

An aerial photograph of the Belmont Public Library and its surroundings. The library building is a large, multi-story structure with a flat roof, situated in the center-right of the image. To its left is a large, open parking lot filled with cars. Further left is a multi-lane road with a median and more parked cars. In the top left corner, there is a large, rectangular building with a flat roof, possibly a school or community center, surrounded by trees. The background is filled with dense green trees. The entire image is overlaid with a semi-transparent dark grey filter.

Belmont Public Library

LBC Meeting #11 May 21, 2019

Oudens Ello Architecture



Open Public Forum Recap





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Descubre los otros maravillosos recursos de colaboración de Post-it®

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En savoir plus sur ces outils de collaboration sur www.post-it.com

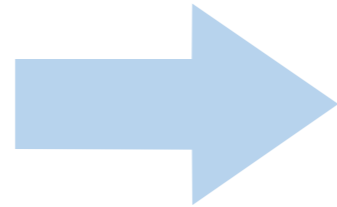
Find out more about these tools at www.post-it.com

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Existing Library

29,650 sf



New Library

42,500 sf

New Functions

Maker Space & Digital Media Lab

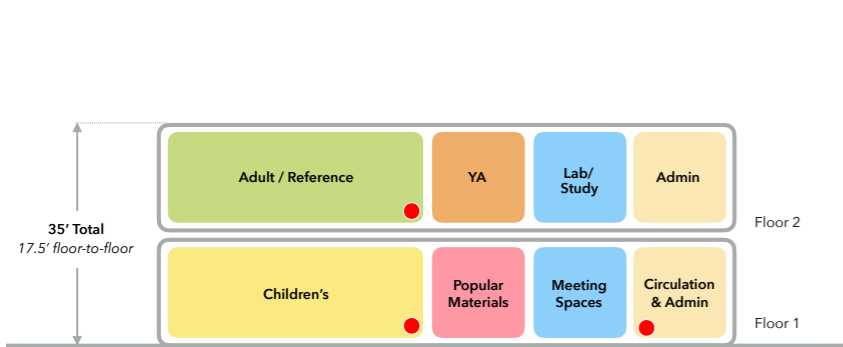
Children's Program Room

Quiet Study Rooms

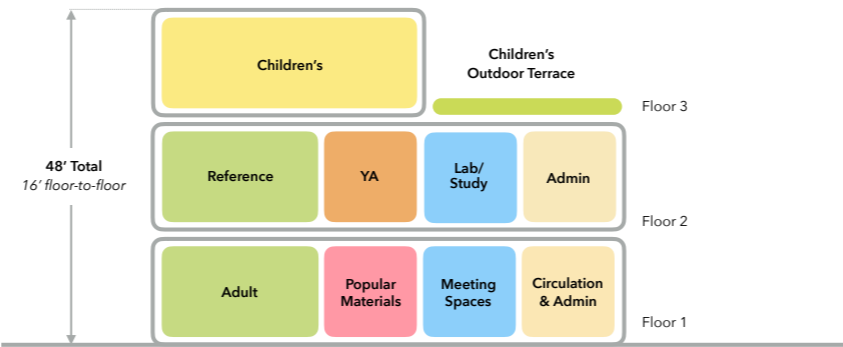
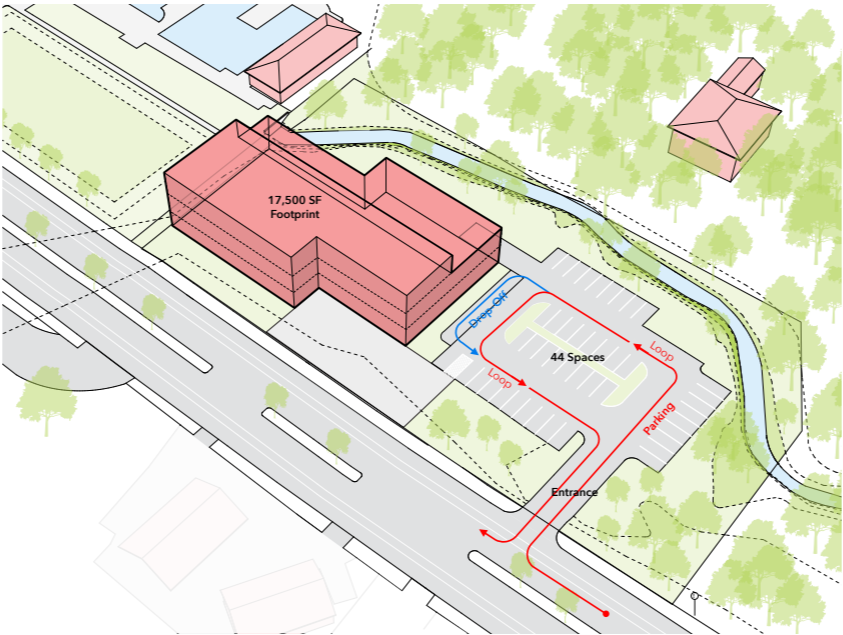
'Library of Things'

