BALLINGER

Community Collaborative Questions

American University Hall of Science

August 7, 2017

The following questions and issues have been raised for discussion:

1. *LEED rating: Is it possible to achieve Platinum and/or net zero?*

2. *Describe best practices to mitigate fume emissions from the building*.

3. *Describe potential light and noise emissions from the building.*

4. *What does the façade facing University Avenue look like? How will we control fugitive light in the evening?*

5. *Provide a rendering of the view from University Avenue & Quebec Street.*

6. *Provide an accurate count of the parking spaces being removed.*

1. LEED rating: Is it possible to achieve Platinum and/or net zero?

The current LEED target is for Gold Level certification. This is already a significant achievement for science buildings. We are looking at strategies that could achieve Platinum level certification. These include:

- Renewable on site energy generation – This is difficult to apply due to limited site area.

- Clean fuel on site generation - The design team is researching possible use of Fuel Cells in lieu of emergency generators. This would both reduce carbon footprint and eliminate a source of emissions.

- Leverage campus' new combined Heat and Power system for greater efficiency and carbon footprint reduction – This is likely based on planned upgrades to campus utility network, real energy savings and carbon reductions.

- Further reductions in water use, both inside and outside the building – the design team is working with AU to ensure lowest possible water use.

1. *LEED rating: Is it possible to achieve Platinum and/or net zero?*

Need additional points in these areas to achieve Platinum.

LEED-NC v2009
Project Scorecard

AU Hall of Science
Ballinger
6/27/2017

sdc

Y	?Y	?N	N		**Minimum Program Requirements**		
Y				PIf1	**Minimum Program Requirements**		
Y				PIf2	**Project Summary Details**		
Y				PIf3	**Occupant & Usage Data**		
Y				PIf4	**Schedule & Overview Documents**		

Y	?Y	?N	N		**Sustainable Sites**		Possible Points 26
23	3	2					
Y				Prereq 1	**Construction Activity Pollution Prevention**		
1				Credit 1	**Site Selection**		1
5				Credit 2	**Development Density & Community Connectivity**		5
		1		Credit 3	**Brownfield Redevelopment**		1
6				Credit 4.1	**Alternative Transportation:** Public Transportation Access		6
1				Credit 4.2	**Alternative Transportation:** Bicycle Storage & Changing Rooms		1
3				Credit 4.3	**Alternative Transportation:** Low Emitting & Fuel Efficient Vehicles		3
2				Credit 4.4	**Alternative Transportation:** Parking Capacity		2
	2			Credit 5.1	**Site Development:** Protect or Restore Habitat	[RP]	1
1				Credit 5.2	**Site Development:** Maximize Open Space		1
2				Credit 6.1	**Stormwater Design:** Quantity Control	[RP]	1
		1		Credit 6.2	**Stormwater Design:** Quality Control		1
1				Credit 7.1	**Heat Island Effect:** Non-Roof		1
1				Credit 7.2	**Heat Island Effect:** Roof		1
	1			Credit 8	**Light Pollution Reduction (v4 Alt: BUG)**		1

Y	?Y	?N	N		**Water Efficiency**		Possible Points 10
4	1	5					
Y				Prereq 1	**Water Use Reduction:** 20% Reduction		
2		2		Credit 1	**Water Efficient Landscaping**		4
		2		Credit 2	**Innovative Wastewater Technologies**		2
2	1	1		Credit 3	**Water Use Reduction:** 30%/ 35%/ 40%		4

Y	?Y	?N	N		**Energy & Atmosphere**		Possible Points 35
10	5	6	16				
Y				Prereq 1	**Fundamental Commissioning - Building Energy Systems**		
Y				Prereq 2	**Minimum Energy Performance**		
Y				Prereq 3	**Fundamental Refrigerant Management**		
5	3	2	10	Credit 1	**Optimize Energy Performance**	[RP, 40%]	19
		2	6	Credit 2	**On-Site Renewable Energy:** 1%-13%	[RP, 1%]	7
2				Credit 3	**Enhanced Commissioning**		2
	2			Credit 4	**Enhanced Refrigerant Management**		2
1		2		Credit 5	**Measurement & Verification**		3
2				Credit 6	**Green Power**		2

