


SOUTHINGTON

PUBLIC LIBRARY

BUILDING COMMITTEE UPDATE

MEETING – 9/7/22

LIBRARY PLANNING
AND DESIGN SERVICES



Love your
Library!

DRA

Discussion Agenda

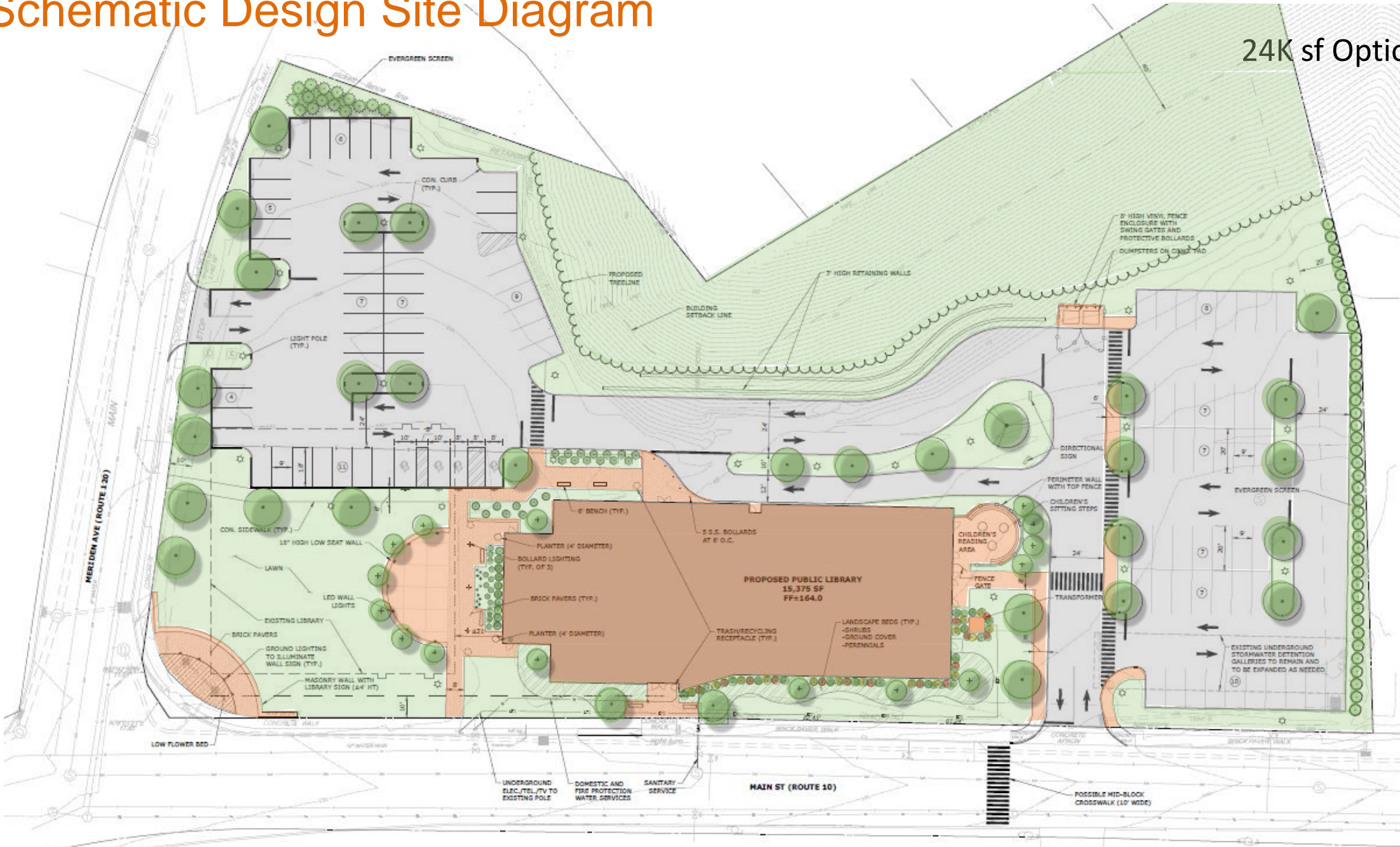
- I. SCHEMATIC PLAN / ELEVATIONAL DEVELOPMENT
- II. SCHEMATIC DESIGN SET – OVERVIEW
- III. VAV vs VRF HEATING VENTILATION + AC
- IV. INITIAL DEDUCT ALTERNATE LISTING

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Schematic Design Site Diagram