After-Hours Meeting Capability

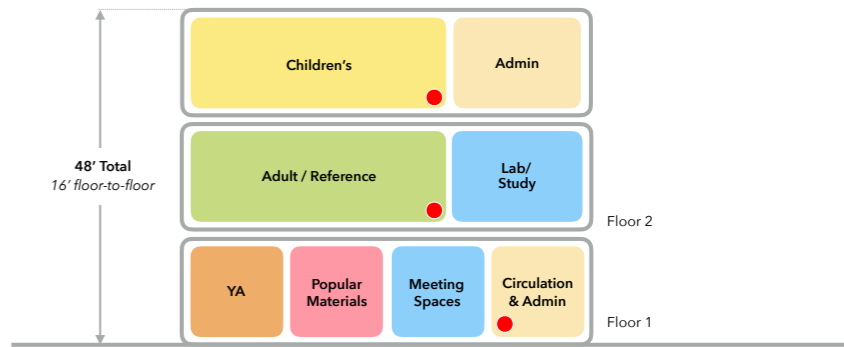
2 Story



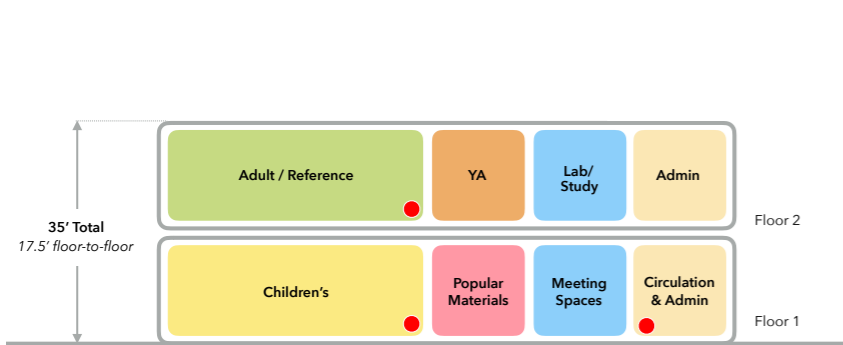
Partial 3rd Story



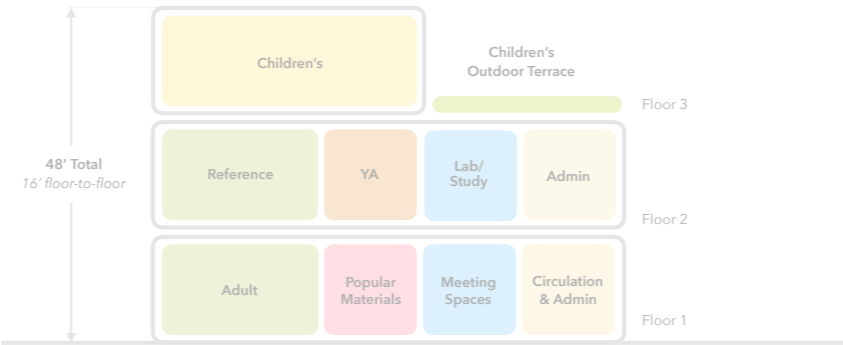
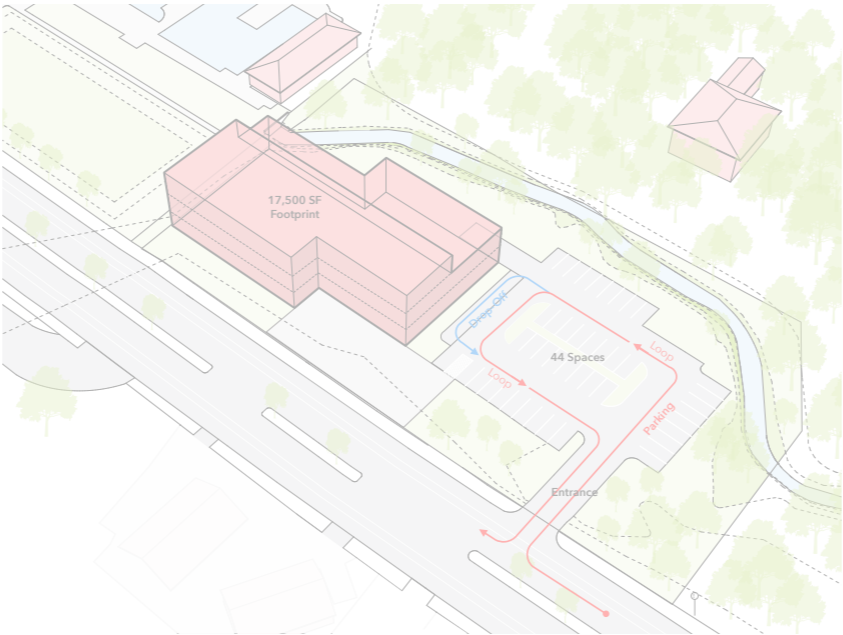
3 Story