[RP] - Regional Priority credit (adds 1 point)

Y	?Y	?N	N		**Materials & Resources**		Possible Points 14
6		1	7				
Y				Prereq 1	**Storage & Collection of Recyclables**		
			3	Credit 1.1	**Building Reuse:** Maintain Existing Walls, Floors, and Roof	[RP]	3
			1	Credit 1.2	**Building Reuse:** Maintain 50% of Interior Non-Structural Elements		1
2				Credit 2	**Construction Waste Management:** 50%/ 75%		2
			2	Credit 3	**Materials Reuse:** 5%/ 10%		2
1		1		Credit 4	**Recycled Content:** 10%/ 20%		2
2				Credit 5	**Regional Materials:** 10%/ 20%		2
			1	Credit 6	**Rapidly Renewable Materials:** 2.5%		1
1				Credit 7	**Certified Wood:** 50%		1

Y	?Y	?N	N		**Indoor Environmental Quality**		Possible Points 15
11	3		1				
Y				Prereq 1	**Minimum IAQ Performance**		
Y				Prereq 2	**Environmental Tobacco Smoke (ETS) Control**		
1				Credit 1	**Outdoor Air Delivery Monitoring**		1
1				Credit 2	**Increased Ventilation:** 30%		1
1				Credit 3.1	**Construction IAQ Management Plan:** During Construction		1
	1			Credit 3.2	**Construction IAQ Management Plan:** Before Occupancy		1
1				Credit 4.1	**Low-Emitting Materials:** Adhesives & Sealants		1
1				Credit 4.2	**Low-Emitting Materials:** Paints		1
1				Credit 4.3	**Low-Emitting Materials:** Flooring Systems		1
1				Credit 4.4	**Low-Emitting Materials:** Composite Wood & Agrifiber Products		1
1				Credit 5	**Indoor Chemical & Pollutant Source Control**		1
1				Credit 6.1	**Controllability of Systems:** Lighting		1
			1	Credit 6.2	**Controllability of Systems:** Thermal Comfort		1
1				Credit 7.1	**Thermal Comfort:** Design		1
1				Credit 7.2	**Thermal Comfort:** Verification		1
	1			Credit 8.1	**Daylight & Views:** Daylight 75% of Spaces		1
	1			Credit 8.2	**Daylight & Views:** Views for 90% of Spaces		1

Y	?Y	?N	N		**Innovation & Design Process**		Possible Points 6
6							
1				Credit 1.1	**EP SSc4.1**		1
1				Credit 1.2	**TBD: EP SSc5.2 or MRc7**		1
1				Credit 1.3	**EP EAc6**		1
1				Credit 1.4	**ASHRAE 110 Fume Hood Cx**		1
1				Credit 1.5	**Green User Education**		1
1				Credit 2	**LEED Accredited Professional**		1

Y	?Y	?N	N	**Total**	Possible Points 110
60	12	14	24		

Certified 40 to 49 points Silver 50 to 59 points **Gold 60 to 79 points** Platinum 80 to 110 points

1. *LEED rating: Is it possible to achieve Platinum and/or net zero?*

International Institute for Sustainable Laboratories

I²SL International Institute for Sustainable Laboratories®

- Annual Conference
- Sponsorship
- Working Groups
- Training and Education
- E-Library
- Global Community
- Partnerships
- Resources
  - Labs21 Tool Kit
  - Industry Events
  - Industry Books and Publications
  - Helpful Links

Best Practice Guides

Part of the Labs21 Tool Kit

The Labs21 program has granted I²SL permission to share Labs21 Tool Kit resources.

Best Practice Guides provide information on the design, construction, and operation of specific technologies that contribute to energy efficiency and sustainability in laboratories. The guides include information from actual implementation of these technologies in various laboratory facilities by highlighting quantifiable performance goals and possible methods to achieve them.