24K sf Option **B**



Schematic Design Plan Diagram

24K sf Option **B**

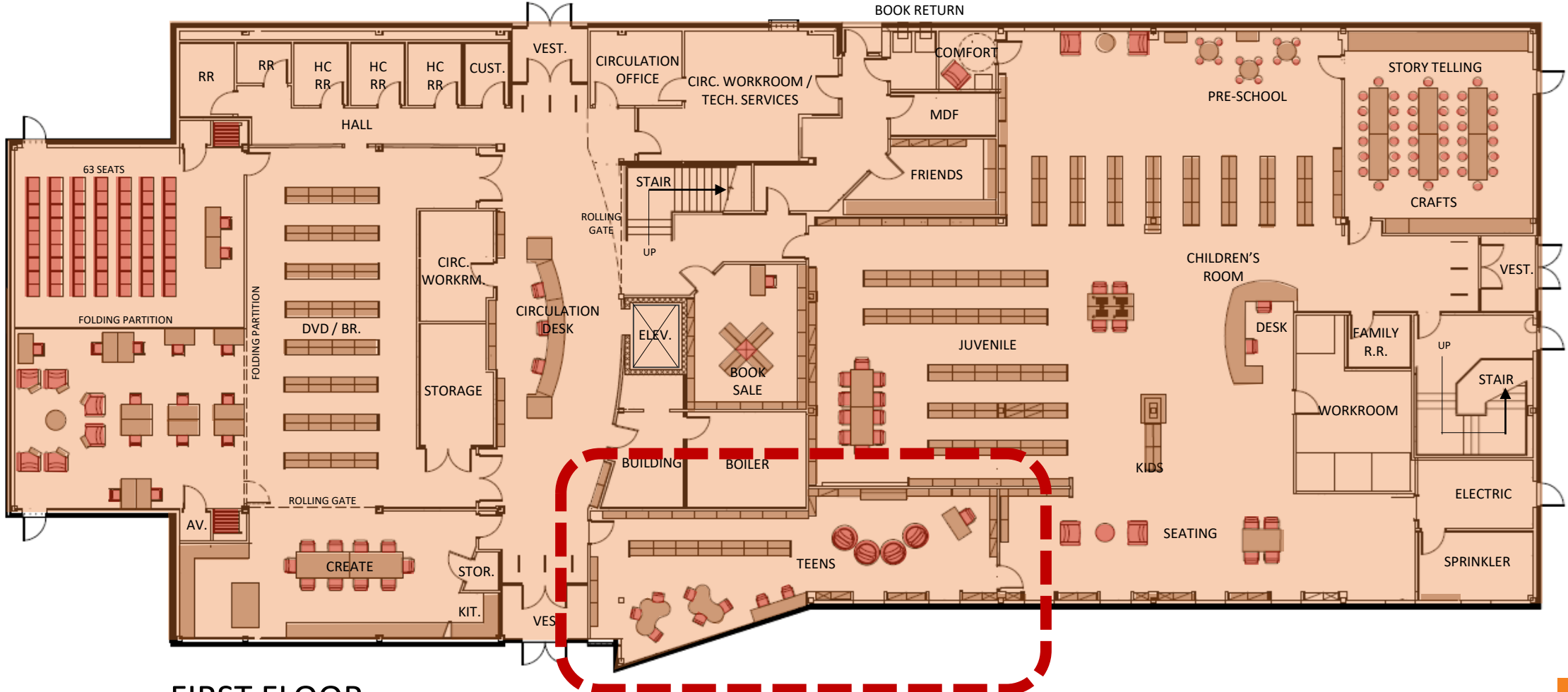


FIRST FLOOR 8/31/22



Schematic Design Plan Diagram

24K sf Option **B**

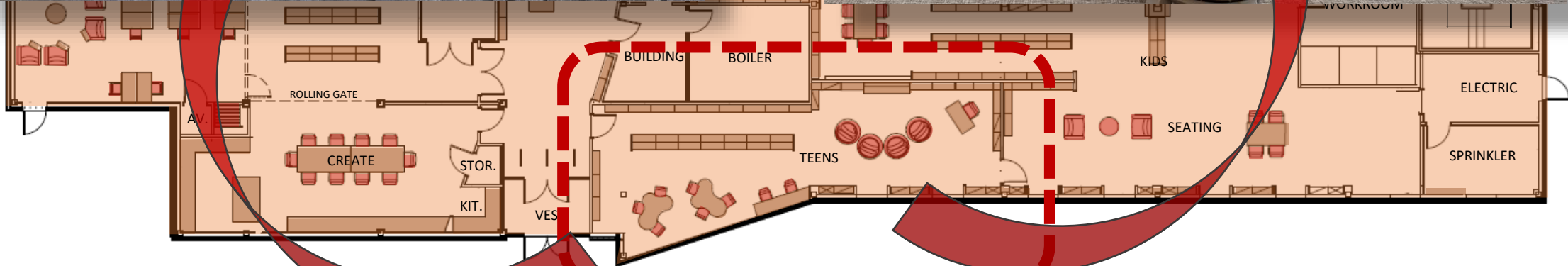
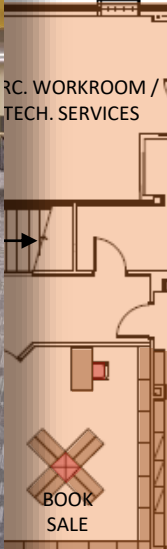