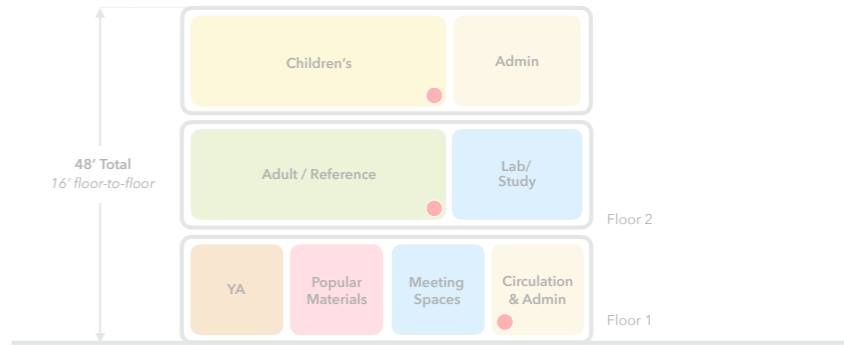
2 Story



Partial 3rd Story

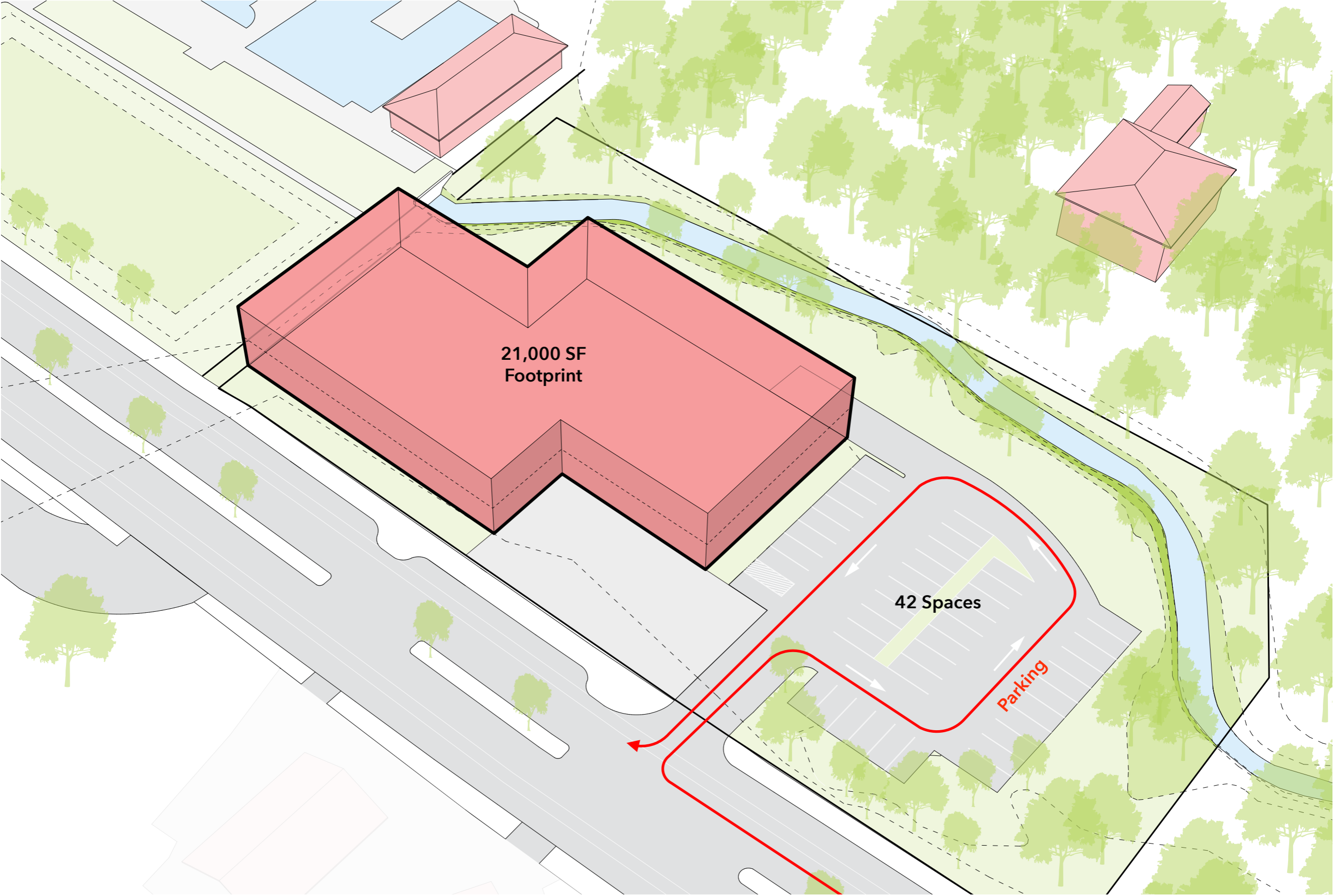


3 Story



Initial Building Studies Preferred Option

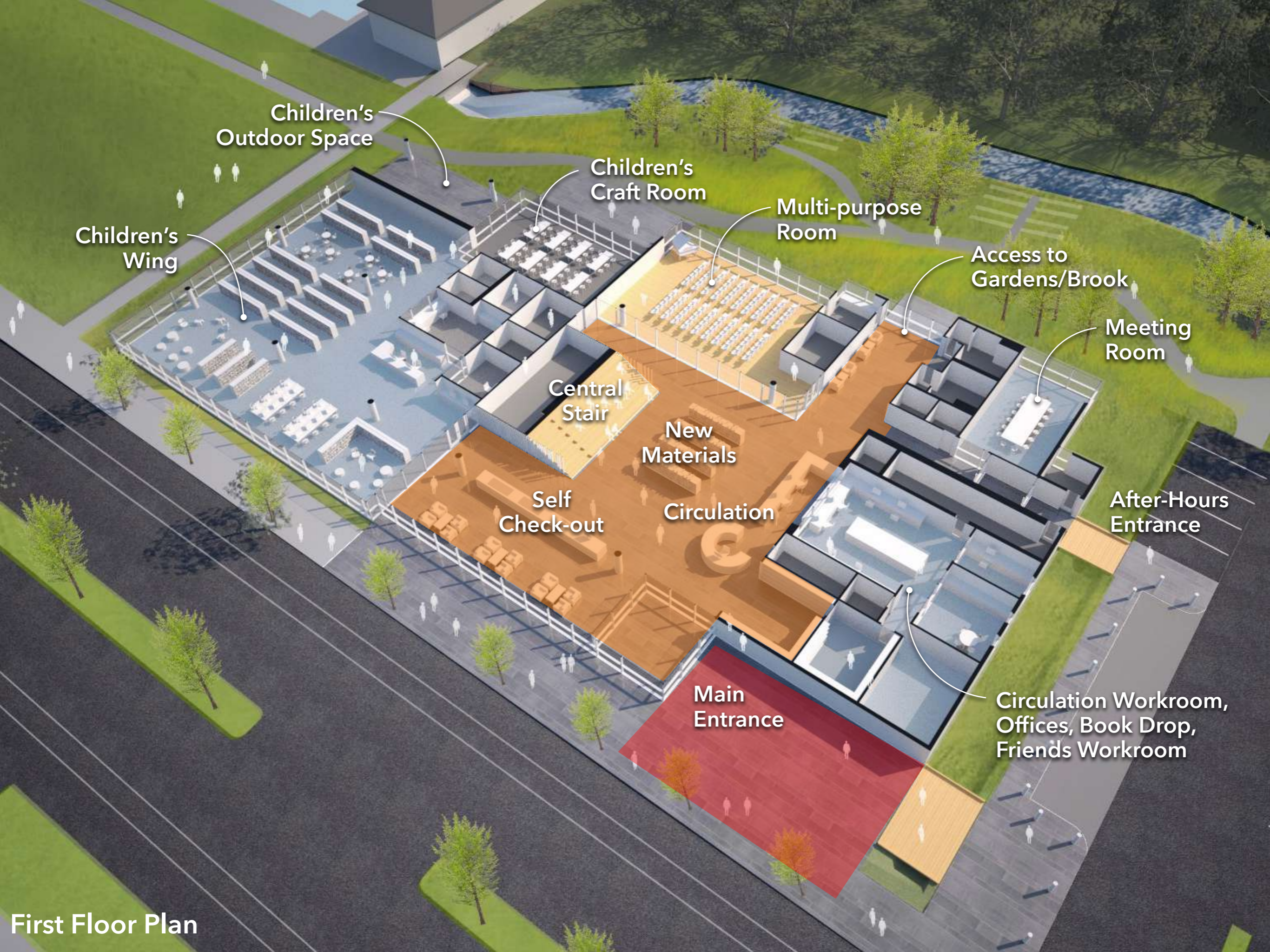
2 Story



Initial Building Studies Preferred Option



First Floor Plan



Children's
Outdoor Space

Children's
Craft Room

Multi-purpose
Room

Access to
Gardens/Brook

Meeting
Room

After-Hours
Entrance

Circulation Workroom,
Offices, Book Drop,
Friends Workroom

Main
Entrance

Circulation

New
Materials

Central
Stair

Self
Check-out

Children's
Wing



Second Floor Plan



Adult Reading Room