- Energy Recovery in Laboratory Facilities (1.3 MB, 18 pp) *Updated June 2012*
- Chilled Beams (3.0 MB, 15 pp)
- Optimizing Laboratory Ventilation Rates (1.22 MB, 13 pp)
  The Labs21 Optimizing Ventilation Rates Best Practice Guide is serialized in the February, March, and April 2010 issues of *R&D Magazine's Laboratory Design Newsletter*.

Strategies currently being applied to the Hall of Science

- Commissioning Ventilated Containment Systems in the Laboratory (2.8 MB, 8 pp)

Strategies in consideration for the Hall of Science

- Laboratory Guidelines Using ASHRAE 90.1—2007 Appendix G (85 KB, 8 pp)
- Metrics and Benchmarks for Energy Efficiency in Laboratories (1.06 MB, 11 pp)
- Manifolding Laboratory Exhaust Systems (410 KB, 10 pp)
- Efficient Electric Lighting in Laboratories (759 KB, 10 pp)
- Minimizing Reheat Energy Use in Laboratories (392 KB, 8 pp)
- Right-Sizing Laboratory Equipment Loads (546 KB, 8 pp)
- Modeling Exhaust Dispersion for Specifying Acceptable Exhaust/Intake Designs (772 KB, 12 pp)
- Water Efficiency Guide for Laboratories (504 KB, 12 pp)
- Low-Pressure-Drop HVAC Design for Laboratories (385 KB, 8 pp)
- Daylighting in Laboratories (572 KB, 8 pp)

Strategies currently being applied to the Hall of Science

- Onsite Power Systems for Laboratories (1.2 MB, 22 pp)

Strategies in consideration for the Hall of Science

Back to the Labs21 Tool Kit

U.S. EPA U.S. DOE Laboratories for the 21st Century

Most IISL Best Practices are being employed in the design for the Hall of Science. All of them are in consideration, but some may have less applicability.

2. Describe best practices to mitigate fume emissions from the building.

These best practices will be employed in the design of the Hall of Science:

- Wind Wake modeling for effluent dispersion – description of procedure on following page.
- High dilution exhaust fans - located within a roof well to the east of the mechanical penthouse.
- Manifolded exhaust system for pre-dilution – emissions are first diluted within the building.
- Exhaust discharge per ANSI Z9.5

Description of wind-wake modelling procedure:

The International Building Code only prescribes the distance from exhausts to air intakes for a building. We use wind wake modeling to ensure the safety of building inhabitants and those in the surrounding area. The modeling procedure has two steps. The first is numeric modeling method to estimate the dilution of effluents based on dispersion. The second, if necessary, is wind tunnel testing.

The dispersion of these effluents is dependent on wind conditions and the distance between the emitter (exhaust) source and the receptor (air intake or people in surrounding area). The numeric modeling utilizes the method outlined by ASHRAE to determine dilution that occurs between the emitter and the receptor. The method identifies all the building emitters and surrounding receptors. Calculations are done to determine the dilution ratio between the emitter and receptor. Target dilution ratios are determined by the effluent emitted and threshold limit values of the receptor. These values are typically determined using criteria from ACGIH- Threshold Limit Values for Chemical Substances and Physical Agents. For specific emitters such as cooling towers or diesel generators, ASHRAE Guideline 12 or CalEPA California Ambient Air Quality Standard for Nitrogen Dioxide are used.

If the numerical analysis produces results that need further study, a wind tunnel test is utilized. The test uses a scale model of the site and its surroundings. A tracer gas at a known concentration is released from each emitter location on the model. The actual dilution of the gas is measured at receptor points in the scale model. The model is put on a turntable so results can be determined for all wind conditions.