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Schematic Design Plan Diagram

B



FIRST FLOOR 8/31/22

DRA

Schematic Design Plan Diagram

24K sf Option **B**

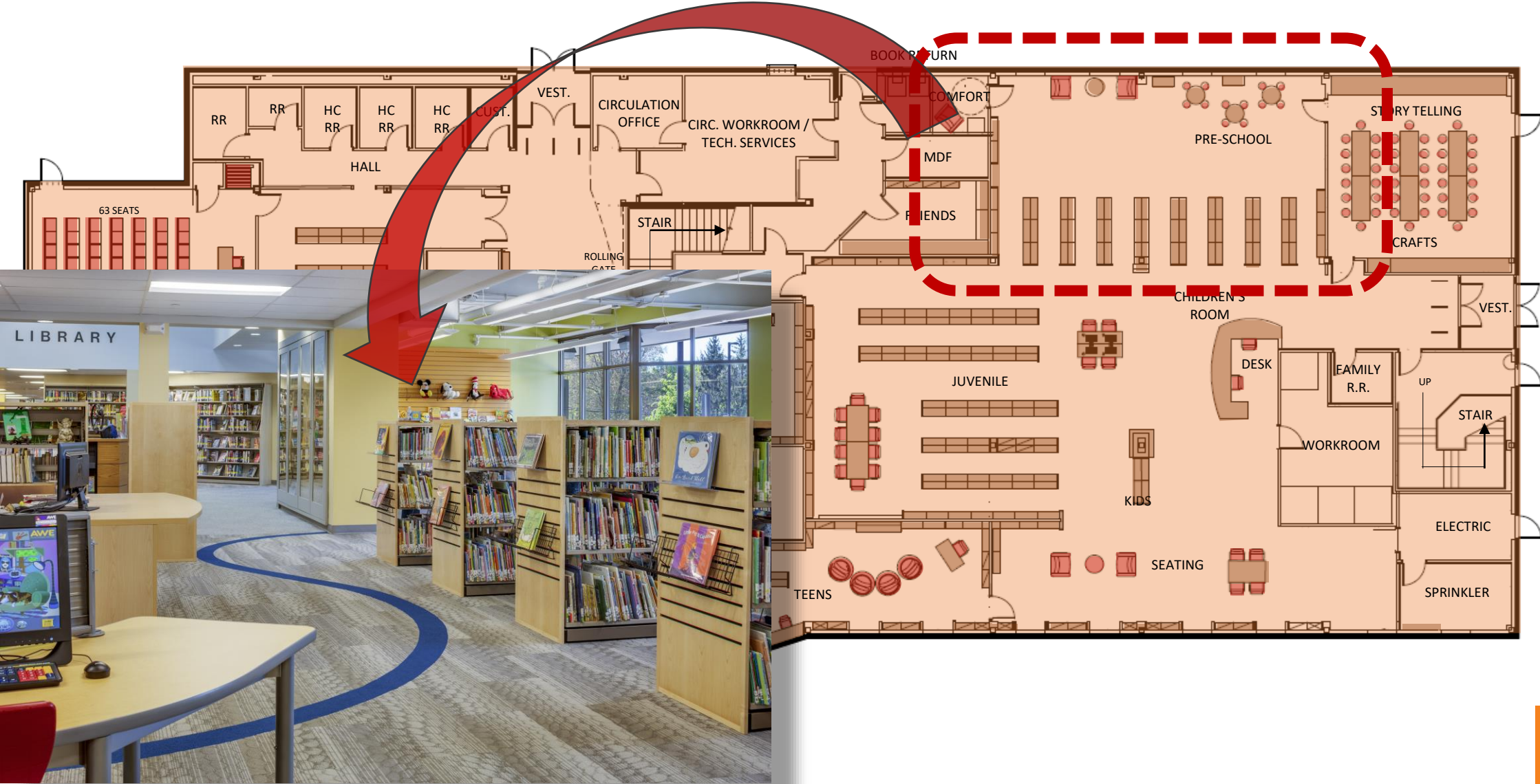


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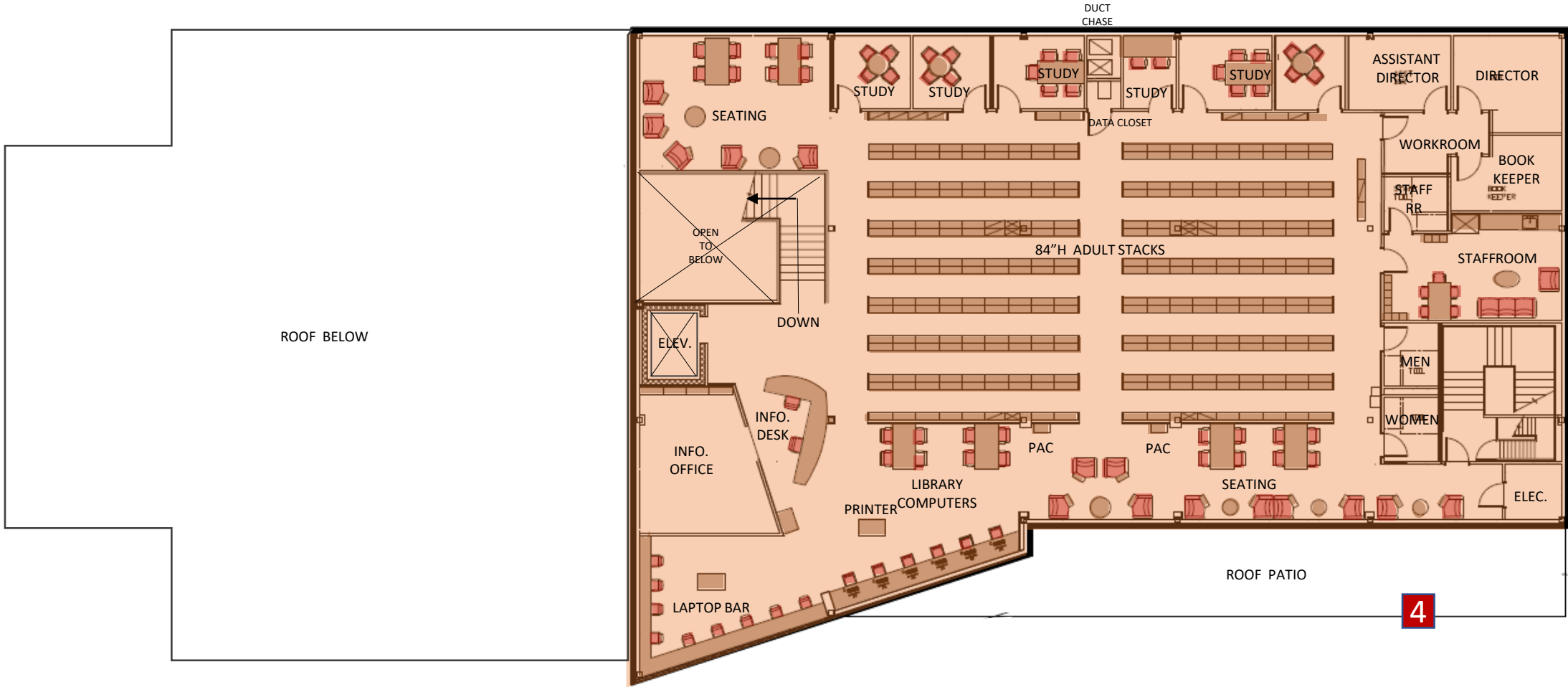
Schematic Design Plan Diagram