Outdoor Reading Porch

Digital Media Lab

Maker Space

Specialty Studios

Quiet Study

Belmont History Room

Claflin Room

Library Commons

Periodicals

Staff Workroom and Offices

Young Adults

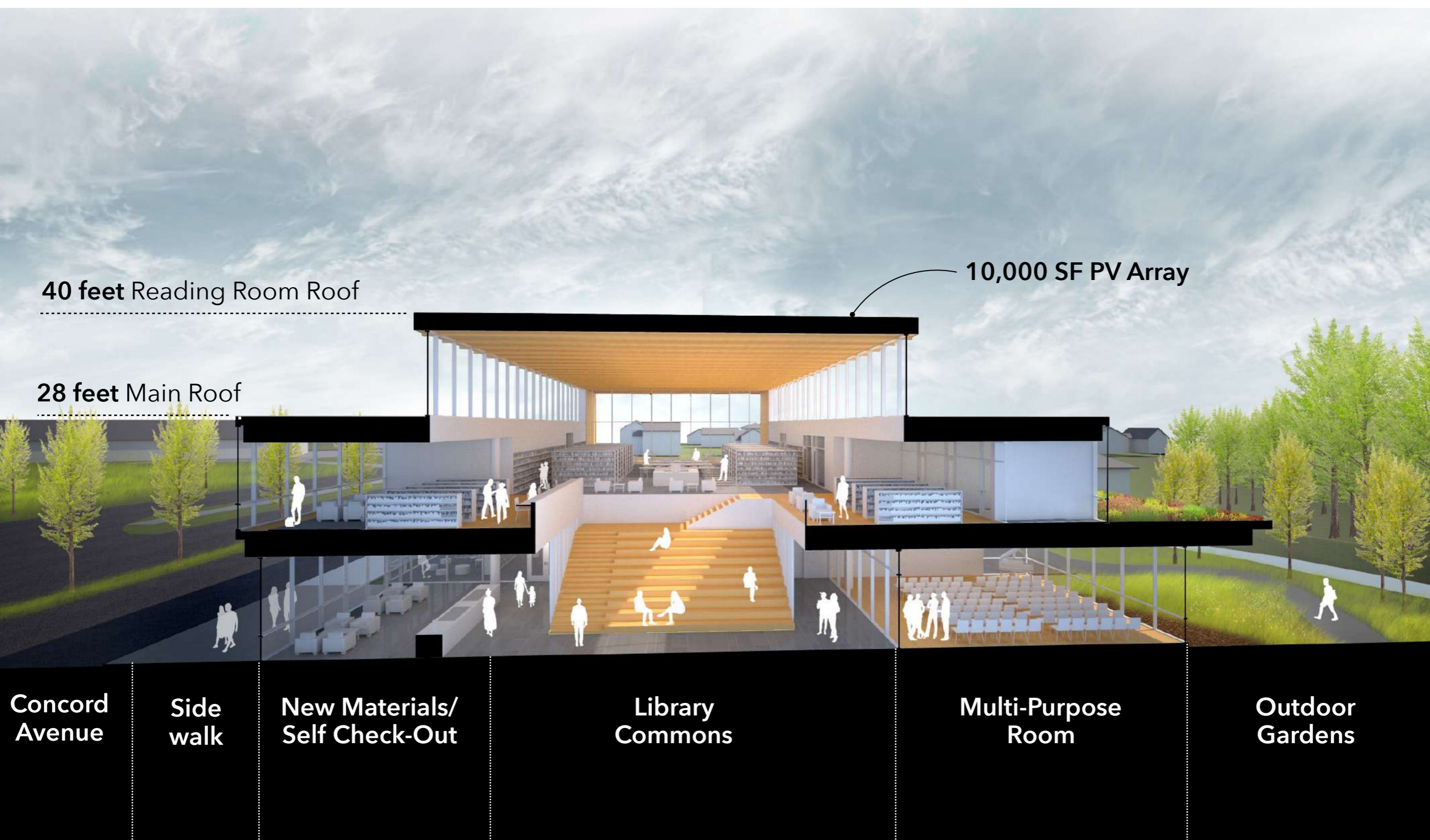
Second Floor Plan



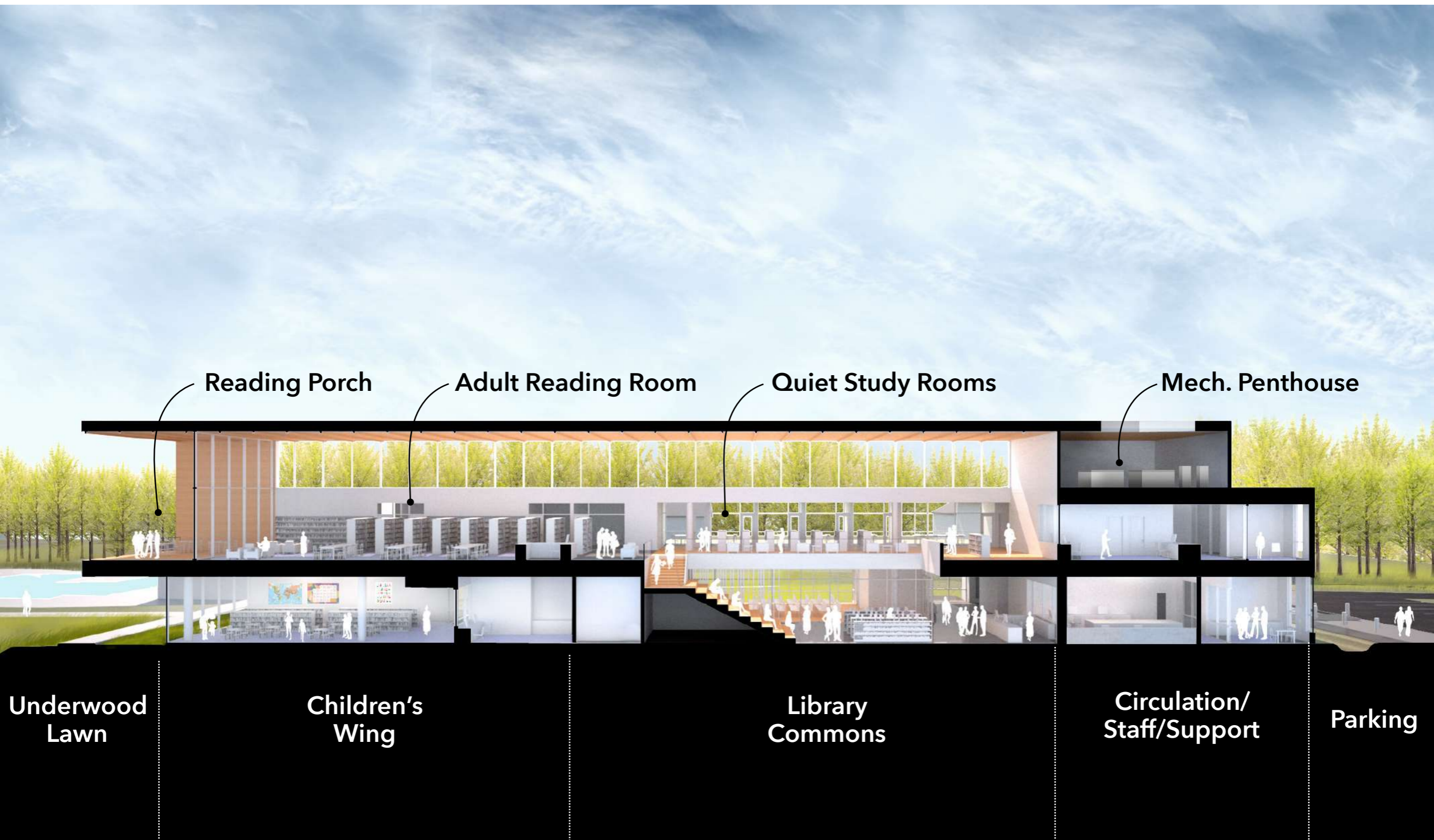








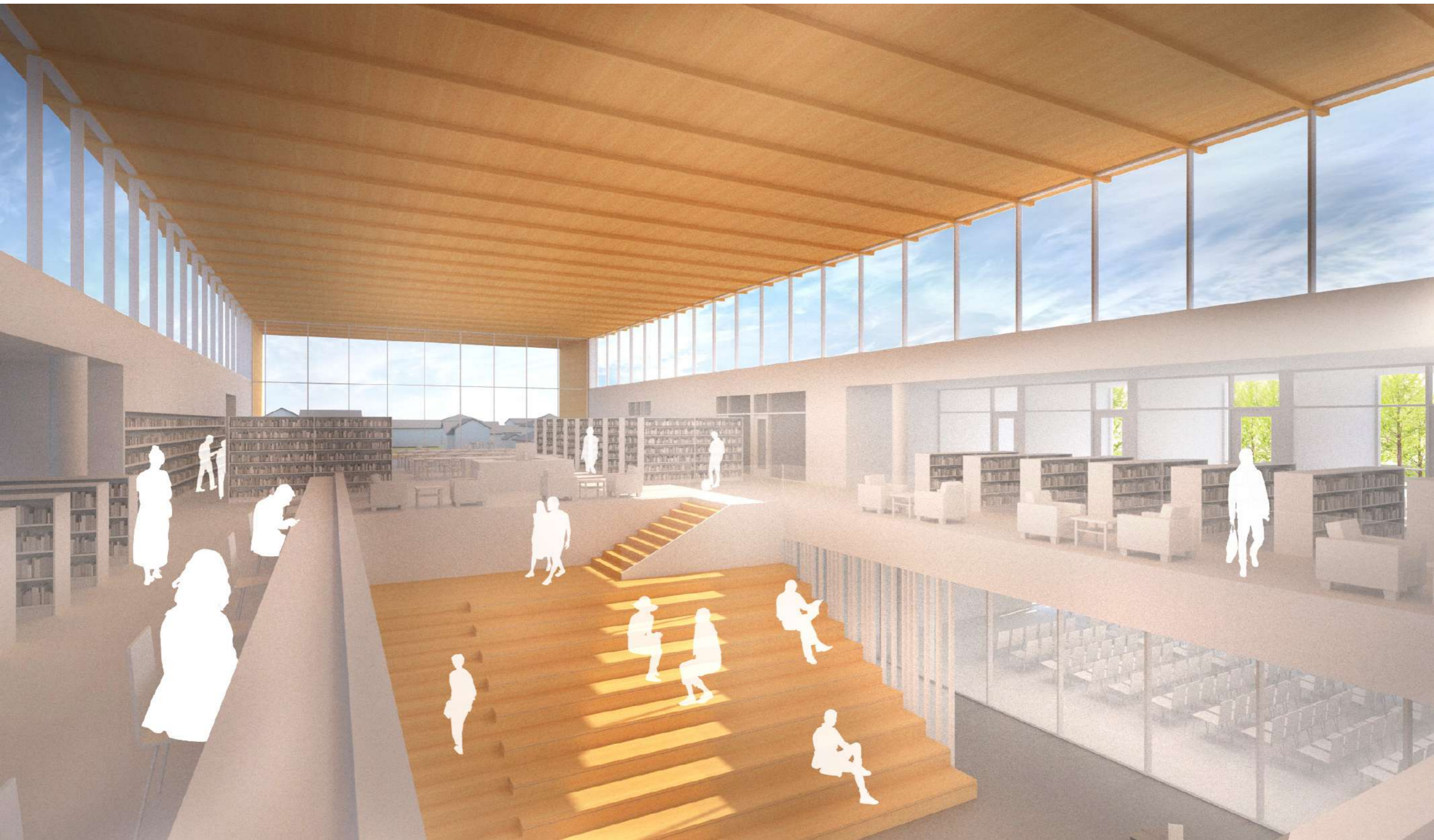
Building Section North-South



Building Section East-West



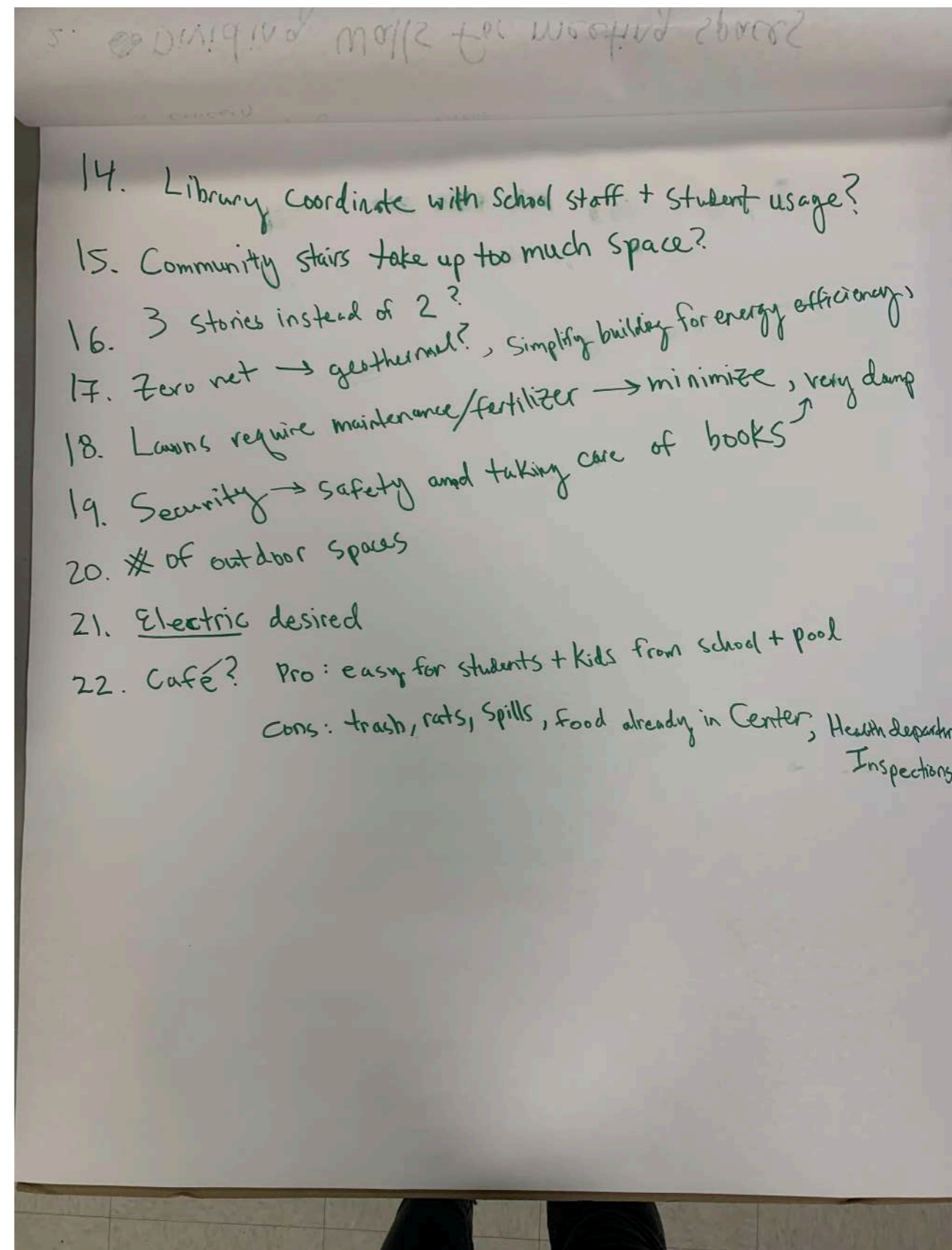
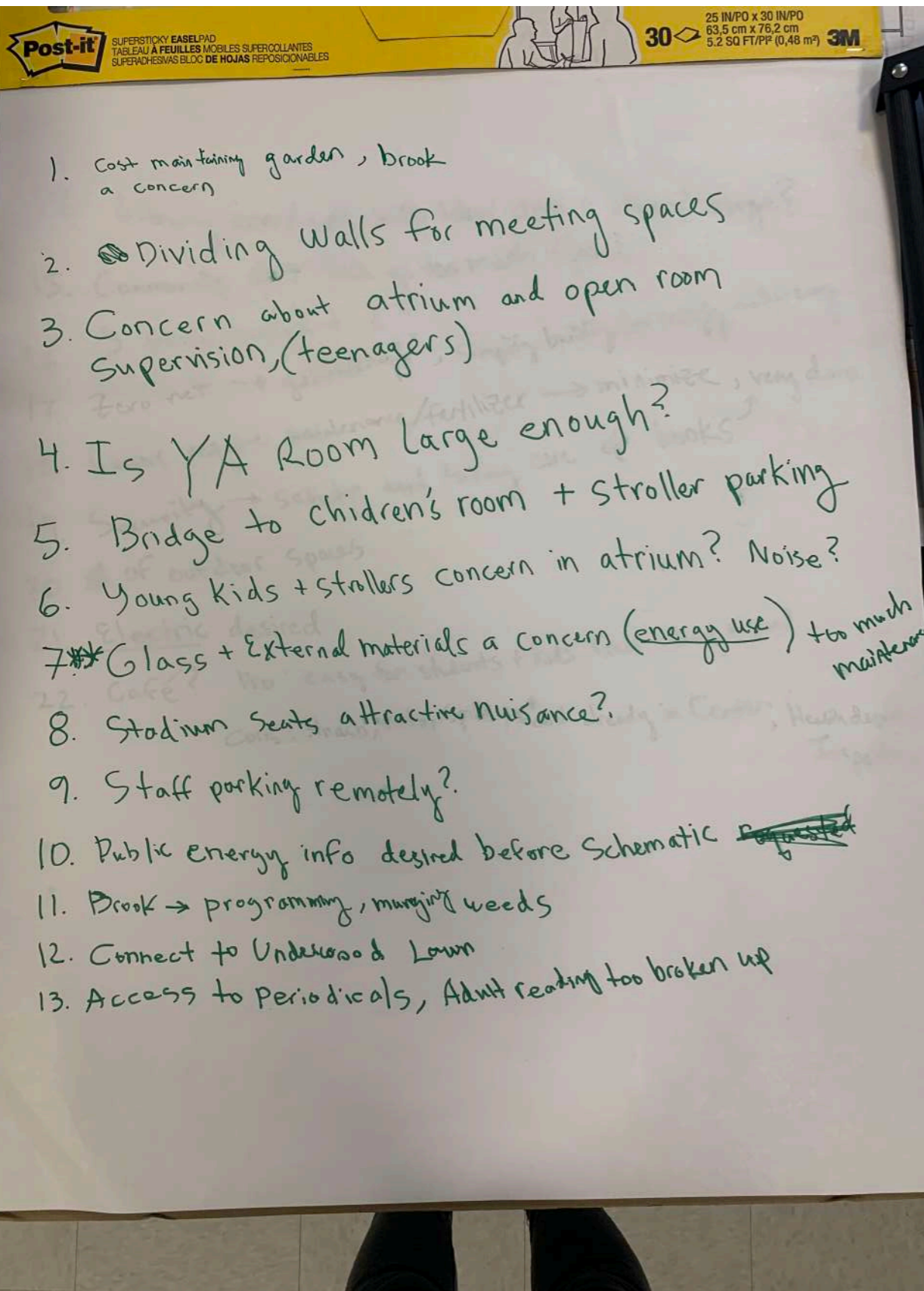
Library Commons View from Main Entrance on First Floor



Library Commons View from Second Floor Looking East



Adult Reading Room



An aerial photograph of a school campus, overlaid with a semi-transparent dark grey filter. The image shows a large, multi-story school building with a complex roofline, surrounded by extensive greenery and trees. To the left of the main building is a large, open paved area, possibly a sports field or parking lot. A multi-lane road runs diagonally across the lower half of the image, with several cars visible. To the right of the road is another large paved area, likely a parking lot, filled with many cars. The overall scene is a typical school environment.