Standards/Guides for wind-wake modeling:

ANSI/AIHA American National Standard for Laboratory Ventilation, Standard Z9.5
ASHRAE –ASHRAE Handbook-HVAC Applications, Chapter 44 Building Intake and Exhaust Design
ACGIH, Guide to Occupational Exposure Values
ACGIH, Threshold Limit Values for Chemical Substances and Physical Agents
ASHRAE Guideline 12 Minimizing Risk of Legionellosis Associated with Building Water systems
CalEPA, ARB, OEHHA Review of the California Ambient Air Quality Standard for Nitrogen Dioxide

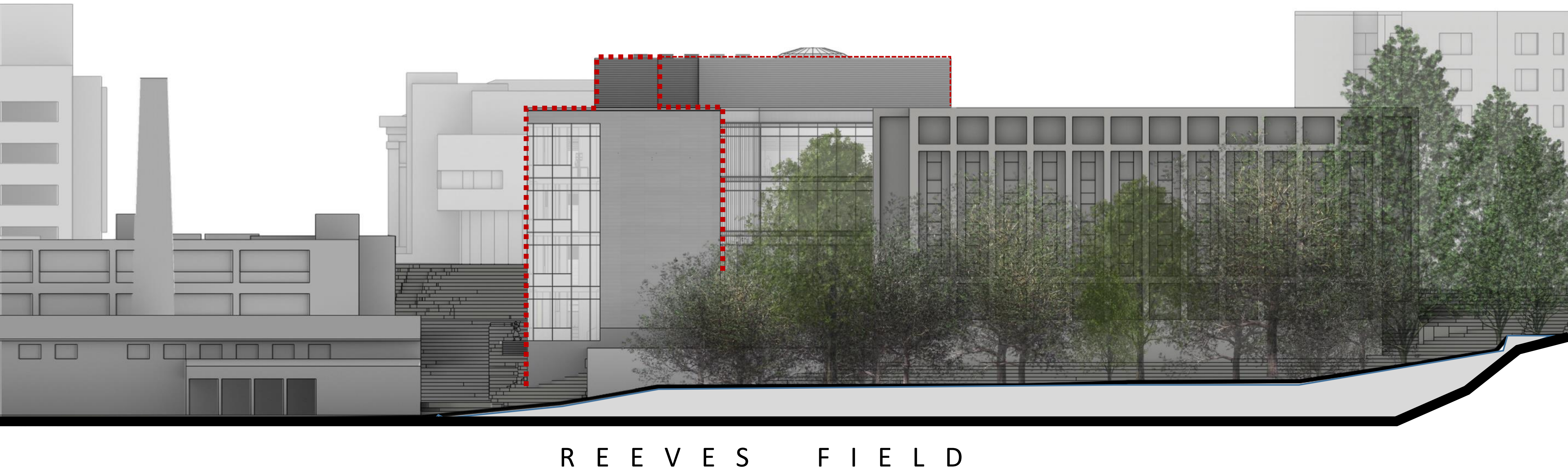
3. Describe potential light and noise emissions from the building?

The building will be equipped with vacancy sensors so that it goes almost completely dark when unoccupied. Only some minimal emergency lighting as required by code will be left operational. Laboratory windows facing the adjacent residential areas can be equipped with automated blackout shades to eliminate light spill from the building after dark.

The largest noise emissions will be from the high velocity exhaust fans at the rooftop. These are located away from the neighboring residential area and oriented towards the center of campus. Silencer nozzles will be used to reduce noise, and acoustic dampening panels will line the inside of the roof well where these fans are located. They will go to a lower velocity setback position at night when the building is not fully utilized and internal ventilation rates can be safely reduced.

4. What does the façade facing University Avenue look like? How will we control fugitive light in the evening?

Building Elevation Facing University Avenue across Reeves Field



The labs at the Northwest corner of the building will have vacancy sensors to ensure the lighting is off when they are unoccupied. Automated shades could be added if this proved necessary.