24K sf Option **B**



Schematic Design Plan Diagram

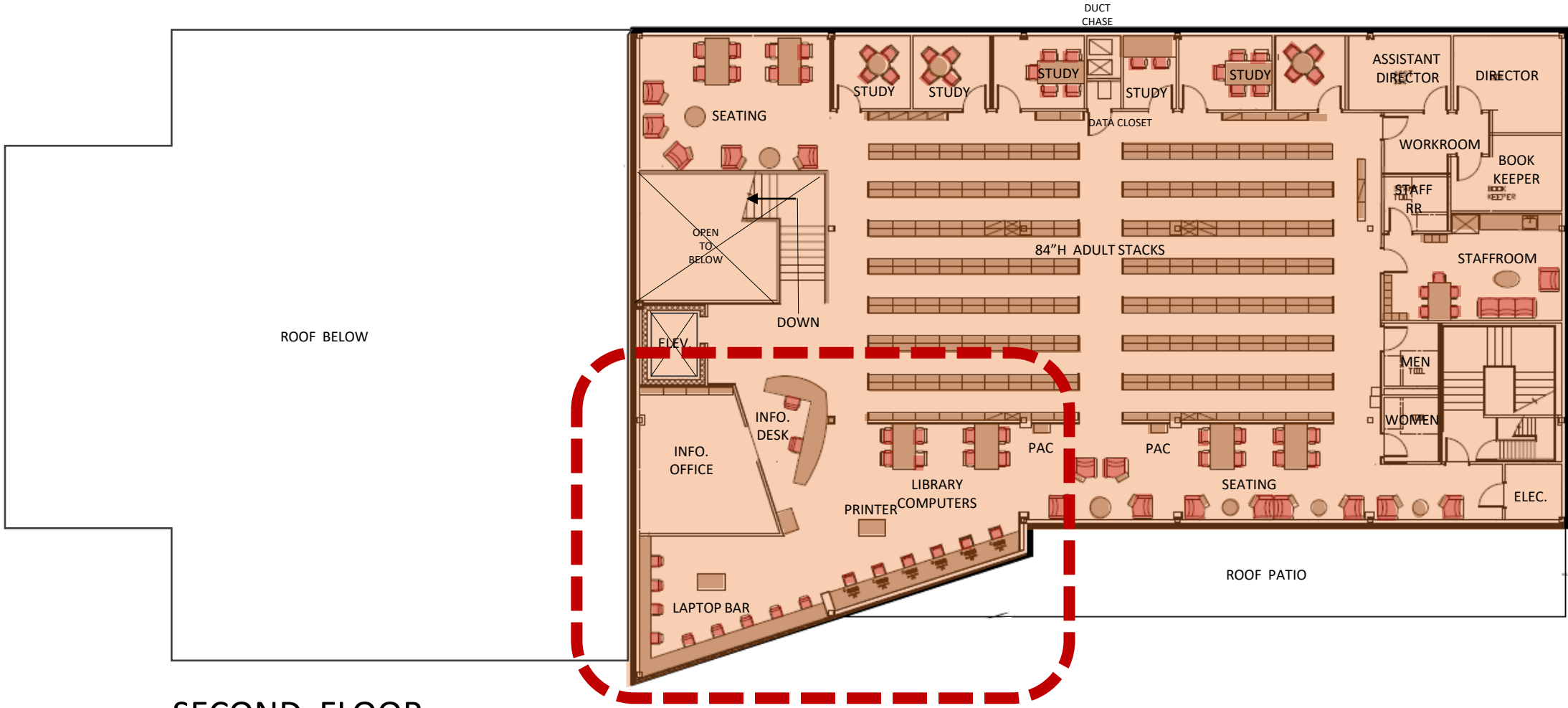
24K sf Option **B**



SECOND FLOOR

Schematic Design Plan Diagram

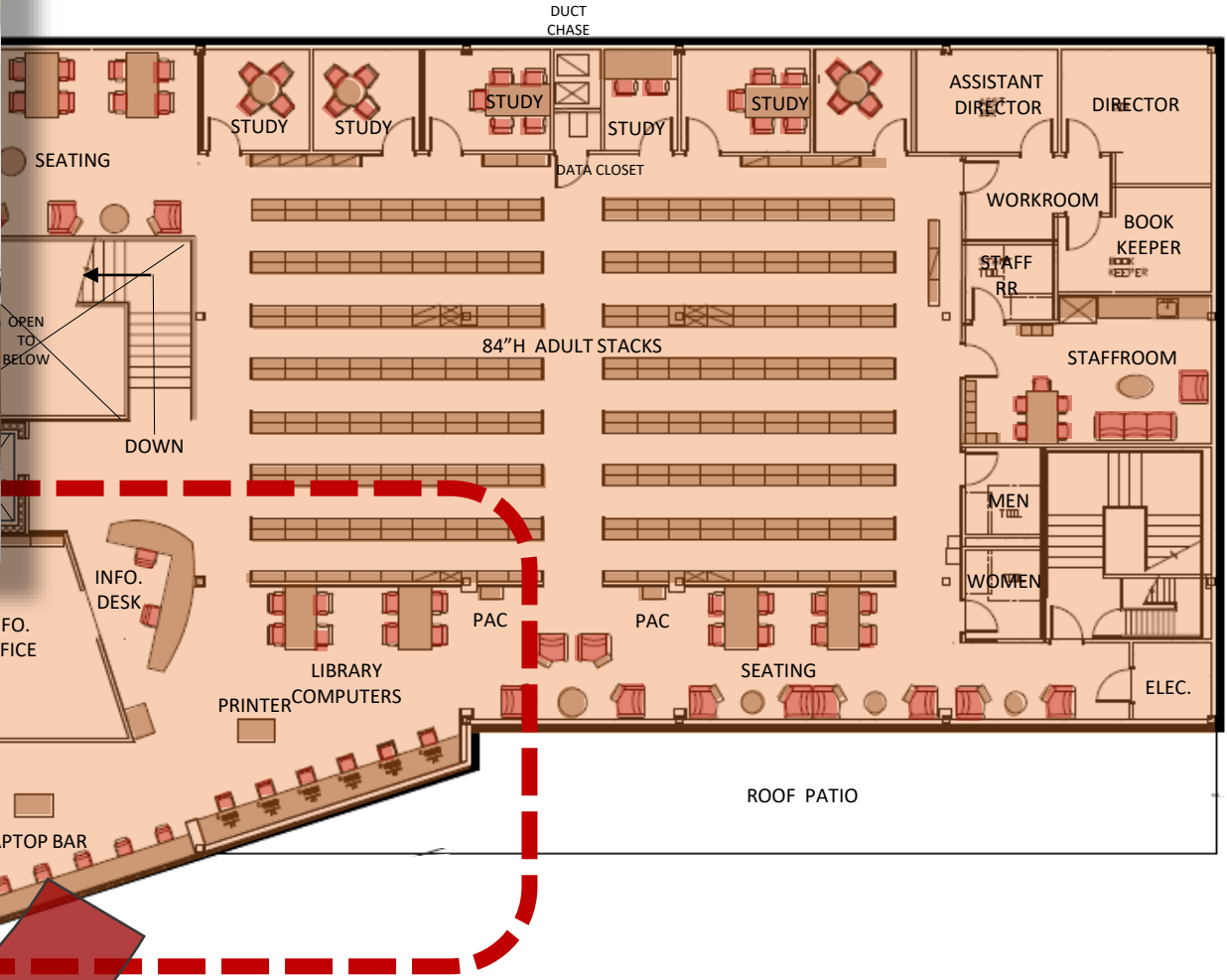
24K sf Option **B**



SECOND FLOOR

Schematic Design Plan Diagram

24K sf Option **B**

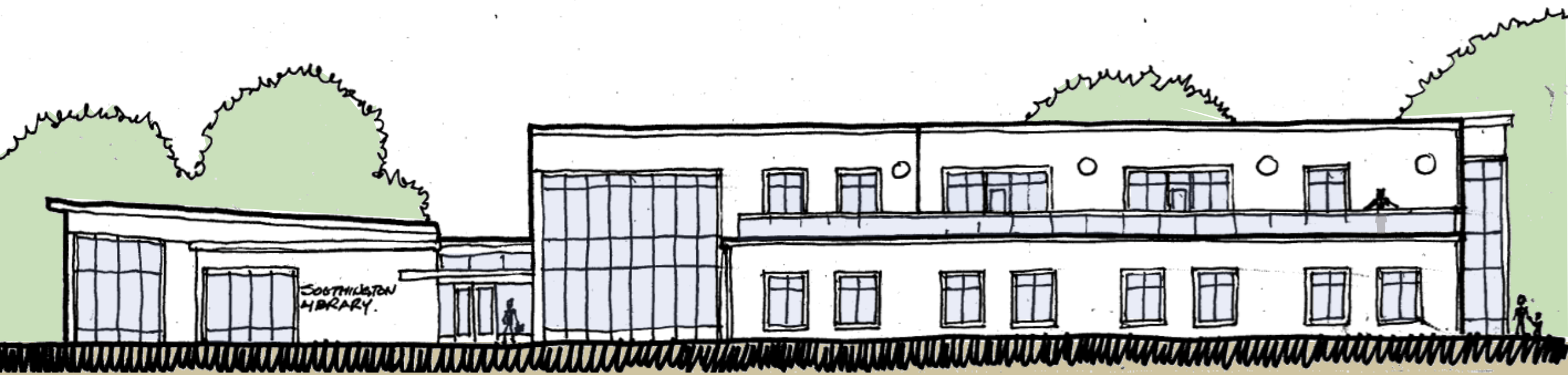


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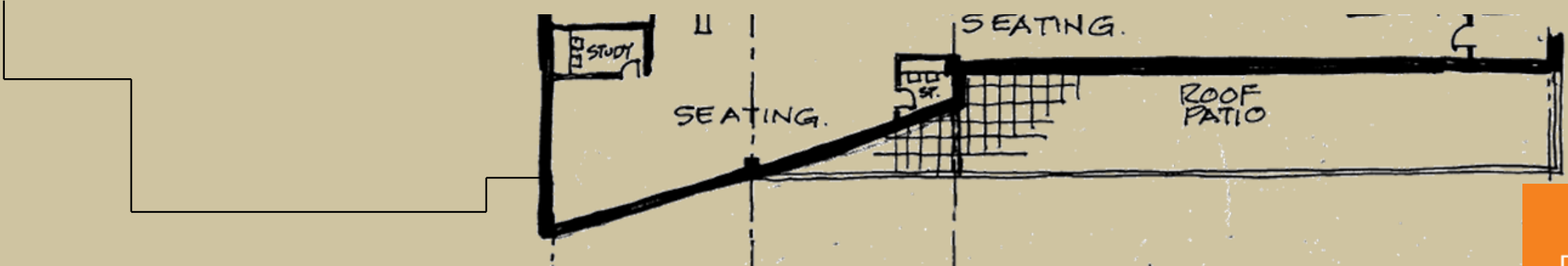