ZNE Study Report

Pathway to Net Zero Energy

Step 1 Reduce Demand

- ✓ Improve Envelope
- ✓ Reduce lighting and plug loads
- ✓ Right-size HVAC

Step 2 Harvest Site Energy

- ✓ Daylighting Opportunities
- ✓ Passive Solar
- ✓ Harvest "waste" energy through heat recovery and other means

Step 3 Maximize Efficiency

- ✓ Efficient Equipment
- ✓ Eliminate Fossil Fuel use

Step 4 O&M

- ✓ Building Commissioning, staff training, maintenance
- ✓ Continuous Monitoring of on-going performance

Step 5 Renewable Energy

- ✓ Implement On-site Solar
- ✓ Buy RECs or implement off-site solar to get to NZE

Terminology

- DX VAV – Direct Expansion Cooling, Variable Air Volume. Centralized Cooling at air handling unit, with variable air flow depending on loads. Conventional system and MA code baseline.
- VRF – Variable Refrigerant Flow Heat Pumps: use electricity and a refrigeration cycle for heating and cooling, uses atmosphere as heat source and heat sink
- GSHP – Ground Source Heat Pump: similar to VRF, but uses ground as heat source and heat sink

Concept Alternatives for Study

| | | Envelope Options | | LPD Options | | HVAC Systems | | Renewable Energy | |
|--|-----------|---------------------------------------|-----------------------------|--|-------------------------------------|---|-----------------------------|-----------------------|-------------|
| | | New MA Code 20% Better Envelope | Super-insulated Envelope | New MA Code Improved Lighting & Controls | 40% Better Than MA Code Lighting | Conventional System DX VAV Condensing Boilers | All Electric HVAC Sytems | On-site PV on roof | Off-site PV |
| Convention System DX VAV unit w/ Condensing Boilers | Option 1A | X | | X | | X | | X | |
| | Option 1B | | X | | X | X | | X | |
| All Electric VRF Systems | Option 2A | X | | X | | | X | X | X |
| | Option 2B | | X | | X | | X | X | X |
| Ground Source Heat Pump | Option 3A | X | | X | | | X | X | X |
| | Option 3B | | X | | X | | X | X | X |

Figure 4: GHG emissions and EUI

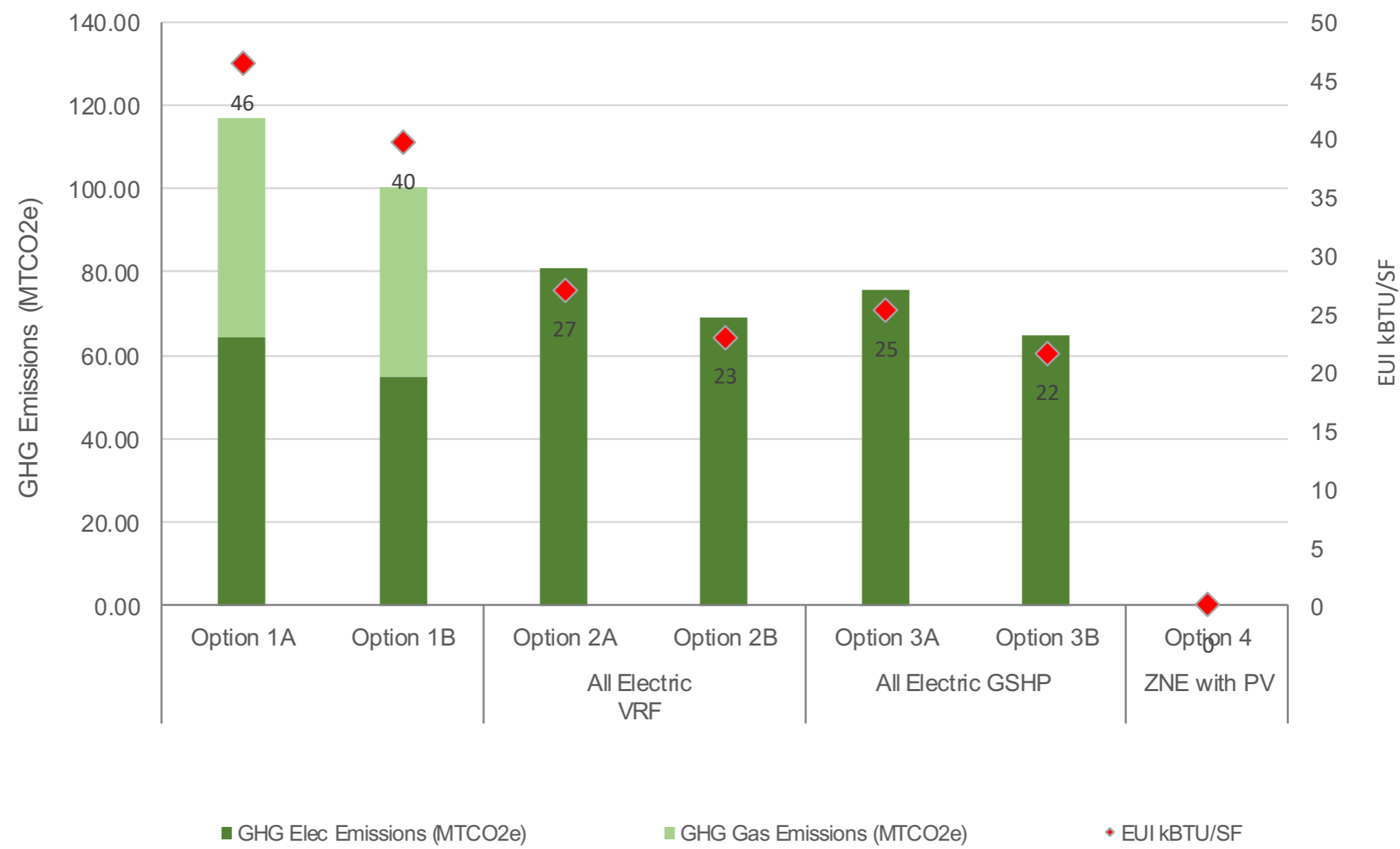


Figure 6: Potential available roof area for PV array



Estimated maximum
solar capacity on
roof = 100 kWp

Will offset between
23% and 49% of
building energy
consumption.

Off-site renewables
required to achieve
NZE

VRF vs GHSP

| Option | Incremental Construction Cost (\$) | EUI before PV (kbtu/sf/yr) | PV Needed to achieve NZE (kWp) | Additional PV Cost (\$) | Total Incremental Cost (\$) |
|-----------|------------------------------------|----------------------------|--------------------------------|-------------------------|-----------------------------|
| 2B - VRF | \$0 | 23 | 215 | \$646,000 | \$646,000 |
| 3B - GSHP | \$240,000 | 22 | 202 | \$607,000 | \$847,000 |