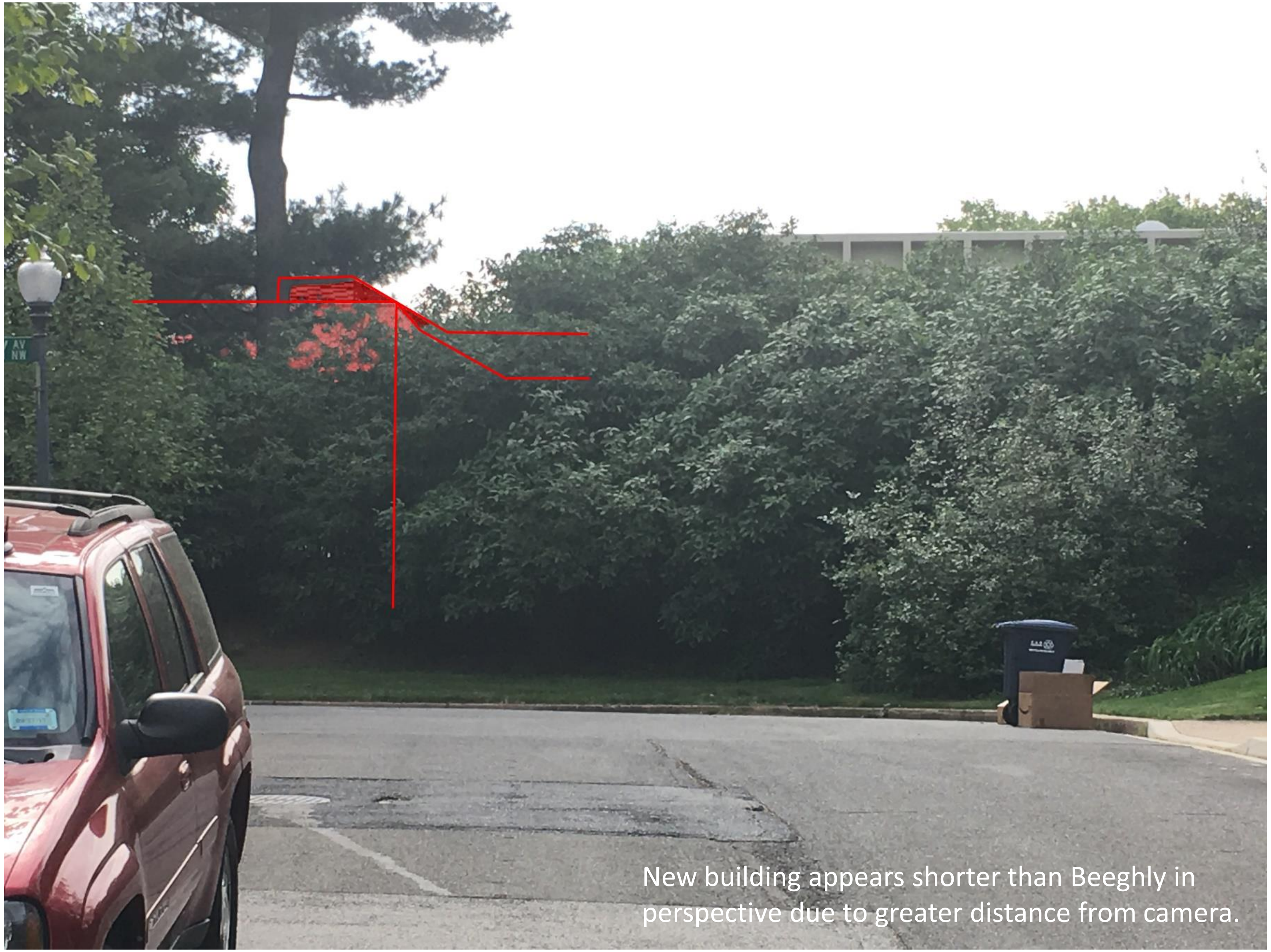
5. Provide a rendering of the view from University Avenue & Quebec Street:

View A: From Quebec St. – Near corner with 48th Street

5. Provide a rendering of the view from University Avenue & Quebec Street:

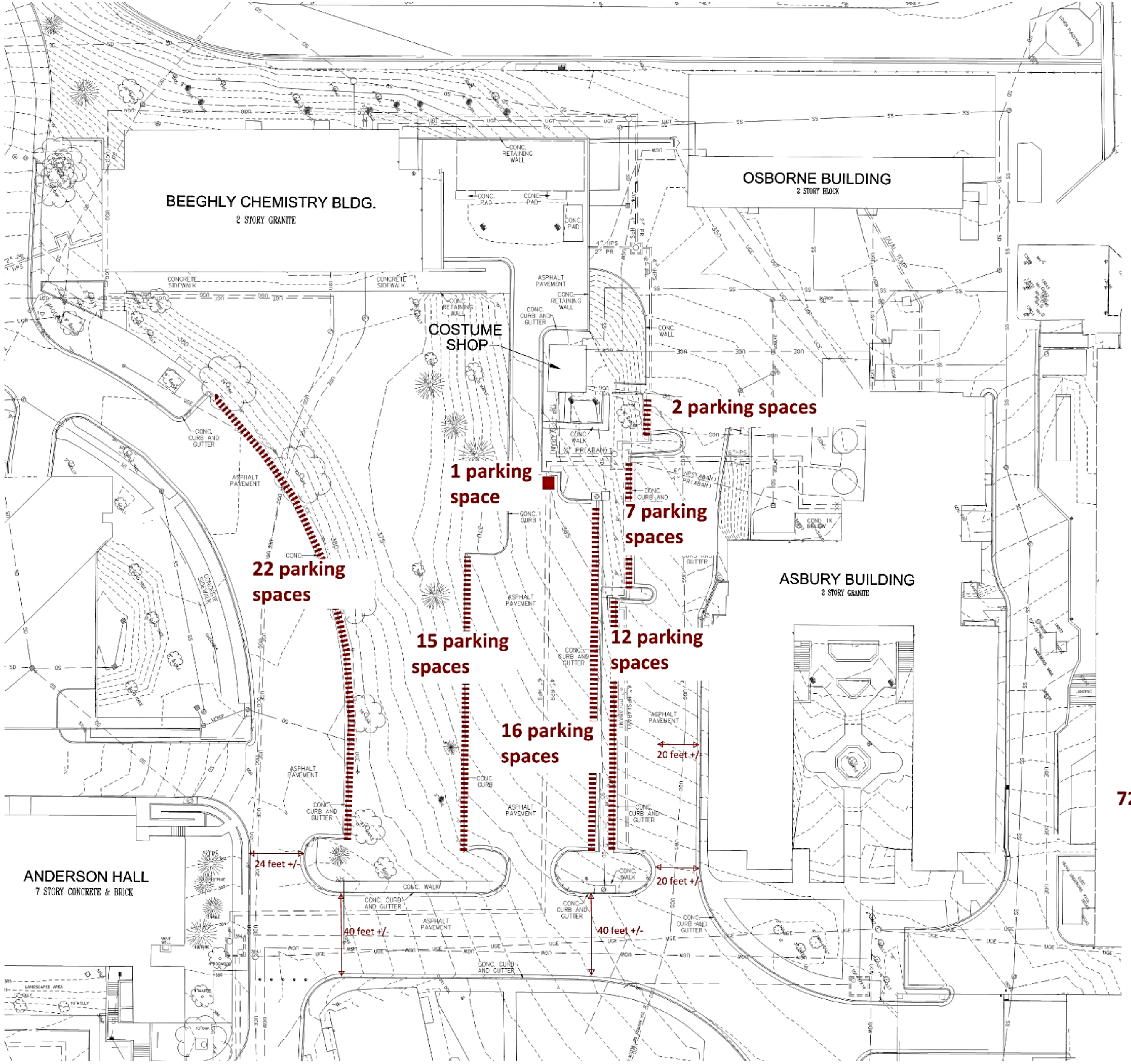
View B: From Quebec St. – Several houses downhill from corner with University Avenue

5. Provide a rendering of the view from University Avenue & Quebec Street:



View C: From Quebec St. – Close to corner with University Avenue

6. Provide an accurate count of the parking spaces being removed.



72 total parking spaces