Schematic Design Elevation Study

24K sf Option **A**



ELEVATIONAL STUDY

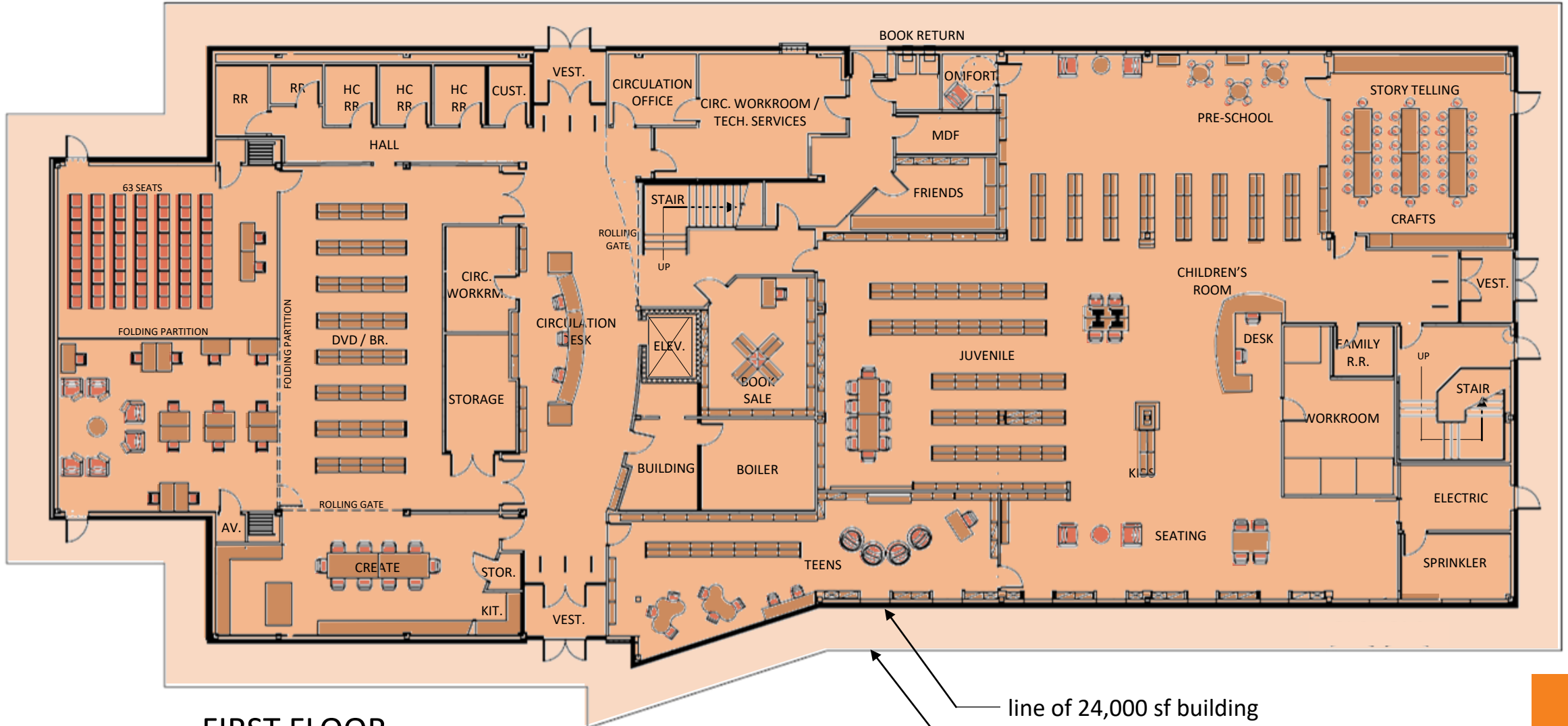


PARTIAL PLAN

DRA

Plan Diagram – 24,000sf vs. 29,900sf

24K sf Option **B**



FIRST FLOOR 8/31/22

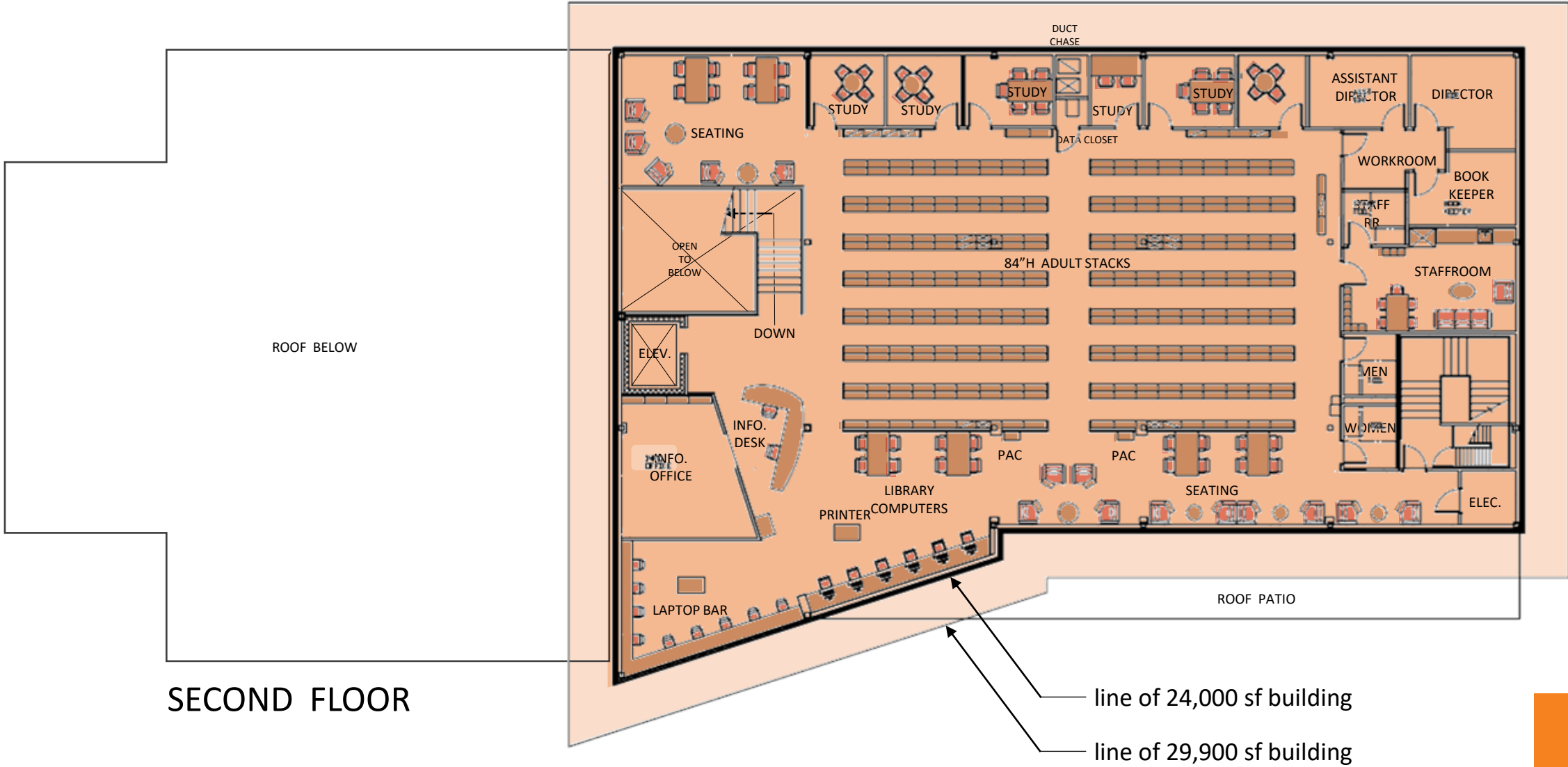
line of 24,000 sf building

line of 29,900 sf building



Plan Diagram – 24,000sf vs. 29,900sf

24K sf Option **B**



SECOND FLOOR

line of 24,000 sf building

line of 29,900 sf building



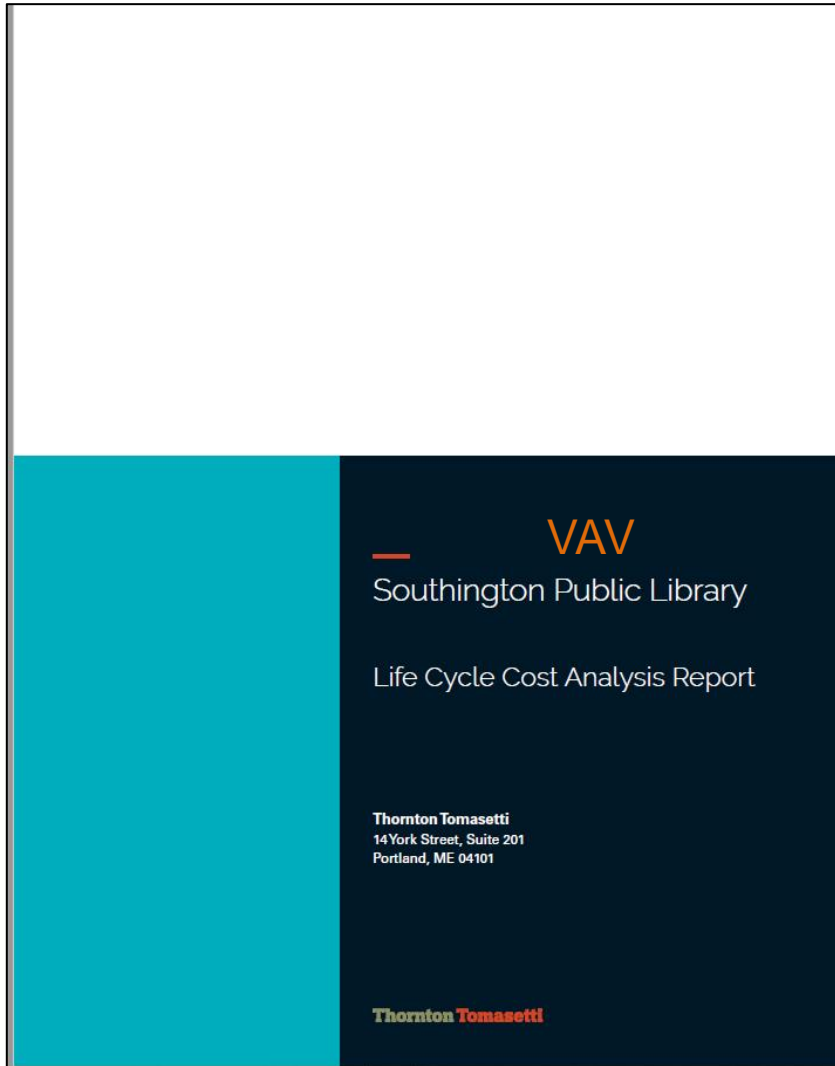
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MEP Narrative / Comparative Study



LIFE CYCLE COST ANALYSIS

Thornton Tomasetti has completed a Life-Cycle Cost Analysis (LCCA) study for the two HVAC design options of the new Southington Public Library Project. The project is a new construction located at 255 Main St, Southington, CT. The proposed building is approximately 23,000 SF with two floors. The LCCA study was based on the conceptual design information received in August 2022.

The goal of this analysis is to better understand the financial implications of the two design options as summarized below:

- Option 1: Variable refrigerant flow system with a dedicated outside air system (VRF + DOAS) and fin tube radiators and radiant panels
- Option 2: Variable air volume system (VAV)

Based on the results of the analysis, the cumulative life cycle cost of the VAV system is \$300,000 less than the cumulative life cycle cost of the VRF system over the 20 year analysis period.

Methodology

Two whole building energy models were developed in eQuest v3.65, incorporating the building's as-designed geometry, window-to-wall ratio, zoning, and the two MEP system types. Envelope thermal properties and lighting power density are based on the minimum performance values given in ASHRAE 90.1-2019.