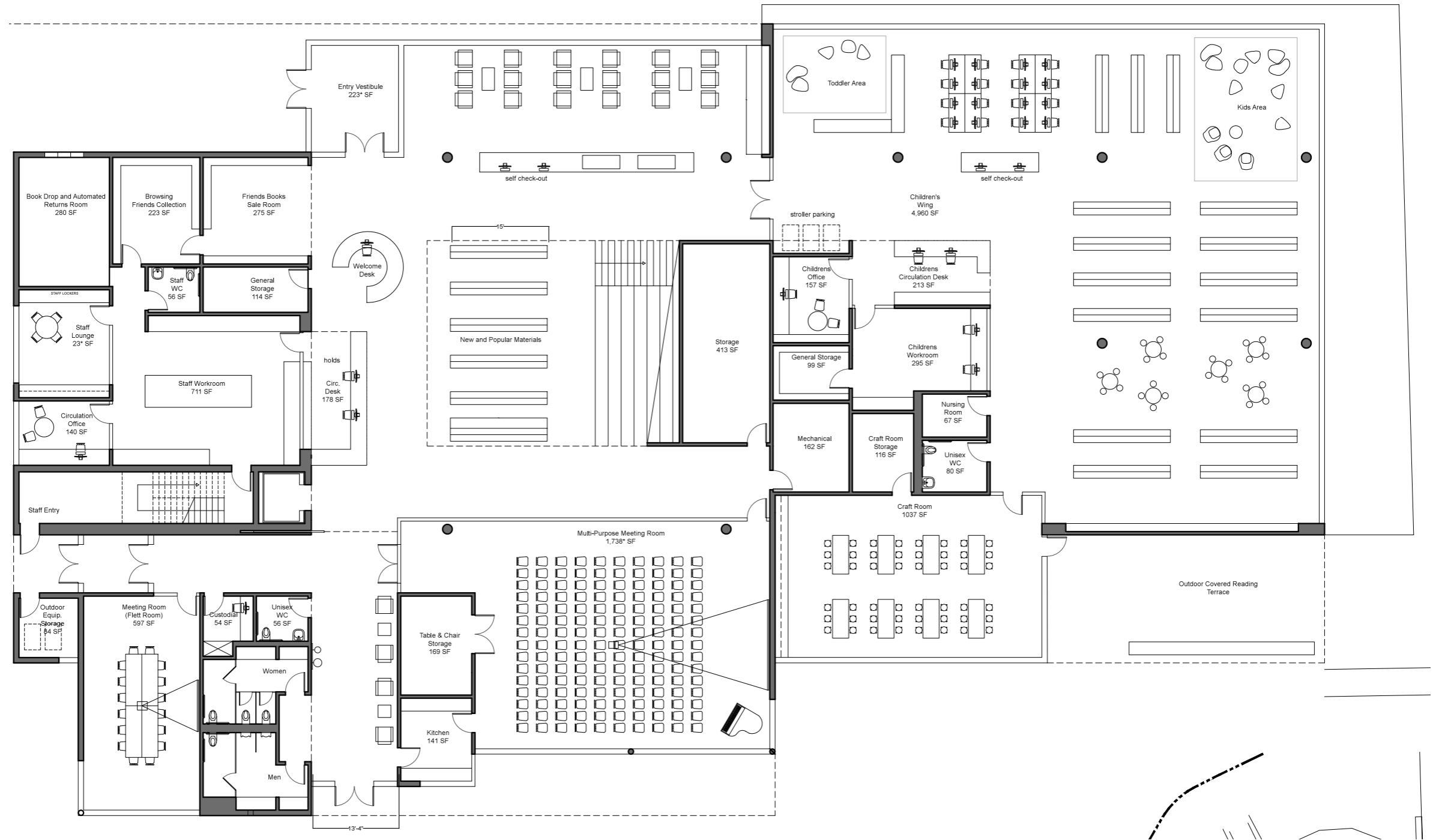
Life-Cycle Cost Comparison

(Using Total Equivalent Annual Cost Method – Not including Solar)

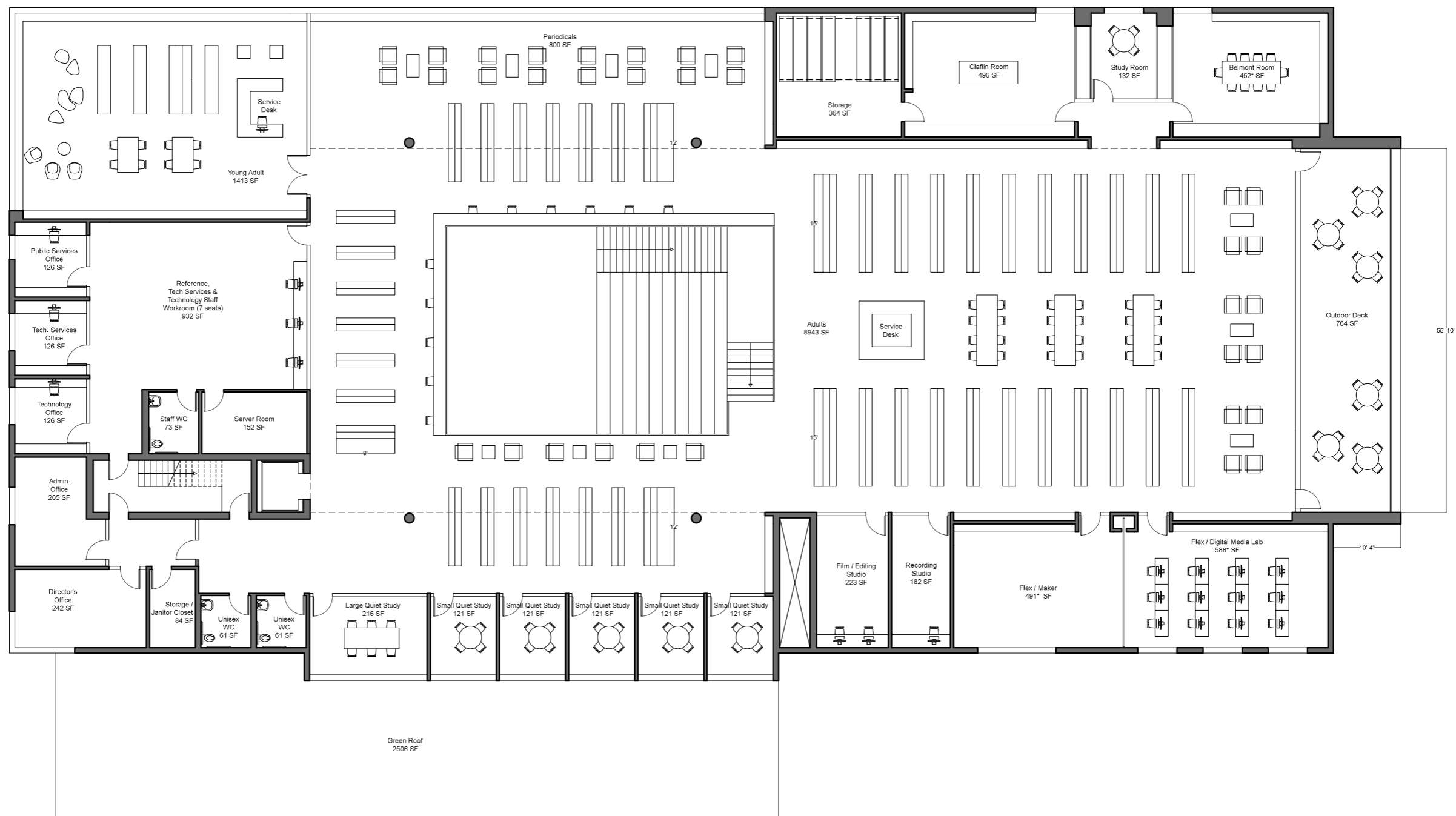
| Option | Incremental Equivalent Annual Cost | Site EUI (kbtu/sf/yr) |
|---------------|------------------------------------|-----------------------|
| 1A – Gas Heat | Base | 46 |
| 1B – Gas Heat | \$0.86 | 40 |
| 2A - VRF | \$0.01 | 27 |
| 2B - VRF | \$0.86 | 23 |
| 3A - GSHP | \$0.29 | 25 |
| 3B - GSHP | \$1.04 | 22 |

An aerial photograph of a campus or institutional site, overlaid with a semi-transparent dark grey filter. The image shows a large, multi-story building with a complex roofline in the center. To the left of the building is a wide, multi-lane road with several cars parked along the side. To the right of the building is a large parking lot filled with cars. In the background, there are more buildings and a large area of trees. The text "Design Review" is centered over the image in a large, white, sans-serif font.

