 10 yr	$4,253,831	
Total Cost – 15 yr	$4,786,914	
Total Cost – 20 yr	$5,334,352	
Initial Cost Comparison to Option 1	($229,403)	
10 year Cost Comparison to Option 1	$315,456	
Calculated Payback Period (With Option 1 as Baseline)	5.22	

Estimated Cost	Hybrid System	Notes
First Cost HVAC	$2,114,400	$44.050
First Cost Generator	$368,165	
First Cost Solar	$770,640	
Energy Cost / yr	$15,080	
% Elec vs Gas Usage (Elec shown)	65%	Average Electrical Inflation rate 2.36%, average gas inflation rate is 1.57%
Projected Energy Inflation (%/yr)	2.08%	Sources include Xcel energy historic data, and future projections on electrical data, and United States Energy Information Administration and Xcel energy for historical gas data.
Maintenance Cost / yr	$19,210	
Replacement Cost / yr	$69,345	
Total Cost – 1 yr	$3,357,155	Inflation included
Total Cost – 5 yr	$3,779,235	
Total Cost – 10 yr	$4,320,975	
Total Cost – 15 yr	$4,878,424	
Total Cost – 20 yr	$5,451,582	
Initial Cost Comparison to Option 1	($256,105)	
10 year Cost Comparison to Option 1	$248,313	
Calculated Payback Period (With Option 1 as Baseline)	6.11	