Building geometry, zoning, envelope thermal properties, lighting power densities, plug-loads were kept the same between the two cases.

Simulations were performed to determine the performance of the two cases' annual energy consumption and annual utility cost.

See detailed energy model inputs in the Appendix A.

The annual HVAC energy costs, along with first costs, and maintenance costs were input in the Building Life Cycle Cost program (BLCC 5) for the LCCA calculation. The cumulative costs of each case were compared for 20 years.

Analysis Results

It can be seen from the energy analysis summary in Table 1. that the VRF+DOAS system uses comparable energy as the VAV system. This is because the VRF heating is set to heat only when the outside air is above 40F. When the outside air is below 40F, heating is provided by the perimeter heating from the boiler. The two HVAC systems have similar cost performance because in both options boilers serve the loads predominantly during the cold season.

Table 1. Energy Analysis Summary

	Initial Investment	HVAC EUI (kBtu/st/yr)	Annual HVAC Energy Cost	Annual Maintenance Cost
Option 1: VRF + DOAS	\$1,632,000	26.4	\$20,462	\$6,000
Option 2: VAV system	\$1,392,000	28.9	\$20,235	\$3,600

Note:

The annual energy consumption and energy cost are only applicable for comparative analyses. They are not predictions of actual energy costs of the proposed design after construction. Actual cost will differ from these calculations due to variations such as occupancy, building operation and maintenance, weather, changes in energy rates, etc.

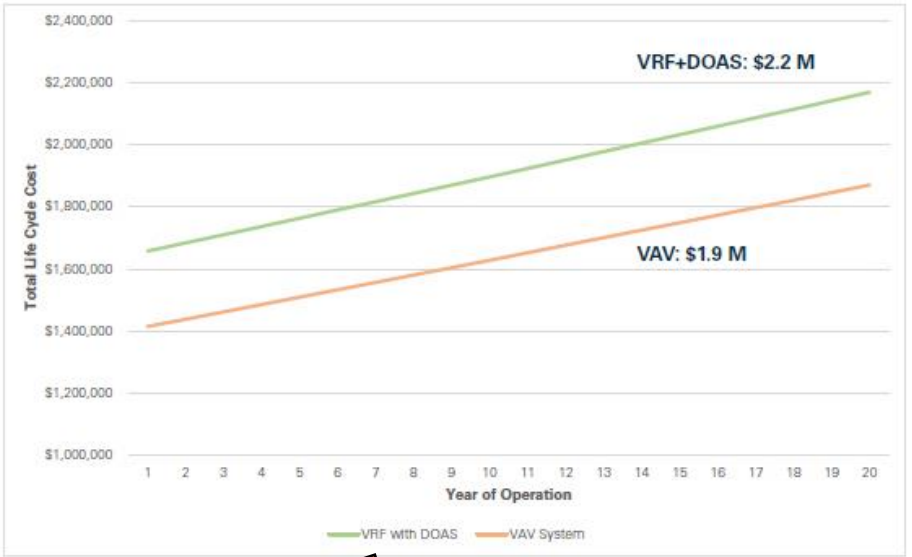
Energy Analysis Summary VAV vs VRF

Initial Cost	✓	
Annual HVAC Energy Cost	✓	
Annual Maintenance Cost	✓	



MEP Narrative / Comparative Study

Cumulative Cash Flow: Capital, Operational, Maintenance & Replacement Costs



Cycle Cost program (BLCC 5) was used to perform the life cycle cost analysis. The key metric study was the total life cycle cost of each option.

Analysis was performed with the assumptions outlined below:

Electricity rate - \$0.18 / kWh*

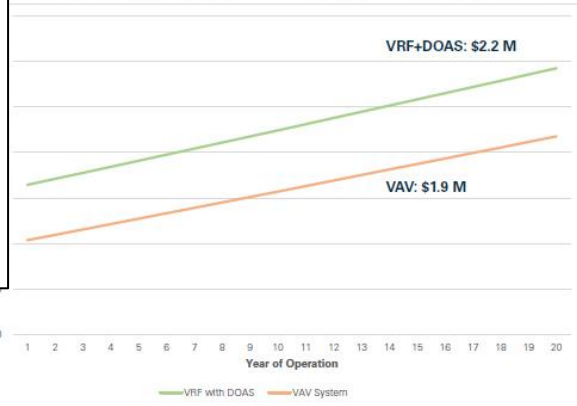
Gas rate - \$1.63 / therm*

Discount and inflation rates (3% discount rate)

Analysis period 20 years beginning 2023

Useful life cycle of both systems - 20 years

Cash Flow: Capital, Operational, Maintenance & Replacement Costs



Given the time frame of analysis (20 years), the VAV system costs approximately \$300,000 less than the VRF+DOAS option. The VAV system also has lower annual energy costs and maintenance costs. The LCCA study assumed the same 20 anticipated useful life for both of the options.

Note that this analysis does not account for the value of carbon emissions associated with both systems.

*provided by CES

Thornton Tomasetti
August 26, 2022

Southington Public Library | LIFE CYCLE COST ANALYSIS

Appendix A - Energy Model Inputs

General Information		
Weather File	Climate Zone: 5A_TMY2\HARTFOCT.bin	
Utility Rates	Electricity - \$0.18/kWh	
Source: Existing Utility Bill	Natural Gas - \$1.63/Therm	
Internal Gain		
Plug-Loads	0.8 W/sf	
Lighting	0.7 W/sf	
Ventilation	10,000 cfm outside air	
Envelope		
WWR	25%	
Roof	U-0.032, R-30	
Wall	U-0.055, R-13 + R-10 c.i.	
Slab on grade	F-0.520, R-15 for 24 in	
Glazing Assembly	U-0.36, SHGC-0.38, VT-0.42	
HVAC Water Loop		
Hot Water Loop	Condensing boiler	
Boiler Type	92% Et	
Boiler Efficiency	160F / 40F deltaT	
HW Loop Temperature		
Aiside HVAC		
	Option 1 VRF + DOAS	Option 2 VAV
Cooling Source	VRF cooling DOAS: Dx cooling	DX cooling
Cooling Efficiency	VRF: 3.90 COP DOAS: 3.67 COP	3.67 COP
Heating Source	VRF heating (>40F OA) Perimeter HW heating (<40F OA) DOAS: Hot water	Hot Water
Heating Efficiency	VRF heating: 4.47 COP Perimeter HW heating: 80% Et DOAS: 92% Et	92% Et
Fan Control	Variable Speed	Variable Speed
Fan Power	VRF: 0.1 W/cfm DOAS: 0.88 W/cfm	1.1 W/cfm
Economizer	N/A	
Energy Recovery	Total energy wheel: Sensible 76% eff. Latent 74% eff.	Total energy wheel: Sensible 76% eff. Latent 74% eff.