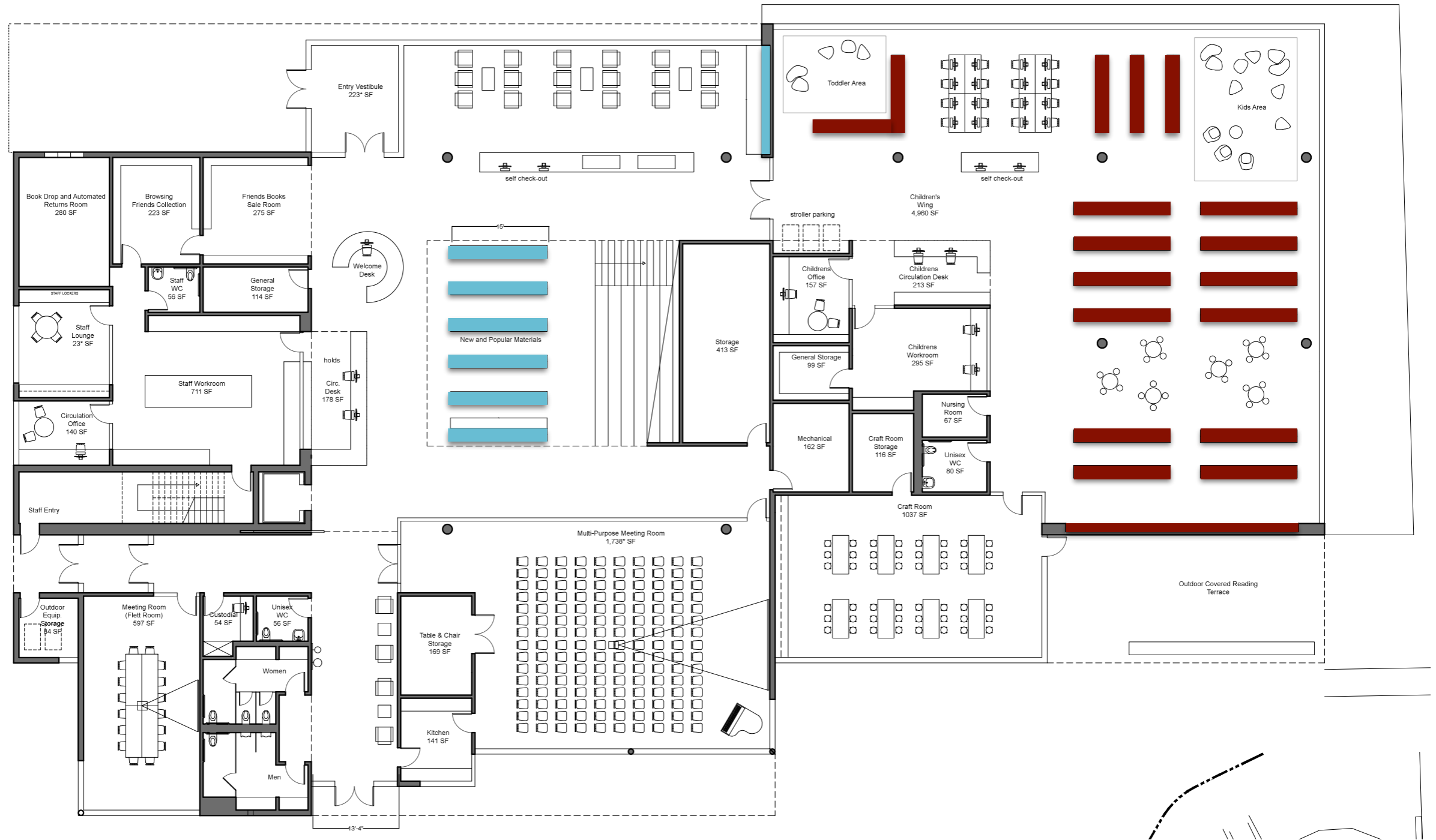
Design Review



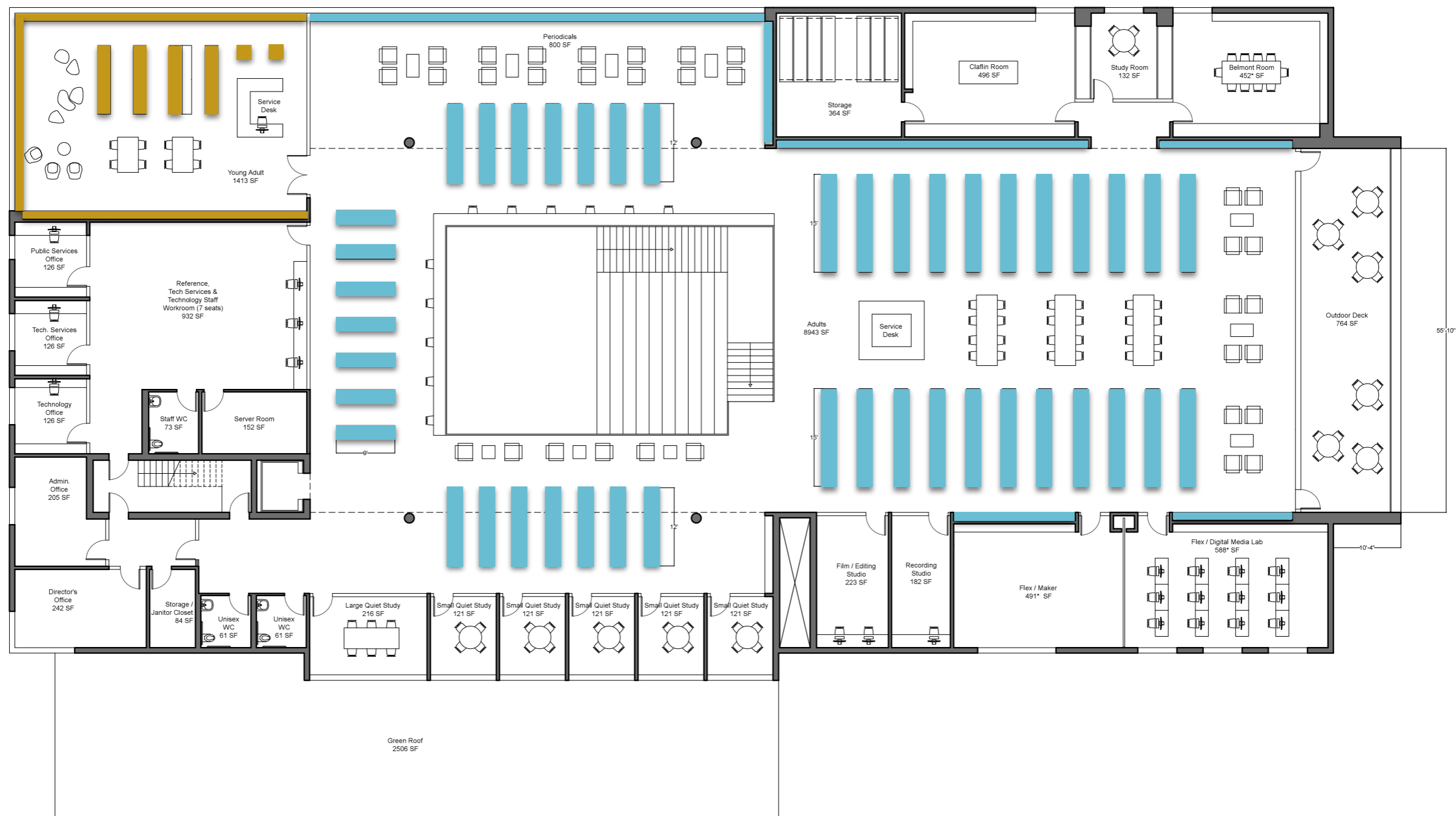
Current Design First Floor Plan



Current Design Second Floor Plan



Current Design First Floor Plan - SHELVING CALCULATIONS



Current Design Second Floor Plan - SHELVING CALCULATIONS

OEA PROPOSED DESIGN

| | SHELVING COUNT (LF) | Volumes/LF MULTIPLIER | VOLUME CAPACITY |
|-----------------------|---------------------|-----------------------|-----------------|
| ADULTS | 8,958 | 8 | 71,664 |
| | | | |
| | | | |
| TEENS | 795 | 12 | 9540 |
| | | | |
| | | | |
| CHILDREN | 2,646 | 20 | 52,920 |
| TOTAL VOLUME CAPACITY | | | 134,124 |
| DIFFERENCE | | | -1,171 |

CURRENT COLLECTION

| | VOLUME COUNT |
|--------------------|--------------|
| ADULTS | 87,753 |
| | |
| | |
| TEENS | 7,233 |
| | |
| | |
| CHILDREN | 40,309 |
| TOTAL VOLUME COUNT | |
| | 135,295 |



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