Thornton Tomasetti
August 26, 2022

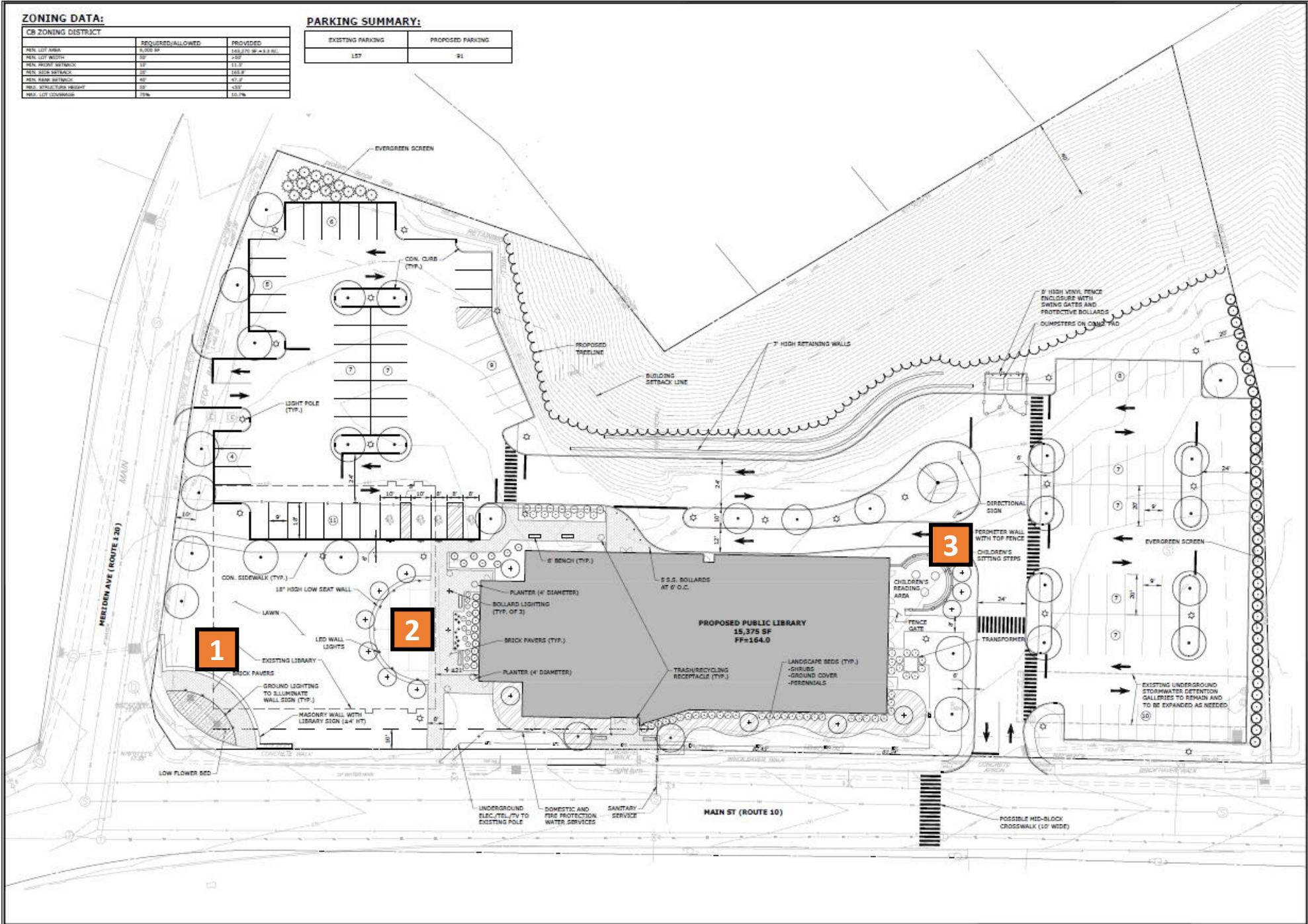
Southington Public Library | LIFE CYCLE COST ANALYSIS

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Deduct Bid Alternates

- 1** Deduct corner pavers and site signage wall
- 2** Deduct community pavilion plaza hardscape
- 3** Deduct children's reading plaza, seat wall, and fencing



ZONING DATA:

CB ZONING DISTRICT	REQUIRED/ALLOWED	PROVIDED
MIN. LOT AREA	6,000 SF	149,200 SF ± 3.8 AC.
MIN. LOT WIDTH	30'	75'
MIN. FRONT SETBACK	10'	11.5'
MIN. SIDE SETBACK	10'	10.5'
MIN. REAR SETBACK	10'	10.7'
MAX. STRUCTURE HEIGHT	35'	23'
MAX. LOT COVERAGE	10%	10.7%

PARKING SUMMARY:

EXISTING PARKING	PROPOSED PARKING
157	91

SLR
INCORPORATED
100 MAIN STREET, SUITE 200, SOUTHINGTON, CT 06488

DATE	BY

DESCRIPTION

SCHEMATIC DESIGN - SITE PLAN
PROPOSED PUBLIC LIBRARY
TOWN OF SOUTHINGTON
 250 MAIN STREET
 SOUTHINGTON, CONNECTICUT

DWD	SMM	TDR

SCALE: 1"=20'
 AUGUST 31, 2022
 13057.00110
 1 OF 1

SP

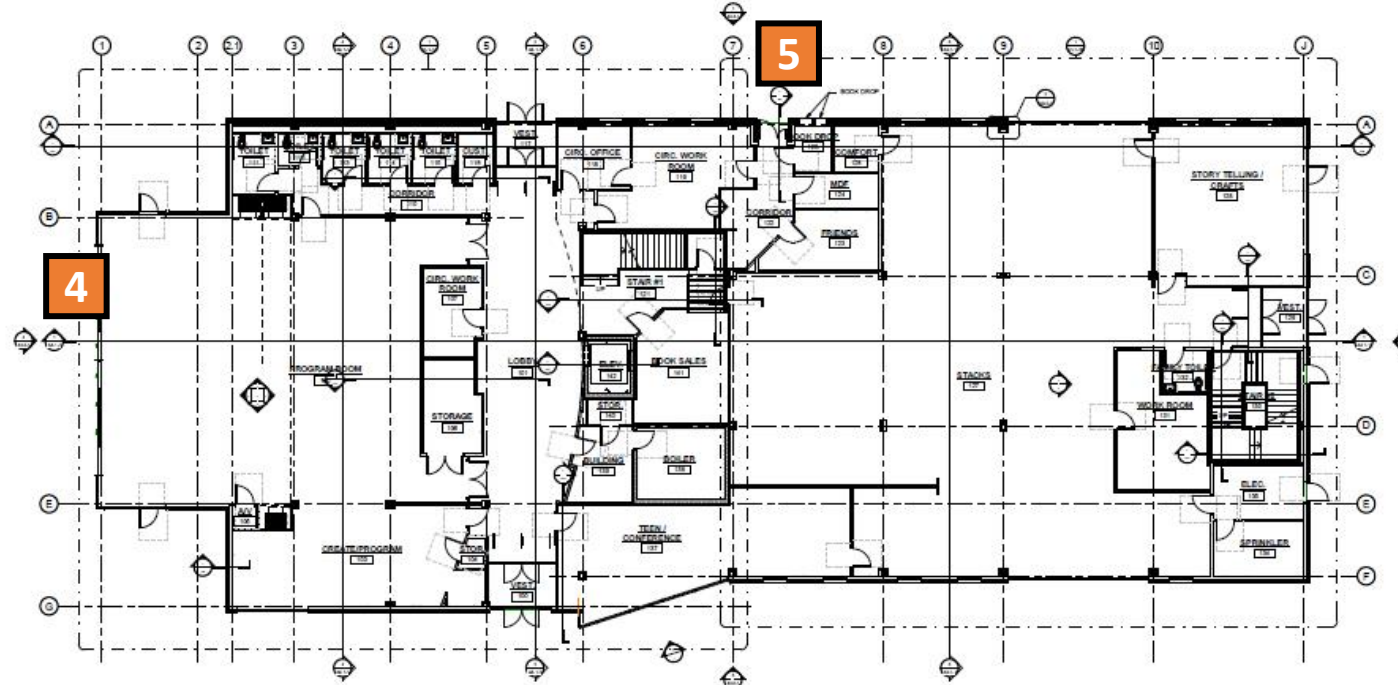
Deduct Bid Alternates

4

Deduct sliding glass wall
at north face of
community pavilion

5

Deduct drive-up
transaction window



FIRST FLOOR

DRA

Drumway House Architects, Inc.
225 Colwell Road
South Plainfield, CT 06489
Tel: 860.380.8800

SOUTHINGTON
LIBRARY

255 MAIN STREET
SOUTHINGTON, CT
06489

15/NOVEMBER/2021 09:44:00 AM PROJECT: SOUTHINGTON LIBRARY

SCHEMATIC
DESIGN

8/31/2022



KEY PLAN



OVERALL FIRST
FLOOR PLAN

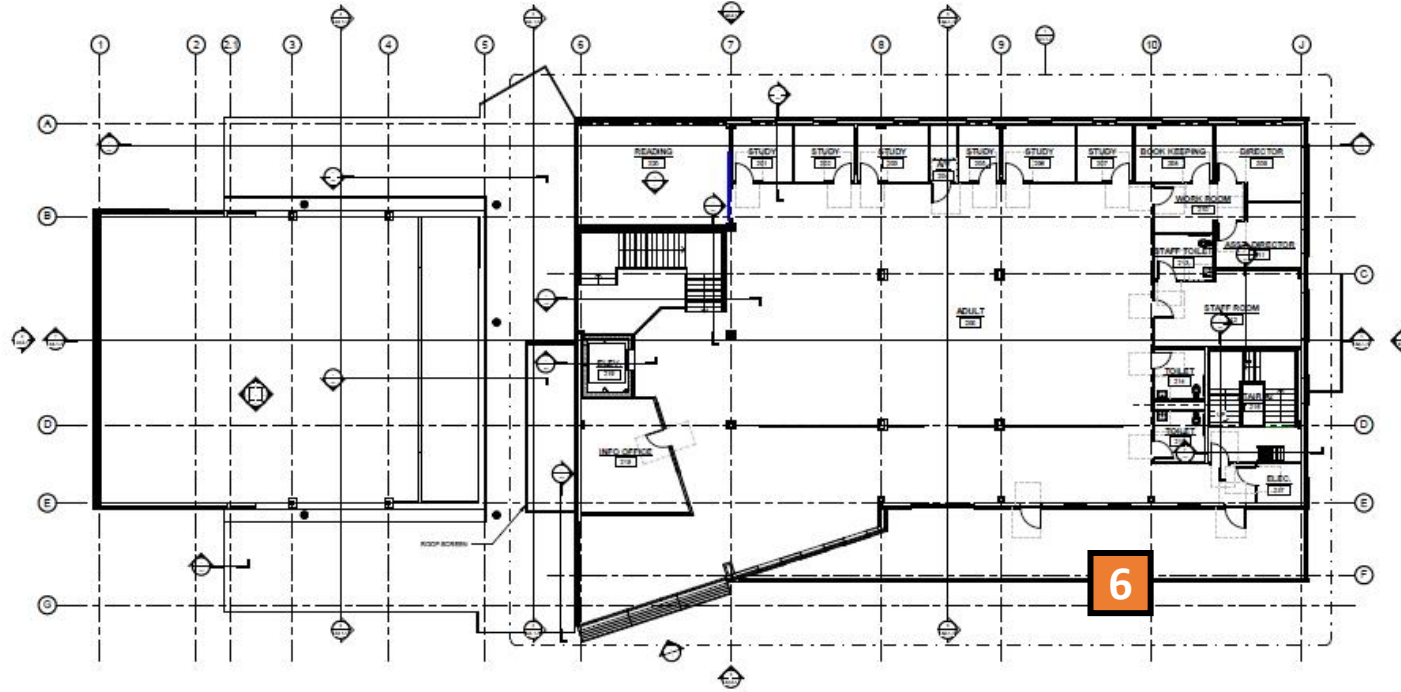
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Date: 03/10/22

A1-0-1

Deduct Bid Alternates

6

Deduct roof paver
pedestals and wearing
surface pavers



SECOND FLOOR

DRA

Drumway Practice Architecture, Inc.
225 Oakland Road
South Plainfield, NJ 07080
Tel: 908.486.8883 Fax: 908.486.8778

3800 Corporate Center
Woburn, MA 01897
Tel: 978.234.3333 Fax: 978.234.3333

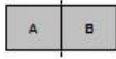
SOUTHINGTON
LIBRARY

255 MAIN STREET
SOUTHINGTON, CT
06489

REVISIONS: SEE LAYOUTS FOR REVISIONS

SCHEMATIC
DESIGN

8/31/2022



KEY PLAN



OVERALL
SECOND FLOOR
PLAN

Scale: 1/8" = 1'-0"
Job No.: 2018.00
Drawn By: DRA
Date: 03/02/22

A1-0-2

Deduct Bid Alternates

7

Deduct skylight over main stair

8

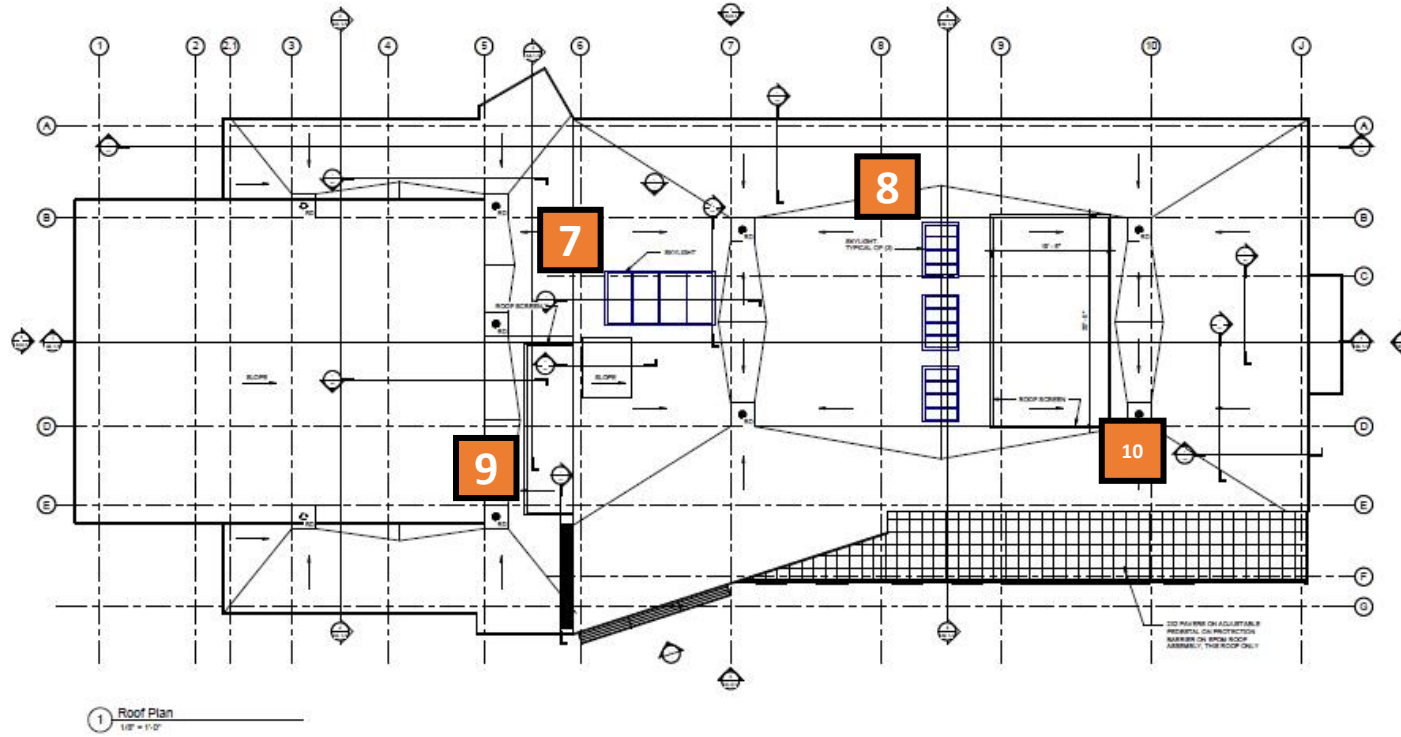
Deduct skylight over adult stack area main aisle

9

Deduct roof screen over low roof area

10

Deduct roof screen over second floor roof area



1 Roof Plan
1/8" = 1'-0"

ROOF PLAN



225 Oakland Road
Southington, CT 06487
Tel: 860-438-8800 Fax: 860-438-1700
www.dra.com

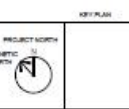
**SOUTHINGTON
LIBRARY**

255 MAIN STREET
SOUTHINGTON, CT
06489

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SCHEMATIC
DESIGN

8/31/2022



ROOF PLAN

Scale: 1/8" = 1'-0"
Date: 08/31/2022

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SOUTHINGTON

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